

Initial Environmental Examination

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People's Republic of China: Anhui Huangshan Xin'an River Ecological Protection and Green Development Project

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CURRENCY EQUIVALENTS

(as of 23 September 2019)

Currency unit	–	yuan (CNY)
CNY1.00	=	€0.1280
€1.00	=	CNY7.8135

ABBREVIATIONS

ADB	- Asian Development Bank	GRM	- Grievance redress mechanism
BOD	- Biochemical Oxygen Demand	HMG	- Huangshan Municipal Government
COD	- Chemical Oxygen Demand	HTIC	- Huangshan Trust Investment Company
CNY	- Chinese Yuan	LIEC	- Loan implementation environment consultant
CSC	- Construction supervision company	IA	- Implementing Agency
DEIA	- Domestic EIA	IEE	- Initial Environmental Examination
EA	- Executing Agency	MSW	- Municipal Solid Waste
EHS	- Environmental, health and safety	Mu	- Chinese land unit (1 ha = 15 mu)
EIA	- Environment impact assessment	PM	- Particulate matter
EMA	- Environmental monitoring agency	PMO	- Huangshan municipal project management office
EMP	- Environmental management plan	PRC	- People's Republic of China
EPD	- Environmental protection department	SPS	- Safeguard Policy Statement
EEB	- Ecology and environment bureau	TOR	- Terms of Reference
ESMS	- Environmental and Social Management System	TRTA	- Transaction Technical Assistance
FSR	- Feasibility Study Report	WSCP	- Water and soil conservation plan
GAP	- Gender action plan	WSP	- Water supply plant
GDP	- Gross Domestic Product	WWTP	- Wastewater treatment plant
GHG	- Greenhouse Gas		

WEIGHTS AND MEASURES

°C	degree centigrade	m ²	square meter
dB	decibel	m ³ /a	cubic meter per annum
g	gram	m ³	cubic meter
ha	hectare	m ³ /d	cubic meter per day
km	kilometer	m ³ /s	cubic meter per second
km ²	square kilometer	mg/l	milligram per liter
kW	kilowatt	mg/m ³	milligram per cubic meter
L	liter	mm	millimeter
L _{Aeq}	Equivalent continuous A-weighted sound	t	metric ton
MW	megawatt	t/d	metric ton per day
m	meter	t/a	ton per annum

NOTE

In this report, “\$” refers to US dollars.

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I. EXECUTIVE SUMMARY

A. Introduction

1. The Huangshan Municipal Government (HMG) of the People's Republic of China (PRC) has requested the Asian Development Bank (ADB) to provide investment and technical assistance support for the Anhui Huangshan Xin'an River Ecological Protection and Green Development Project (the project). The project will help the HMG to demonstrate water pollution reduction in the Xin'an River Basin through improving urban and rural wastewater management, reducing soil erosion and agriculture-related non-point source pollution, and strengthening financing mechanisms, water resources management capacity, and public awareness, within three districts (Huangshan, Tunxi, and Huizhou) and four counties (She, Xiuning, Yi, and Qimen).

2. Based on the ADB Safeguard Policy Statement (SPS, 2009), the project is classified as environmental Category B. The scope of works involves two approaches: (i) components with clearly defined scope of works and for which feasibility studies have been prepared. This comprises all except one project component; and (ii) subprojects which will be designed during project implementation and funded through a "Green Investment Fund" that will be managed by a financial intermediary (output 3; see below). The project environmental safeguards are accordingly addressed through two parallel approaches: (i) the preparation of this initial environmental examination (IEE), including an environmental management plan (EMP). The EMP describes the overall project requirements for environmental safeguards, including mitigation, monitoring, reporting, and training. The EMP is largely focused on outputs 1 and 2, which encompass most of the project civil works; and (ii) an environmental and social management system (ESMS), for activities to be funded under the Green Investment Fund.

3. The IEE, EMP, and ESMS have been prepared in accordance with SPS requirements and the PRC's related environmental laws, regulations and standards. They are based on information and data from: (i) a draft domestic EIA report in Chinese prepared by Central Southern Safety & Environment Technology Institute Co., Ltd (the DEIA institute); (ii) draft domestic feasibility study report (FSR) by the T.Y. Lin International Engineering Consulting (China) Co., Ltd; and (iii) environmental, social, and economic assessments conducted from December 2018 to May 2019 by the consultants for the project transaction technical assistance (TRTA), in cooperation with the FSR institute, DEIA institute, and municipal and local governments.

B. Background

4. The Xin'an River originates in Huangshan Municipality in Anhui Province and flows east through Zhejiang Province. In 2018, Huangshan had a population of 1.48 million. It comprises three urban districts and four counties and has an area of 9,807 km². Huangshan is a famous domestic tourist destination, largely due to its mountain scenery. Rapid economic development, urbanization, intensive agriculture production, and tourism growth have increased the pressures on water resources and environment in the basin. The Xin'an River is of critical importance for water supply for over 11 million people in two provinces: it is the only water source for Huangshan Municipality, and, the only water supply for Qiandao Lake, a large reservoir downstream in Zhejiang Province, which provides water supply for over 10 million people (Maps ES-1 and ES-2).

5. Point (urban and rural sewage) and non-point (agriculture-based run-off) pollution sources contribute to the decline of water quality in the Xin'an River. The river's upstream water quality remains relatively good (within Class III standards), although levels of total nitrogen and total phosphorus are increasing due to agriculture and other human activities. Rural sewage collection infrastructure is inadequate, and most rural sewage from villages is discharged untreated into waterways. Efforts to control non-point source pollution from agriculture have been relatively limited. There is also a need for a sustainable financing mechanism for

investments to address water pollution and support livelihood development. The HMG aims to leverage public funds to enable private sector capital to accelerate green development, such as village-based ecotourism, promote green and sustainable agricultural practices, and facilitate urban and rural integration. In addition, HMG requires strengthened institutional and technical capacity for water resource and environmental management, including monitoring and pollution control, disaster risk management, and data management. Local capacity in water resource and environmental management needs to be enhanced at HMG's district and county levels.

6. Recognizing the risks posed by rising water pollution levels, the National Development and Reform Commission prepared an Integrated Plan for Water Resources and Eco-Environmental Protection in the Basin of Qiandao Lake and its Upstream Xin'an River (2013–2020), which was approved by the State Council in December 2013. The plan defines the key functions of the Xin'an River and Qiandao Lake as a water source for domestic use, hydropower, irrigation, and as a facility for ecological protection and flood control. The plan recognizes the urgency to address point and non-point sources of pollution to the Xin'an River and flood control issues. The current project has been designed to contribute to the plan's objectives, and will be implemented in parallel with another internationally funded development project for the Xin'an River Basin (Section III.A).

C. Project Components

7. The expected project impact is sustainable economic growth and environmental improvement in the YREB achieved, as envisaged in the YREB Development Plan. The project outcome will be economic and environmental conditions in the upstream of Xin'an River improved. The project has four outputs, as follows. The project locations are shown in Maps ES-1 and ES-2 and Annex 3.

8. **Output 1: Urban point source pollution management facilities upgraded.** This output will include: (i) sewage and stormwater management through upgrading the existing centralized sewerage systems in Huangshan's central district and four county urban areas; and (ii) river rehabilitation and flood control through structural and non-structural methods.

9. **Output 2: Rural point and non-point source pollution control enhanced.** Innovative approaches supporting green agricultural and ecological practices will be adopted. This includes point and non-point source pollution controls through: (i) decentralized sewage treatment system management in rural villages; (ii) changing fertilizer application practices, including the improved use of organic fertilizer and biological pesticides with low toxicity, at agricultural and forestry sites; and (iii) improvement of pine forest conditions through disease monitoring and prevention.

10. **Output 3: Green financing mechanisms piloted.** This output includes the establishment of a green investment fund to support SMEs involved in green business and establishment of a green incentive fund to encourage farmers to adopt sustainable farm management practices to address agricultural non-point source pollution in Huangshan. The green investment fund will be funded through the FIL component.

11. **Output 4: Capacity for ecological system and project management strengthened.** This output will enhance HMG capacity in water resources management and flood forecasting and management in the Xin'an River Basin. This includes: (i) strengthened environmental monitoring and emergency response capacity; (ii) integrated Smart MIS; (iii) studies on Huangshan city green development strategy, eco-compensation mechanisms, rural wastewater discharge standards, and green farming certification; and (iv) HMG implementation support and capacity development.

D. Project benefits and features

12. The key project objectives include protection and enhancement of environmental quality. Environmental benefits are as follows.

13. **Reduced discharge of untreated wastewater.** Under the Huangshan 13th Five Year Ecological Construction and Environmental Protection Plan (2016-2020), Huangshan aims to achieve treatment rates of 100% and 75% for urban and rural wastewater respectively. The project designs to help address these targets include: (i) construction of 100.41 km of sewage pipes and 83.97 km of stormwater drainage pipes, which is estimated to increase the rate of wastewater collection and treatment from 94.9%¹ to 100% in the urban area; (ii) construction of 85 rural onsite wastewater treatment stations with associated 111.48 km of sewage collection pipes, and a combined total treatment capacity of 2,359 m³/day, to service a total of 121 villages; and (iii) improved capture and filtration of stormwater prior to entering creeks and the Xin'an River, through the establishment of "green belts" of trees with "tree pits" (depressions around and under the root mat, with a drainage mat and channels leading to stormwater drains).

14. **Reduced application rates of chemical fertilizer and pesticide.** The project will implement "soil test formulated fertilization" and promote organic fertilizer and biopesticide application or insecticidal lamps in six agricultural demonstration parks. This will result in an estimated reduction of about 253 tons of chemical fertilizer per year, compared to baseline conditions. The project support for increased use of organic fertilizers reflects the increasing national trend toward improved food safety and "green production systems", as stated in the range of national plans for agriculture and water resources management. Under output 3, the project will design and pilot a Green Incentive Fund to financially support "green production" and sustainable green tea farming in Huangshan. The fund will encourage tea gardens to adopt green farming practice and will offer farmers a subsidy for using organic fertilizer. Reduced use of pesticide will result in reduced residue of pesticide in and improved quality of agricultural products in Huangshan.

15. **Reduced water and soil erosion.** Pine forests (comprised of pine trees *Pinus* spp.) in Huangshan play an important role in water and soil conservation, but are under pressure from pine wilt, a tree disease (Section III). The project will enhance disease prevention and control capacity by reinforcing quarantine inspection, monitoring and personnel training.

16. **Increased flood resistance capacity.** The project designs will help to address the following targets: (i) construct new river revetments and improve existing masonry flood walls along Zhang River and Caocun River to protect communities from flooding; and (i) clear large debris which has been washed into the river channels due to flooding, to improve flows.

17. **Improved environmental monitoring and management.** The project will contribute to the following targets set in the Huangshan 13th Five Year Ecological Construction and Environmental Protection Plan (2016-2020): (i) enhance the capacity of environmental monitoring, supervision and emergency response; (ii) realize online environmental data review and real-time monitoring of pollution sources; and (iii) promote the construction of data center for environmental information sharing. The project designs to develop a Huangshan Smart Hydrology System, a Qimen County Smart Environment System and two smart management systems for two industrial parks, which will improve the online environmental management, emergency response and information sharing capacities in Huangshan. Overall, the project will also result in the improved management of about 105,000 mu (7,000 ha) of existing croplands comprising bamboo, rice, tea, oil tea, and fruit orchards, through the reduced use of water and chemical fertilizers, pest management, and improved farming methods.

¹ Huangshan Municipality Statistical Yearbook of 2018.

18. **Improved management of industrial parks.** The project is supporting the piloting of new environmental, health and safety systems (EHS) for two existing industrial parks. EHS manuals have been prepared for each park, tailored to their specific needs and industries. Preparation of the manuals was led under an initiative specialized in urban management (Cities Development Initiative Asia) and based on international best practice. It is expected that these pilots will result in improved management of wastewater, air emissions, noise emissions, and community and worker health and safety; and serve as a demonstration for other industrial parks in Huangshan Municipality.

19. **Social and economic benefits, including improved solid waste collection and quality of life.** About 297,000 residents will benefit from the project, including a rural population of about 90,617, 150,000 female beneficiaries, and 28,700 poor and low-income group residents. Benefits include improved sanitation for residents; as well as avoided litter from tourism through the establishment of litter collection systems at tourism sites.

E. Baseline environment

20. **Project area.** The project will be implemented in 33 locations in Huangshan Municipality. These sites are located in urban and rural areas in Huangshan, Huizhou, and Tunxi districts, and She, Yi, Xiuning, and Qimen counties. The sites are within modified agricultural landscapes of cultivation, bamboo and forest plantations, with scattered secondary growth, and settlements. There are no known rare or endangered flora or fauna, species with international, national or provincial protection status, areas of natural or critical habitat, nature reserves, or areas with special national, regional or local ecological significance, located within or adjacent to any of the project sites. There are no known physical cultural resources near the subproject sites. Five subproject sites are located within two designated scenic zones: Taiping Lake Scenic Zone and Huashan Mysterious Grottoes Scenic Zone. The proposed works in both sites will be within two existing villages, on modified land, and comprise the installation of small rural wastewater treatment stations in order to halt the current discharge of untreated effluent from these settlements into nearby waterbodies.

21. **Water and air quality and noise levels.** Environmental baselines were established at subproject sites by sampling of surface and groundwater quality, air quality, and noise quality. Water quality of the Xin'an River and four tributaries (Shuaishui, Heng, Lian, Fengle) near the project sites met the Class III standard of GB3838-2002 for all parameters except TN (Class IV to worse than Class V; all sampling locations) and TP at one monitoring point (Class V). High levels of TN are due to non-point pollution from farmland and wastewater discharge from surrounding villages. For ambient air quality, the PM₁₀ concentration (Class II) at two sampling points in national scenic zones exceeded the Class I standard of GB3095-2012, due to traffic disturbance; and all other parameters met the GB 3095-2012 Class I standard within scenic zones and Class II standard in other project areas. Ambient noise levels met the Class II or Class IV-a (along the main roads) standard of GB3096-2008. For groundwater quality, concentrations of NH₃-N at two sampling points (Class IV) exceeded the Class III standard of GB/T 14848-2017, due to the discharge of domestic wastewater from villages; all other parameters met the Class III standard. For surface water quality, these baseline values mostly comply with national standards. Nonetheless, non-point source pollution from agriculture is affecting this situation and requires action to avoid future deterioration of water quality, especially given the importance of the Xin'an River for downstream populations in Anhui and Zhejiang provinces.

F. Potential environmental impacts and mitigation measures

22. Environmental risks are anticipated from the construction and operational phases of the project. Key risks are associated with the wastewater, dust, noise, solid waste and ecology in project area for subprojects under outputs 1 and 2, which involve the majority of civil works.

23. **Construction phase.** Potential adverse environmental impacts during construction include air pollution (fugitive dust and machinery emissions), construction noise, wastewater emission from uncontrolled discharge, soil erosion from uncontrolled earthworks, uncontrolled solid waste disposal, and clearance of existing vegetation in project sites. Other anticipated impacts include temporary disturbance of traffic and municipal services, due to construction vehicle movements and pipeline works alongside roads, and occupational and community health and safety.

24. These potential impacts are considered to be low as: (i) the impacts from construction activities are short-term, localized, small-scale and reversible; (ii) the project does not involve dredging, or flow diversions, along rivers; (iii) there are no rare, endangered, or protected flora or fauna species, or critical habitats, known to occur in or near the project sites; and (iv) due to the modified nature of most sites, existing vegetation communities are generally widespread species and much is planted and/or secondary regrowth. For the project works in Taiping Lake Scenic Zone and Huashan Mysterious Grottoes Scenic Zone, works comprise construction of 13 wastewater treatment stations as well as agricultural and tourism infrastructures, and comply with the regulatory and management requirements for scenic zones, and will improve environmental conditions in each site.

25. Mitigation measures to address these impacts and risks are included in the environmental management plan (EMP). For dust impacts, mitigation measures include installation of barriers, water spray, covering of onsite stockpiles, and design of haulage routes and schedules. For noise impacts, measures include the installation of noise barriers and regular community consultations before and during the works to adjust works as needed. For the project works in the two scenic zones, works will be restricted to designated sites on rural land and with site access along established roads. Construction and worker waste will be contained and regularly transported offsite.

26. **Operational phase.** Potential adverse risks during operation include effluent discharge and odor emissions from the rural wastewater treatment stations; noise from 23 pump stations; and inadequate collection and disposal of tourism solid waste. These impacts will be minimized through periodical inspection of WWTS operations and pump stations to ensure normal operation and noise levels; installation of low-noise equipment, anti-vibration pad, and thick walls for pump stations; and strengthening of sanitary management of tourism toilets and dust bins. The project-supported improvements for crop production may lead to increased demand for water and agricultural chemicals. However, these risks are minimized through the project designs: (i) all project-supported activities are within existing crop production sites and do not involve land conversion or changes in crop types; (ii) the project designs for water use, fertilizers, capacity building, and monitoring, will increase the efficiency of water use, less use of chemical fertilizers, and help improve water quality in the Xin'an River; and (iii) under the project components for the Green Incentive Fund and Green Investment Fund, the success of these objectives will be measured in real terms through payments for improved farming (Green Incentive Fund) and award of low-interest financing to projects with sustainable activities (Green Investment Fund).

27. **Associated facilities.** The project does not include any associated facilities. There are "linked" facilities that will be involved in project construction and/or operation, but for which the project does not involve any works or activities. These comprise municipal wastewater treatment plants, water supply plants, construction waste disposal centers, and a waste incineration plant. Due diligence has been conducted for these facilities (Section III.D) and which confirmed that the facilities: (i) are operating in accordance with domestic approvals and management plans; (ii) do not have any documented compliance issues; and (iii) have the capacity to meet the project requirements.

G. Public Consultation and Grievance Redress Mechanism

28. One round of information disclosure and two rounds of public consultation were conducted in the three districts and four counties in Huangshan Municipality. During the first and second consultations, a total of 1,255 residents were consulted over seven days and a total of 1,289 questionnaires were distributed to 1,255 residents and 34 agencies. The male/female ratio of participation in the public consultations was well balanced: 690 (55%) men : 565 (45%) women. Most participants (1,243; 99%) supported the project. Two concerns were expressed during the consultations: (i) noise levels during construction may disturb nearby residents; and (ii) dust generated during construction, which may impact air quality near residents.

29. These concerns were addressed in the project designs and safeguards as follows. For noise control, construction works will be limited to daytime. Movable noise barriers will be installed and low-noise equipment will be applied during construction. Noise monitoring will be conducted at regular intervals to identify non-compliance of noise emission, and corrective measures will be applied. For dust control, daily water spraying on construction sites will be required. Stockpiles will be covered to minimize dust generation. No construction work will be allowed during strong winds. Timely monitoring of air quality and inspections during construction will be performed. Public consultation will continue during project construction and operation. A project-specific grievance redress mechanism (GRM) has been developed to address environmental, health, safety, and social concerns associated with the project. The GRM was introduced to residents during the design phase and will be implemented throughout project implementation.

H. Climate Change

30. A climate risk vulnerability assessment (CRVA) for Huangshan Municipality was conducted by the TRTA consultant to identify the risk that climate change presents to project viability. According to multidecadal climate change projections, there will be a general increase in temperatures from 2020 to 2100, and the largest decadal average temperature will be in the 2090s (1.16°C higher than baseline temperatures). Precipitation from 2020 to 2100 is projected to increase in quantity, but varies under different scenarios. Projected annual precipitation and rainy days will increase to a peak of 1,880 mm and 163 days. These projected changes in climate pose several risks for the project. Projected temperature increases may stress physical structures and degrade materials. The increase in rainfall variability and intensity of extreme rainfall events may increase flood risk.

31. To address these issues, the following adaptation measures have been integrated to the project designs: reinforcement of structural materials for roads, drains, pipelines, paths, and wastewater treatment stations, for resilience against increased rainfall or storm events; enhanced pipe flow capacity or emergence outlets at wastewater treatment stations; improved monitoring of forest condition (which will improve early detection of pine wilt spread under rising temperatures); and management information systems (to improve data collection of wastewater and water supply volumes in the project area) (Section G). For greenhouse gas emissions, the project presents a low risk. Carbon sequestration potential from the vegetation plantations (3 ha) and improved croplands (1,980 ha) is estimated to be 1,000 t carbon/year (3,666.7 t CO₂e per year). This sequestration will be offset by the emissions generated during project construction and operation, resulting in a net emission of 251 tons CO₂e per year i.e. well below the SPS threshold of concern of 100,000 t CO₂e per year.

I. Environmental Management Plan and ESMS

32. **EMP.** As part of this IEE, an EMP has been developed (Appendix 1). This is the overarching document to guide environmental safeguard management for the project. The EMP describes the project requirements and methods for environmental mitigation measures,

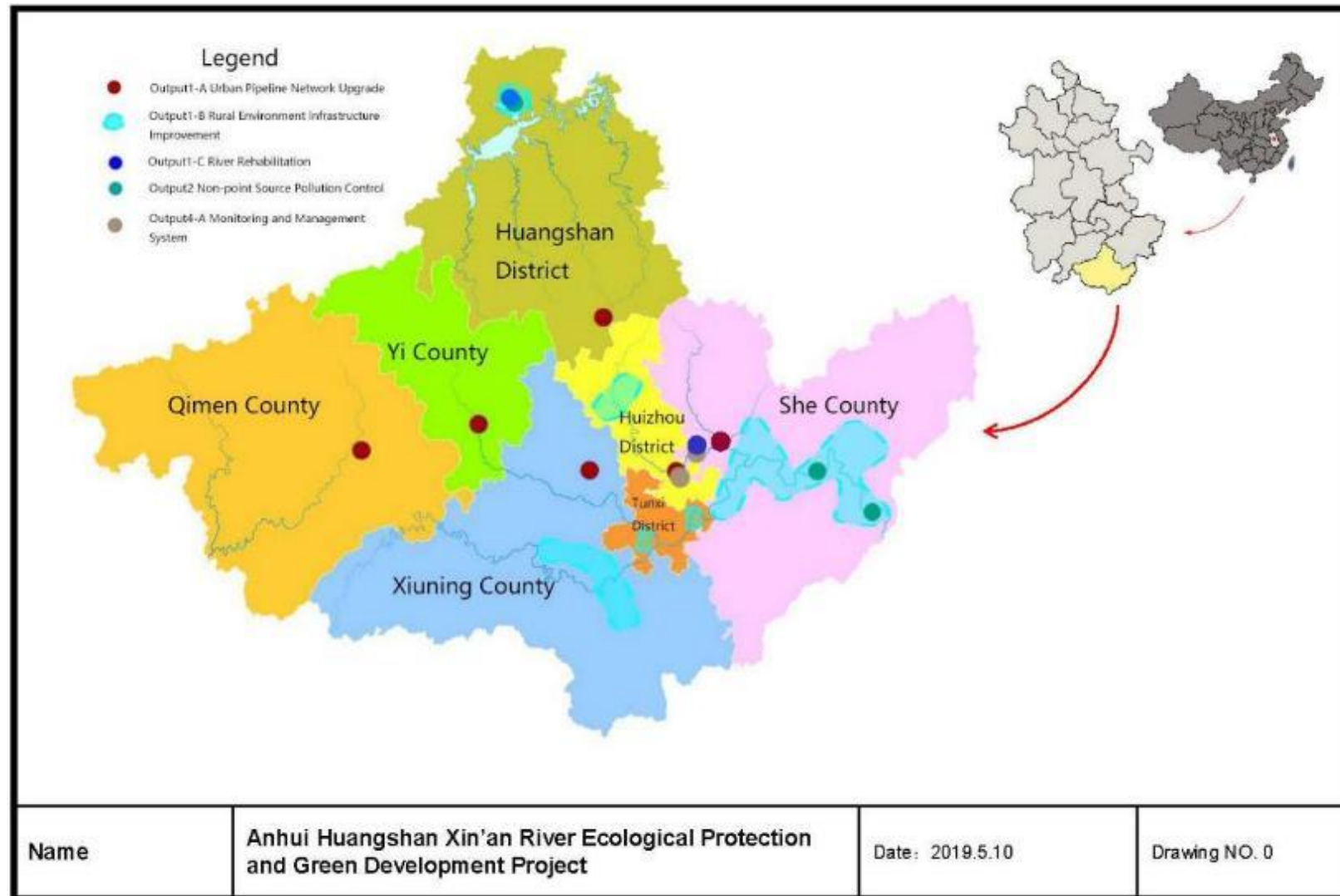
monitoring, reporting, roles and responsibilities, budget, and the GRM. In November 2020, the EMP was expanded to include a COVID-19 health and safety plan, in accordance with ADB requirements for all projects.

33. **ESMS.** The environmental and social safeguard requirements for all subprojects to be funded under the Green Investment Fund will be subject to the requirements of a project ESMS (Appendix 2). The activities to be supported under the Green Investment Fund will be consistent with the overall project scope i.e. environmentally sustainable and socially responsible “green” development. The ESMS describes the required procedures for safeguard screening, categorization, impact assessment, mitigation, monitoring, and reporting for these subprojects. It also defines the types of subprojects which may be supported. Proposed activities which may meet the following risk levels (per ADB’s SPS) will not be supported under the Green Investment Fund: (i) category “A” risk level for environmental impacts; and (ii) category “A” or “B” risk level for social risks related to resettlement and/or indigenous peoples. The ESMS will be implemented by the Huangshan Trust Investment Company (HTIC), with guidance from the Huangshan Municipality project management office and loan implementation consultants.

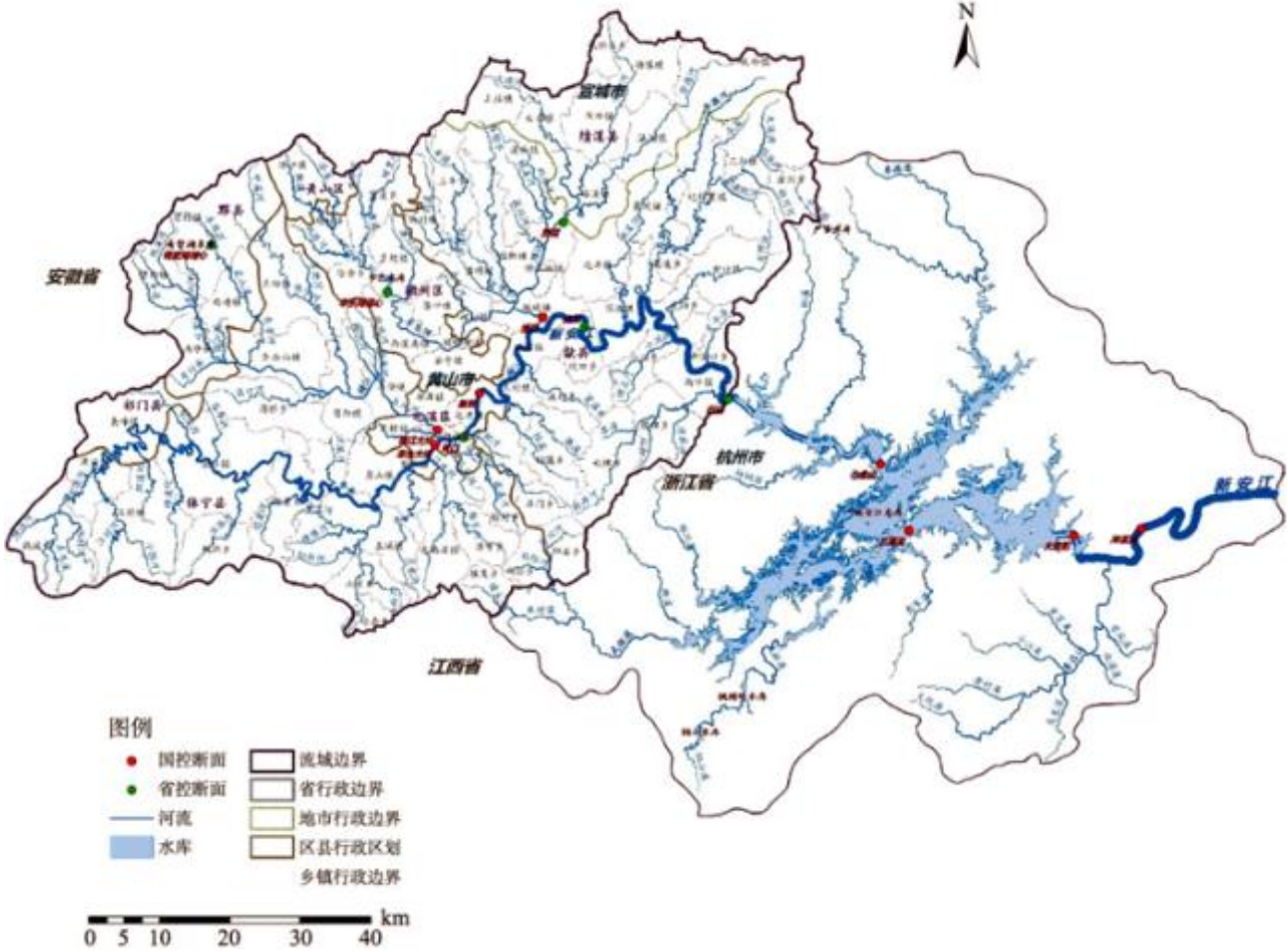
34. Semi-annual environmental monitoring reports will be provided to ADB to report on implementation progress for the EMP and ESMS.

J. Risks and Assurances

35. The HMG has no previous experience in ADB safeguards and low institutional capacity for environmental management. This may result in limited implementation of the project EMP and inadequate operation of the project facilities. These risks have been minimized as follows: (i) appointment of a full-time environment officer in the Huangshan Municipal project management office (PMO); (ii) appointment of one environment officer in each project implementation unit of the implementing agencies for the three districts and four counties; (iii) recruitment of environment officer and one social officer in the HTIC; (iv) the inclusion of an environmental safeguard specialist as part of the “start-up” consulting services, to provide interim support to the PMO before the loan implementation consultants are recruited. The “start-up” consultants will assist the PMO to assess whether: the detailed engineering designs are within the scope of the EMP and/or whether new safeguard assessments are required; and, to integrate the EMP within the project bidding documents; (v) the inclusion of a loan implementation environment consultant in the loan consulting services; (vi) clear roles and responsibilities of all relevant agencies for EMP implementation, including contractors and construction supervision companies; and (vi) capacity building for EMP implementation. Environmental assurances (Section X) have been agreed and are included in the loan and project agreements.



Map ES-1: Project Locations and Proposed Scope of Works in Huangshan Municipality, Anhui Province, People's Republic of China.



Map ES-2: Huangshan Municipality (left polygon), Xin'an River Basin (whole polygon) and Qiandao Lake (Zhejiang Province).

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. Overview

36. The project is classified as environment Category B under the ADB SPS (2009), requiring the preparation of an initial environmental examination (IEE). ADB's country partnership strategy for the PRC (2016-2020) supports the PRC's realizing an 'ecological civilization' through: environmental sustainability, pollution control, and climate change adaptation measures; achieving greenhouse gas emissions commitments ahead of its 2030 target; and, the overarching strategic goal of building a well-off society by focusing on the three strategic pillars of inclusive growth, environmentally sustainable development, and urban-rural integration.

37. The PRC has a range of laws, regulations, technical guidelines and standards that govern the way in which environmental protection and environmental impact assessment for projects must be implemented, including laws for pollution prevention and control on air, noise, water, ecology and solid waste, and technical guidelines on assessing ambient air, noise, surface water, groundwater, and ecological impacts. Under domestic regulations, a full domestic EIA (DEIA) report is required and forms the main basis for this IEE. The DEIA was prepared in accordance with the PRC Law on Environmental Impact Assessment (2018 revision); Management Regulation on EIA Categories of Construction Projects (2018); Guidelines on Public Participation in EIA (2018); and, Technical Guidelines for Environmental Impact Assessment (HJ 2.1-2016).

B. PRC Environmental Laws, Regulations, Guidelines, and Standards

38. The environmental protection and management system in the PRC consists of a hierarchy of regulatory, administrative and technical institutions. At the top level the People's Congress of the PRC has the authority to pass and revise national environmental laws; the Ministry of Ecology and Environment (formerly the Ministry of Environmental Protection) under the State Council promulgates national environmental regulations; and the Ministry of Ecology and Environment either separately or jointly with the Administration of Quality Supervision, Inspection and Quarantine issues national environmental standards. Provincial and local governments can also issue provincial and local environmental regulations and guidelines in accordance with the national ones. In addition, national and local five-year environmental protection plans form an important part of the legal framework.

39. The primary national laws and regulations that govern DEIA preparation are in Tables II-1 and II-2. Table II-3 shows the relevant Anhui Provincial and Huangshan Municipal regulations.

Table II-1: Relevant National Laws and Year of Effectiveness

Law	Year of Effectiveness
Environmental Protection Law (revised)	2015
Environmental Impact Assessment Law (revised)	2018
Water Law (revised)	2016
Water Pollution Prevention and Control Law (revised)	2018
Air Pollution Prevention and Control Law (revised)	2018
Solid Waste Pollution Prevention and Control Law (revised)	2016
Noise Pollution Prevention and Control Law (revised)	2018
Land Administration Law (revised)	2004
Forest Law (revised)	2009
Water and Soil Conservation Law (revised)	2011
Flood Prevention Law (revised)	2016
Urban and Rural Planning Law (revised)	2018
Cleaner Production Promotion Law (revised)	2012

Table II-2: National Administrative Regulations and Year of Effectiveness

Regulation	Effective Year
Management Regulation on EIA Categories of Construction Projects	2018
Regulation on Environmental Protection of Construction Projects	2017
Regulation on Public Participation of Environmental Impact Assessment	2018
Provisional Methods of Management of Projects Financed by International Financial Institutions and Foreign Governments	2005
Regulation on Nature Reserves	2017
Regulations on Scenic and Historic Areas	2016
Detailed Rules for the Implementation of the Water Pollution Prevention and Control Law of the People's Republic of China	2000
Regulation on Pollution Prevention of Drinking Water Source	2010

Table II-3: Anhui Provincial and Huangshan Municipality Regulations

Regulation	Effective Date
Regulation of Anhui Province on the Protection of Drinking Water Source	2016
Management Regulation of Anhui Province on Drinking Water Safety Project	2016
Regulation of Anhui Province on Environment Protection	2018
Approval and Management Regulation of Huangshan Municipality on Environmental Impact Assessment of Construction Project	2014
Regulation on Yellow Mountain Scenic Area	2017
Regulation on Taiping Lake Scenic Area	2018
Implementation Plan of Huangshan Municipality on Air Pollution Control	2014
Management Plan of Huangshan Municipality on Environmental Protection of Construction Project	2005

40. Implementation of PRC laws and regulations is supported by associated management and technical guidelines. Those applicable to the project are summarized in Table II-4.

Table II-4: Applicable Environmental Guidelines

Guideline	Year/Code
Guideline on Jurisdictional Authorities for Approval of EIAs of Construction projects	2009
Guideline of River Management of PRC	2011
Ecological Functional Planning of PRC	2015
Guideline on EIA Classification of Construction Projects	2015
Guideline on Environmental Information Disclosure	Dec 11, 2015
Ecological Environment Protection Planning for Yangtze River Economic Belt	July 17, 2017
Technical Guideline for EIA: General principle	HJ 2.1-2016
Technical Guideline for EIA: Surface Water	HJ/T 2.3-2018
Technical Guideline for EIA: Atmospheric Environment	HJ2.2-2018
Technical Guideline for EIA: Acoustic Environment	HJ2.4-2009
Technical Guideline for EIA: Ecological Impact Assessment	HJ19-2011
Technical Guideline for EIA: Groundwater Environment	HJ 610-2016
Technical Guideline on Control of Pollution from Agricultural Solid Waste	HJ588-2010
ADB Environmental Assessment Guidelines	2003
Action Plan of Zero Growth of Pesticide Application by 2020	Feb, 2015
Action Plan of Zero Growth of Chemical Fertilizer Application by 2020	Feb, 2015
General Planning of Anhui Province on Ecology Construction	Feb, 2004
Zoning of Ecological Protection and Sensitivity in Anhui Province	2018
Ecological Environmental Protection Planning of Huangshan City (2016-2020)	2017

41. The national environmental quality standard system that supports and evaluates the implementation of the environmental protection laws and regulations in the PRC is classified into two categories by function: pollutant emission/discharge standards and ambient environmental quality standards. The relevant latest standards applicable to the proposed project are in Table

II-5.

Table II-5: Applicable Environmental Standards

Standard	Code
Ambient Air Quality Standard	GB3095-2012
Environmental Quality Standards for Noise	GB3096-2008
Environmental Quality Standard for Surface Water	GB3838-2002
Environmental Quality Standard for Groundwater	GB/T14848-2017
Water Quality Standard for Sewage Discharged into Municipal Sewers	CJ343-2010
Domestic Drinking Water Quality Standard	GB 5749-2006
Emission Standard of Environment Noise for Boundary of Construction Site	GB 12523-2011
Emission Standard of Noise for Boundary of Industrial Enterprise	GB 12348-2008
Emission Standard of Pollutants for Urban Wastewater Treatment Plant	GB 18918-2002
Standard for Pollution Control on Hazardous Waste Storage	GB 18597-2001
Integrated Wastewater Discharge Standard	GB 8978-2002
Integrated Air Pollution Discharge Standard	GB 16297-1996

C. International Agreements

42. The PRC is signatory to major international agreements dealing with biodiversity, wetland protection, and climate change. Relevant agreements are listed in Table II-6.

Table II-6: Applicable International Agreements

Agreement	Year	Purpose
Ramsar Wetland Convention	1975	Promote 'wise use' of wetlands
Convention on Biological Diversity	1993	Wetland ecology
UN Framework Convention on Climate Change	1994	Carbon sink from re-vegetation
Montreal Protocol on Substances That Deplete the Ozone Layer	1989	Protect ozone layer (as above)
UN Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification	1996	Fight desertification and soil erosion control
Kyoto Protocol to UN Framework Convention on Climate Change	2005	Climate change and carbon sink
Paris climate agreement	2015	Dealing with greenhouse gas emissions mitigation, adaptation and finance starting in 2020

D. Applicable ADB Policies and World Bank's EHS

43. ADB's SPS (2009) provides the basis for this IEE. All projects funded by ADB must comply with the SPS. The purpose of the SPS is to ensure that projects are environmentally sound, designed to operate in line with applicable regulatory requirements, and are not likely to cause significant environment, biology, health, or safety hazards. The SPS also promotes the use of international standards, including the World Bank Group's Environmental, Health and Safety (EHS) Guidelines.² EHS guidelines relevant to the project include environment protection, water conservation, hazardous materials, waste management, noise control, sanitation, and community and occupational health and safety. Where EHS standards are higher than national standards, efforts are made for ADB-funded projects to target the EHS standards. The standards applied to this project (Section II.E) are based on comparison of national and EHS thresholds: in cases where no EHS thresholds are available, or the PRC standards are the same or higher than the EHS standards, the national standards are applied. In general, many PRC standards are the same as, or higher than, the EHS standards.

² World Bank Group. 2007. Environmental, Health, and Safety Guidelines. Washington, USA.
http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines

44. Compared with the PRC EIA requirements, the SPS emphasizes additional requirements, including: (i) a project grievance redress mechanism; (ii) definition of the project area of influence; (iii) assessment of indirect, induced and cumulative impacts; (iv) due diligence of associated and existing facilities; (v) protection of physical cultural resources; (vi) climate change mitigation and adaptation (partly addressed under the PRC's requirement for project-specific energy efficiency and pollution reduction plans); (vii) occupational and community health and safety; (viii) impacts on livelihoods through environmental media; (ix) biodiversity conservation; and (x) a project-specific EMP. This project IEE complies with the SPS requirements.

E. Assessment Standards for Proposed Project Components

a. Surface Water Quality

45. The surface water quality standard applied for the project is Environmental Quality Standards for Surface Water (GB3838-2002) Class III (Table II-7). The World Bank EHS Guideline has guidelines on effluent quality standards but not ambient water quality targets. The PRC standard is adopted for this IEE.

Table II-7: Surface Water Quality Standards (mg/L, pH excluded)

Parameter	Class III
pH	6~9
BOD ₅	≤4
COD _{cr}	≤20
TP	≤0.2
TN	≤1.0
NH ₃ -N	≤1.0
Petroleum	≤0.05
Fecal coliform	≤10,000

Note: BOD₅= 5 days biochemical oxygen demand, COD_{cr} = chemical oxygen demand, NH₃-N=ammonia nitrogen; TN = total nitrogen; TP = Total Phosphorus.

b. Wastewater Discharge

46. Treated effluent to be discharged from the rural wastewater treatment stations will be required to meet the PRC's Class I and Class II standards of Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant (GB 18918-2002), in order to be suitable for discharge to nearby waterbodies or reused for irrigation. This also meets the World Bank's EHS Guidelines, which indicate that wastewater discharged to surface water bodies should not cause surface water quality exceeding local standards, and comply with domestic wastewater discharge standards.

Table II-8: Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant (mg/L, pH excluded)

Pollutants	Class I-A	Class I-B	Class II
COD _{cr}	50	60	100
BOD ₅	10	20	30
Suspended Solids (SS)	10	20	30
Animal and Vegetable Oil	1	3	5
NH ₃ -N	5	8	25
TP (constructed after Jan 1, 2006)	0.5	1	3
pH	6-9	6-9	6-9

c. Air Quality

47. The Grade I of the Ambient Air Quality Standards (GB 3095-2012) is applicable for

ambient air quality in national scenic zones. The Grade II of GB 3095-2012 is applicable for other project areas. Besides, Appendix D of Technical Guidelines of EIA – Atmospheric Environment (HJ 2.2-2018) sets up the concentration limits of H₂S and ammonia gas.

48. The World Health Organization (WHO) Air Quality Guidelines are recognized as international standards and are adopted by the World Bank Group's EHS Guidelines. In addition to guideline values, interim targets are given for each pollutant by the WHO as incremental targets in a progressive reduction of air pollution. The WHO guidelines and corresponding PRC standards are presented in Table II-9.

Table II-9: Ambient Air Quality Standard (µg/m³)

Air quality parameter	Averaging period	PRC GB3095-2012/ HJ 2.2-2018		WHO guidelines	
		Grade I	Grade II	Interim targets	Air quality guideline
PM ₁₀	Annual average	40	70	30-70	20
	Daily average	50	150	75-150	50
PM _{2.5}	Annual average	15	35	15-35	10
	Daily average	35	75	37.5-75	25
SO ₂	Annual average	20	60	n/a	n/a
	Daily average	50	150	50-125	20
	Hourly average	150	500	n/a	n/a
NO ₂	Annual average	40	40	n/a	40
	Daily average	80	80	n/a	n/a
	Hourly average	200	200	n/a	200
TSP	Annual average	80	200	n/a	n/a
	Daily average	120	300	n/a	n/a
H ₂ S	Hourly average	10	10	n/a	n/a
Ammonia	Hourly average	200	200	n/a	n/a

49. From Table II-9, it can be observed that:

- For TSP, H₂S and Ammonia, there are PRC standards but no corresponding WHO guidelines.
- For PM₁₀ and PM_{2.5}, PRC Grade II annual average and 24-hour average standards meet WHO interim target-1.
- For SO₂, WHO only has a 24-hour average guideline (0.125 mg/m³), which is slightly lower than the PRC standard (0.150 mg/m³). However, SO₂ levels are low in the project area, and the project will only contribute to low levels of SO₂, so the minor difference is inconsequential.
- For NO₂, the annual and hourly average PRC standards are equivalent to the WHO annual and hourly average guidelines, respectively.

50. Overall the PRC standards show a high degree of equivalency to the WHO guidelines or IT-1 values and are adopted for use in the project.

d. Air Pollutant Emissions

51. During project construction, fugitive emission of particulate matter (PM) should meet the limits regulated in PRC Integrated Emission Standard of Air Pollutants (GB16297-1996) (Table II-10). The odor pollutant emission should meet the limits regulated in Emission Standards for Odor Pollutants (GB 14554-93) (Table II-11). There is no equivalent standard recommended in the World Bank EHS Guidelines, and the PRC standard is adopted for use in this project.

Table II-10: Integrated Emission Standard for Air Pollutants (mg/m³)

Pollutant	Maximum allowable Emission	Fugitive emission limits at monitoring points
Particles	120	1.0

Note: There is no specification on the PM's particle diameter in GB 16297-1996.

Table II-11: Emission Standard for Odor Pollutants at the site boundary (mg/m³)

No.	Parameter	Class I Standard	Class II Standard
1	Ammonia	1	1.5
2	H ₂ S	0.03	0.06

52. The PRC Government has a comprehensive program for the control and reduction of vehicle emissions.³ This includes: (i) improvement and stricter enforcement of national emission standards for new vehicles; (ii) improvement of conventional fuels to make them cleaner with less GHG emissions; (iii) use of alternative or cleaner fuels; (iv) improved maintenance and inspection of vehicles; and (v) encouragement for the scrapping of older high emission vehicles.

e. Ambient Noise

53. In accordance with the PRC Ambient Acoustic Quality Standard of GB3096-2008, the noise standards for the proposed subprojects must comply with Class I, Class II and Class IV-a, respectively, depending on their locations. Table II-12 presents the relevant PRC GB3096-2008 standards and the World Bank EHS guidelines. The classes within the standards are not directly comparable, but the PRC Category I standards are equivalent to WHO Class I standards, Category II standards are less stringent than WHO Class I standards and Category III standards are more stringent than WHO Class II standards. For this project, Class IV-a standards are applicable for the project areas along main roads. Class I standards are applicable for the project areas within the national scenic areas. Class II standards are applicable for the other project areas, such as villages and residential communities.

Table II-12: Acoustic Quality Standards (dB (A))

Standard Category	PRC GB3096-2008		World Bank EHS Guidelines	
	Day (06:00-22:00)	Night (22:00-06:00)	Day (07:00-22:00)	Night (22:00-07:00)
I	55	45	WHO Class I: residential, institutional, educational: 55	WHO Class I: Residential, institutional, educational: 45
II	60	50		
4a	70	55	WHO Class II: industrial, commercial: 70	WHO Class II: Industrial, Commercial: 70

f. Noise Emissions

54. During project construction period, the construction activities must comply with PRC Emission Standard of Environment Noise for boundary of Construction Site (GB12523-2011). Table II-13 represents the relevant PRC and international standards (US EPA standards; and, IFC EHS Guideline: *occupational health and safety standards*) for on-site construction noise.

Table II-13: Noise Limits for Construction Sites Standard (dB(A))

GB12523-2011		International Standards	IFC EHS Guideline
Day 06:00–22:00	Night 22:00–06:00		

³ PRC Air Pollution Control Action Plan. 2013. Ministry of Ecology and Environment.

70	55	US EPA: 85 (day, 8-hour exposure)	Occupational Health and Safety: 85 (Equivalent level; LAeq,8h) / 110 (Maximum LAmax)
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55. During the project operation, the applicable limits for noise emission along the main roads are 70 dB(A) (daytime) and 55 dB (A) (nighttime) and the limits for noise emission in other areas are 60 dB(A) (daytime) and 50 dB(A) (nighttime), regulated by Emission Standard for Industrial Enterprise Noise at Boundary (GB 12348-2008).

g. Groundwater quality

56. The Class III of Groundwater Quality Standard (GB/T 14848-2017) is applicable for the groundwater quality in the project areas. The applicable groundwater pollutant concentration limits are listed in Table II-14. There is no equivalent standard recommended in the EHS Guidelines, and the PRC standard is adopted for use in the project.

Table II-14: Groundwater Quality Standards

Pollutant	Class III of GB/T 14848-2017
Ph	6.5-8.5
DO	3.0
Nitrate	≤20
Nitrite	≤1.00
Volatile Phenols	≤0.002
Cyanide	≤0.05
Chloride	≤250
Arsenic	≤0.01
Mercury	≤0.001
Chromium (VI)	≤0.05
Total Hardness	≤450
Aluminum	≤0.01
Fluoride	≤1.0
Cadmium	≤0.005
Manganese	≤0.1
Total Dissolved Solids	≤1000
Total Coliform	≤3.0
Sulfate	≤250

F. Domestic EIA Preparation and Approval

57. The Central Southern Safety & Environment Technology Institute Co., Ltd was commissioned by the PMO to prepare a DEIA for the proposed project. Fieldwork was conducted during February to May 2019 and comprised site visits, discussions with PMO staff, village leaders and potential beneficiary farmers on the project sites, project activities and current environmental quality. Baseline environmental quality monitoring was carried out during March 10-16 and May 18-24, 2019. Relevant documents, including draft feasibility study report (FSR), environmental quality report, environmental laws/regulations and applicable environmental standards/regulations for the project sites, have been collected. Two rounds of public consultations were implemented. The DEIA will be submitted to Huangshan Municipal Ecology and Environment Bureau (EEB) for review and final approval in August 2019.

III. DESCRIPTION OF THE PROJECT

A. Rationale

58. The Yangtze River Economic Belt (YREB) covers nine provinces and two specially administered municipalities. It accounts over 40% of the PRC's population and freshwater resources; serves as the drinking water resource for 400 million people; and contributes about 45% of the PRC's economic output. Given its economic significance, the YREB has been earmarked as one of the three key growth engines for the PRC's development.⁴

59. Rapid economic growth in the YREB has resulted in increased water consumption, pollutant discharges and ecosystem degradation, and economic, ecological and health-related risks. The government has formulated the YREB Development Plan, 2016–2030,⁵ which stipulated the prioritization of ecological protection and promotion of green development as the guiding principle for the YREB development. ADB and the government have agreed to adopt a framework approach for the YREB, providing about \$2.0 billion in funding between 2018 and 2020 to implement ADB lending support for development initiatives in four areas: (i) ecosystem restoration, environmental protection, and water resources management; (ii) green and inclusive industrial transformation; (iii) construction of an integrated multimodal transport corridor; and (iv) institutional strengthening and policy reform.

60. Huangshan is a prefecture-level municipality in the southern part of Anhui Province, with a population in 2018 of 1.48 million. It comprises three urban districts and four counties and has an area of 9,807 km². Huangshan is a famous tourist destination in the PRC, largely due to scenic values (mountains, pine forests). Rapid economic development, urbanization, intensive agriculture production, and the growth of tourism are increasing the environmental pressures in the Xin'an River Basin. The Xin'an River originates in Huangshan Municipality in Anhui Province and flows eastward, through Zhejiang Province, before entering the sea. The river is 373 km long, of which 242 km is located in Huangshan, before entering Qiandao Lake, the largest water body in Zhejiang Province. The river is the main source of drinking water for 10 million residents living near Qiandao Lake and Hangzhou City.

61. Point (urban and rural sewage) and non-point (agriculture-based and run-off) pollution sources contribute to the decline of water quality in the Xin'an River. The river's upstream water quality remains relatively good (within Class III standards), although levels of total nitrogen and total phosphorus are increasing due to agriculture and other human activities. Rural sewage collection infrastructure is inadequate, and most rural sewage from villages is discharged into waterways untreated. Efforts for agriculture-based non-point source pollution are limited.

62. Recognizing the importance of the area and the threats posed by rising water pollution levels, the National Development and Reform Commission prepared an Integrated Plan for Water Resources and Eco-Environmental Protection in the Basin of Qiandao Lake and its Upstream Xin'an River (2013–2020),⁶ which was approved by the State Council in December 2013. The plan redefines the key functions of the Xin'an River and Qiandao Lake as a water source for domestic use, hydropower, irrigation, and as a facility for ecological protection and flood control. The river was selected as the first demonstration case to pilot trans-provincial ecological compensation (eco-compensation) mechanism for protecting ecosystem in the PRC. Two initial pilot phases for eco-compensation linked with water quality measurements have been completed and the governments of Anhui and Zhejiang provinces concluded that good progress had been made.⁷ The current project has also been designed and will be implemented in parallel

⁴ These also include: Beijing–Tianjin–Hebei integrated regional development strategy and the Belt and Road Initiative.

⁵ PRC Government. 2016. *Outline of the Yangtze River Economic Belt Development Plan, 2016–2030*. Beijing.

⁶ PRC Government. 2013. *Integrated Plan for Water Resources and Eco-Environmental Protection in the Basin of Qiandao Lake and its Upstream Xin'an River (2013–2020)*. Beijing.

⁷ The pilot implementation's first phase (2012–2014) and second phase (2015–2017) were highly successful in

with a World Bank-funded development project for the Xin'an River Basin.⁸

63. There is also a need for a sustainable financing mechanism for investments to address water pollution and support livelihood development. The HMG wishes to examine how public funds can leverage private sector capital to accelerate green development such as village-based ecotourism and institutional reform;⁹ promoting sustainable agricultural practices; and facilitating urban and rural integration.

64. HMG also requires strengthened institutional and technical capacity for water resource and environmental management, which include monitoring and pollution control, disaster risk management, and data management. The sharing of information with the downstream Qiandao Lake area in Zhejiang Province needs to be institutionalized. Capacities in water resource and environmental management need to be enhanced at HMG district and county levels. Trans-provincial water pollution management with Zhejiang Province for the Xin'an River requires effective collaboration.

65. The project aims to demonstrate water pollution reduction in the Xin'an River Basin through improving urban and rural wastewater management; reducing soil erosion and agriculture-related non-point source pollution; and strengthening financing mechanisms, capacities, and public awareness. This is aligned with the PRC's goal of building a harmonious and prosperous society through environmentally sustainable growth, which is consistent with: (i) the PRC Thirteenth Five-Year Plan 2016–2020, which aims to realize an "ecological civilization"; (ii) the YREB Development Plan 2016–2030, which emphasizes green development, environmental protection, rehabilitation, and management of water resources; (iii) ADB's Strategy 2030 (operational priorities for livable cities and tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability); (iv) ADB's country partnership strategy for the PRC, 2016–2020, which aims to improve the PRC's environment and manage climate change by realizing an "ecological civilization"; and (v) ADB's Water Operational Plan, 2011–2020, which emphasizes integrated water resources management and aims to increase efficiency and productivity in the delivery of water services. The project also contributes to the Sustainable Development Goals, particularly 1, 6, 13, and 15.¹⁰

B. Impact, Outcome and Outputs

66. The overall impact of the project will be sustainable economic growth and environmental improvement in the YREB achieved, as envisaged in the YREB development plan. The project outcome will be economic and environmental conditions in the upstream of Xin'an River improved. The project has four outputs, as follows.

67. **Output 1: Urban point source pollution management facilities upgraded.** This output will include: (i) sewage and stormwater management through upgrading the existing centralized sewerage systems in Huangshan's central district and four county urban areas; and (ii) river rehabilitation and flood control through structural and non-structural methods.

68. **Output 2: Rural point and non-point source pollution control enhanced.** Innovative approaches supporting green agricultural and ecological practices will be adopted. This includes point and non-point source pollution controls through: (i) decentralized sewage treatment system management in rural villages; (ii) changing fertilizer application practices, including the improved use of organic fertilizer and biological pesticides with low toxicity, at agricultural and forestry

exhibiting trans-provincial watershed management in the PRC.

⁸ World Bank. 2016. *Zhejiang Qiandao Lake and Xin'an River Ecological Environmental Protection Project*. Washington D.C. <http://projects.worldbank.org/P159870?lang=en>

⁹ Ecotourism is defined as "responsible travel to natural areas that conserves the environment, sustains the well-being of local people, and involves interpretation and education." *The International Ecotourism Society*. 2015

¹⁰ United Nations. 2016. *Sustainable Development Goals*.

sites; and (iii) improvement of pine forest conditions through disease monitoring and prevention.

69. **Output 3: Green financing mechanisms piloted.** This output includes the establishment of a green investment fund to support SMEs involved in green business and establishment of a green incentive fund to encourage farmers to adopt sustainable farm management practices to address agricultural non-point source pollution in Huangshan. The green investment fund will be funded through the FIL component.

70. **Output 4: Capacity for ecological system and project management strengthened.** This output will enhance HMG capacity in water resources management and flood forecasting and management in the Xin'an River Basin. This includes: (i) strengthened environmental monitoring and emergency response capacity; (ii) integrated Smart MIS; (iii) studies on Huangshan city green development strategy, eco-compensation mechanisms, rural wastewater discharge standards, and green farming certification; and (iv) HMG implementation support and capacity development.

71. The proposed project covers three districts and four counties in Huangshan Municipality (Figure III-1). Implementation of the project will help HMG to address two key challenges: improvement of water quality in upstream area of Xin'an River Basin; and, development of a sustainable financing mechanism to manage water pollution and support economic development and rural livelihoods.

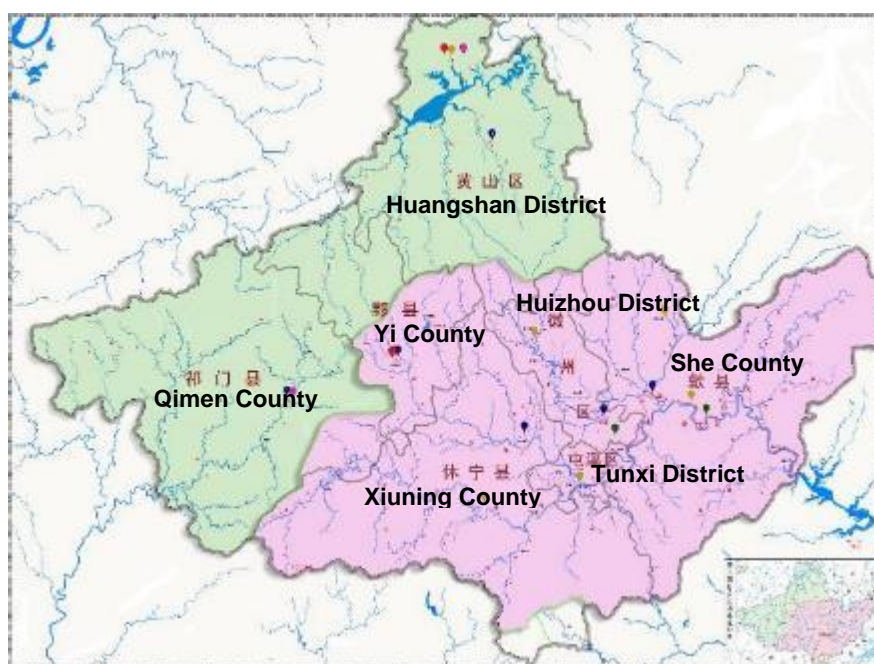


Figure III-1: Location of Project Districts and Counties in Huangshan
(Source: the FSR)

72. Thirty-five subprojects are proposed under the project. Seventeen of these are under output 1 and 2 and involve most of the civil works under the project: (i) six under output 1 are to install and/or upgrade urban sewerage systems (100.41 km of sewage pipes and 83.97 km of stormwater drainage pipes with associated manholes); (ii) two under output 1 are to enhance river embankment (1.1 km along Zhang River and 3.85 km along Cao River); (iii) six under output 2 are to manage rural sewage and improve rural environment (84 onsite wastewater treatment stations in 121 villages; 111.48 km of sewage pipes; and 101.1 km of water supply pipes); (iv) three under output 2 are to enhance non-point source pollution control capacity in agricultural land and forest, which involve large areas but with limited civil works: 1,120 mu of tea farm; 5,500 mu of orchard; 1,600 mu of bamboo farms (upgrade agricultural infrastructure, construct road/walkway in agricultural parks, construct tourism infrastructures, and promote green

agriculture practices); and 1.05 million mu of forest (long-distance video monitoring and unmanned aerial monitoring, tree trunk injection, chemical control of pine wilt and information management system in the proposed forest area). Two subprojects are under output 3 and aim to establish a Green Incentive Fund and a special Green Investment Fund. Finally, under output 4, sixteen subprojects are planned: (i) six to develop management information systems (MIS) for environmental monitoring, flood control and emergency response; (ii) six for capacity development in water resources and environmental management; and (iii) four to improve project management capacity. Project outputs and subprojects are described in Table III-1. Overall, the management of about 105,000 mu (7,000 ha) of existing croplands comprising bamboo, rice, tea, oil tea, and fruit orchards will be improved through the project, through the reduced use of water and chemical fertilizers, pest management, and improved farming methods.

Table III-1: Summary of Outputs and Components

No	Subprojects	Construction content
Output 1: Urban Point Source Pollution Management		
<i>A-Urban Drainage System Upgrade</i>		
1A-1	Sewage and Stormwater Sewer Upgrade Project in Huizhou District	1) install 28.04 km of sewage pipes (open cut); 2) install 3.14 km of stormwater drainage pipes (open cut); 3) construct one wastewater pump station; 4) construct 21.27 km of stormwater ditches; 5) construct 60,000 m ² of porous pavement on sidewalk, 3000 ecological tree pits, and 400 gutter inlets during road surface restoration.
1A-2	Sewage and Stormwater Sewer Upgrade Project in Huangshan District	1) install 3.25 km of sewage interception main (open cut); 2) install 1.87 km of stormwater drainage pipes (open cut); 3) construct 5,250 m ² of porous pavement on sidewalk, 525 ecological tree pits, and 70 gutter inlets during road surface restoration.
1A-3	Sewage and Stormwater Sewer Upgrade Project in Xiuning County	1) renovate 4.38 km of sewage main pipes along Binjiang Rd (pipe-jacking); 2) install 12.37 km of sewage pipes (open cut); 3) install 3.39 km of stormwater drainage pipes (open cut); 4) construct 6,870 m ² of porous pavement on sidewalk, 687 ecological tree pits, and 92 gutter inlets during road surface restoration
1A-4	Sewage and Stormwater Sewer Upgrade Project in Yi County	1) renovate 4.3 km of sewage interceptor along Hexi Rd (pipe-jacking); 2) install 1.75 km of sewage pipes (open cut); 3) construct 525 ecological tree pits.
1A-5	Sewage and Stormwater Sewer Upgrade Project in She County	1) renovate 9.22 km of sewage pipes (open cut); 2) install 20.23 km of sewage pipes (open cut); 3) install 25.45 km of stormwater drainage pipes (open cut); 4) install 1.43 km of stormwater pipe culverts (open cut); 5) construct 45,000 m ² of porous pavement on sidewalk, 4,500 ecological tree pits, and 1,018 gutter inlets during road surface restoration
1A-6	Sewage and Stormwater Sewer Upgrade Project in Qimen County	1) renovate 10.22 km of sewage pipes (open cut); 2) install 6.65 km of sewage pipes (open cut); 3) install 14.51 km of stormwater drainage pipes (open cut); 4) clean-up 2.42 km of stormwater pipe culverts; 5) construct 51,792 m ² of porous pavement on sidewalk, 3,960 ecological tree pits, and 580 gutter inlets during road surface restoration
<i>B-River Rehabilitation</i>		
1B-1	Zhang River Rehabilitation Project in Yi County	1) construct revetment along the Zhang River from Jiudong Bridge to Dongmen Bridge (1.1 km);

No	Subprojects	Construction content
		2) landscaping improvement along Zhang River (3,200 m ²) and construction of 1.52 km walkway (see Para. 78 for details)
1B-2	Caocun River Rehabilitation Project in Huangshan District	Rehabilitate and upgrade a 3.85 km section of flood control channel that starts from downstream of Dashankeng Reservoir and ends at the confluence point of Caocun River and Xinhua River.
Output 2: Rural Point and Non-point Source Pollution Control		
<i>A-Rural Environment Infrastructure Improvement</i>		
2A-1	Village Environment Improvement Project in Xiuning County	For 32 natural villages: 1) install 41.42 km of water supply pipes; 2) construct 26 onsite wastewater treatment stations; 3) construct 2 wastewater pumping stations; 4) install 67.11 km of sewage pipes; 5) construct 16,848 m ² of landscape walkway; 6) construct 3,000 m ² of parking lot; 7) construct 6 landscape pavilions and 10 lookouts.
2A-2	Village Environment Improvement Project in Huizhou District	For 8 natural villages: 1) construct 13 onsite wastewater treatment stations; 2) install 5.67 km of sewage pipes;
2A-3	Village Environment Improvement Project in Tunxi District	For 54 natural villages: 1) construct 4 onsite wastewater treatment stations; 2) install 50.8 km of sewage pipes; 3) construct 22 wastewater pump stations.
2A-4	Xinhua Village Environment Improvement Project in Huangshan District	For 7 natural villages: 1) construct 16 onsite wastewater treatment stations; 2) install 8.9 km of sewage pipes; 3) construct 15,000 m ² of walkway; 4) road greening of 3,000 m ² ; 5) construct 800 m ² of parking lots; 6) construct 2 tourism toilets.
2A-5	Xitou Village Environment Improvement Project in She County	For 20 natural villages: 1) construct 25 onsite wastewater treatment stations; 2) install 39 km of sewage pipes; 3) install 59.68 km of water supply pipes; 4) construct 4,800 m ² of walkway; 5) landscape development of 450 m ² ; 6) road greening of 3,000 m ² and landscape of 6,000 m ² ; 7) construct 600 m ² of parking lots.
2A-6	Tourism Infrastructure Improvement along Xin'an River (She County Section)	A total of 10 villages and towns are involved: Construct 8,452 m ² of parking lots and other supporting facilities for ecotourism development, including walkways, observation platforms, tourism toilets, landscape development, tourists rest stations, retaining walls, solid waste collection bins, etc.
<i>B-Non-point Source Pollution Control</i>		
2B-1	Xin'an River Green Agriculture Demonstration Project in She County	1) improve the agricultural infrastructure and tourism reception facilities in Nanping Village Characteristic Agricultural Park (2000 mu), Takeng Citrus Demonstration Park (3000 mu) and Miantan Loquat Demonstration Park (1500 mu) in Huicheng Town, She County; 2) promote soil test formulated fertilization, application of organic fertilizer and solar energy powered insecticidal lamps, etc.
2B-2	Xinhua Village Green Agriculture Demonstration Base in Huangshan District	1) upgrade the agricultural infrastructure in Baishabao Lei Bamboo Ecological Demonstration Park (1000 mu), Xinchang Lei Bamboo Ecological Demonstration Park (700 mu) and Xinhua Oil Tea Ecological Demonstration Park (120 mu); 2) construct 650m main road and 5.24km walkway within the parks for daily agriculture activities and sightseeing;

No	Subprojects	Construction content
		3) construct tourism facilities, including parking lots, tourism toilets, lookouts, etc. 4) promote soil test formulated fertilization, application of organic fertilizer and solar energy powered insecticidal lamps, etc.
2B-3	Pine Forest Disease Prevention Project	1) long-distance video monitoring and unmanned aerial vehicle monitoring of pinewood, and personnel training; 2) procurement of quarantine inspection equipment and pulverisers; 3) tree trunk injection for healthy pine trees (900,000 trees over an area of 70,000 ha, using environmentally friendly chemicals); 4) development of an information management system for pine wilt control in Huangshan.
Output 3: Pilot Green Finance and Eco-compensation Mechanism		
3-1	Green Investment Fund	The Fund targets sustainable companies and partners which needs capital for investing into projects supporting the green agenda of Huangshan Municipality.
3-2	Greener Tea Production Green Incentive Fund	1) select 20,000 mu of main polluted areas for development of pilot green tea plantations; 2) establish technical standard for green production in tea gardens; 3) establish "green" tea production certification system; 4) evaluate the production, cost, revenue, ecological benefits and compensation standard for green production in tea gardens; 5) build good brand and establish green marketing system; 6) project experience dissemination.
Output 4: Capability Strengthening for Ecological System and Project Management		
<i>A-Monitoring and Management System</i>		
4A-1	Smart River Monitoring System of Huangshan	1) develop an intelligent water resources management network; 2) develop an intelligent cloud service center; 3) develop an intelligent water resources application integration system; 4) develop standard and regulation system, safeguard system and operation and maintenance safeguard system.
4A-2	Smart Environment Monitoring System in Qimen County	1) an eco-environmental monitoring network; 2) a basic database of eco-environment; 3) a comprehensive evaluation system of eco-environment; 4) multiple monitoring platforms, including environmental quality monitoring platform, pollution source automatic monitoring platform, etc.
4A-3	Smart EHS Management System in Huizhou District Industrial Park	Construction of Internet of Things system, application support platform, data support system, standards and specifications, integrated business application system, etc.
4A-4	Smart EHS Management System in She County Industrial Park	Construction of Internet of Things system, application support platform, data support system, standards and specifications, integrated business application system, etc.
4A-5	Huangshan MIS Top Layer System Project	MIS/GIS database, communications, and programs at Huangshan Municipal Smart Management System to support overall smart city management system.
4A-6	Huangshan Smart EHS General System	A GIS and program for environmental, health and safety (EHS) administration, management, monitoring, and emergency response systems for industrial parks and factories.
<i>B-Technical Support</i>		
4B-1	Study on Evaluation of Xin'an River Eco-compensation	1) study and establish statistical indicators of eco-compensation; 2) propose accounting methods of compensation standards; 3) study the compensation benefits evaluation.
4B-2	Rural Wastewater Discharge Standard Study	Research on sewage discharge standard in rural areas.

No	Subprojects	Construction content
4B-3	Green Economic Development Strategic Study and Planning for Ecological Huangshan City	Strategic study for green development in Huangshan
4B-4	Greener Tea Production Eco-compensation Certification Program	Research on the standard certification system of green tea plantations.
4B-5	She County Household Pig Manure Management Study	Pilot study for household pig manure management
4B-6	Green Incentive Fund Feasibility Study	Feasibility study for the implementation of Green Incentive Fund
4B-1	Study on Evaluation of Xin'an River Eco-compensation	4) study and establish statistical indicators of eco-compensation; 5) propose accounting methods of compensation standards; 6) study the compensation benefits evaluation.
4B-2	Rural Wastewater Discharge Standard Study	Research on sewage discharge standard in rural areas.
4B-3	Study on Greener Tea Eco-Compensation Criteria and Training	Research on the eco-compensation criteria for green tea plantations and provide trainings to corporations and farmers.
4B-4	Greener Tea Production Eco-compensation Certification Program	Research on the standard certification system of green tea plantations.
C-Project Management		
4C-1	Project Management Consulting Service	1) Project implementation supporting consulting service. 2) External social and resettlement compliance monitoring 3) Dissemination of project experiences 4) Project Start-up Consultancy before Loan Implementation
4C-2	Capacity Training	1) trainings provided by project implementation supporting consultants; 2) project management trainings provided by ADB; 3) study tours.
4C-3	Office Equipment Purchase	1) Project Information Management System: covering contract management, budget management, cost management, fund management, risk management, progress management, quality management, safety management, etc. 2) office supplies such as computers, printers and photocopiers in project management offices;
4C-4	Construction Supervision Service	Recruitment of agencies for construction supervision.

Source: the FSR Institute

C. Design scheme and Construction Methods

Works under Outputs 1 and 2

73. Only 16 subprojects involve civil works, and these are classified into four types (Table III-2). The locations of each subproject are described in Appendix 3.

Table III-2: Classification of Project Types (involving construction works)

No.	Project Type	Subproject No.	Main Contents
1	Urban sewerage system upgrading	1A-1 1A-2 1A-3 1A-4 1A-5 1A-6	1) Installation of sewage pipes 2) Installation of stormwater drainage pipes 3) Construction of stormwater side ditches 4) Cleaning of stormwater pipe culverts 5) Renovation of existing combined sewerage system
2	Rural water and	2A-1	1) Installation of sewage pipes

	wastewater management	2A-2 2A-3 2A-4 2A-5	2) Construction of septic tanks 3) Construction of onsite wastewater treatment stations 4) Installation of water supply pipes
3	River embankment improvement	1B-1 1B-2	1) Construction of river revetment and flood walls 2) Landscaping along the riverbanks
4	Agricultural and tourism infrastructure construction	2A-1 2A-4 2A-5 2A-6 2B-1 2B-2	1) Construction of roads as well as irrigation and drainage system within the agricultural demonstration parks. 2) Construction of tourism toilets, parking lots, walkways, observation platforms, tourists rest stations, etc.

74. **Urban sewerage system upgrading.** To enhance the domestic wastewater collection and treatment rate in urban areas, and to reduce the pollutant discharged to Xin'an River from overflow of existing combined sewerage systems, the project will replace these with separate sewerage systems. In old urban areas with combined sewerage systems, existing pipes will be renovated to sewer pipes and new stormwater drainage pipes will be installed. In areas without wastewater collection systems, new sewer pipes and stormwater drainage pipes with associated manholes will be installed/constructed. The designs ensure that during operation, the collected wastewater will be diverted to the nearest existing wastewater treatment plants and stormwater will be discharged to nearby surface water bodies or sewerage network. Wastewater collected in Huizhou District, Huangshan District, Xiuning County, She County, Yi County and Qimen County will be conveyed to Huizhou District Wastewater Treatment Plant (WWTP), Huangshan District WWTP, Huangshan Municipal 2nd WWTP, She County WWTP, Yi County WWTP and Qimen County WWTP for treatment, respectively. These existing WWTPs are operating in good condition and have the capacity to meet the project demand (see Section III.D). Details of each subproject are summarized in Appendix 4 and locations are shown in Appendix 3.

75. Pipe-jacking construction method is proposed in Binjiang Road in Xiuning County and Hexi Road in Yi County mainly due to two reasons: (i) the designed buried depths of pipes range from 6-10 m and pipe-jacking is more cost-effective compared to open cut; (ii) both roads are located along rivers and perform flood protection function, whereas open cut construction may increase flood impacts and soil erosion. In other areas, open cut construction will be applied, with a mean designed buried depth of 2-3 m. The project designs to use steel belt reinforced PE spiral corrugated pipe for both sewer pipes and stormwater drainage pipes. For road surface restoration, permeable pavements, gutters, and planted trees will be installed along sidewalks to collect and reduce stormwater runoff.

76. **Rural wastewater management:** In rural areas of Huangshan Municipality, many small isolated villages are distributed along rivers, and approximately 94% of domestic wastewater is discharged directly without proper treatment.¹¹ This poses a threat to surface water quality. To address this issue, the project will construct 85 onsite wastewater treatment stations (WWTS) for 121 villages, with associated septic tanks, sewage pipes, household connection pipes, and small wastewater pump stations. The design capacity of each WWTS will range from 2 to 250 m³/day. Four treatment processes will be applied to meet local demands (Figure III-1 and Tables III-3, III-4). These four processes comprise three aerobic and one anaerobic process. The three aerobic processes will treat water to a higher standard and will treat larger volumes of water, and is suitable for villages which are larger, situated closer to waterbodies, and are required to have higher discharge standards. The single anaerobic method is suitable for smaller villages with lower discharge volumes and a lower regulatory requirement for treatment standard. To ensure maximum efficiency in treatment standards and costs, the 121 villages were divided into 7 categories or "types" reflecting their size and required treatment standard (Table VI-2 in Section

¹¹ The Feasibility Study Report, June 6, 2019.

VI). Effluent from the WWTS will be discharged to nearby surface water bodies or reused for irrigation. For 50 villages in Tunxi District, no onsite WWTS will be constructed; instead, the collected wastewater will be conveyed to Huangshan Municipal WWTP for treatment through sewage pipe networks, as these villages are close enough for wastewater transfer to the existing WWTP to be cost-effective.

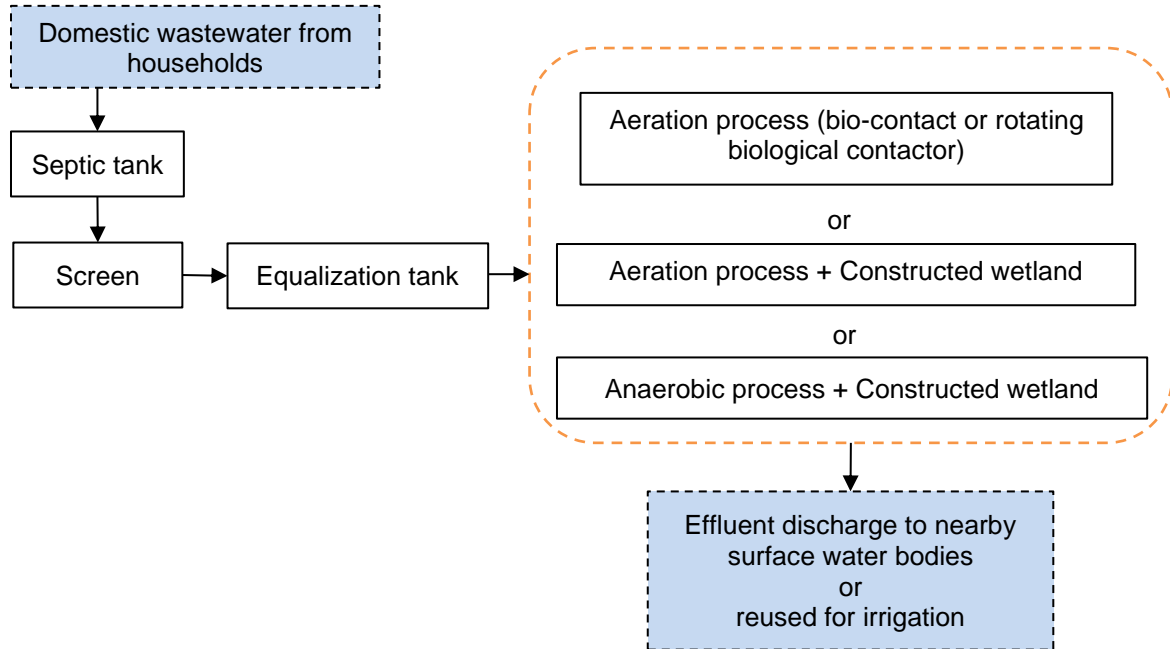


Figure III-1 Proposed rural wastewater treatment process flow chart

Table III-3: Estimated pollutant concentrations in influent and effluent standards
(unit: mg/L, excluding pH)

Parameter	pH	SS	COD	BOD ₅	NH ₃ -N	TP
Influent	6.5-8.5	100-200	100-300	60-150	20-40	2-6
Class IB Effluent standard	6-9	20	60	20	8	1
Class IA Effluent standard	6-9	10	50	10	5	0.5
Class II Effluent standard	6-9	30	100	30	25	3

Table III-4: Design of rural onsite wastewater treatment stations

Sub-project	Name of WWTS	Design Capacity (m ³ /d)	Treatment process	Effluent Standard
1B-1 Xiuning County	Xizhou-Xiafudu	60	Aerobic process + Constructed wetland	Class IA
	Hexi-Yangcunjiang-Tangchuan	150	Aerobic process + Constructed wetland	Class IA
	Yaoxi	100	Aerobic process + Constructed wetland	Class IA
	Yaotian-Yantang	100	Aerobic process + Constructed wetland	Class IA
	Jinzhu-Shuangqiao	250	Aerobic process	Class IB
	Dalu	20	Aerobic process	Class II
	Xiafu	30	Aerobic process	Class II
	Futan	20	Aerobic process + Constructed wetland	Class IB
	Hongfang	20	Aerobic process + Constructed wetland	Class IA
	Shangyang	40	Aerobic process + Constructed wetland	Class IB
	Yanchao	10	Anaerobic process + Constructed wetland	Class II
	Xiazhuang	50	Aerobic process	Class IB
	Suntian	80	Aerobic process	Class IB

Sub-project	Name of WWTS	Design Capacity (m ³ /d)	Treatment process	Effluent Standard
	Wutian	2	Anaerobic process + Constructed wetland	Class II
	Bingtian	20	Aerobic process + Constructed wetland	Class IA
	Zhujiatie	15	Anaerobic process + Constructed wetland	Class II
	Jiangtan	60	Aerobic process + Constructed wetland	Class IA
	Taixi	50	Aerobic process + Constructed wetland	Class IA
	Shikeng	20	Aerobic process + Constructed wetland	Class IA
	Dalukou-Dongchong	15	Anaerobic process + Constructed wetland	Class II
	Dalukou-Dongchong	10	Anaerobic process + Constructed wetland	Class II
	Dalukou-Dongchong	20	Aerobic process + Constructed wetland	Class IB
	Dalukou-Dongchong	15	Aerobic process + Constructed wetland	Class IA
	Xibei	20	Aerobic process + Constructed wetland	Class IA
	Yuetan-Luntang	60	Aerobic process + Constructed wetland	Class IA
	Zhouxie	10	Anaerobic process + Constructed wetland	Class II
	Xingzhou-Xi'an	20	Aerobic process + Constructed wetland	Class IA
1B-2 Huizhou District	Changwucun	60	Aerobic process + Constructed wetland	Class IA
	Shankoucun	30	Aerobic process + Constructed wetland	Class IA
	Huangcun	30	Aerobic process + Constructed wetland	Class IA
	Jincunzu-Tangkeng	10	Anaerobic process + Constructed wetland	Class II
	Zhangcunzu	8	Anaerobic process + Constructed wetland	Class II
	Zhangcunzu	3	Anaerobic process + Constructed wetland	Class II
	Zhangcunzu	2	Anaerobic process + Constructed wetland	Class II
	Wucunzu	4	Anaerobic process + Constructed wetland	Class II
	Wucunzu	4	Anaerobic process + Constructed wetland	Class II
	Wucunzu	2	Anaerobic process + Constructed wetland	Class II
	Dalingxiangzu	10	Anaerobic process + Constructed wetland	Class II
	Dalingxiangzu	2	Anaerobic process + Constructed wetland	Class II
	Dalingxiangzu	3	Anaerobic process + Constructed wetland	Class II
1B-3 Tunxi District	Fudun	80	Aerobic process + Constructed wetland	Class IA
	Litangxia	60	Aerobic process + Constructed wetland	Class IA
	Wucun	120	Aerobic process + Constructed wetland	Class II
	Wainantang	10	Anaerobic process + Constructed wetland	Class IB
1B-4 Huangshan District	Dianjie	30	Aerobic process	Class II
	Laowu	20	Aerobic process	Class II
	Junlingjiao1	5	Anaerobic process + Constructed wetland	Class II
	Junlingjiao2	5	Anaerobic process + Constructed wetland	Class II
	Shaochong1	5	Anaerobic process + Constructed wetland	Class II
	Shaochong2	3	Anaerobic process + Constructed wetland	Class II
	Shaochong3	5	Anaerobic process + Constructed wetland	Class II
	Shaochong4	3	Anaerobic process + Constructed wetland	Class II
	Shaochong5	3	Anaerobic process + Constructed wetland	Class II
	Gaoshan	10	Anaerobic process + Constructed wetland	Class II
	Jinkengzi1	5	Anaerobic process + Constructed wetland	Class II
	Jinkengzi2	5	Anaerobic process + Constructed wetland	Class II
	Michong1	5	Anaerobic process + Constructed wetland	Class II
	Michong2	5	Anaerobic process + Constructed wetland	Class II
	Michong3	5	Anaerobic process + Constructed wetland	Class II
	Michong4	5	Anaerobic process + Constructed wetland	Class II
1B-5 She County	Yanxia	10	Anaerobic process + Constructed wetland	Class II
	Yanxia	5	anaerobic process + Constructed wetland	Class II
	Taokeng	30	Aerobic process + Constructed wetland	Class IB
	Dongfeng	15	Anaerobic process + constructed wetland	Class II
	Hongcunkou	60	Aerobic process + Constructed wetland	Class IB
	Wangcha	40	Aerobic process + Constructed wetland	Class IB
	Hucha	10	Anaerobic process + Constructed wetland	Class II
	Jinchuan	20	Aerobic process + Constructed wetland	Class IB

Sub-project	Name of WWTS	Design Capacity (m ³ /d)	Treatment process	Effluent Standard
	Zikeng	50	Aerobic process + Constructed wetland	Class IB
	Yecha	45	Aerobic process + Constructed wetland	Class IB
	Yejiazu	90	Aerobic process + Constructed wetland	Class IB
	Banlingzu	5	Anaerobic process + Constructed wetland	Class II
	Banlingzu	5	Anaerobic process + Constructed wetland	Class II
	Banlingzu	2	Anaerobic process + Constructed wetland	Class II
	Banlingzu	3	Anaerobic process + Constructed wetland	Class II
	Chengjiazu	10	Aerobic process + Constructed wetland	Class IB
	Chengjiazu	10	Aerobic process + Constructed wetland	Class IB
	Chengjiazu	10	Aerobic process + Constructed wetland	Class IB
	Panwu	10	Anaerobic process + Constructed wetland	Class II
	Changqingzu	15	Anaerobic process + Constructed wetland	Class II
	Shiliucun	20	Aerobic process + Constructed wetland	Class II
	Xiayeqi	10	Anaerobic process + Constructed wetland	Class II
	Xipo	30	Aerobic process + Constructed wetland	Class IB
	Xiaohekeng	10	Anaerobic process + Constructed wetland	Class II
	Yancun	20	Aerobic process + Constructed wetland	Class IB

Source: the FSR institute.

77. **Sludge disposal from the WWTS.** Sludge generated from the WWTS will be transported to the five nearby, existing municipal WWTPs for treatment, until the construction of a single, centralized WWTP, the Huangshan Municipal WWTP Sludge and Kitchen Waste Treatment Plant, is completed. The sludge will be dewatered, dried, and then disposed in existing landfills. Due diligence for the WWTPs and landfills has been completed and all are confirmed to have adequate capacity to receive the project sludge (Section III.D). The possibility to re-use the sludge from the project WWTS as a resource for producing organic fertilizer was considered, but concluded not to be a viable option as: (i) the production of organic fertilizer involves detailed issues of sludge quality control, parasites and removal of pathogenic bacteria, as well composting process control. The amount of sludge generated by the 85 WWTS will be relatively small and the 85 plants are widely distributed: it would not be cost-effective or feasible to support the operation of a decentralized sludge treatment and composting facility. Organic fertilizer factories already exist in Huangshan and prefer to use agricultural waste (e.g. straw) which is locally abundant, cleaner, and safer compared with sludge from human waste.

78. **Rural water supply.** The project will improve water supply in 34 villages in Xiuning and She counties. Currently in these villages, no municipal water supply is available. Farmers rely on groundwater from wells or mountain runoff for daily life. The project will install 101.1 km of water supply pipes to connect households to existing municipal water supply networks. Water will be supplied by Huangshan Municipal 1st Water Supply Plant and She County 2nd Water Supply Plant in Xiuning County and She County, respectively. The two water supply plants are operating in good condition and have the capacity to meet the project demand (Section III.D).

79. Open cut construction will be applied. HDPE double-wall corrugated pipe and nodular cast iron pipe will be used as sewage pipes and water supply pipes, respectively. The design of the sewage pipeline network and water supply network has been conducted in an integrated approach, to ensure both are installed at the same time, to save time, cost, repeated excavation of roads, and unnecessary disturbance to communities. For operation and maintenance of the completed water supply pipelines, in accordance with PRC Water Quality Standards for Urban Water Supply (CJ/T 206-2005), water quality at the end nodes of the water supply network will be monitored on a monthly basis by the water supply company.

80. **Improved stormwater collection and passive treatment.** After separation of the existing drainage system into two separate networks, management of stormwater runoff will still be required to minimize non-point source pollution, especially from “first flush” rainfall events. To address this issue the project will: (i) establish “green belts” of about 13,000 trees along the urban drainage network to be improved; and (ii) for each individual planted tree, “ecological tree pits” will be established, comprising depressions around each tree to capture rainwater, a porous mat under the root mass, and small drain leading from the mat to the stormwater drain. This will improve stormwater retention and filtration prior to discharge; (iii) establishment of about 1,100 gutters with silt traps along urban roads to reduce pollutant input from runoff; and (iv) the use of permeable materials for pavements to improve rainwater filtration (Table III-1).

81. **River embankment.** The project includes improvement and construction of 4.95 km embankment for flood control: (i) 1.1 km from Jiudong Bridge to Dongmen Bridge along Zhang River in Yi County; and (ii) 3.85 km section of flood control channel that starts downstream of Dashankeng Reservoir and ends at the confluence point of Caocun and Xinhua Rivers in Xinhua Village, Huangshan District. The riverbanks are mostly natural surface, lack any protective revetment or river channel protection, and suffer from soil erosion (Figures III-2 to III-5).



Figure III-2+3 Sections of Riverbanks to be improved of Zhang River



Figure III-4+5 Sections of Riverbanks to be improved of Caocun River

82. Along Zhang River, the project will: (i) build new river revetment using gabion stone cages (Figure III-6) with a length of 630 m and a height of 3.4 m from Jiudong Bridge to Heimu Bridge section; and (ii) raise the height of a 1.52 km-section of existing flood walls, from Heimu Bridge to Dongmen Bridge section, by 0.6 to 1 m. The additional height will be achieved through stone masonry, an optimal approach for structural integrity when building on top of the existing structure (as compared to the river revetment works, which are to build new structures). The landscape along Jiudong Bridge to Heshangchihe Dam section will be improved by developing

a 3,000 m² of green area comprising of tree zone, shrub zone and high-grass herb zone. Local Lei bamboo, *Metasequoia* (水杉) and *Pinus taiwanensis* (黄山松) will be planted on the top of river embankment, while Smelly pile (臭椿), *Cotinus coggygia* (黄栌) and *Miscanthus floridulus* (五节芒) will be cultured on the slope with Bermuda grass (狗牙根草). Behind the riverbanks, a walkway will be constructed with local stone material as surface with a length of 1km (Figure III-7). For areas with new constructed flood walls in urban area, winter jasmine trees (迎春树) and hanging planters with seasonal flowers will be used for landscape optimization.

83. For one river, Caocun, the project will: (i) reinforce 1.09 km of existing grouted rubble river revetment and construct 4.58 km of new river revetment, using gabion stone cages for the 3.85 km section of flood control channel (Figure III-8); and (ii) remove stone debris left over from previous river revetment works, within a section of river channel that is 109 m long, has an average width of 26 m, and is located at the end of a floodway. The debris will be manually picked up to reduce the height of stone piles and will enhance the flow capacity of river channel. To improve the landscaping along the flood control channel in Cao Village, the project will construct 3.2 km of flagstone walkway with local bermuda grass (狗牙根草) and Lei bamboo planted along the riverbanks. Eight wooden sightseeing platforms and four wooden pavilions will be constructed along the riverbanks (Figure III-9).

84. All river revetment works will only be carried out during between October and March, the dry season. The project does not involve any dredging.



Figure III-6+7 Proposed River Embankment and Landscaping Design along Zhang River



Figure III-8+9 Proposed River Embankment and Landscaping Design along Caocun River

85. **Agricultural infrastructure.** The project includes construction of main roads as well as irrigation and drainage systems in Baishabao Lei Bamboo Ecological Demonstration Park (1000 mu), Xinchang Lei Bamboo Ecological Demonstration Park (700 mu) and Xinhua Oil Tea Ecological Demonstration Park (120 mu). The following infrastructure will be constructed: i) 650

m of 3.5 m-width main roads with concrete pavement in Baishabao park; ii) nine reinforced concrete irrigation water tanks with an effective volume of 50m³ per tank and a density of 1 tank per 15 hm² at the uphill area in the parks. Stormwater and mountain runoff will be the main water resource for irrigation; iii) 7.3 km of PE irrigation pipes with diameters of 125 mm, 60 mm and 30 mm will be installed at a density of 60m per ha; iv) 3.65 km of main drainage canals with both width and height of 0.5 m along the main roads; and v) an information management system to trace and monitor the production of bamboo and oil tea crop respectively, in each park. In addition, 4 km of mechanized rail conveyors will be constructed in Takeng Citrus Demonstration Park and Miantan Loquat Demonstration Park for harvest and transportation of products, 3 km of drainage canals will be constructed in Miantan park, and 1km of existing natural drainage canals will be renovated in Takeng park.

86. **Tourism infrastructure.** Huangshan Municipality is one of the highest-visited tourism destinations in the PRC. Most visitors come to see Huangshan Mountain range, yet “agri-tourism” is increasing rapidly due to the municipality’s scenic villages, tea plantations, and high quality teas and other produce. The government has already improved domestic transport networks and accommodation services to support tourism. The project will further support the development of agri-tourism, through the establishment of basic tourism infrastructure in 11 locations: Wanzhe No.1 Line – She County section (a tour route from Zhejiang to Anhui Province), Xipo Village in She County, three villages in Xiuning County, Baishabao Lei Bamboo Ecological Demonstration Park, Xinchang Lei Bamboo Ecological Demonstration Park, Xinhua Oil Tea Ecological Demonstration Park, Nanping Village Characteristic Agricultural Park, Takeng Citrus Demonstration Park and Miantan Loquat Demonstration Park. The key contents comprise the construction of parking lots, public toilets, walkways, observation platforms, rest stations, and solid waste bins. The walkways will upgrade existing paths and serve as access for tourists, local workers, and residents. Examples of proposed environmentally friendly infrastructures are shown in Figures III-10 to III-13. The management committee of each site will be responsible for daily management of the infrastructure (including toilets and dust bins) during operation.



Figure III-10+11 Example of “ecological” parking lot and tourism toilet



Figure III-12+13 Current situation of walkway in Gubutou and example of proposed walkway

87. **Green agriculture.** Non-point source pollution from agricultural activities is one of the key contributors to the total nitrogen (TN) and total phosphorous (TP) pollution in surface water

in Huangshan. To reduce the use of agrichemicals and promote environmentally and ecologically friendly agriculture practices, the following activities will be implemented: (i) “soil test formulated fertilization”,¹² with the type, frequency, and volume of fertilizer to be applied in each site based on annual soil sampling; (ii) improving soil conditions in the agricultural demonstration parks by using hydrated lime as the soil conditioner at a rate of 1,125 kg/hectare and a frequency of once every two years; (iv) 321 solar powered insecticide lamps will be installed and biopesticide will be applied in the agricultural demonstration parks for insect pest control. Under project output 3, financial support to farmers to adopt organic fertilizers will be provided, under a Green Incentive Fund (see below). For the use of biopesticides, at the time of project preparation the specific types of chemicals and organisms to be used had not been identified. Given the potential ecological impacts of introducing new biological agents to the project area, project conditions for use of biopesticides are included in the project assurances and EMP.

88. The project sites for green agriculture promotion are Baishabao Lei Bamboo Ecological Demonstration Park, Xinchang Lei Bamboo Ecological Demonstration Park, Xinhua Oil Tea Ecological Demonstration Park, Nanping Village Characteristic Agricultural Park (2000 mu), Takeng Citrus Demonstration Park (3000 mu) and Miantan Loquat Demonstration Park (1500 mu).

89. Based on the project feasibility studies, current usage amounts of chemical fertilizers and predicted reduction after project completion are summarized in Table III-5. The projected reduction in the volume of chemical fertilizer used varies widely between the pilot sites due to differing crop requirements and locations.

Table III-5 Summary of annual chemical fertilizer usage amount

Name of park	Usage amount before project implementation (tons/year)	Predicted usage amount after project implementation (tons/year)	Reduced usage amount (tons/year)
Baishabao Lei Bamboo Ecological Demonstration Park	82	68	14 (17%)
Xinchang Lei Bamboo Ecological Demonstration Park			
Xinhua Oil Tea Ecological Demonstration Park	/	14.88	/
Nanping Village Characteristic Agricultural Park	180	106	74 (41%)
Takeng Citrus Demonstration Park	405	315	90 (22%)
Miantan Loquat Demonstration Park	195	120	75 (38%)

Note: the Xinhua Oil Tea Ecological Demonstration Park started construction in 2018 and the baseline annual usage amount of chemical fertilizers is not available. Source: FSR (28 June 2019).

90. **Forest health.** Pine (*Pinus* spp.), as the main tree species for afforestation and greening, is widely distributed in Xin'an River Basin. It plays an important role in natural landscape, water and soil conservation, and forestry economy in Huangshan. Pine wilt is a lethal disease caused by a species of nematode and can kill infected trees within months. The natural distribution of the pine wilt nematode is in North America, and it has spread to other countries as a result of wood and soil transport. Pine wilt became established in Huangshan in 2018, as part of a gradual spread across the PRC. The project includes the following activities: (i) setting up 50 long-distance video monitoring points in pinewood, conducting unmanned aerial vehicle monitoring, and providing trainings for 1,200 person-time; (ii) procurement of 29 sets of quarantine inspection equipment, 29 small-scale and 10 large-scale pulverizers to dispose infected

¹² Soil test formulated fertilization is the application of organic and chemical fertilizer based on soil testing and field fertilizer experiments; crop demand; and soil fertility. The approach considers the types of fertilizer, amount, and application method, frequency, and timing.

pinewood; (iii) preventive tree trunk injections for 900,000 healthy pine trees (over an area of about 70,000 ha), through the highly localized application of small quantities of immunizing chemicals (Emamectin benzoate, Avermectin B1a and Imidacloprid) to be drilled into the trunks of individual trees. This will avoid impacts to soil, waterways, other vegetation, or fauna; (iv) aerial spraying of 70,000 ha of pine forest using 8% slow-release cypermethrin microcapsules and 3% thiacloprid powder; and (iv) developing an information management system for pine wilt control. These measures complement existing silvicultural measures already undertaken in Huangshan, including the establishment of forest belts with no pine trees, to reduce the spread of the pine wilt nematode.

91. **Works under Output 3: addressing non-point source agricultural pollution.** The project will contribute to reducing non-point source pollution (NPS) in Huangshan Municipality through two approaches: (i) Green Incentive Fund, to incentivize farmers to switch from the use of chemical to organic fertilizers; and (ii) a Green Investment Fund, to facilitate and promote environmentally sustainable and socially inclusive agriculture, agro-forestry, and ecotourism.

92. **Green Incentive Fund.** The Xin'an River Basin Eco-compensation Scheme has established a strong framework for transboundary payments for ecological services between Anhui and Zhejiang provinces. However, the scheme comprises inter-provincial government payments to help maintain water quality, and does not involve a key source of water pollution, NPS from agriculture in Huangshan Municipality, and does not work at the level of individual farmers. The project will establish a separate pilot system to address this issue, with a total amount of CNY 40 million. It will focus initially on about 20,000 mu of existing tea plantations, and work with tea farmers to adopt improved farming practices. Assessments conducted during project preparation clarified the existing farming practices and the changes that farmers will need to make to convert to organic fertilizers (including more manual labor to carry fertilizer up steep hillsides which lack roads; and more frequent fertilizer application compared with the use of chemicals); and the market demand for "green" products. Key subcomponents comprise: (i) a feasibility study to design the system, including the identification of eligible activities for rewarding, establishing an evaluation mechanism to assess the contributions made by farmers to ecological improvement, and the operational mechanism of the system; (ii) design and implementation of a third party verification mechanism to measure and verify the contributions made by the farmers through adopting the recommended green farming practice. The third party is anticipated to be a civil society organization, to ensure independence in the monitoring and verification of farmer activities and the system's performance; and (iii) establishment and piloting of the system.

93. **Green Investment Fund.** The project will establish a revolving loan system to incentivize and provide financial support to private enterprises for environmentally sustainable and socially inclusive "green development". Loans will only be awarded for activities involving agriculture, agro-forestry, ecotourism, water resources management, and environmental activities which directly protect the environment and support socially inclusive development. Seed capital for the fund will be provided from the ADB loan, KfW, and the Xin'an River Basin Eco-compensation Scheme. All proposed loans will be subject to safeguard screening, categorization, impact assessment, and mitigation under an environmental and social management system (ESMS). The ESMS is described in Appendix 2.

Works under output 4

94. Under output 4, the project will support the development of six management information systems (MIS): for two industrial parks and four for Huangshan Municipality (Table III-1). For the two industrial parks, the MIS will include environmental, health, and safety monitoring. The beneficiaries for four MIS will be the Huangshan Water Resources Bureau, Ecology and Environment Bureau, and other agencies responsible for operation and maintenance of the MIS. For the industrial parks, the beneficiaries will be the park management committees. These MIS

will improve environmental management and monitoring for Huangshan Municipality, including: (i) the systematic collection and storage of data on ambient air and water quality; (ii) improved flood forecasting, to complement the project-supported river revetments. The government has already completed most structural works required to address flood risks in the municipality, and the MIS for flood forecasting will further strengthen these efforts; (iii) compliance of the industrial parks with domestic regulatory standards for environmental safeguards, including the quality of treated effluent discharged from each park; and (iv) systematic recording of the results of the project-supported green funds, including reduced use of chemical fertilizers. Output 4 also includes the preparation of technical studies on green certification (although the project does not involve actual certification) and improved water resources management. Output 4 does not involve any construction works.

D. Associated, Existing, and Linked Facilities

95. The project due diligence considered three types of facilities: (i) associated facilities – those which are not funded by the project but whose viability and existence depend exclusively on the project and whose operation and services are essential for successful operation of the project; (ii) project existing facilities – those which are already established and operating, and which the project will help upgrade or rehabilitate; and (iii) linked facilities – existing facilities which will be necessary for the project operations, but which are not part of the project scope of works and do not involve any project-supported works, activities, construction, operation, upgrade, or rehabilitation. These definitions for associated and existing facilities follow ADB's SPS (2009). The SPS does not include a specific definition for linked facilities.

96. The project does not include any associated or project existing facilities. There are a range of linked facilities that will be involved in the project construction and/or operation. Due diligence for these facilities is described below and in Table III-6.

97. **Wastewater treatment.** Wastewater collected by the new constructed sewerage systems will be conveyed to six existing municipal wastewater treatment plants (WWTP) for treatment in two districts and four counties, respectively, including Huizhou District WWTP, Huangshan District WWTP, Huangshan Municipal 2nd WWTP, She County WWTP, Yi County WWTP and Qimen County WWTP. Rural wastewater collected in the villages in Tunxi District will be conveyed to Huangshan Municipal WWTP for treatment.

98. **Water supply.** Upon completion of the water supply pipes in the villages of Xiuning and She counties, municipal water will be supplied by Huangshan Municipal 1st Water Supply Plant (WSP) and She County 2nd WSP, respectively. The water intake of Huangshan Municipal 1st WSP is at Shuaishui River. The designed capacity of the intake is 80,000 ton/day. The water intake of She County 2nd WSP is at Fengle Reservoir. The water intake was constructed in 2004 (EIA approval: huanjian[2004]No.34) with a designed capacity of 120,000 ton/day. In addition to She County 2nd WSP, it also supplies water to Huizhou District 2nd WSP. The current water supply load is 80,000 ton/day.

99. **Solid waste management.** Solid waste under the project will be generated from three sources: (i) construction waste materials, including the disposal of old sewage pipelines or storm drains which cannot be reused by the project. As far as possible, the project will seek to utilize the materials of the existing drains, and the amount of pipeline to be discarded is expected to be relatively small; (ii) litter from tourism at the six pilot tourist sites in She County and Huangshan District. Construction waste materials will be transported by the contractors to construction waste landfill facilities. Of the seven project counties and districts: four (Huangshan and Tunxi districts and She and Qimen counties) have existing facilities, which will be utilized for the project; for another (Xiuning County) a facility is under construction; and two (Huizhou District and Yi County) have no such facilities. For the counties and districts with existing facilities or which are under construction, the project construction waste will be disposed at these. For Huizhou District and

Yi County, the project construction waste will be transported to a new Huangshan Municipal Construction Waste Plant, which is under construction. All existing facilities are licensed and certified to operate. The disposal capacity and operational period of some facilities is unclear as some data is not readily available. Nonetheless, discussions held with the HMG and design institutes confirm that all facilities have (or will have) the capacity to receive the project waste; and for those facilities under construction, they will be operational by the time the project works begin; and (iii) sludge from the rural onsite WWTS. Sludge disposal will be managed as follows: in the short-term, the sludge will be transported to five existing WWTPs: Huizhou District WWTP, Huangshan District WWTP, Huangshan Municipal 2nd WWTP, She County WWTP, and Huangshan Municipal WWTP. At these WWTPs, the sludge is dewatered (about 60% moisture content) without digestion and then disposed to the local landfills.

100. Due diligence has been conducted for these WWTPs and which are confirmed to have adequate capacity to receive the project sludge (Table III.6). A new treatment plant, the Huangshan Municipal WWTP Sludge and Kitchen Waste Treatment Plant is currently under construction: it will have a designed capacity of 120 t/d sludge treatment and will begin operation in August 2020. All sludge generated by the project WWTS will be transported to this plant for treatment, and subsequently disposed in landfill or used as fertilizer for landscaping.

101. For the tourism litter, this will initially be collected on-site in the project-installed litter bins, then transferred to the existing rural solid waste transfer stations in each county and district. Preliminary sorting of the waste will be conducted at the transfer stations, to remove recyclable or reusable items (e.g. plastic and glass bottles, cardboard) and organic waste (discarded food). The remaining waste, comprising “dry” items (e.g. cups, paper, other packaging) will be transferred to the Huangshan Municipal Domestic Solid Waste Incineration Plant for final disposal.

102. **Industrial parks.** The project includes the piloting of a management information system and environmental, health and safety standards for two industrial parks. Both are existing, established parks which already support a range of businesses and are under full operation. The project does not involve any structural works of any kind for either park. Both parks have all required environmental approvals and no documented safeguard compliance issues.

103. Due diligence for all linked facilities is summarized in Table III-6. For the water supply plants and WWTPs, estimated water supply demand and wastewater production by the project is compared against the capacity of each relevant plant. The due diligence confirms that all facilities are: (i) operating in accordance with approved domestic EIAs and management plans; and (ii) for the WWTPs (including sludge treatment facilities in the municipal WWTPs), WSPs, waste incineration plant, existing construction waste landfill centers, and the sludge treatment plant under construction, all have the capacity to meet the project requirements. No past or present concerns related to impacts on the environment were identified. Furthermore, the ADB-funded project does not involve rehabilitation, modernization, or expansion of any existing facilities. Based on this information, the due diligence described here is concluded to be adequate per ADB’s SPS requirements to constitute an environmental audit (SPS Appendix 1 para. 10).

Table III-6: Linked Facilities

Name of Facility	Date of Construction	Operational Period	Capacity	EIA Approval Date	Operational Plan (Y/N)	Standards if relevant	Compliance Issue? (Y/N)	Link with Project		
								Physical	Demand*	Capacity to meet demand? (quantitative)
Huizhou District WWTP	Phase I: Year 2009 Phase II: Year 2016	2010-2050	Wastewater: Phase I: 20,000 t/d Phase II: 15,000 t/d Sludge: 6 t/d	Phase I: Huihuanjian [2009] No.181 Phase II: Huihuanjian [2016] No.33	Y	GB18918-2002 Class IA	N	Receiving wastewater collected in Huizhou District	Wastewater: 1953 t/d Sludge volume unclear but relatively small	Current load: 20000 t/d (wastewater); 4.5 t/d (sludge) Remaining capacity: 15000 t/d (wastewater); 1.5 t/d (sludge)
Huangshan District WWTP	Phase I: Year 2007 Phase II: Year 2014	2007-2047	Wastewater: Phase I: 15,000 t/d Phase II: 15,000 t/d Sludge: 2.3 t/d	Phase I: Huanjian [2003] No.24 Phase II: Huanghuanzi [2009] No.24	Y	Phase I: GB8978-1996 Class I Phase II: GB18918-2002 Class IA	N	Receiving wastewater collected in Huangshan District	Wastewater: 3587 t/d Sludge volume unclear but relatively small	Current load: 26000 t/d (wastewater); 1.7 t/d (sludge) Remaining capacity: 4000 t/d (wastewater); 0.6 t/d (sludge)
Huangshan Municipal 2 nd WWTP	Year 2014	2014-2054	Wastewater: 50,000 t/d Sludge: 50 t/d	Huanghuan [2013] No.12	Y	GB18918-2002 Class IA	N	Receiving wastewater collected in Xiuning County	Wastewater: 7356 t/d Sludge volume unclear but relatively small	Current load: 24,910 t/d (wastewater); 10 t/d (sludge) Remaining capacity: 25,090 t/d (wastewater); 40 t/d (sludge)
She County WWTP	Phase I: Year 2008 Phase II: Year 2018	2010-2040	Wastewater: 60,000 ton/day Sludge: 50 t/d	Phase I: Shehuanzi [2008] No.6 Phase II: Shehuanzi [2018] No.28	Y	GB18918-2002 Class IA	N	Receiving wastewater collected in She County	Wastewater: 8974 t/d Sludge volume unclear but relatively small	Current load: 40000 t/d (wastewater); 40 t/d (sludge) Remaining capacity y: 20000 t/d (wastewater); 10 t/d (sludge)
Yi County WWTP	Year 2017	2018-2048	20,000 ton/day	Yihuanshen [2017] No.13	Y	GB18918-2002 Class IA	N	Receiving wastewater collected in Yi County	286 t/d	Current load: 10000 t/d Remaining capacity: 10000 t/d

Name of Facility	Date of Construction	Operational Period	Capacity	EIA Approval Date	Operational Plan (Y/N)	Standards if relevant	Compliance Issue? (Y/N)	Link with Project		
								Physical	Demand*	Capacity to meet demand? (quantitative)
Qimen County WWTP	Year 2009	2010-2050	30,000 ton/day	Huanjian [2007] No.167	Y	GB18918-2002 Class IA	N	Receiving wastewater collected in Qimen County	3715.2 t/d	Current load: 7000 t/d Remaining capacity: 23000 t/d
Huangshan Municipal WWTP	Year 2004 Upgraded in Year 2012	2005-2045	Wastewater: 50,000 ton/day Sludge: 50 t/d	Huanjian [2012] No.300	Y	GB18918-2002 Class IA	N	Receiving rural wastewater collected in Tunxi District	Wastewater: 1791 t/d Sludge volume unclear but relatively small	Current load: 41,370 t/d (wastewater); 25 t/d (sludge) Remaining capacity: 8,630 t/d (wastewater); 25 t/d (sludge)
Huangshan Municipal 1 st WSP	2012	2012-2052	30,000 ton/day	Huanjian [2012] No.252	Y	GB 5749-2006	N	Provide water supply to Xiuning County through new constructed pipes	823 t/d	The current load of Huangshan Municipal 1 st and 2 nd WSPs is 74,832 t/d in total. Design capacity of the 2 nd WSP is 80,000 t/d.
She County 2 nd WSP	Phase I 2003; Phase II 2012	2004-2044	Phase I: 30,000 t/d Phase II: 30,000 t/d	Shehuanzi [2012] No.107	Y	GB 5749-2006	N	Provide water supply to She County through new constructed pipes	998 t/d	Current load: 42000 t/d Remaining capacity: 18000 t/d
Tunxi Construction Waste Landfill Facility	2015-2016	April 2017	35,000 t/d	Awaiting data	Y	CJJ/T134-2009 GB16889-2008 ^a	N	Dispose construction waste from works in Tunxi District	Volume unclear but relatively small	Capacity almost certainly meets project needs due to limited scope of works
Huangshan Construction Waste Landfill Facility	2016-2017	December 2017	Awaiting data	Awaiting data	Y	CJJ/T134-2009 GB16889-2008 ^a	N	Dispose construction waste from works in	Volume unclear but relatively small	As above

Name of Facility	Date of Construction	Operational Period	Capacity	EIA Approval Date	Operational Plan (Y/N)	Standards if relevant	Compliance Issue? (Y/N)	Link with Project		
								Physical	Demand*	Capacity to meet demand? (quantitative)
								Huangshan District		
She Construction Waste Landfill Facility	2017-2018	December 2018	8,000 t/year	Awaiting data	Y	CJJ/T134-2009 GB16889-2008 ^a	N	Dispose construction waste from works in She County	Volume unclear but relatively small	As above
Xiuning Construction Waste Landfill Facility	Under construction	2020 onward	40,000 t/year	Awaiting data	Y	CJJ/T134-2009 GB16889-2008 ^a	N	Dispose construction waste from works in Xiuning County	Volume unclear but relatively small	As above
Qimen Construction Waste Landfill Facility	2009	2010 – 2040	Awaiting data	Awaiting data	Y	CJJ/T134-2009 GB16889-2008 ^a	N	Dispose construction waste from works in Qimen County	Volume unclear but relatively small	As above
Huangshan Municipal Construction Waste Plant	Under construction	2020 – 2050	Awaiting data	Awaiting data	Y	CJJ/T134-2009 GB16889-2008 ^a	N	Dispose construction waste from works in Huizhou, Yi	Volume unclear but relatively small	As above
Huangshan Municipal Domestic Solid Waste Incineration Plant	2016	2018-2058	Phase I: 600 t/d Phase II: 300 t/d	Huanghuan [2016] No.187	Y	GB18485-2014	N	Receiving the tourism waste in She County and Huangshan District	Awaiting data	Phase I trial operation approved March 2019. Remaining capacity considered enough for project (local government)
Huangshan Municipal WWTP Sludge and Kitchen Waste	2019	2020-2060	WWTP Sludge: 120 t/d	Expected in October 2019	Y	GB18599-2001	N	Receiving the sludge from 85 rural onsite WWTSs	Volume unclear but relatively small	The capacity is considered enough for the project

Name of Facility	Date of Construction	Operational Period	Capacity	EIA Approval Date	Operational Plan (Y/N)	Standards if relevant	Compliance Issue? (Y/N)	Link with Project		
								Physical	Demand*	Capacity to meet demand? (quantitative)
Treatment Plant										
Huizhou District Recycling Economy Industrial Park	2008	2008-2048	2.36 km ² , with 50 manufacturing enterprises registered	Strategic Planning EIA for Development of Recycling Economy Industrial Parks, approved in 2012	Y	Manufacturing of resin and dyeing materials' composition	N	None	N/a	Develop MIS for park; pilot EHS measures. No structural measures
She County Recycling Economy Industrial Park	2011	2011-2051	1.39 km ² , with 38 manufacturing enterprises included	SPEIA, approved in Year 2012	Y	Manufacturing of resin and dyeing materials' composition	N	None	N/a	As above

EHS = environmental, health and safety, MIS = management information system, N = no, N/a = not applicable, Y = yes. Note: *Data provided by the FSR institute.

^aCJJ/T134-2009 "Construction Waste Disposal Technical Standard" sets the general requirements for construction waste landfills design, operation and closure. Environmental monitoring during operation at construction waste landfills follows "GB16889-2008: Standard for Pollution Control on the Landfill Site of Municipal Solid Waste".

IV. DESCRIPTION OF THE ENVIRONMENT (BASELINE)

A. Overview of Huangshan Municipality

104. Huangshan Municipality is a prefecture-level city located in the Yangtze River Delta and the southern region of Anhui Province, at the junction of Anhui, Zhejiang and Jiangxi Provinces (117°02'-118°55'E and 29°24'-30°24'N). It comprises three districts and four counties.¹³ The municipality has an area of 9,807 km² and a total population in 2017 of 1.4846 million, including urban and rural populations of 0.7557 million (50.9%) and 7289 million (49.1%); and the male and female populations of 0.7598 million (51.18%) and 0.7248 million (48.82%), respectively.¹⁴ The average GDP per capita of Huangshan Municipality in 2018 was CNY48,579 (\$7,341).

B. Environmental Setting of Huangshan Municipality

(a) Geography, Topography and Geology

105. **Huangshan District.** Huangshan District is situated in the north of Huangshan Municipality, with longitude of 118°11'-118°24'E and latitude of 30°00'-30°32'N. The total area of the district is 1,775 km². The Huang Mountain Scenic Area, a popular tourism destination, is located in the south of Huangshan District. Landforms are dominated by mountains, hill, and valleys. The topography grades from south to north with elevation ranges from 85 to 1,864 m.

106. **Huizhou District.** Huizhou District is situated in the middle of Huangshan Municipality and the center of Southern Anhui Basin, with longitude of 117°50'-118°21'E and latitude of 29°30'-30°09'N. The total area of the district is 419 km². The majored landforms are mountains and hills. The topography grades from north to south with elevation ranges from 120 to 1,280m. Dahuishan Mountain Range and Xinling Mountain Range are located within Huizhou District.

107. **Tunxi District.** Tunxi District is situated in the southeast of Huangshan Municipality with longitude of 118°11'-118°24'E and latitude of 29°39'-29°47'N. It is adjacent to She County in the east, Xiuning County in the west and south, and Huizhou District in the north. The total area of the district is 191 km². It is surrounded by mountains and hills with an elevation of 200 to 300 m. The topography is low in the middle and grades from northeast to southwest. In the middle region, Xintan Basin, Tunxi Basin and Shexian Basin are distributed from west to east.

108. **Qimen County.** Qimen County is situated in the west of Huangshan Municipality with longitude of 117°12'-117°57'E and latitude of 29°35'-30°08'N. The total area of the county is 2,257 km². The majored landforms are mountains and hills, while middle mountain, low mountain, hills, intermountain basin and narrow river valley interweave each other. The topography grades from north to south with an elevation of 79 to 1,728 m.

109. **She County.** She County is situated in the east of Huangshan Municipality, with longitude of 118°15'-118°53'E and latitude of 29°30'-30°07'N. The total area of the county is 2,122 km². The landforms are dominated by mountains and hills, with an area of 1,106 km² (43.3%) and 1,308 km², (51.2%), respectively. Low mountains and hills are distributed around the county center with an elevation ranges from 145 m to 406 m. The topography is plain in northeast, southwest and middle regions with elevation ranges from 116 to 145m.

¹³ Huangshan Municipality comprises 3 districts (Tunxi, Huangshan, Huizhou) and 4 counties (She, Yi, Qimen, Xiuning).

¹⁴ Huangshan Municipality Statistical Yearbook of 2018.

110. **Yi County.** Yi County is situated in the northwest of Huangshan Municipality, with longitude of 117°38'-118°06'E and latitude of 29°47'-30°11'N. The total area of the county is 857 km². The county is located in mountainous area of South Anhui with the branch range of Huang Mountain extending from northeast to southwest. The major landforms in the county is mountains and hills, which accounts for 85.4% of the total area. The topography grades from the middle region to north and south, respectively.

111. **Xiuning County.** Xiuning County, where the Xin'an River originated, is situated in the south of Huangshan Municipality, with longitude of 117°39'-118°26'E and latitude of 29°24'-30°02'N. The total area of the county is 2,135 km². The landforms are dominated by mountains and hills, which accounts for 76.7% of the total area. The topography is high in the north and south, low in the middle, with large fluctuations and obvious vertical elevation difference.

112. **Soils in project area.** In most low mountain areas in Huangshan, the soil is mainly yellow soil and yellow brown soil with thick soil layer and high gravel content. Mountain yellow brown soil is a transitional soil type between mountain brown soil and mountain yellow soil, formed in the subtropical humid mountain evergreen broad-leaved and deciduous broad-leaved mixed forest. The soil has good permeability for water and air, which is conducive to the growth of wood, tea, mulberry and medical materials. In hilly areas, the soil is red soil and purplish soil with heavy texture, acidity and poor fertility. Sandy loam is distributed in piedmont basin and plain valley with alluvial soil on both sides of rivers.

113. **Soil erosion.** Huangshan Municipality has a mountainous topography and is susceptible to soil erosion. From 2000 to 2015, Huangshan Municipality implemented soil erosion control (including bank stabilization and afforestation) and the area of soil erosion was reduced to 1,286.05 km² by 2015. Currently, the area of soil erosion in Huangshan accounts for 13.29% of the total area of soil erosion in the PRC, among which the light, moderate, severe, moderate severe and extremely severe erosion areas are 287.81 km², 925.30 km², 25.87 km², 23.17 km² and 23.90 km².

Table IV-1 Soil Erosion in Huangshan Municipality

Item	No obvious erosion (km ²)	Area of Soil Erosion (km ²)						Land Area (km ²)
		light	moderate	severe	moderate severe	extremely severe	Sub-total	
Area (km ²)	8392.33	287.81	925.30	25.87	23.17	23.90	1286.05	9678.38
% of total area of soil erosion	/	22.38	71.95	2.01	1.80	1.86	100.00	/
	/	96.34			3.66			/
% of total land area	86.71	2.97	9.56	0.27	0.24	0.25	13.29	/

Source: the FSR.

(b) Meteorology and Climate

114. Located in the north subtropical zone, Huangshan Municipality has a humid monsoon climate with mild, rainy and distinct seasons. The average frost-free period is 235 days. The average annual relative humidity is 70% (annual evaporation less than precipitation). The dominant wind direction throughout the year is from northeast to southwest. Mean monthly wind speeds (1981-2010) range from 4.9–6.3 m/s (minimum in September: 4.9 m/s; maximum in July

– 6.3 m/s).¹⁵ This is equivalent to Levels 3 or 4 in the national wind rating system (see footnote).

115. **Temperature.** The annual average temperature is between 15 to 17°C with the highest temperature occurs in July and August (40 °C and 41.5 °C) and the lowest in January and February (-10 °C and -13.5 °C).

116. **Sunshine.** The annual average sunshine times on the southern slope and northern slope of Huang Mountain are 1,930 hours and 1,750 hours, respectively. The longest daily sunshine time occurs in July and the shortest occurs in February.

117. **Precipitation.** The average annual precipitation day is 145-159 days. The multi-year average annual precipitation is 1,700mm, with the maximum annual precipitation of 2,460mm and the minimum annual precipitation of 1,400 mm. The maximum daily precipitation is 320mm. Due to the concentrated precipitation in summer and low precipitation in autumn, Huangshan is vulnerable to flooding and drought in these two seasons, respectively.

118. **Evaporation:** The average annual evaporation is between 850-950 mm. The evaporation during irrigation period (April-October) accounts for 75-80% of the total annual evaporation. When the precipitation decreases and the evaporation increases, drought easily occurs.

(c) Hydrology and water resource

119. Huangshan Municipality is divided into Xin'an River Basin (5,676 km²) and Yangtze River Basin (4,131 km²) by Huang Mountain Range from northeast to southwest. Xin'an River Basin has a well-developed river system and the average amount of water resources per capita within the basin is 6,405 m³. Xin'an River is originated from Wugujian Mountain at the junction of Xiuning County in Anhui Province and Jiangxi Province. It has a total length of 242.3 km and a catchment area of 6,440 km² within Anhui Province. Among the tributaries of Xin'an River, 57 branches have a length more than 10 km. The primary tributaries of Xin'an River include Shuaishui River, Heng River and Lian River.

120. Shuaishui River is originated from Liugujian in Xiuning County with a length of 138 km, a catchment area of 1,522 km² and an average slope of 1.41‰. It flows from west to east passing through Liukou Town in Xiuning County, Xiaofeng Town in Qimen County, and Xikou Town, Shangshan Town in Xiuning County. Heng River is originated from Baiding Mountain in Yi County with a length of 75 km, a catchment area of 977 km² and an average slope of 2.71‰. It flows from northwest to southeast passing through Yuting Town in Yi County, and Haiyang Town, Wan'an Town in Xiuning County. The confluence point of Shuaishui River and Heng River is at Huaxi Hotel in Xiuning County. Lian River is originated from Longcong Mountain in Jixi County with a length of 78.7 km, a catchment area of 1,609 km² and an average slope of 2.6‰. It flows from southwest to northeast into She County.

121. In Yangtze River Basin within Huangshan Municipality, the main tributaries of Yangtze River include Machuan River, Puxi River, Yangxi River, Qingxi River, Chang River and Meixi River. Table IV-2 summarizes the basic information of the main rivers in Huangshan Municipality.

¹⁵ China National Meteorological Data Center; website accessed 1 August 2019. In the PRC, wind speeds are categorized in 18 levels, with 1 the lowest (no wind) and 18 the highest (severe; by comparison, typhoons are usually rated around Level 12). Level 4 comprises winds of 5.5–7.9 m/s. Level 4 is defined as being of sufficient strength to raise dust including from construction sites.

Table IV-2 Basic Information of the Main Rivers in Huangshan Municipality

Basin	River	Length (km)	Catchment Area (km ²)	Average Slope (‰)
Xin'an River Basin	Xin'an River	242.3	6,440	-
	Shuaishui River	138	1,522	1.41
	Heng River	75	977	2.71
	Lian River	78.7	1,609	2.6
Yangtze River Basin	Machuan River	78	690	8.87
	Puxi River	47.9	207.7	5.05
	Yangxi River	59.2	205.9	4.48
	Qingxi River	69.3	590.1	-
	Chang River	81.3	1975.9	-
	Meixi River	23.2	103.8	-

Source: the FSR

(d) Protected areas

122. Locations for the rural wastewater treatment stations to be installed by the project include villages located within two designated state-level scenic zones. The project works are aligned with management requirements for each site and will improve site protection through a halt to the existing discharge of untreated effluent to nearby waterbodies.

123. **National Huashan Mysterious Grottoes Scenic Zone.** The National Huashan Miku Scenic Zone is an AAAA scenic spot located at the boundary of Tunxi District and She County in Huangshan Municipality (E118°20'37.5"-E118°28'47.5", N29°43'45.0"-N29°50'48.0") with a total area of 61.2 km². There are 36 artificial caves within the scenic zone, among which the largest one has a height of 18m and a length of 170 m. Natural and cultural resources within the scenic zone form the key scenic spots attracting tourists. The site is divided into five zones (sightseeing, scientific investigation and protection, culture and recreation, historic landscape zone, ecosystem conservation). Different ecological and environmental protection requirements and measures are established for each zone based on their characteristics. The location of project villages within the scenic zone are listed in Table V-14.

124. **Taiping Lake Scenic Zone.** Taiping Lake is a reservoir constructed in 1970 with a surface area of 88.6 km² and maximum capacity of 2.4 billion m³. It extends from east to west with a length of 60 km. Main water sources are in the Yellow Mountain and Jiuhua Mountain. The Qingge River, a tributary of Yangtze River, is located downstream of Taiping Lake. The Taiping Lake Scenic Zone is an AAAA scenic spot located in the north of Huangshan District with a total area of approximately 276 km². For ecological and environmental protection purposes, the scenic zone is divided into Grade I (58.53 km²), Grade II (169.32 km²) and Grade III (47.98 km²) protection areas, and a peripheral protection area (149.07 km²) was defined embracing the scenic zone. The site is divided into seven zones: scenery; ecosystem conservation; wetlands; water area protection; history and culture exploration; recreation; and, tourism reception zone. Scenic sites include natural scenery (lake, islands, and wetland) and sites and relics of ancient buildings. The scenic zone supports at least 170 species of birds, 70 species of mammal, 40 species of reptile, 20 species of amphibian, and 43 species of fish. Common flora within the scenic zone include woods, bamboos, medicinal plants and crops (<https://baike.baidu.com/>). The location of project villages within the scenic zone are listed in Table V-14.

(e) Flora and fauna

125. **Flora – overview for Huangshan Municipality.** Huangshan Municipality is located at

the subtropical evergreen broad-leaved forest zone, mid-subtropical evergreen broad-leaved forest zone, southern sub-zone of the mid-subtropical evergreen broad-leaved forest zone, and the castanopsis, schima superba forest zone and limestone vegetation area. The vegetation distribution varies horizontally and vertically in space. The primary/native natural vegetation has mostly been replaced by secondary vegetation and/or artificial vegetation, except for some primary broad-leaved forest and alpine meadow in mountain area. In low mountainous and hilly areas, and valleys in north-central Huangshan, the existing vegetation is secondary or planted fir, bamboo, oil tea, mulberry, fruit trees and tea trees, etc. To the north of Yellow Mountain, vegetation is mainly composed of evergreen and deciduous broad-leaved mixed forest and coniferous broad-leaved mixed forest. To the south of Yellow Mountain, vegetation is mainly composed of secondary evergreen and deciduous broad-leaved mixed forest and valley evergreen forest. Wild plants within/near project sites include *Castanea henryi* (锥栗), chestnut (毛栗), fern root (蕨根), oak, bayberry (杨梅), rose strawberry, *Osmanthus fragrance* (桂花), kamuning (九里香), rose (蔷薇), magnolia (玉兰), cinnamon oil (桂皮油), *Arisaema calcareum* (红根), and oak (橡树). Altitudinal distribution of flora in Huangshan Municipality is summarized in Table IV-3.

Table IV-3 Altitudinal distribution of flora in Huangshan Municipality

Altitude	Flora
Less than 400m	Mainly reclamation and cultivation areas. Key flora includes Oriental plane (法梧), Poplar (白杨), Robinia pseudoacacia (刺槐), Willow (柳树), Camphor tree (樟树), Ginkgo (银杏), Pinus massoniana (马尾松), Cunninghamia lanceolata plantation (杉树人工林), Tung tree (油桐), Camellia olei fera (油茶), as well as some economic crops (tea trees, mulberry, fruit trees) and bamboo.
400m-700m	Chinese fir (杉木), Masson pine (马尾松), Moso bamboo (毛竹), garden bamboo (园竹), tricuspid fir (三尖杉), Lingchun wood (领春木), Liquidambar (枫香), Castanopsis eyrei (甜槠), Schima superba (木荷), Litsea cubeba (山苍子), Chinese torreyia (香榧) and Kiwifruit trees.
700m-1000m	Masson pine (马尾松), Sawtooth oak (麻栎), Oriental oak (栓皮栎), Castanea henryi (锥栗), Castanopsis sclerophylla (苦槠), Quercus glauca (青冈栎), Zelkova (大叶榉), and Kiwifruit trees
1000m-1300m	Pinus taiwanensis (黄山松), Pseudotsuga gaussenii (华东黄杉), magnolia cylindrica (黄山木兰), Beech (山毛榉), Mount Huangshan Rhododendron (黄山杜鹃), Kiwifruit trees, etc.
1300m-1600m	winged euonymus (卫矛), buxus microphylla (小叶黄杨), Rhododendron shanii (都支杜鹃), Pinus taiwanensis (黄山松), Oriental bamboo (华东箬竹), Magnolia sieboldii (天女花), etc.

Source: Chinese Vegetation.

126. Project areas. All project locations for the urban and rural water supply and wastewater treatment networks are located in cultivated and/or modified habitats of agricultural land, urban development, and support little remaining natural vegetation. The bamboo and tea plantations under the project support planted vegetation. Waterways retain small patches of secondary vegetation. The two scenic zones contain more intact and extensive natural vegetation, but all project works are localized and restricted to cleared land within villages.

127. Fauna. According to the statistics data from the *Zoogeography of China*, there are 429 species of vertebrates (66% of 742 species in Anhui Province) in Huangshan Municipality, including 65 species of mammals, 170 species of birds, 20 species of amphibians, 38 species of reptiles and 135 species of fish, among which 30 species are listed as state protective animal. The subprojects under the project are in or near villages and urban areas with intensive human

activities and development, and support populations of widespread, abundant species that are not rare, restricted-range, threatened, or protected e.g. those in Table IV-4.

Table IV-4 Incidental observations of species around the project sites

Category	Fauna
Bird	barn swallow (家燕), mynas (八哥), <i>Lanius schach</i> (棕背伯劳)
Amphibian	<i>Bufo gargarizans</i> (中华蟾蜍), <i>Fejervarya limnocharis</i> (泽陆蛙)
Reptiles	<i>eumeces chinensis</i> (中国石龙子), <i>zaocys dhumnade</i> (乌梢蛇)
Mammal	<i>Lepus sinensis</i> (华南兔), Yellow weasel (黄鼬), Wild Boar (野猪)

Source: the Domestic EIA.

128. The main water bodies within the project area are Taiping Lake, Caocun River, Xin'an River and its surrounding tributaries. Good water quality has provided suitable aquatic habitat for fishes, phytoplankton and zooplankton. Diatom (硅藻) and blue-green algae (蓝藻) are the dominant species of phytoplankton and rotifers (轮虫类) is the dominant species of zooplankton. In addition, mollusks and annelids are also distributed in the rivers. According to statistics data, there are 103 species of economic fishes in Xin'an River (Anhui section). Grass carp (草鱼), bream (鳊鱼), silver carp (鲢鱼), bighead carp (鳙鱼), carp (鲤鱼), crucian carp (鲫鱼) and eel (鳗鱼) are the main populations in the river. Aquatic plants mainly include *Zizania latifolia*, lotus root, water chestnut, and water celery.

129. For this description of flora and fauna, a desktop review and incidental observations during field work was considered adequate for the impact assessment considering (i) the modified nature of the project sites; (ii) the relatively limited scope of physical works; and (iii) the location of works within cultivated rural habitats. Potential impacts, and mitigation measures in the environmental management plan, are described in Section V.D.6.

(f) Fertilizer and pesticide management and usage

130. The HMG has established a series of regulations and policies to control and optimize the use of chemicals in agriculture activities, such as the *Huangshan Municipal Pesticide Safety Management Ordinance (Exposure Draft)*, and *Implementation Plan for Replacement of Chemical Fertilizer by Organic Fertilizer in Fruit, Vegetables and Tea Farming in Huangshan*. In 2015, Huangshan Municipal started to develop a centralized pesticide delivery system and by 2017, a total of 455 delivery branches have been established. The coverage rate of pesticide delivery reached 100% at town level and 80% at village level.

131. According to the FSR, the current usage of chemical fertilizers in Baishabao Lei Bamboo Ecological Demonstration Park, Xinchang Lei Bamboo Ecological Demonstration Park, Xinhua Oil Tea Ecological Demonstration Park, Nanping Village Characteristic Agricultural Park, Takeng Citrus Demonstration Park and Miantan Loquat Demonstration Park is 862 tons per year (Section III.C, Table III-5).

(g) Social and economic status

132. The project counties and districts had a total registered population of 1.5 million people in 2017 (statistic yearbooks 2018). Social and economic indicators are in Table IV-5.

Table IV-5: Social and Economic Data for the Project Districts and County (2018)

Statistical data	Tunxi District	Huizhou District	Huangshan District	She County	Xiuning County	Yi County	Qimen County
Total registered population	206,500	97,000	163,000	478,000	270,000	94,700	186,700
Total Area (km ²)	242	419	1,775	2,122	2,135	857	2,257

Regional annual GDP (CNY million)	14,850.42	6,981.69	9,159.89	16,871.27	6,398.69	3215.24	6,930
Per capita disposable income (CNY, urban)	36,716	36,233	35,643	30,762	23,433	29,785	30,602
Per capita disposable income (CNY, rural)	16,384	16,040	15,984	15,266	11,560	15,462	15,202

Source: the official websites of three districts and four counties.

C. Environmental Baseline

133. The subproject sites are distributed in 3 districts and 4 counties in Huangshan Municipality. The EIA institute and TRTA environmental specialists visited about 85% of subproject sites, including 103 villages for onsite wastewater treatment stations and 43 villages for water supply works. Representative sites for environmental baseline sampling were selected to characterize the ambient environment (Appendix 5).

(a) Surface water quality

134. Main surface water bodies near the subproject sites are Xin'an River, Shuaishui River, Heng River, and Fengle River. The results of municipal water quality monitoring (not project-specific sampling) in 2018 is shown in Table IV-6.

Table IV-6: 2018 Surface Water Quality in Rivers Near Subproject Sites
(annual average, unit mg/L, pH excluded)

Water Body	Section	Parameters					
		pH	COD	BOD ₅	NH ₃ -N	TP	TN
Xin'an River	Huangkou section	8.03	8.42	1.16	0.3	0.07	1.6
	Huangdun section	7.94	7.17	1.47	0.22	0.07	1.71
	Kengkou section	8.18	9.5	1.18	0.22	0.08	1.84
	Jiekou section	8.09	10	1.48	0.09	0.04	1.35
Shuaishui River	Shuaishui Bridge section	8.29	6.08	0.85	0.15	0.03	0.99
Heng River	Heng River Bridge section	8.11	8.75	1.01	0.18	0.06	1.57
Lian River	Pukou section	7.98	10	1.48	0.41	0.12	2.63
Fengle River	Fengle River Section	7.99	6.75	0.78	0.05	0.01	1.09
Applicable Standard: Surface Water Environment Quality Standard (GB 3838-2002) Class III		6~9	≤20	≤4	≤1.0	≤0.2	≤1.0
Compliance Status		Met	Met	Met	Met	Met	Exceeded

Sources: The DEIA institute

135. According to the municipal routine monitoring results, the concentrations of pH, COD, BOD₅, NH₃-N and TP met the Class III standard of GB3838-2002. The concentration of TN exceeded the Class III standard mainly due to the non-point pollution from the farmland and wastewater discharge from surrounding towns and villages as indicated by the DEIA institute.

136. **Project-specific sampling.** Baseline surface water quality of Xin'an River mainstream and tributaries were monitored by Anhui Guosheng Testing Technology Co., Ltd. during 18-24 May, 2019. A total of 22 sampling points were selected (Table IV-7) and results are in Table IV-8. Geographic coordinates of the sampling locations are described in Appendix 6.

Table IV-7: Monitoring Points for Baseline Monitoring of Surface Water Quality

Sampling No.	Sampling point (location)	Water quality function	Remark
W1	Upstream of Dianjie WWTS outlet (an unnamed channel)	Class III	Huangshan District

W2	Downstream of Dianjie WWTS outlet (an unnamed channel)	Class III	Huangshan District
W3	Upstream of Fudun WWTS outlet (Xin'an River)	Class III	Tunxi District
W4	Downstream of Litangxia WWTS outlet (Xin'an River)	Class III	Tunxi District
W5	Upstream of Yaoxi WWTS outlet (Xin'an River)	Class III	Xiuning County
W6	Downstream of Yaoxi WWTS outlet (Xin'an River)	Class III	Xiuning County
W7	Upstream of Xizhou WWTS outlet (Xin'an River)	Class III	Xiuning County
W8	Downstream of Hexi WWTS outlet (Xin'an River)	Class III	Xiuning County
W9	Upstream of Changwu WWTS outlet (Caoxi River)	Class III	Huizhou District
W10	Downstream of Changwu WWTS outlet (Caoxi River)	Class III	Huizhou District
W11	Upstream of Huangcun WWTS outlet (Fengle River)	Class III	Huizhou District
W12	Downstream of Shankou WWTS outlet (Fengle River)	Class III	Huizhou District
W13	Upstream of Shuangzhu WWTS outlet (an unnamed channel)	Class III	Xiuning County
W14	Downstream of Shuangzhu WWTS outlet (an unnamed channel)	Class III	Xiuning County
W15	Upstream of Xinhua Oil Tea Ecological Demonstration Park (an unnamed channel)	Class III	Huangshan District
W16	Downstream of Xinhua Oil Tea Ecological Demonstration Park (an unnamed channel)	Class III	Huangshan District
W17	Upstream of Nanping Village Characteristic Agricultural Park (Xin'an River)	Class III	She County
W18	Downstream of Nanping Village Characteristic Agricultural Park (Xin'an River)	Class III	She County
W19	Upstream of Takeng Citrus Demonstration Park (Xin'an River)	Class III	She County
W20	Downstream of Takeng Citrus Demonstration Park (Xin'an River)	Class III	She County
W21	Upstream of Miantan Loquat Demonstration Park (Xin'an River)	Class III	She County
W22	Downstream of Miantan Loquat Demonstration Park (Xin'an River)	Class III	She County

W = water sampling point, WWTS = wastewater treatment station.

Table IV-8: Water Quality Monitoring Results – May 2019
(Unit: mg/L, except pH)

Sampling No.	Item	pH	COD _{Cr}	BOD ₅	NH ₃ -N	TP	TN	Oil	Dimethoate
	Grade III Standard	6~9	≤20	≤4	≤1.0	≤0.2	≤1.0	-	≤0.08
W1 (an unnamed channel)	Result	7.58~7.83	6~7	1.0~1.1	0.03~0.041	0.01~0.03	1.56~1.68	0.05~0.07	/
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	
W2 (an unnamed channel)	Result	7.68	7	0.8~0.9	0.028~0.036	0.02~0.03	1.73~1.8	ND	/
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	
W3 (Xin'an River)	Result	7.42~7.46	4~6	0.7~0.8	0.116~0.129	0.04~0.05	1.58~1.63	ND	/
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	
W4 (Xin'an River)	Result	7.25~7.3	15~17	0.7~0.9	0.801~0.811	0.38~0.4	2.22~2.33	ND	/
	Standard compliance	Met	Met	Met	Met	Exceeded	Exceeded	/	
W5 (Xin'an River)	Result	7.43~7.48	8~9	1.1~1.2	0.166~0.167	0.11~0.19	2.98~3.12	ND	/
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	
W6 (Xin'an River)	Result	7.53~7.55	6	0.7	0.058~0.068	0.04~0.05	1.45~1.52	ND	/
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	
W7 (Xin'an River)	Result	8.66~8.79	6~7	0.9~1.0	0.033~0.04	0.01~0.02	1.17~1.21	ND	
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	

W8 (Xin'an River)	Result	8.75~8.82	7~8	0.8~1.2	0.082~0.085	0.02	0.99~1.08	ND	/
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	
W9 (Caoxi River)	Result	7.82~7.94	4	0.6	0.031	0.02	1.76~1.84	ND	/
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	
W10 (Caoxi River)	Result	7.62~7.7	4	0.7	ND	0.01	1.49~1.62	ND	/
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	
W11 (Fengle River)	Result	7.59~7.61	4~5	0.6	ND	0.02	1.49~1.52	ND	/
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	
W12 (Fengle River)	Result	7.69~7.75	6~7	1.1	0.322~0.346	0.04	1.54~1.62	0.09~0.13	/
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	
W13 (an unnamed channel)	Result	7.74~7.8	4~5	0.6	ND	0.01	1.19~1.24	ND	/
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	
W14 (an unnamed channel)	Result	7.3~7.41	4	0.7	0.033~0.036	0.03	1.25~1.32	ND	/
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	
W15 (an unnamed channel)	Result	7.11~7.13	11~12	2.1~2.3	0.233~0.244	0.05~0.07	1.86~1.95	ND	/
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	
W16 (an unnamed channel)	Result	7.19~7.26	14~16	2.3~2.5	0.239~0.251	0.12~0.15	1.67~1.74	ND	/
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	
W17 (Xin'an River)	Result	7.75~7.84	10	2.1~2.4	0.041~0.053	0.05~0.06	1.78~1.85	ND	ND
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	Met
W18 (Xin'an River)	Result	7.69~7.78	17~18	3~3.1	0.206~0.211	0.05~0.06	2.11~2.26	ND	ND
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	Met
W19 (Xin'an River)	Result	7.79~7.84	12	2.6~2.8	0.286~0.302	0.03~0.04	2.15~2.21	ND	ND
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	Met
W20 (Xin'an River)	Result	8.02~8.06	8~10	1.5~1.8	0.151~0.168	0.02~0.03	2.47~2.56	ND	ND
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	Met
W21 (Xin'an River)	Result	7.56~7.66	12~13	2.3~2.6	0.088~0.093	0.04~0.05	1.38~1.43	ND	ND
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	Met
W22 (Xin'an River)	Result	7.5~7.58	14~15	2.7~2.9	0.134~0.147	0.05	2.52~2.61	ND	ND
	Standard compliance	Met	Met	Met	Met	Met	Exceeded	/	Met

Note: ND = not detected. The standard for dimethoate refers to Standard for Groundwater Quality (GB/T 1448-2017).

137. The results in Table IV-8 show that all the monitored parameters in both the upstream and downstream of WWTS outlets met the Grade III Standard of GB3838-2002, except the TP at W4 and TN at all monitoring points exceeded the standard due to non-point pollution from the nearby farmland according to the DEIA. A pesticide, dimethoate was monitored at the upstream and downstream of agriculture demonstration parks and was not detected.

(b) Air Quality

138. Baseline air quality in the project areas was assessed through: (i) review of public available monitoring data for Huangshan Municipality, where the local EEB have permanent monitoring stations to record up to six parameters (NO₂, SO₂, CO, O₃, PM₁₀, PM_{2.5}); and (ii) specific air quality monitoring for seven consecutive days within the selected project sites, conducted by Anhui Provincial Zhongwang Environmental Protection and Energy Saving Monitoring Co., Ltd. and Anhui Guosheng Testing Technology Co., Ltd. The project sampling effort, although limited, was considered adequate for the project because air quality within the

three districts and four counties largely meets the required national standards (Table IV-9). In addition, the project sites do not support large sources of industrial or other emissions.

139. Ambient air quality in Huangshan Municipality. According to the Huangshan Environmental Quality Bulletin (2017) published on Huangshan Municipal Government website, the concentration of six pollutants, including SO₂ (annual average), NO₂ (annual average), PM₁₀ (annual average), PM_{2.5} (annual average), CO (24-hour average) and O₃ (8-hour average), were reported as shown in Table IV-9. All the concentrations complied with the GB3095-2012 Class II standards and the air quality in Huangshan Municipality is relatively good.

Table IV-9 Ambient Air Quality in Huangshan Environmental Quality Bulletin (2017)

(Unit: µg/m³, except CO mg/m³)

Pollutant	Indicator	Reported Concentration	GB3095-2012 Grade II Standard	Compliance
SO ₂	Annual average	12.6	60	Met
NO ₂	Annual average	8.3	40	Met
PM ₁₀	Annual average	40.8	70	Met
PM _{2.5}	Annual average	22.38	35	Met
CO	24-hour average	0.66	4	Met
O ₃	8-hour average	73	160	Met

Source: Huangshan Municipal Environmental Quality Bulletin (2017).

140. Project-specific sampling. The baseline ambient air quality monitoring was conducted for seven consecutive days, during 10 to 16 March 2019 (A1-A4) by Anhui Provincial Zhongwang Environmental Protection and Energy Saving Monitoring Co., Ltd., and 18 to 24 May 2019 (A5-A29) by Anhui Guosheng Testing Technology Co., Ltd. A total of 29 air quality monitoring points in 17 subproject sites were selected. Parameters monitored include 24-hour average PM₁₀, PM_{2.5}, SO₂ and NO₂ for all monitoring points, and for rural wastewater treatment station sites, the hourly average concentration of H₂S and ammonia gas were also monitored. Sampling locations and geographic coordinates are described in Appendix 6. The baseline monitoring results (Table IV-10) indicate that the daily average concentrations of PM₁₀ at A18 and A29 exceeded the Class I standard of GB3095-2012 mainly due to traffic disturbance as indicated by the DEIA institute. All other parameters met the GB 3095-2012 Class I standard within scenic zones and Class II standard in other project area.

Table IV-10: Baseline Monitoring Results of Air Quality

(10-16 March 2019 and 18-24 May 2019, mg/m³)

Parameter	Sampling Location	Monitored Results	GB3095-2012 Standards	Compliance
PM ₁₀ (Daily Average)	A5 (Changwu WWTS)	0.062~0.075	0.15 (Class II)	Met
	A6 (Yeja WWTS)	0.046~0.057	0.15 (Class II)	Met
	A7 (Xizhou-Xiafudu WWTS)	0.058~0.072	0.15 (Class II)	Met
	A8 (Hexi WWTS)	0.053~0.071	0.15 (Class II)	Met
	A9 (Suntian WWTS)	0.048~0.057	0.15 (Class II)	Met
	A10 (Yuetan-Luntang WWTS)	0.052~0.060	0.15 (Class II)	Met
	A11 (Fudun WWTS)	0.021~0.036	0.05 (Class I)	Met
	A12 (Taiping Villa in Huangshan District)	0.049~0.058	0.15 (Class II)	Met
	A13 (Yuhe Village in Huangshan District)	0.053~0.062	0.15 (Class II)	Met
	A14 (Hebian Village in Huangshan District)	0.052~0.059	0.15 (Class II)	Met
	A15 (Fuchun International Garden Residential Area in Huizhou District)	0.048~0.057	0.15 (Class II)	Met
	A16 (Sunshine Residential Area in Huizhou District)	0.052~0.063	0.15 (Class II)	Met

	A17 (Congmu Village in Huizhou District)	0.057~0.072	0.15 (Class II)	Met
	A18 (Piyun Shanzhuang Residential Area in She County)	0.058~0.072	0.05 (Class I)	Exceeded
	A19 (Sanqingyan Villa Residential Area in She County)	0.059~0.068	0.15 (Class II)	Met
	A20 (Daming Villa Residential Area in She County)	0.063~0.072	0.15 (Class II)	Met
	A21 (Gaoqi Residential Area in Yi County)	0.053~0.066	0.15 (Class II)	Met
	A22 (Kaiyuan Shijia Residential Area in Yi County)	0.049~0.067	0.15 (Class II)	Met
	A23 (Qimen No.1 Middle School in Qimen County)	0.051~0.062	0.15 (Class II)	Met
	A24 (Qishan Primary School in Qimen County)	0.056~0.062	0.15 (Class II)	Met
	A25 (Wenjiang Primary School in Qimen County)	0.049~0.057	0.15 (Class II)	Met
	A26 (Qimen No.2 Middle School in Qimen County)	0.049~0.056	0.15 (Class II)	Met
	A27 (Huangshan Donghua Technician School in Xiuning County)	0.053~0.066	0.15 (Class II)	Met
	A28 (Haiyang Middle School in Xiuning County)	0.053~0.064	0.15 (Class II)	Met
	A29 (Gucheng Village in Xiuning County)	0.049~0.058	0.05 (Class I)	Exceeded
PM _{2.5} (Daily Average)	A5 (Changwu WWTS)	0.029~0.035	0.075 (Class II)	Met
	A6 (Yeja WWTS)	0.028~0.035	0.075 (Class II)	Met
	A7 (Xizhou-Xiafudu WWTS)	0.029~0.033	0.075 (Class II)	Met
	A8 (Hexi WWTS)	0.024~0.031	0.075 (Class II)	Met
	A9 (Suntian WWTS)	0.024~0.031	0.075 (Class II)	Met
	A10 (Yuetan-Luntang WWTS)	0.024~0.035	0.075 (Class II)	Met
	A11 (Fudun WWTS)	0.026~0.031	0.035 (Class I)	Met
	A12 (Taiping Villa in Huangshan District)	0.026~0.032	0.075 (Class II)	Met
	A13 (Yuhe Village in Huangshan District)	0.026~0.032	0.075 (Class II)	Met
	A14 (Hebian Village in Huangshan District)	0.026~0.032	0.075 (Class II)	Met
	A15 (Fuchun International Garden Residential Area in Huizhou District)	0.025~0.031	0.075 (Class II)	Met
	A16 (Sunshine Residential Area in Huizhou District)	0.025~0.031	0.075 (Class II)	Met
	A17 (Congmu Village in Huizhou District)	0.026~0.031	0.075 (Class II)	Met
	A18 (Piyun Shanzhuang Residential Area in She County)	0.026~0.031	0.035 (Class I)	Met
	A19 (Sanqingyan Villa Residential Area in She County)	0.026~0.036	0.075 (Class II)	Met
	A20 (Daming Villa Residential Area in She County)	0.025~0.034	0.075 (Class II)	Met
	A21 (Gaoqi Residential Area in Yi County)	0.028~0.033	0.075 (Class II)	Met
	A22 (Kaiyuan Shijia Residential Area in Yi County)	0.026~0.031	0.075 (Class II)	Met
	A23 (Qimen No.1 Middle School in Qimen County)	0.026~0.035	0.075 (Class II)	Met
	A24 (Qishan Primary School in Qimen County)	0.026~0.031	0.075 (Class II)	Met
	A25 (Wenjiang Primary School in Qimen County)	0.026~0.033	0.075 (Class II)	Met
	A26 (Qimen No.2 Middle School in Qimen County)	0.025~0.034	0.075 (Class II)	Met
	A27 (Huangshan Donghua Technician School in Xiuning County)	0.028~0.035	0.075 (Class II)	Met
	A28 (Haiyang Middle School in Xiuning County)	0.028~0.031	0.075 (Class II)	Met
	A29 (Gucheng Village in Xiuning County)	0.026~0.035	0.035 (Class I)	Met
SO ₂	A5 (Changwu WWTS)	0.016~0.021	0.15 (Class II)	Met

(Daily Average)	A6 (Yejiia WWTS)	0.020~0.027	0.15 (Class II)	Met
	A7 (Xizhou-Xiafudu WWTS)	0.015~0.022	0.15 (Class II)	Met
	A8 (Hexi WWTS)	0.019~0.023	0.15 (Class II)	Met
	A9 (Suntian WWTS)	0.018~0.025	0.15 (Class II)	Met
	A10 (Yuetan-Luntang WWTS)	0.016~0.021	0.15 (Class II)	Met
	A11 (Fudun WWTS)	0.014~0.016	0.05 (Class I)	Met
	A12 (Taiping Villa in Huangshan District)	0.012~0.023	0.15 (Class II)	Met
	A13 (Yuhe Village in Huangshan District)	0.012~0.017	0.15 (Class II)	Met
	A14 (Hebian Village in Huangshan District)	0.013~0.017	0.15 (Class II)	Met
	A15 (Fuchun International Garden Residential Area in Huizhou District)	0.014~0.017	0.15 (Class II)	Met
	A16 (Sunshine Residential Area in Huizhou District)	0.015~0.022	0.15 (Class II)	Met
	A17 (Congmu Village in Huizhou District)	0.012~0.021	0.15 (Class II)	Met
	A18 (Piyun Shanzhuang Residential Area in She County)	0.014~0.018	0.05 (Class I)	Met
	A19 (Sanqingyan Villa Residential Area in She County)	0.018~0.020	0.15 (Class II)	Met
	A20 (Daming Villa Residential Area in She County)	0.012~0.018	0.15 (Class II)	Met
	A21 (Gaoqi Residential Area in Yi County)	0.020~0.022	0.15 (Class II)	Met
	A22 (Kaiyuan Shijia Residential Area in Yi County)	0.015~0.025	0.15 (Class II)	Met
	A23 (Qimen No.1 Middle School in Qimen County)	0.015~0.021	0.15 (Class II)	Met
	A24 (Qishan Primary School in Qimen County)	0.012~0.017	0.15 (Class II)	Met
	A25 (Wenjiang Primary School in Qimen County)	0.015~0.023	0.15 (Class II)	Met
	A26 (Qimen No.2 Middle School in Qimen County)	0.014~0.023	0.15 (Class II)	Met
	A27 (Huangshan Donghua Technician School in Xiuning County)	0.020~0.022	0.15 (Class II)	Met
	A28 (Haiyang Middle School in Xiuning County)	0.019~0.020	0.15 (Class II)	Met
	A29 (Gucheng Village in Xiuning County)	0.015~0.021	0.05 (Class I)	Met
NO ₂ (Daily Average)	A5 (Changwu WWTS)	0.021~0.029	0.08 (Class II)	Met
	A6 (Yejiia WWTS)	0.026~0.035	0.08 (Class II)	Met
	A7 (Xizhou-Xiafudu WWTS)	0.021~0.030	0.08 (Class II)	Met
	A8 (Hexi WWTS)	0.024~0.033	0.08 (Class II)	Met
	A9 (Suntian WWTS)	0.022~0.032	0.08 (Class II)	Met
	A10 (Yuetan-Luntang WWTS)	0.021~0.033	0.08 (Class II)	Met
	A11 (Fudun WWTS)	0.043~0.062	0.08 (Class I)	Met
	A12 (Taiping Villa in Huangshan District)	0.027~0.051	0.08 (Class II)	Met
	A13 (Yuhe Village in Huangshan District)	0.024~0.056	0.08 (Class II)	Met
	A14 (Hebian Village in Huangshan District)	0.040~0.056	0.08 (Class II)	Met
	A15 (Fuchun International Garden Residential Area in Huizhou District)	0.044~0.056	0.08 (Class II)	Met
	A16 (Sunshine Residential Area in Huizhou District)	0.031~0.055	0.08 (Class II)	Met
	A17 (Congmu Village in Huizhou District)	0.036~0.052	0.08 (Class II)	Met
	A18 (Piyun Shanzhuang Residential Area in She County)	0.048~0.054	0.08 (Class I)	Met
	A19 (Sanqingyan Villa Residential Area in She County)	0.033~0.042	0.08 (Class II)	Met

	A20 (Daming Villa Residential Area in She County)	0.036~0.045	0.08 (Class II)	Met
	A21 (Gaoqi Residential Area in Yi County)	0.033~0.037	0.08 (Class II)	Met
	A22 (Kaiyuan Shijia Residential Area in Yi County)	0.041~0.046	0.08 (Class II)	Met
	A23 (Qimen No.1 Middle School in Qimen County)	0.032~0.036	0.08 (Class II)	Met
	A24 (Qishan Primary School in Qimen County)	0.037~0.044	0.08 (Class II)	Met
	A25 (Wenjiang Primary School in Qimen County)	0.038~0.045	0.08 (Class II)	Met
	A26 (Qimen No.2 Middle School in Qimen County)	0.033~0.039	0.08 (Class II)	Met
	A27 (Huangshan Donghua Technician School in Xiuning County)	0.033~0.037	0.08 (Class II)	Met
	A28 (Haiyang Middle School in Xiuning County)	0.041~0.046	0.08 (Class II)	Met
	A29 (Gucheng Village in Xiuning County)	0.036~0.037	0.08 (Class I)	Met
H ₂ S (Hourly Average)	A1 (Shuangzhu WWTS)	ND	0.01 (Class II)	Met
	A2 (Xinyan WWTS)	ND	0.01 (Class II)	Met
	A3 (Wucun WWTS)	ND	0.01 (Class II)	Met
	A4 (Yaoxi WWTS)	ND	0.01 (Class II)	Met
	A5 (Changwu WWTS)	ND	0.01 (Class II)	Met
	A6 (Yeji WWTS)	ND	0.01 (Class II)	Met
	A7 (Xizhou-Xiafudu WWTS)	ND	0.01 (Class II)	Met
	A8 (Hexi WWTS)	ND	0.01 (Class II)	Met
	A9 (Suntian WWTS)	ND	0.01 (Class II)	Met
	A10 (Yuetan-Luntang WWTS)	ND	0.01 (Class II)	Met
	A11 (Fudun WWTS)	ND	0.01 (Class I)	Met
Ammonia gas (Hourly Average)	A1 (Shuangzhu WWTS)	ND	0.2 (Class II)	Met
	A2 (Xinyan WWTS)	ND	0.2 (Class II)	Met
	A3 (Wucun WWTS)	ND	0.2 (Class II)	Met
	A4 (Yaoxi WWTS)	ND	0.2 (Class II)	Met
	A5 (Changwu WWTS)	ND	0.2 (Class II)	Met
	A6 (Yeji WWTS)	ND	0.2 (Class II)	Met
	A7 (Xizhou-Xiafudu WWTS)	ND	0.2 (Class II)	Met
	A8 (Hexi WWTS)	ND	0.2 (Class II)	Met
	A9 (Suntian WWTS)	ND	0.2 (Class II)	Met
	A10 (Yuetan-Luntang WWTS)	ND	0.2 (Class II)	Met
	A11 (Fudun WWTS)	ND	0.2 (Class I)	Met

(c) Acoustic environment

141. Noise monitoring in the project area was conducted at 23 locations (Table IV-11). Geographic coordinates of the sampling locations are described in Appendix 6. Noise levels at all locations met the PRC Environmental Quality Standard for Noise (GB3096-2008) – Class II or Class IV-a (along the main road) (Table IV-12).

Table IV-11: Monitoring Location for Noise Baseline

Sampling No.	Location	Purpose of Monitoring
N1	Tangjiazhou Village in Xiuning County	Ambient noise baseline
N2	Wu Village in Tunxi District	Ambient noise baseline

N3	Changwu Village in Huizhou District	Ambient noise baseline
N4	Yejiazu Village in She County	Ambient noise baseline
N5	Hexi Village in Xiuning County	Ambient noise baseline
N6	Taiping Villa in Huangshan District	Noise Baseline at sensitive point
N7	Yuhe Village in Huangshan District	Ambient noise baseline
N8	Hebian Village in Huangshan District	Ambient noise baseline
N9	Fuchun International Garden Residential Area in Huizhou District	Noise Baseline at sensitive point
N10	Sunshine Residential Area in Huizhou District	Noise Baseline at sensitive point
N11	Congmu Village in Huizhou District	Ambient noise baseline
N12	Piyun Shanzhuang Residential Area in She County	Noise Baseline at sensitive point
N13	Sanqingyan Villa Residential Area in She County	Noise Baseline at sensitive point
N14	Daming Villa Residential Area in She County	Noise Baseline at sensitive point
N15	Gaoqi Residential Area in Yi County	Noise Baseline at sensitive point
N16	Kaiyuan Shijia Residential Area in Yi County	Noise Baseline at sensitive point
N17	Qimen No.1 Middle School in Qimen County	Noise Baseline at sensitive point
N18	Qishan Primary School in Qimen County	Noise Baseline at sensitive point
N19	Wenjiang Primary School in Qimen County	Noise Baseline at sensitive point
N20	Qimen No.2 Middle School in Qimen County	Noise Baseline at sensitive point
N21	Huangshan Donghua Technician School in Xiuning County	Noise Baseline at sensitive point
N22	Haiyang Middle School in Xiuning County	Noise Baseline at sensitive point
N23	Gucheng Village in Xiuning County	Ambient noise baseline

Table IV-12: Baseline Noise Monitoring Data (dB(A))

Sampling No.	Time	Monitoring Result		Standard of GB3096-2008	Standard compliance
		18 May 2019	19 May 2019		
N1	Day	51.3	50.9	60 (Class II)	Met
	Night	47.2	48.6	50 (Class II)	Met
N2	Day	51.2	50.6	60 (Class II)	Met
	Night	48.2	47.6	50 (Class II)	Met
N3	Day	51.3	51.8	60 (Class II)	Met
	Night	46.8	46.2	50 (Class II)	Met
N4	Day	50.8	52.0	60 (Class II)	Met
	Night	47.8	47.0	50 (Class II)	Met
N5	Day	52.1	53.4	60 (Class II)	Met
	Night	46.9	47.5	50 (Class II)	Met
N6	Day	51.6	51.2	70 (Class IV-a)	Met
	Night	45.9	46.3	55 (Class IV-a)	Met
N7	Day	51.8	50.2	70 (Class IV-a)	Met
	Night	45.2	45.8	55 (Class IV-a)	Met
N8	Day	51.7	49.6	70 (Class IV-a)	Met
	Night	44.4	44.3	55 (Class IV-a)	Met
N9	Day	52.3	52.1	70 (Class IV-a)	Met
	Night	47.0	46.2	55 (Class IV-a)	Met
N10	Day	50.9	51.0	70 (Class IV-a)	Met
	Night	46.8	44.8	55 (Class IV-a)	Met
N11	Day	49.2	50.3	70 (Class IV-a)	Met
	Night	45.2	45.9	55 (Class IV-a)	Met
N12	Day	50.3	49.6	70 (Class IV-a)	Met
	Night	46.8	47.1	55 (Class IV-a)	Met

N13	Day	51.1	49.8	70 (Class IV-a)	Met
	Night	45.8	46.0	55 (Class IV-a)	Met
N14	Day	51.8	52.6	70 (Class IV-a)	Met
	Night	48.2	47.1	55 (Class IV-a)	Met
N15	Day	50.7	52.8	70 (Class IV-a)	Met
	Night	46.3	45.8	55 (Class IV-a)	Met
N16	Day	52.3	53.0	70 (Class IV-a)	Met
	Night	44.2	43.9	55 (Class IV-a)	Met
N17	Day	51.8	50.9	70 (Class IV-a)	Met
	Night	46.8	47.1	55 (Class IV-a)	Met
N18	Day	50.8	51.8	70 (Class IV-a)	Met
	Night	47.5	46.9	55 (Class IV-a)	Met
N19	Day	51.9	52.0	70 (Class IV-a)	Met
	Night	46.2	47.8	55 (Class IV-a)	Met
N20	Day	50.3	50.9	70 (Class IV-a)	Met
	Night	46.5	45.8	55 (Class IV-a)	Met
N21	Day	52.6	53.4	70 (Class IV-a)	Met
	Night	45.3	47.2	55 (Class IV-a)	Met
N22	Day	51.4	52.6	70 (Class IV-a)	Met
	Night	46.8	46.0	55 (Class IV-a)	Met
N23	Day	53.3	54.0	70 (Class IV-a)	Met
	Night	45.2	46.1	55 (Class IV-a)	Met

(d) Groundwater quality

142. Baseline groundwater quality within the project area were monitored by Anhui Guosheng Testing Technology Co., Ltd. during 18-24 May, 2019. Fifteen sampling points were selected (Table IV-13) and results are in Table IV-14. Geographic coordinates of the sampling locations are described in Appendix 6. Volatile phenols, cyanide, chromium (VI), cadmium, manganese, arsenic, mercury were not detected in all groundwater samplings. According to the monitoring results, the concentrations of $\text{NH}_3\text{-N}$ at GW 3 (Xizhou-Xiafudu WWTS) and GW 5 (Suntian WWTS) exceeded the Class III standard of GB/T 14848-2017, which mainly due to the discharge of domestic wastewater from villages in surrounding areas. The concentrations of all other parameters met the Class III standard.

Table IV-13: Monitoring Points for Baseline Monitoring of Groundwater Quality

Sampling No.	Sampling point (location)	Groundwater quality function	Remark
GW1	Changwu WWTS	GB/T 14848-2017 Class III	Huizhou District
GW2	Yejiazu WWTS		She County
GW3	Xizhou-Xiafudu WWTS		Xiuning County
GW4	Hexi WWTS		Xiuning County
GW5	Suntian WWTS		Xiuning County
GW6	Yuetan-Luntang WWTS		Xiuning County
GW7	Fudun WWTS		Tunxi District
GW8	Wucun WWTS		Tunxi District
GW9	Shuangzhu WWTS		Xiuning County
GW10	Xinyan WWTS		Xiuning County
GW11	Yaoli WWTS		Xiuning County
GW12	Xinhua Oil Tea Ecological Demonstration Park		Huangshan District

GW13	Nanping Village Characteristic Agricultural Park		She County
GW14	Takeng Citrus Demonstration Park		She County
GW15	Miantan Loquat Demonstration Park		She County

Table IV-14: Water Quality Monitoring Results – May 2019
(Unit: mg/L, except pH)

Sampling No.	Item	pH	NH ₃ -N	Nitrate	Nitrite	Fluoride	Chloride	Sulfate	Total Hardness	TDS	DO	Total Coliform
	Class III Standard of GB/T 14848-2017	6.5-8.5	0.5	20	1.0	1.0	250	250	450	1000	3	3
GW1	Result	7.66	0.052	10.6	0.008	0.62	24	34	160	184	1.2	<3
	Standard compliance	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met
GW2	Result	7.84	0.036	12.9	0.007	0.59	38	40	184	278	1.3	<3
	Standard compliance	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met
GW3	Result	6.62	0.6	14.1	0.004	0.65	ND	ND	112	164	1.3	<3
	Standard compliance	Met	Exceeded	Met	Met	Met	Met	Met	Met	Met	Met	Met
GW4	Result	6.53	0.302	0.23	0.071	0.75	ND	11	42	94	1.5	<3
	Standard compliance	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met
GW5	Result	6.92	1.09	1.93	0.02	0.88	ND	ND	82	106	1.4	<3
	Standard compliance	Met	Exceeded	Met	Met	Met	Met	Met	Met	Met	Met	Met
GW6	Result	7.23	ND	ND	0.006	0.61	ND	25	78	106	1.4	<3
	Standard compliance	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met
GW7	Result	7.04	ND	0.16	ND	0.7	32	36	212	276	1.3	<3
	Standard compliance	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met
GW8	Result	6.84	ND	6.25	ND	0.69	13	16	104	160	1.2	<3
	Standard compliance	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met
GW9	Result	7.32	ND	2.6	0.011	0.89	ND	10	68	100	2.4	<3
	Standard compliance	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met
GW10	Result	5.93	ND	16.1	ND	0.71	13	ND	156	190	1.1	<3
	Standard compliance	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met
GW11	Result	7.92	0.228	0.14	0.019	0.68	ND	ND	172	228	1.3	<3
	Standard compliance	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met
GW12	Result	7.55	0.205	3.52	0.018	0.84	20	40	133	155	1.5	<3
	Standard compliance	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met
GW13	Result	7.36	0.336	10.6	0.015	0.74	18	32	111	169	1.4	<3
	Standard compliance	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met
GW14	Result	7.29	0.341	9.25	ND	0.72	20	28	132	210	1.3	<3
	Standard compliance	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met
GW15	Result	7.41	0.286	4.28	0.014	0.66	ND	41	165	187	1.3	<3
	Standard compliance	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met	Met

ND = not detected.

V. ANTICIPATED IMPACTS AND MITIGATION MEASURES

A. Project Area of Influence and Sensitive Receptors

143. To define the geographic scope of the impact assessment, the “project area of influence” and “sensitive receptors” were identified. The project area of influence was defined as the total area which might be subject to adverse impacts of the project. This was based on the locations of sensitive receptors, defined as settlements and/or environmental values that might be affected by the associated construction and/or operation activities. The receptors vulnerable to construction/operation impacts (Tables V-1 to V-7) comprise: (i) villages, communities and/or public buildings (e.g. schools, hospitals, offices, if any) potentially subject to noise/vibration emissions, air pollution, altered water quality or supply, as well as environment-related social impacts; (ii) public service facilities vulnerable to disturbance or pollution e.g. water source protection areas and/or national scenic areas; (iii) surface water resources; and (iv) vegetation and fauna habitats within or around the settlements, agricultural demonstration parks, and/or bamboo and forest plantations that might be affected by civil works.

144. The following distances were applied to identify the sensitive receptors: (i) for construction and/or operational noise – receptors within 200 m of the noise-generating source; (ii) for construction-related air quality impacts (e.g. particulates from road excavation) – receptors within 200 m of the source; (iii) for construction/operation-related surface water quality impact - surface water within 300 m upstream and 1000 m downstream from the construction sites. These distances combined with the direct construction sites, were assumed to encompass the total project area of influence.

Table V-1: Environmentally Sensitive Receptors – Huangshan District

Subproject	No.	Sensitive Receptor	Distance and direction from works to sensitive receptor	Households (HH) and # people	Impact
A. Ambient air and acoustic environment					
Village Environment Improvement Project in Xinhua Village	1B-4	Dianjie	N110 m	140HH, 350persons	Noise, air pollution
		Laowu	S30 m	80HH, 200persons	
		Gaoshan	NE38 m	48HH, 120persons	
		Michong	W20 m	12HH, 30persons	
		Michong	N11 m	12HH, 30persons	
		Michong	W14 m	8HH, 20persons	
		Michong	W15 m	8HH, 20persons	
		Shaochong	E20 m	8HH, 20persons	
		Shaochong	N7 m	20HH, 50persons	
		Shaochong	NE30 m	12HH, 30persons	
		Shaochong	N15 m	8HH, 20persons	
		Shaochong	S5 m	8HH, 20persons	
		Shaochong	S5 m	8HH, 20persons	

	Junlingjiao wastewater treatment station 1		Junlingjiao	S17 m	12HH, 30persons	
	Junlingjiao wastewater treatment station 2		Junlingjiao	E5 m	12HH, 30persons	
	Junlingjiao wastewater treatment station 3		Junlingjiao	NW48 m	12HH, 30persons	
	Jinkengzi wastewater treatment station 1		Jinkengzi	W45 m	16HH, 40persons	
	Jinkengzi wastewater treatment station 2		Jinkengzi	W37 m	20HH, 50persons	
Forestry Demonstration Base in Xinhua Village of Huangshan District	Baishabao Lei Bamboo Ecological Demonstration Park	2-2	Zhangzhuangcun	W37 m	7HH, 20persons	Noise, air pollution
	Xinchang Lei Bamboo Ecological Demonstration Park		Xiazhuang	N200 m	3HH, 10persons	
			Tanghua	N200 m	10HH, 30persons	
Caocun River Rehabilitation Project in Xinhua Village		1C-2	Dongbian	E10 m	12HH, 30persons	Noise, air pollution
			Shengjia	E10 m	40HH, 120persons	
			Dingxuandian	E25 m	10HH, 30persons	
Sewage and Stormwater Sewer Upgrade Project in Huangshan District	Sewage Interception Main of Puxi Road	1A-2	Wangjiacun	W30 m	300HH, 1200persons	Noise, air pollution
			Hebian	E40 m	120HH, 360persons	
			Zhangjiageng	W20 m	70HH, 280persons	
			Shangchajia	W50 m	150HH, 600persons	
			Zifancun	E15 m	100HH, 400persons	
			Muqiaotou	E20 m	30HH, 120persons	
			Batou	W40 m	50HH, 160persons	
			Zhimaqiu	E80 m	10HH, 40persons	
			Bijia	E50 m	35HH, 140persons	
			Feicuihuating Residential Area	E80 m	1000HH, 400persons	
	Industrial Park Management Committee of Huangshan District		W40 m	100persons		
	Stormwater Pipe of Pinghu East Road		Yujingshangzhuan Residential Area	S20 m	1000HH, 3200perons	
			Quanhuaashunjingyuan Residential Area	N20 m	1000HH, 3200perons	
			Dujuanhuayuan Residential Area	S20 m	400HH, 1200persons	
	Stormwater Pipe of Qingxi Road and Yuping South Road		Furong Residential Area	S30 m	800HH, 2400persons	
			Minyuanxincun Residential Area	N30 m	1200HH, 3600persons	
			Dingshengyuxuanhuayuan Residential Area	S30 m	1000HH, 3000persons	
			Haianhuayuan Residential Area	E20 m	1200HH, 3600persons	

B. Surface water

Village Environment Improvement Project in Xinhua Village	1B-4	Taiping Lake	S80 m	/	Water pollution
Sewage and Stormwater Sewer Upgrade Project in Huangshan District	1A-2	Puxi River	E10 m	/	Water pollution
Caocun River Rehabilitation Project in Xinhua Village	1C-2	Caocun River	River revetment/flood walls to be constructed along the river bank	/	Water pollution
C. Ecological Environment					
Village Environment Improvement Project in Xinhua Village	1B-4	Taiping Lake Scenic Zone	National scenic zone	/	Important ecological

Source: DEIA institute

Table V-2: Environmentally Sensitive Receptors – Huizhou District

Subproject		No.	Sensitive Receptor	Distance and direction from works to sensitive receptor	Households (HH) and # people	Impact
A. Ambient air and acoustic environment						
Sewage and Stormwater Sewer System Upgrade Project in Huizhou District		1A-1	Zhufang	W30 m	100HH, 380persons	Noise, Air pollution
			Guanghuicun	E20 m	200HH, 700persons	
			Xiajiecun	E10 m	50HH, 180persons	
			Fushancun	W20 m	400HH, 1500persons	
			Shanglukou	W20 m	500HH, 200persons	
			Liguangshan	E10 m	300HH, 100persons	
Village Environment Improvement Project in Huizhou District	Changwucun wastewater treatment station	1B-2	Changwucun	E65 m	8HH, 20persons	Noise, Air pollution
	Shankoucun wastewater treatment station		Shankoucun	E70 m	10HH, 25persons	
	Huangcun wastewater treatment station		Huangcun	W50 m	6HH, 18persons	
	Zhangcun wastewater treatment station		Zhangcun	N30 m	15HH, 50persons	
	Dalingxinagzu wastewater treatment station		Dalingxiang	W70 m	5HH, 20persons	
	Wucun wastewater treatment station		Wucun	E70 m	15HH, 50persons	

	Changwucun wastewater treatment station		Changwucun	E65 m	80HH, 300persons	
	Shankoucun wastewater treatment station		Shankoucun	E70 m	100HH, 380persons	
	Huangcun wastewater treatment station		Huangcun	W50 m	80HH, 300persons	
	Zhangcun wastewater treatment station		Zhangcun	N30 m	15HH, 50persons	
	Dalingxinagzu wastewater treatment station		Dalingxiang	W70 m	5HH, 20persons	
	Wucun wastewater treatment station		Wucun	E70 m	15HH, 50persons	
A. Surface water						
Sewage and Stormwater Sewer System Upgrade Project in Huizhou District		1A-1	Fengle River	S70 m	/	Water pollution
Village Environment Improvement Project in Huizhou District		1B-2	Fengle River	W70 m	/	Water pollution

Source: the DEIA institute

Table V-3: Environmentally Sensitive Receptors – Tunxi District

Table V-5: Environmentally Sensitive Receptors – Tunxi District						
Subproject		No.	Sensitive Receptor	Distance and direction from works to sensitive receptor	Households (HH) and # people	Impact
A. Ambient air and acoustic environment						
Village Environment Improvement Project in Tunxi District	Fudun wastewater treatment station	1B-1	Fulicun	E56 m	90HH, 290persons	Noise, air pollution
	Litangxia wastewater treatment station			W26 m	50HH, 180persons	
	Wucun wastewater treatment station		Wucun	E60 m	25HH, 90persons	
			Jiangchong	S130 m	25HH, 80persons	
	Zhucun wastewater treatment station		Wainantangcun	W55 m	26HH, 95persons	
B. Surface water						
Village Environment Improvement Project in Tunxi District		1B-1	Xin'an River	E150 m	/	Water pollution
C. Ecological Environment						
Village Environment Improvement Project in Tunxi District	Fudun wastewater treatment station	1B-1	Huashan Mysterious Grottoes Scenic Zone	National scenic zone	/	Important ecologically sensitive areas
	Litangxia wastewater treatment station				/	
	Wucun wastewater treatment station				/	

Source: the DEIA institute

Table V-4: Environmentally Sensitive Receptors – Qimen County

Table V-4: Environmental Sensitive Receptors – Qimen County					
Subproject	No.	Sensitive Receptor	Distance and direction from construction site to nearest sensitive receptor	Households (HH) / # people	Impact
A. Ambient air and acoustic environment					
Sewage and Stormwater Sewer Upgrade Project in Qimen County	1A-6	Qimen County NO.1 Middle School	E10 m	2500 persons	Noise, air pollution
		Limingcun	W10 m	40HH / 120	
		Baolichengshihuayuan Residential Area	E10 m	360HH / 1500	
		Yingkeshanshuihuayuan Residential Area	E10 m	100HH / 400	
		Qimen County Qishan Primary School	W88 m	1000 persons	
		Qimen County traditional Chinese medicine Hospital	W10 m	900 persons	
		Qihuahongyuan Residential Area	W10 m	800 HH / 3200	
		Shijiyuan Residential Area	W10 m	300 HH / 1200	
		Taoyuanxincun Residential Area	W5 m E5 m	80HH / 320	
		Shanghaihuayuan	W200 m	1500HH / 6000	
		Qimen County NO.2 Middle School	W35 m	2000 persons	
		Qimen County Chang River Primary School	W5 m	1800 persons	
		Changjiangmingyuan Residential Area	E5 m	60HH / 240	
		Nanchengshui Residential Area	N5 m	500HH / 1500	
		Fenghuang Residential Area	W5 m E5 m	700HH / 2800	
		Qishanhuanyuan Residential Area	N5 m	400HH / 1600	
		Xin'anyuan Residential Area	S5 m	60HH / 1240	
		Ping'an Hospital	E5 m	500 persons	
		Xinxing Road North Side Residential Area	N5 m	200HH / 800	
		Shidaijiayuan Residential Area	W105 m	300HH / 1200	
Shanshuimingmen Residential Area	N5 m	1000HH / 4000			
B. Surface water					
Sewage and Stormwater Sewer Upgrade Project in Qimen County	1A-6	Chang River	E40 m	/	Water pollution

Subproject		No.	Sensitive Receptor	Distance and direction from works to sensitive receptor	Household s (HH) and # people	Impact ⁶⁴
A. Ambient air and acoustic environment						
Village Environment Improvement Project in She County	Taoyuancun wastewater treatment station	1A-5	Yanxia	E80 m	50HH, 160persons	Noise, air pollution
			Dongfeng	W170 m	50HH, 160persons	
	Hongcunkou wastewater treatment station		Hongcunkou	E150 m	180HH, 490persons	
	Wangcha wastewater treatment station		Wangchanan	SE130 m	90HH, 350persons	
	Hucha wastewater treatment station		Hucha	W110 m	40HH, 126persons	
	Zikeng wastewater treatment station		Zikeng	N120 m	200HH, 630persons	
	Yecha wastewater treatment station		Yecha	W20 m	170HH, 530persons	
	Yejiazu wastewater treatment station		Yejiazu	W10 m	380HH, 490persons	
	Banlingzu wastewater treatment station		Banlingzu	N70 m	50HH, 420persons	
	Chengjiazu wastewater treatment station		Chengjiazu	10 m	150HH, 120persons	
	Panwu wastewater treatment station		Panwu	E20 m	30HH, 93persons	
	Changqingzu wastewater treatment station		Changqingzu	W10 m	69HH, 186persons	
	Shiliucun wastewater treatment station		Shiliucun	W10 m	85HH, 193persons	
	Xiayeqi wastewater treatment station		Xiayeqi	W30 m	56HH, 180persons	
	Xipo wastewater treatment station		Xipo	W90 m	88HH, 350persons	
Xiaohekeng wastewater treatment station	Xiaohekeng	W140 m	54HH, 192persons			
Agricultural Demonstration Base along Xin'an River (She County Section)	Nanping Village Agricultural Park in Huicheng Town, Shexian County	2-1	Nanpingcun	S20 m	100HH, 100persons	Noise, air pollution
			Wangjiaqi	W20 m	50HH, 180persons	
	Takeng Orange Demonstrational Park, Xinxikou township		Chaoshanjiann	N100 m	20HH, 70persons	
			Shitatou	30 m	20HH, 70persons	
			Takeng	E130 m	30HH, 93persons	
	Miantan Loquat Demonstration Park		Miantancun	W30 m	200HH, 800persons	
Tourism Infrastructure Improvement along Xin'an River (She County Section)	Wangcun Town	1B-6	Yancun	10 m	500HH, 2000person s	Noise, air pollution
			Zhujiabao	E20 m	100HH, 400persons	
	Xiongcun Town		West side of Parking lot	W15 m	3HH, 10persons	
			Hushang	SE100 m	60HH, 240persons	

	Huicheng Town		Wangjiaqi	S100 m	50HH, 200persons	
			Nanpingcun	W100 m	60HH, 240persons	
			Yutancun	E100 m	350HH, 1400person s	
			Wanglongke ngcun	E100 m	150HH, 600persons	
	Kengkou Township		Jintancun	S10 m	200HH, 800persons	
			Yutancun	W80 m	350HH, 1400person s	
			Yuyuancun	W100 m	400HH, 1600person s	
	Shendu Town		Chengjiazhai	S40 m	40HH, 150persons	
	Xiaochuan Township		Chengjiajie	N15 m	20HH, 70persons	
	Xinxikou Township		Takeng	W20 m	12HH, 50persons	
			Shitatou	/	40HH, 120person	
			Chaojiansha n	N40 m	25HH, 100persons	
	Shendu Town Miantan Township		Miantancun	E20 m	150HH, 600persons	
	Shendu Town Foling		Chengjiazhai	S60 m	60HH, 240persons	
	Shendu Town Mianxi		Mianxi	N70 m	80HH, 320persons	
	Jiekou		Guanshan	S10 m	60HH, 240persons	
Wuyang	Damengcun	E10 m	30HH, 90persons			
	Dakengyuan cun	E100 m	30HH, 90persons			
B. Surface water						
Sewage and Stormwater Sewer Upgrade Project in She County	1A-5	Fengle River	S90 m	/	Water pollution	
		Fuzishui River	S100 m	/		
		Lianjiang River	W90 m	/		
		Xin'an River	S100 m	/		
Tourism Infrastructure Improvement along Xin'an River (She County Section)	1B-6	Xin'an River	S10 m	/	Water pollution	
Village Environment Improvement Project in She County	1B-5	Xin'an River	N10 m	/	Water pollution	
C. Ecological Environment						
Tourism Infrastructure Improvement along Xin'an River (She County Section)	1B-6	Huashan Mysterious Grottoes Scenic Zone	National	/	Important ecological ly sensitive areas	

Source: the DEIA institute

Table V-5: Environmentally Sensitive Receptors – She County

Subproject	No.	Sensitive Receptor	Description	Households (HH) and # people	Impact
A. Ambient air and acoustic environment					
Village Environment Improvement Project in She County	1A-5	Yanxia	E80 m	50HH, 160persons	Noise, air pollution
		Dongfeng	W170 m	50HH, 160persons	
		Hongcunkou	E150 m	180HH, 490persons	
		Wangchanan	SE130 m	90HH, 350persons	
		Hucha	W110 m	40HH, 126persons	
		Zikeng	N120 m	200HH, 630persons	
		Yecha	W20 m	170HH, 530persons	
		Yejiazu	W10 m	380HH, 490persons	
		Banlingzu	N70 m	50HH, 420persons	
		Chengjiazu	10 m	150HH, 120persons	
		Panwu	E20 m	30HH, 93persons	
		Changqingzu	W10 m	69HH, 186persons	
		Shiliucun	W10 m	85HH, 193persons	
		Xiayeqi	W30 m	56HH, 180persons	
		Xipo	W90 m	88HH, 350persons	
		Xiaohekeng	W140 m	54HH, 192persons	
Agricultural Demonstration Base along Xin'an River (She County Section)	2-1	Nanpingcun	S20 m	100HH, 100persons	Noise, air pollution
		Wangjiaqi	W20 m	50HH, 180persons	
		Chaoshanjian	N100 m	20HH, 70persons	
		Shitatou	30 m	20HH, 70persons	
		Takeng	E130 m	30HH, 93persons	
		Miantancun	W30 m	200HH, 800persons	
Tourism Infrastructure Improvement along Xin'an River (She County Section)	1B-6	Yancun	10 m	500HH, 2000persons	Noise, air pollution
		Zhujiabao	E20 m	100HH, 400persons	
		West side of Parking lot	W15 m	3HH, 10persons	
		Hushang	SE100 m	60HH,	

					240persons	
	Huicheng Town		Wangjiaqi	S100 m	50HH, 200persons	
			Nanpingcun	W100 m	60HH, 240persons	
			Yutancun	E100 m	350HH, 1400persons	
			Wanglongkeng cun	E100 m	150HH, 600persons	
	Kengkou Township		Jintancun	S10 m	200HH, 800persons	
			Yutancun	W80 m	350HH, 1400persons	
			Yuyuancun	W100 m	400HH, 1600persons	
			Chengjiazhai	S40 m	40HH, 150persons	
	Shendu Town		Chengjiajie	N15 m	20HH, 70persons	
	Xinxikou Township		Takeng	W20 m	12HH, 50persons	
			Shitatou	/	40HH, 120person	
			Chaojianshan	N40 m	25HH, 100persons	
			Miantancun	E20 m	150HH, 600persons	
	Shendu Town Miantan Township		Chengjiazhai	S60 m	60HH, 240persons	
	Shendu Town Foling		Mianxi	N70 m	80HH, 320persons	
Shendu Town Mianxi	Guanshan	S10 m	60HH, 240persons			
Jiekou	Damengcun	E10 m	30HH, 90persons			
Wuyang	Dakengyuancu n	E100 m	30HH, 90persons			
B. Surface water						
Sewage and Stormwater Sewer Upgrade Project in She County	1A-5	Fengle River	S90 m	/	Water pollution	
		Fuzishui River	S100 m	/		
		Lianjiang River	W90 m	/		
		Xin'an River	S100 m	/		
Tourism Infrastructure Improvement along Xin'an River (She County Section)	1B-6	Xin'an River	S10 m	/	Water pollution	
Village Environment Improvement Project in She County	1B-5	Xin'an River	N10 m	/	Water pollution	
C. Ecological Environment						
Tourism Infrastructure Improvement along Xin'an River (She County Section)	1B-6	Huashan Mysterious Grottoes Scenic Zone	National	/	Important ecologically sensitive areas	

Source: the DEIA institute

Table V-6: Environmentally Sensitive Receptors – Xiuning County

Subproject	No.	Sensitive Receptor	Distance and direction from works	Household s (HH) and # people	Impact
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				to sensitive receptor		
A. Ambient air and acoustic environment						
Sewage and Stormwater Sewer Upgrade Project in Xiuning County		1A-3	Chetiancun	NW20 m	60HH, 230persons	Noise, air pollution
			Xiachetian	NW30 m	30HH, 110persons	
			Niutoucun	W30 m	50HH, 180persons	
			Wan'anzhen	E38 m	100HH, 380persons	
			North Side School	E30 m	300persons	
			Nanjiecun	N20 m	200persons	
			Chuanhucun	N20 m	100persons	
			Wan'anzhen	E38 m	100HH, 380persons	
			Lunhecun	S20 m	80HH, 280persons	
			Wanxincun	S22 m	100HH, 380persons	
			Zhentoushan	W5 m	200HH, 700persons	
			Wenxi	W4 m	300HH, 110persons	
			Gucheng	W90 m	30HH, 110persons	
			Shangguan cun	W70 m	20HH, 70persons	
Village Environment Improvement Project in Xiuning County	Xiafudu wastewater treatment station	1B-1	Xiafudu	NW30 m	20HH, 90persons	Noise, air pollution
	Hexi wastewater treatment station		Hexicun	W40 m	70HH, 250persons	
	Xizhou wastewater treatment station		Xizhou	W20 m	40HH, 150persons	
	Tangchuan wastewater treatment station		Tangjiazhou	W20 m	200HH, 700persons	
	Yaoxi wastewater treatment station		Yaoxicun	W200m	10HH, 20persons	
	Shuangzhu wastewater treatment station		Shuangqiaocun	E70 m	50HH, 180persons	
	Dalu wastewater treatment station		Dalu	E70 m	10HH, 40persons	
	Xiafu wastewater treatment station		Xiafu	W80 m	15HH, 55persons	
	Futan wastewater treatment station		Futan	W60 m	18HH, 60persons	
	Hongfang wastewater treatment station		Hongfang	N65 m	40HH, 150persons	
	Shangyangcun wastewater treatment station		Shangyang cun	W73 m	35HH, 140persons	
	Yanchao wastewater treatment station		Yanchao	W65 m	20HH, 75persons	
	Xiazhuang wastewater treatment station		Xiazhuang	E80 m	80HH, 300persons	
	Suntian wastewater treatment station		Suntian	W58 m	50HH, 180persons	

Wutian wastewater treatment station	Wutian	NE70 m	60HH, 230persons
Xingzhou-Xi'an wastewater treatment station	Xi'an	W20 m	40HH, 150persons
Longwancun-Zhouxie wastewater treatment station	Zhouxie	W20 m	20HH, 70persons
Yuetan-Luntang wastewater treatment station	Luntangcun	W150 m	60HH, 230persons
Xibei wastewater treatment station	Xibei	NW50 m	20HH, 70persons
Xikou-Shikeng wastewater treatment station	Songjiazhou	S30 m	20HH, 70persons
Jiangtanzhongxincun wastewater treatment station	Jiangtanzhongxincun	N50 m	80HH, 310persons
Bingtang-Taixincun wastewater treatment station	Taixincun	NE30 m	80HH, 310persons
Bingtang-Zhujiatie wastewater treatment station	Zhujiatie	S30 m	50HH, 190persons
Xiafudu wastewater treatment station	Xiafudu	NW30 m	20HH, 90persons
Xizhou wastewater treatment station	Xizhou	W20 m	120HH, 400persons
Tangchuan wastewater treatment station	Tangjiazhou	W20 m	200HH, 700persons
	Zhujiacha	N150 m	30HH, 110persons
Yaoxi wastewater treatment station	Yaoxicun	W200 m	200HH, 700persons
Shuangzhu wastewater treatment station	Shuangqiaocun	E70 m	400HH, 1500persons
Dalu wastewater treatment station	Dalu	E70 m	10HH, 40persons
	Licun	NW109 m	20HH, 70persons
	Jingxiang	NE167 m	30HH, 110persons
Xiafu wastewater treatment station	Xiafu	W80 m	15HH, 55persons
Futan wastewater treatment station	Futan	W60 m	18HH, 60persons
Hongfang wastewater treatment station	Hongfang	N65 m	40HH, 150persons
Shangyangcun wastewater treatment station	Shangyangcun	W73 m	35HH, 140persons
Yanchao wastewater treatment station	Yanchao	W65 m	20HH, 75persons
Xiazhuang wastewater treatment station	Xiazhuang	E80 m	80HH, 300persons
Suntian wastewater treatment station	Suntian	W58 m	150HH, 500persons

	Wutian wastewater treatment station		Wutian	NE70 m	60HH, 230persons	
	Hexi wastewater treatment station		Hexicun	W40 m	70HH, 250persons	
	Xingzhou-Xi'an wastewater treatment station		Xi'an	W20 m	40HH, 150persons	
	Longwancun-Zhouxie wastewater treatment station		Zhouxie	W20 m	20HH, 70persons	
	Yuetan-Luntang wastewater treatment station		Luntangcun	W150 m	60HH, 230persons	
	Xibei wastewater treatment station		Xibei	NW50 m	20HH, 70persons	
	Xikou-Shikeng wastewater treatment station		Songjiazhou	S30 m	20HH, 70persons	
	Jiangtanzhongxincun wastewater treatment station		Jiangtanzhongxincun	N50 m	80HH, 310persons	
	Bingtang-Taixicun wastewater treatment station		Taixicun	NE30 m	80HH, 310persons	
	Bingtang-Zhujiatie wastewater treatment station		Zhujiatie	S30 m	50HH, 190persons	
B. Surface water						
Sewage and Stormwater Sewer Upgrade Project in Xiuning County	1A-3	Xin'an River	S130 m	/	Water pollution	
Village Environment Improvement Project in Xiuning County	1B-1	Xin'an River	S100 m	/		

Source: the DEIA institute

Table V-7: Environmentally Sensitive Receptors – Yi County

Subproject	No.	Sensitive Receptor	Distance and direction from works to sensitive receptor	Households (HH) and # people	Impact
A. Ambient air and acoustic environment					
Zhang River Rehabilitation Project in Yi County		Jiangjiaduan	S30 m	20HH,80persons	Noise, air pollution
		Biyang Primary School	N40 m	300persons	
		Xiagaoqi	N60 m	20HH,80persons	
		Shanggaoqi	N10 m	100HH,300persons	
		Shangyanbu	N10 m	70HH,200persons	
		Madao	S30 m	80HH,240persons	
		Beicun	S30 m	2000HH,6000persons	
		Biyang Junior Middle School	N20 m	1200persons	
Zhang River Rehabilitation Project in Yi County	1C-1	Dongjie Residential Area	S10 m	600HH,2400persons	Noise, air pollution
		Dongjia Residential Area	S10 m	50HH,150persons	
		Madao Residential Area	S30 m	80HH,240persons	
		Beicun Residential Area	S30 m	2000HH,6000persons	

Sewage and Stormwater Sewer Upgrade Project in Yi County	1A-4	Shanshuitonghe Residential Area	W10 m	300HH,1200persons	Noise, air pollution
		Taoyuan Residential Area	S10 m	120HH,480persons	
		Kaiyuanshijia Residential Area	S10 m	200HH,800persons	
		Yangguanghuayuan Residential Area	N10 m	400HH,1600persons	
		People Hospital	N10 m	600persons	
		Huimin Resdential Area	N10 m	400HH,1200persons	
		Gongyuanshoufu Residential Area	S10 m	200HH,800persons	
		Xinchenglijing Resdential Area	W10 m	150HH,600persons	
		Huifubieyuan Residential Area	N30 m	400HH,1600persons	
		Beicejumin Resdential Area	N10 m	1000HH,4000persons	
		Nancejumin Resdential Area	S70 m	30HH,120persons	
		Yangmeiwu	S150 m	50HH, 200persons	
B. Surface water					
Zhang River Rehabilitation Project in Yi County	1C-1	Zhang River	River revetment/flood walls to be constructed along the river bank	/	Water pollution
Sewage and Stormwater Sewer Upgrade Project in Yi County	1A-4	Hejia River	E10m	/	Water pollution

Source: the DEIA institute

B. Anticipated Project Benefits and Positive Impacts

145. Environmental benefits will be key outcomes of the project, including: (i) reduction of wastewater discharge in urban and rural areas; (ii) reduction of chemical fertilizer and pesticide application; (iii) reduction of water and soil erosion; (iv) increased flood resistance capacity; (v) improvement of eco-environment in rural areas for ecotourism development in Huangshan; (vi) improvement of water supply condition in rural areas; and (vii) enhancement of water resource and environmental monitoring and emergency response capacity in Huangshan.

146. **Reduced wastewater discharge.** According to the *Huangshan 13th Five Year Ecological Construction and Environmental Protection Plan (2016-2020)*, Huangshan shall achieve the treatment rate of 100% and 75% for urban and rural wastewater, respectively. The project designs to help address these targets include: (i) construction of 100.41 km of sewage pipes and 83.97 km of stormwater drainage pipes, which is estimated to increase the rate of wastewater collection and treatment from 94.9% to 100% in urban area;¹⁶ (ii) construction of 85 rural onsite wastewater treatment stations with associated 111.48 km of sewage collection pipes, which has a total treatment capacity of 2,359 m³/day.

147. **Reduced application rates of chemical fertilizer and pesticide.** The project will implement soil test formulated fertilization as well as promote organic fertilizer and biopesticide

¹⁶ Huangshan Municipality Statistical Yearbook of 2018.

or insecticidal lamps in six agricultural demonstration parks. It will result in a significant reduction of the use of agricultural chemicals: a reduction of chemical fertilizer by about 253 tons per year, compared to baseline conditions. The project's support for increased use of organic fertilizers reflects the increasing national trend toward improved food safety and "green production systems", as stated in the range of national plans for agriculture and water resources management. Under output 3, the project will design and pilot a Green Incentive Fund to financially support "green production" and sustainable green tea farming in Huangshan. The scheme is targeted to encourage tea gardens to adopt green farming practice and will offer farmers a subsidy for using organic fertilizer. Reduced use of pesticide will result in reduced residue of pesticide in and improved quality of agricultural products in Huangshan.

148. **Reduced water and soil erosion.** Pinewood is widely distributed in the Xin'an River Basin and plays an important role in water and soil conservation. The project will enhance the pine wilt prevention and control capacity in Huangshan by reinforcing quarantine inspection, monitoring and personnel training. Through the protection of forest resource, the healthy pinewood will contribute to reduction of water and soil erosion as well as to stabilize the ecosystem in Huangshan.

149. **Increase flood resistance capacity.** The project designs will help to address the following targets: (i) construct new river revetments, and add masonry height expansion to existing flood walls, along Zhang River and Caocun River to protect communities/villages along the rivers from flooding; and (i) remove the stones sedimented in the river channel to increase flow capacity. After the project completion, the flood control capacity of the targeted sections of Zhang River and Caocun River will achieve 20-year return and 10-year return criteria, respectively.

150. **Improved environmental monitoring and management.** The project will contribute to the following targets in the *Huangshan 13th Five Year Ecological Construction and Environmental Protection Plan (2016-2020)*: (i) enhance the capacity of environmental monitoring, supervision and emergency response; (ii) realize online environmental data review and real-time monitoring of pollution sources; and (iii) promote the construction of data center for environmental information sharing. The project designs to develop a Huangshan Smart Hydrology System, a Qimen County Smart Environment System and two smart environmental management systems for two industrial parks, which will improve the online environmental management, emergency response and information sharing capacities in Huangshan.

151. **Social and economic benefits.** About 297,000 residents will benefit from the project, including a rural population of 90,617 (30.5 %), 150,000 female beneficiaries, and 28,700 poor and low-income residents. For most villages under the project, residents will receive, for the first time, a reliable and safe drinking water supply. Broader, long term benefits for human health and quality of life will also result from the reduction of pollutants to waterbodies, improved safety and reduced damage from flooding, reduced use of agrichemicals, and jobs during construction and operations.

C. Pre-Construction Phase

152. Prior to construction, the following measures will be implemented to ensure project's environment management readiness:

- i) **Institutional strengthening.** (a) The Huangshan Municipal project management office (PMO) will assign at least one full-time, qualified environment officer to the PMO team. This officer will lead the coordination of the EMP; (b) the eight implementing agencies will each assign one full-time, qualified environment officer as part of the eight PMO teams; and (c) under the loan consulting services, the PMO will hire a loan implementation environment consultant (LIEC) as an external support.

- ii) **Updating the EMP.** In the event of any changes in project design, the EMP will be updated as necessary, including mitigation measures and monitoring. This will be the responsibility of the PMO and IAs, with support of the LIEC.
- iii) **Training in environmental management.** The LIEC will provide training in implementation and supervision of environmental mitigation measures to PIUs and contractors and construction supervision companies (CSCs). This will be organized by the PMO.
- iv) **Grievance Redress Mechanism (GRM).** The PMO and IAs will launch the project GRM at least two months before the start of construction, to ensure that project communities and public services (e.g. schools and hospitals) are well informed and to provide the opportunity to discuss and address any concerns.
- v) **Bidding document and contract documents.** The project environment management plan (EMP; Appendix 1) will be included in the bidding documents and contracts for procurement of civil works, goods and services. All contractors and subcontractors will be required to comply with the EMP.
- vi) **Contractor obligations.** Contractors, in their bids, must comply with the environmental clauses in the bidding documents for EMP requirements. Prior to construction, each contractor will develop a site EMP, based on the attached project EMP, and assign at least one person responsible for environment, health, and safety (EHS). The draft site EMPs will be reviewed by the PMO and PIU environmental officers, local EEB, and LIEC, to ensure compliance with the project EMP.

D. Construction Phase

153. **Overview.** For the five types of subprojects (Section III.C), urban sewerage system updating and rural water and wastewater management subprojects will generate wastewater, dust and noise during construction, which may have impacts on nearby sensitive receptors. River embankment improvement subprojects are located near sensitive receptors, but the impacts from dust and noise during construction will be minimal as the proposed activities are mainly piling up and stabilization of the gabion stone cages and grouted rubble without onsite stone cutting or river dredging. Regarding the agricultural and tourism infrastructure construction subprojects and green agriculture and forest health protection subprojects, the proposed project sites are within existing demonstration parks/farms or rural open fields. Construction activities will generate wastewater, dust and noise; and no sensitive receptors are within the impact zones for noise or other disturbance as defined in Section V.A.

(1) Water Quality, Wastewater Management and Hydrology

154. **Construction wastewater.** Construction wastewater will be produced from drainage of excavation sites, the maintenance and cleaning of mechanical equipment and vehicles, maintenance water for mixing and curing concrete, stormwater runoff and lost water and soil during the construction period which is discharged as pollutants. During construction there will be about 100 construction sites, over 4 years, with an average of 25 construction sites per year. Each site will generate an estimated 2.5 m³/d of construction wastewater, with suspended solids (SS) (about 500 mg/L) and petroleum (8 mg/L; assuming occasional leakage from machinery). Construction wastewater will not be discharged onto the surrounding soil or into the river. Treated wastewater will be reused for dust control.

155. **Domestic wastewater from construction workers.** Peak work forces are estimated to be 131 in Huangshan District, 136 in Huizhou District, 66 in Tunxi District, 236 in She County, 115 in Yi County, 115 in Qimen County and 201 in Xiuning County. Daily domestic water usage

is estimated as 0.1 m³ per worker per day and the wastewater discharge is estimated as 80% of the water usage, which equals to 0.08 m³ per worker per day. The pollutant concentrations of COD_{Cr}, BOD₅, SS and NH₃-N in the domestic wastewaters from the construction workers are assumed to be 400 mg/L, 200 mg/L, 200 mg/L and 25 mg/L, respectively. Estimated volumes of construction and domestic wastewater are shown in Table V-8. Direct discharge of any wastewater is forbidden for surface water quality protection purpose. Proposed disposal arrangements are listed below.

Table V-8: Wastewater Generated during Construction

No.	Item	Huangshan	Huizhou	Tunxi	She	Yi	Qimen	Xiuning	Total
1	Total construction sites	12	8	12	28	12	8	20	100
2	Average numbers of construction sites per year	3	2	3	7	3	2	5	25
3	Construction wastewater generated (m ³ /d)	8	5	8	18	8	5	13	63
4	Pollutant generation from construction wastewater (SS kg/d)	3.8	2.5	3.8	8.8	3.8	2.5	6.3	31.3
5	Pollutant generation from construction wastewater (petroleum kg/d)	0.06	0.04	0.06	0.14	0.06	0.04	0.1	0.5
6	Number of workers at peak construction	131	136	66	236	115	115	201	1000
7	Domestic wastewater (m ³ /d)	10.5	10.9	5.3	18.9	9.2	9.2	16.1	80.0
8	Pollutant generation from domestic wastewater (COD _{Cr} , kg/d)	4.2	4.3	2.1	7.6	3.7	3.7	6.4	32.0
9	Pollutant generation from domestic wastewater (BOD ₅ , kg/d)	2.1	2.2	1.1	3.8	1.8	1.8	3.2	16.0
10	Pollutant generation from domestic wastewater (NH ₃ -N, kg/d)	0.3	0.3	0.1	0.5	0.2	0.2	0.4	2.0

156. Mitigation measures. The following measures will be implemented to minimize water pollution:

- (i) Sedimentation tanks will be installed on site and, after settling out of solids, the upper clear liquid will be recycled for spraying the construction site (dust control), and the waste residue in the tank will be cleared and transported to the construction spoil disposal sites.
- (ii) Oil-water separators will be installed before the sedimentation tank for oily wastewater treatment.
- (iii) All sites for washing of construction equipment will be equipped with water collection basins and sediment traps.
- (iv) Domestic wastewater generated from construction camps will be disposed in three ways: (i) for project sites nearing septic tanks in surrounding villages, domestic wastewater will be treated by the septic tanks before being used for irrigation; (ii) for project sites accessible to municipal sewerage systems, domestic wastewater will be discharged into the nearest sewerage system; (iii) for project sites neither close to villages nor sewerage systems, temporary septic tanks will be constructed for the centralized treatment of domestic wastewater.
- (v) Fuel storage, machinery maintenance workshop and vehicle cleaning areas must be stationed at least 500 m away from the waterbody.
- (vi) Storage facilities for fuels, oil, and other hazardous materials will be within secured areas on impermeable surfaces and provided with bunds and cleanup installations.
- (vii) Contractors will develop actions for control of oil and other dangerous substances as part

of their site EMPs.

- (viii) Contractors' fuel suppliers must be properly licensed. They shall follow proper protocol for transferring fuel and the PRC standard of JT3145-91 (Transportation, Loading and Unloading of Dangerous or Harmful Goods. revised).
- (ix) Labor camps will be located at least 500 m from waterbody.
- (x) Portable toilets and on-site wastewater pre-treatment systems will be installed at construction camps along with proper maintenance protocols.
- (xi) Water quality will be monitored by local EMAs during construction as per the EMP.

157. After site treatment, construction wastewater will comply with the Integrated Wastewater Discharge Standard (GB8978-1996). This standard provides the limits to restrain pollutant concentrations and the total allowed wastewater discharge from industries and construction sites. The indicative pollution parameters are total SS and oil/petrochemical residues. These will be monitored as part of the EMP (Appendix 1).

158. **Hydrology and water availability.** There will be neither dredging work nor flow diversion or interruption of the Xin'an River mainstream. Water required for construction will be sourced from municipal water supplies.

(2) Air Quality

159. Dust from earth excavation, filling, loading, hauling, bare earth surfaces, uncovered construction areas and vehicle movements on unpaved roads, especially in windy days, and exhaust gas from vehicle and machinery emissions (gaseous CO, CH and NO₂) will be generated from all construction sites. For pipe installation activities under urban sewerage system upgrading subprojects, rural water and wastewater treatment subprojects, and agricultural infrastructure construction subprojects, exhaust gas from pipe welding (non-methane hydrocarbon) will be generated. Fugitive emission of odor from cleaning of existing drainage pipes (NH₃ and H₂S) will be generated during urban sewerage system upgrading. Pre-mixed concrete will be used in all construction sites except for the construction of rural onsite wastewater treatment stations, where dust from onsite concrete-mixing will be generated. These various sources of air pollution could affect nearby sensitive receptors, including villages and residential areas (Section V. A).

160. The quantity of dust generated will depend on wind speed, humidity of the material and earth, and condition of site. Dust generated from transportation is estimated to account for 60% of the total fugitive dust during the construction phase. High speed of vehicles and low level of road cleanliness will cause higher dust emissions. Huangshan Municipality in general is not subject to strong seasonal winds (Section IV.B). The impact areas of dust from construction activities and odor from pipe cleaning are estimated to be 150 m and 20-30 m downwind from the sources, respectively. The impact area of transportation-related dust is estimated to be within 20-50 m along the routes with proper mitigation measures (e.g. water spraying and vehicle cleaning).

161. Based on the locations of sensitive receptors (Section V.A), about 32,940 households (total population 120,081) occur within 150 m of the construction sites and may be subject to dust-related disturbance (Table V-9).

Table V-9: Households/persons within 150m of the construction works

District/County	Households	Population
Huangshan District	8,962	25,290
Huizhou District	1,904	4,343
Tunxi District	216	735
Qimen County	4,900	28,820

She County	4,882	16,813
Xiuning County	3,806	13,690
Yi County	8,270	30,390
TOTAL	32,940	120,081

162. **Mitigation measures.** According to the best practices and requirements of *Rule of Dust Control in Construction Site in Anhui Province, 2018 Huangshan Air Pollution Prevention and Control Implementation Method, and Implementation Method of Dust Control in Construction Site in Huangshan Municipality*, mitigation measures to reduce impacts on air quality will be as follows.

- (i) Install barriers at the boundary of construction sites with a height no less than 2.5 m. The bottom of the barriers shall be sealed and overflow prevention sedimentation wells shall be set to avoid mud leakage.
- (ii) Spray water daily on construction sites where fugitive dust is being generated. Before excavation, proper spraying shall be performed on the working surface to maintain a certain humidity to reduce dust generation.
- (iii) Cover stockpiles with dust shrouds or tarpaulin to avoid spillage or dust generation. For the earthwork management for backfill, measures will include surface press and periodical spraying and covering. Extra earth will be cleared from the project site in time to avoid long term stockpiling.
- (iv) Vehicles with a closed load-carrying case shall be used to transport potentially dust-producing materials.
- (v) Design haulage routes and schedules to avoid transport occurring in the central areas, traffic intensive areas or residential areas.
- (vi) Install vehicle washing equipment or conduct wheel washing manually at each exit of the work area to prevent trucks carrying mud and soils onto public roads.
- (vii) Keep construction vehicles and machinery in good working order, regularly service and turn off engines when not in use. Ensure vehicle and machinery emissions comply with PRC standards of GB18352-2005, GB17691-2005, GB11340-2005, and GB18285-2005.
- (viii) During high wind, dust-generating operations shall not be performed and onsite construction materials shall be covered with shrouds. When wind speed exceeds Level 4 (Section IV.B), excavation, soil transportation and demolition works are not permitted. Special precautions need to be applied in the vicinity of sensitive receptors such as schools, kindergartens and hospitals.
- (ix) Transport the sludge from existing sewer pipes offsite timely to reduce fugitive odor emission.
- (x) Use exhaust fans at welding sites to increase ventilation and promote the diffusion of organic exhaust gas onsite.
- (xi) Timely monitoring of air quality and inspections during construction, as defined in the project EMP (Table EMP-5).

163. Since January 2017, the PRC has implemented increased controls on vehicle and machinery emissions to protect ambient air quality. All vehicles and construction machinery must comply with the PRC Grade IV or higher emission standard. Overall, the potential impacts of disturbance related to air quality will be short-term (because of the temporary duration of project works), localized and low in magnitude.

(3) Noise

164. Construction will involve excavators, bulldozers, cutting-machine, road breaker, loaders, and other heavy machinery. Noise during pipe installation, wastewater treatment stations construction, river embankment improvement, tourism infrastructure construction and agricultural infrastructure construction will be generated by onsite machine operation. The noise

will be temporary and localized. Construction materials, surplus spoil and construction wastes will be transported to and from the construction sites. The transportation activities will also cause noise impacts along the haulage routes. Estimated construction noise values (at 5 m distance from the machineries and vehicles) are shown in Table V-10.

Table V-10: Testing Values of Construction Machinery Noise

No.	Machine Type	Maximum Sound Level [dB(A)]
1	Excavator	85
2	Road breaker	90
3	Cutting-machine	90
4	Loader	80
5	Bulldozer	90
6	Dump truck	85
7	Whirling driller	75
8	Compactor	80
9	Submerged pump	85

Source: Domestic EIA report.

165. **Estimating noise levels.** Construction equipment noise source is considered as a point sound source. The predictive model applied in this project is:

$$L_i = L_0 - 20 \lg \frac{R_i}{R_0}$$

Where, L_i and L_0 are equipment noise sound levels at R_i and R_0 , respectively.

For the impact of multiple construction machineries, sound level superposition is needed:

$$L = 10 \lg \sum 10^{0.1 \times L_i}$$

166. **Prediction results.** Noise levels at different distances were derived after calculating the impact scope of equipment noise during construction as defined in Table V-10. The PRC Emission Standard of Environment Noise for boundary of Construction Site (GB12523—2011, revised) specifies the noise limit as 70 dB (A) during daytime and 55 dB (A) during nighttime. The predicted noise impact scope (m) of different machineries is listed in Table V-11.

Table V-11: Noise Values of Construction Machineries at Different Distances dB (A)

Machinery Name	Distance to Machinery									
	15m	20m	40m	60m	80m	100m	130m	150m	200m	300m
Excavator	75.5	73.0	66.9	63.4	60.9	59.0	56.7	55.5	53.0	49.4
Road breaker	80.5	78.0	71.9	68.4	65.9	64.0	61.7	60.5	58.0	54.4
Cutting-machine	80.5	78.0	71.9	68.4	65.9	64.0	61.7	60.5	58.0	54.4
Loader	70.5	68.0	61.9	58.4	55.9	54.0	51.7	50.5	48.0	44.4
Bulldozer	80.5	78.0	71.9	68.4	65.9	64.0	61.7	60.5	58.0	54.4
Dump truck	75.5	73.0	66.9	63.4	60.9	59.0	56.7	55.5	53.0	49.4
Whirling driller	65.5	63.0	56.9	53.4	50.9	49.0	46.7	45.5	43.0	39.4
Compactor	70.5	68.0	61.9	58.4	55.9	54.0	51.7	50.5	48.0	44.4
Submerged pump	75.5	73.0	66.9	63.4	60.9	59.0	56.7	55.5	53.0	49.4
Applicable Standard (GB12523—2011, revised)	70 (daytime)									
	55 (nighttime)									

Source: TRTA estimates

167. Table V-11 shows that if construction machinery is used singly, the impact distance is 15-60 m away from the source during daytime and 60-300 m at night. Within these distances, noise levels will exceed the threshold applied to this project under the PRC standard (GB12523-2011). During construction, it is often the case that a number of machines will be in use simultaneously and the noise impact scope will be consequently larger. To be conservative: (i) noise emissions from different types of construction activity were not differentiated; and (ii) any works within 60 m of sensitive receptors were assumed to generate noise levels exceeding the threshold and so require implementation of mitigation measures as listed below.

168. By comparing the locations of sensitive receptors (Section V. A) with the distance, it was estimated that about 27,498 households are situated within 60 m of planned works. This large number is mainly for the six subprojects which involve the installation of sewage systems in urban areas. In these areas, the sewage pipelines will be installed alongside existing roads which are close to multistory buildings with many households. These communities may experience day-time noise levels up to 70 dB(A) in the audible scale. Extended exposure to such noise levels could cause physical hearing injury to residents and workers, in addition to general stress and disturbance.

169. **Mitigation measures.** The following measures will be implemented to comply with PRC construction site noise limits and to protect sensitive receptors (Section V. A).

- (i) Construction activities will be planned in consultation with local authorities and communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in the least disturbance.
- (ii) Construction works will be limited to daytime and will be strictly prohibited during the nighttime (22:00 h to 06:00 h) and noon (12:00 h to 14:00 h). Exceptions will only be allowed in exceptional cases, and only after getting the approval of the surrounding residents, local environmental authority and other relevant departments. The contractor shall apply for the approval seven days before the construction works. Nearby residents will be notified of such nighttime activities well in advance.
- (iii) When preparing construction planning, simultaneous high-noise activities will be avoided.
- (iv) Movable noise barriers will be adopted during construction at daytime.
- (v) Low-noise equipment will be selected as much as possible. Equipment and machinery will be equipped with mufflers and will be properly maintained to minimize noise.
- (vi) Transportation routes and delivery schedules will be planned to avoid densely populated and sensitive areas and high traffic times. Vehicles transporting construction materials or waste will slow down and not use their horn when passing through or nearby sensitive locations, such as residential communities, schools and hospitals. No honking is permitted during nighttime.
- (vii) Monitor noise at sensitive areas at regular intervals (EMP-Table 5). If noise standards are exceeded, equipment and construction conditions shall be checked, and mitigation measures shall be implemented to rectify the situation.
- (viii) Conduct regular consultations with households prior to the start of any works, to specify the exact planned dates and schedule of works, nature of works, equipment to be used, safety measures, and public access during construction. Community feedback will be used to adjust work hours of noisy machinery.
- (ix) Install noise barriers and/or additional layers on windows of affected homes as necessary, based on the assessment of the most technically effective method and feedback from the community consultations.

170. Based on effective implementation of these measures, the net impact of noise disturbance is expected to be manageable, due to: (i) the extent of noise disturbance to individual communities will be shorter than the total construction time for the project, as the scope of works within individual sites is relatively small compared to the total cumulative works; and (ii) stone

material for river embankment improvement is commercially available, and there will be no on-site stone crushing. Overall, noise management will require close attention during the project implementation.

(4) Soil Erosion

171. The following activities may cause soil erosion during construction period:

- (i) urban sewerage system upgrading: excavation of the sewage and stormwater pipe trenches;
- (ii) rural water and wastewater management: excavation of the sewage and water supply pipe trenches, as well as site formation for onsite wastewater treatment stations;
- (iii) river embankment improvement: limited excavation of existing river banks in rural area;
- (iv) agriculture and tourism infrastructure construction: excavation of irrigation and drainage pipe trenches, and site formation for infrastructure construction.

172. In addition, unprotected stockpiles of soil and spoil, especially in rainy days, will also lead to soil erosion. Erosion could also occur after completion of construction where site restoration is inadequate. Mitigation measures listed below will be implemented during construction phase for soil erosion control purpose.

173. **Earthworks.** According to the estimation made by FSR institute, 162,765 m³ of surplus earth will be generated from construction works. The earth balance for each district/county is shown in Table V-12. The surplus earth will be reused within the district or county for filling roadbed or other construction sites and there will be minimal excess spoil.

Table V-12: Earth Balance for Each Project District/County (m³)

District/ County	Excavation Earth	Filling earth	Borrow earth	Surplus earth	Surplus earth balance and reuse
Huangshan District	54,930	46,691	0	8,240	Roadworks or other construction sites
Huizhou District	264,398	224,739	0	39,660	Roadworks or other construction sites
Tunxi District	139,036	118,181	0	20,855	Roadworks or other construction sites
She County	222,371	189,015	0	33,356	Roadworks or other construction sites
Yi County	28,000	23,800	0	4,200	Roadworks or other construction sites
Qimen County	132,960	113,016	0	19,944	Roadworks or other construction sites
Xiuning County	243,404	206,893	0	36,511	Roadworks or other construction sites
Total	1,085,099	922,335	0	162,765	Zero balance (no surplus)

174. The amount of earth excavation during construction is the main indicator of the magnitude of potential erosion during this phase, since exposed, mostly sloping surfaces will be open to the effects of rain and wind until stabilized. Appropriate mitigation measures will be implemented during construction period to minimize the soil erosion cause by the project.

175. **Rock material for gabion cages.** Rock material to fill the gabion cages for the river revetments will be sourced from: (i) certified local suppliers in Huangshan Municipality. Such suppliers are licensed to provide construction materials; and (ii) the old revetment debris that will be removed from the Caocun River (Section III.C).

176. **Measures for soil erosion control.** Before construction, contractors will each prepare

Site Soil Erosion Management Plans for their specific work sites to prevent soil erosion. The plans will include the following measures.

- (i) Level the ground for the temporary spoil storage sites with proper blocking measures.
- (ii) During construction phase, the earthwork will be reasonably planned and balanced to reduce the stockpiling of spoil onsite as much as possible. Spoil will be reused onsite to the maximum extent feasible as fill. The spoil sites will be away from roads and be restored after storage activities.
- (iii) Limit construction during rainy season and high winds. Appropriate stormwater drainage systems and slope protection measures will be implemented to minimize soil erosion, such as perimeter bunds and temporary detention and settling ponds to control topsoil runoff.
- (iv) The construction schedule will be well designed to minimize the exposure time of bare land surface and stabilize all earthwork disturbance areas timely after the earthworks are completed.
- (v) Minimize open excavation areas and slope during trenching.
- (vi) Construction camps, storage areas and access roads will be located within the acquired land to minimize the impacts on the soil and land vegetation in surrounding area.
- (vii) The contractor shall establish onsite management procedures for soil erosion control.
- (viii) Landscaping will only use native plant species.
- (ix) Construct intercepting channels and drains to prevent runoff entering construction sites and divert runoff from sites to existing drainage or open ground for watering the vegetation.

(5) Solid Waste

177. Solid waste generated in construction phase will include both construction and domestic waste. Construction wastes mainly include construction spoil generated during excavation and site formation. Domestic wastes are generated by onsite construction workers.

178. **Construction spoil.** About 119,992 m³ of construction spoil cannot be reused as filling earth, which is mainly composed of concrete road surface. According to the FSR institute, the construction spoil will be regularly transported off-site by the contractor to the construction waste station for reuse or disposal in landfill.

179. **Domestic solid waste from construction workers.** Peak work forces are estimated to be 131 in Huangshan District, 136 in Huizhou District, 66 in Tunxi District, 236 in She County, 115 in Yi County, 115 in Qimen County and 201 in Xiuning County. Daily domestic solid waste production is estimated as 0.5 kg per worker per day (Table V-13), which equals to 0.5 t/d. Covered garbage bins will be installed in the camps. The construction contractors will be responsible for providing sufficient garbage bins at proper locations and ensure they are protected from birds and vermin and emptied regularly. The domestic waste will be collected and transported regularly for final disposal at the Huangshan Municipal Domestic Solid Waste Incineration Plant. The incineration plant is confirmed to have sufficient capacity to receive the waste (Section III.D).

Table V-13: Summary of Solid Waste Generated during Construction

No.	Item	Huangshan	Huizhou	Tunxi	She	Yi	Qimen	Xiuning	Total
1	Total construction sites	12	8	12	28	12	8	20	100
2	Average numbers of construction sites per year	3	2	3	7	3	2	5	25
3	Number of workers at peak construction	131	136	66	236	115	115	201	1000
4	Domestic solid wastes (t/d)	0.07	0.07	0.03	0.12	0.06	0.06	0.10	0.50
5	Total construction wastes (m ³) *	5,250	36,696	0	20,650	7,963	27,860	21,573	119,992

Note: *data provided by the FSR institute.

(6) Ecology

180. Potential ecological impacts were assessed as follows.

- River embankment improvement subprojects will be carried out along Zhang River and Caocun River focusing on construction of river revetment and flood walls without dredging. Gabion stone cages will be used for embankment improvement, which do not involve riverbed excavation or concrete casting, and all works are designed to be conducted during dry season (October to March).
- For the 109 m section of channel in the Caocun River in which old stone debris from previous revetment works will be removed, no aquatic plants nor fish were observed, the riverbed contains few muddy sediments, and no mechanical works will be conducted. The proposed works will be only conducted during dry season (October to March). There will be limited impacts to aquatic habitats from this localized work. Temporary land occupation for storage of construction material (e.g. gabion stone cages and grouted rubbles) along the rivers will cause temporary damage of existing vegetation in rural sites.
- Excavation and land formation activities will be carried out for rural water and wastewater management subprojects, as well as agricultural and tourism infrastructure construction subprojects. These activities will result in limited clearance of vegetation and temporary noise and/or visual disturbance to fauna within and near the construction sites.
- Urban sewerage system upgrading subprojects are in urban living areas and will have minimal impact on the local ecosystem.
- Biopesticides. The project includes the planned use of biopesticides in the demonstration bamboo, tea, and fruit orchard plantations, as part of measures to reduce the use of chemical fertilizers. At the time of project preparation the specific types of chemicals and organisms to be used had not been identified. Inappropriate selection and use of biopesticides could result in the introduction of invasive species which cause unforeseen ecological impacts and/or cause direct or indirect impacts to native flora or fauna or soil or water quality.

181. The following mitigation measures will be implemented to minimize ecological impacts.

- (i) Clearly demarcate construction sites and off-limit areas, to minimize removal of existing vegetation. Implement timely site rehabilitation, using native plant species.
- (ii) Surface soil (0-30 cm) will be stored separately for reuse for landscape greening or agriculture. The stockpiling shall have a height less than 5m and a slope less than 1:1.5 with proper compaction to avoid soil erosion.
- (iii) For the stone debris removal from river channel in Caocun River, only debris from previous river revetment works will be removed, and all works shall be conducted manually without intervention of any mechanical equipment to prevent mechanical damage to the riverbed.
- (iv) All river channel related works will be carried out during dry season (October to March) to minimize potential impacts on the aquatic habitat.
- (v) Provide training to contractors and workers to increase their awareness on the need to protect the environment, wildlife and vegetation around the construction sites.
- (vi) The construction supervision companies (CSCs) and PMO environment officer will regularly inspect construction sites to ensure that habitats are well demarcated, and workers are fully informed of “no-go” areas.
- (vii) Biopesticides. To minimize the risk of unintended impacts from the use of biopesticides, the following measures will be applied during the detailed engineering designs: (a) a complete inventory of the pest species to be addressed for each demonstration site will be prepared; (b) any “pest” species which are rare, threatened, restricted range, or protected species will be excluded from the pest management program; (c) the specific organisms or other agents to be used as biopesticides will be identified during the detailed engineering designs; (d) each proposed agent or method will be assessed to ensure they are highly crop-specific and will only act on the intended pest species, and will not affect local flora and fauna (e.g.

the use of water mixed with tobacco will not be used as it may impact aquatic organisms in nearby streams); (e) specific application procedures, volumes, and post-application monitoring will be detailed, to ensure safe and responsible use of the biopesticides.

182. Overall, the ecological impacts during construction phase are considered low and manageable as: (i) there are no documented rare, endangered, or protected flora or fauna species, or critical habitats, in or near the construction sites; (ii) affected vegetation and plants comprise widespread species; (iii) most existing vegetation is secondary and planted; (iv) the proposed roads will be constructed within existing agricultural demonstration parks, and the designed parking lots involve either renovation of existing parking lots or construction of new parking lots on vacant land; (v) no aquatic plants nor fish were identified in the channel targeted for stone debris removal work; (vi) the impacts from construction activities are short-term, temporary, small-scale and reversible.

(7) Protected Areas

183. Villages of five subprojects are located in the Taiping Lake Scenic Zone or Huashan Mysterious Grottoes Scenic Zone (Section IV. B), hence civil works will occur in these two scenic zones (Table V-14; Figure V-1 and Figure V-2). Risks to the scenic zones were assessed as follows.

- Thirteen WWTS are located 70–40 m from Taiping Lake and four WWTS will be near the Xin'an River. Improper discharge of construction and domestic wastewater during construction could impact water quality and inshore habitat.
- The planned access roads and irrigation system for the Xinchang Lei Bamboo Ecological Demonstration Park (located in the Taiping Lake Scenic Zone) will involve land occupation.
- Construction of the parking lots and associated tourist facilities will involve land occupation with an area of 2.61 mu. By applying ecological parking lots design (e.g. turf grid), the impacts on vegetation will be minimal.
- These works will involve the clearance of about 2.61 mu (0.17 ha) of existing planted vegetation. The works will not involve the clearance on any natural habitat.

Table V-14: Summary of subprojects related to protected areas

Subproject	Project name and content		Relation to protected area
2A-4	Village Environment Improvement Project in Xinhua Village	<ul style="list-style-type: none"> • 3 WWTS+sewage pipes-Michong Village • 2 WWTS+sewage pipes-Jinkengzi Village 	Within the Grade II land protection area of Taiping Lake Scenic Zone
		<ul style="list-style-type: none"> • 5 WWTS+sewage pipes-Shaochong Village • 1 WWTS+sewage pipes-Gaoshan Village • 1 WWTS+sewage pipes-Dianjie Village • 1 WWTS+sewage pipes-Laowu Village 	Within the Grade III land protection area of Taiping Lake Scenic Zone
1B-2	Caocun River Rehabilitation Project, Xinhua Village	1.5km of the south section of targeted reaches	Within the peripheral protection area of Taiping Lake Scenic Zone
2B-2	Xinhua Village Green Agriculture Demonstration Base, Huangshan District	Xinchang Lei Bamboo Ecological Demonstration Park	Within the peripheral protection area of Taiping Lake Scenic Zone
2A-3	Village Environment Improvement Project, Tunxi District	4 WWTS and associated sewage pipes in Fudun Village, Litangxia Village, Wu Village and Hanshazhong Village in Tuguang Town	Within the Grade I and II protection areas of Huashan Mysterious Grottoes Scenic Zone

2A-6	Tourism Infrastructure Improvement along Xin'an River (She County Section)	Parking lots and associated facilities in Xiongacun Town and Zhujiabao of Yan Village in Wangcun Town	Within the Grade I and peripheral protection areas of Huashan Mysterious Grottoes Scenic Zone
		Eco-environment improvement in Yan Village	Within the Grade III protection areas of Huashan Mysterious Grottoes Scenic Zone

Source: the domestic EIA report.

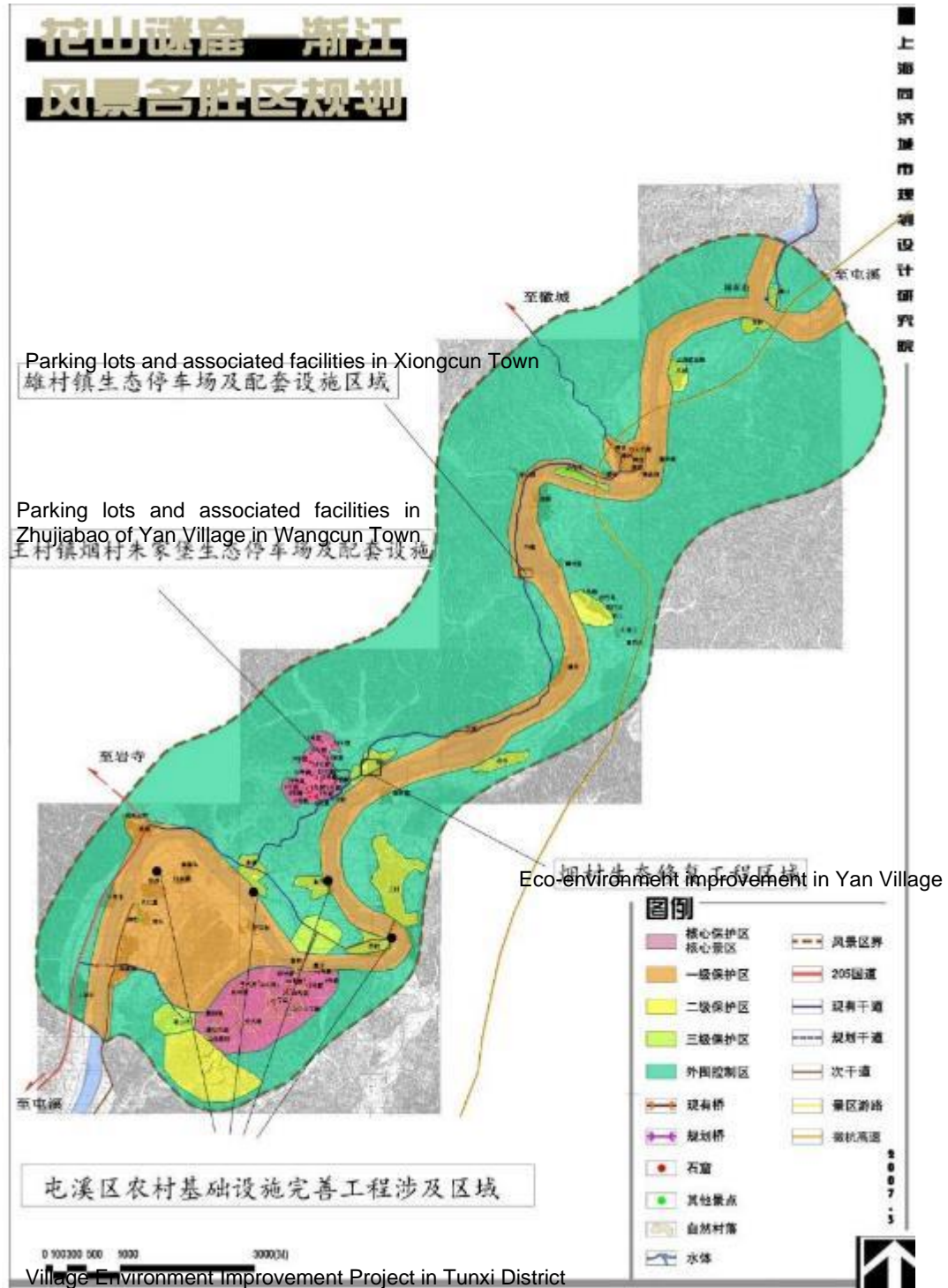


Figure V-1: Project sites located within the protection area of Huashan Mysterious Grottoes Scenic Zone (Source: the draft domestic EIA report)

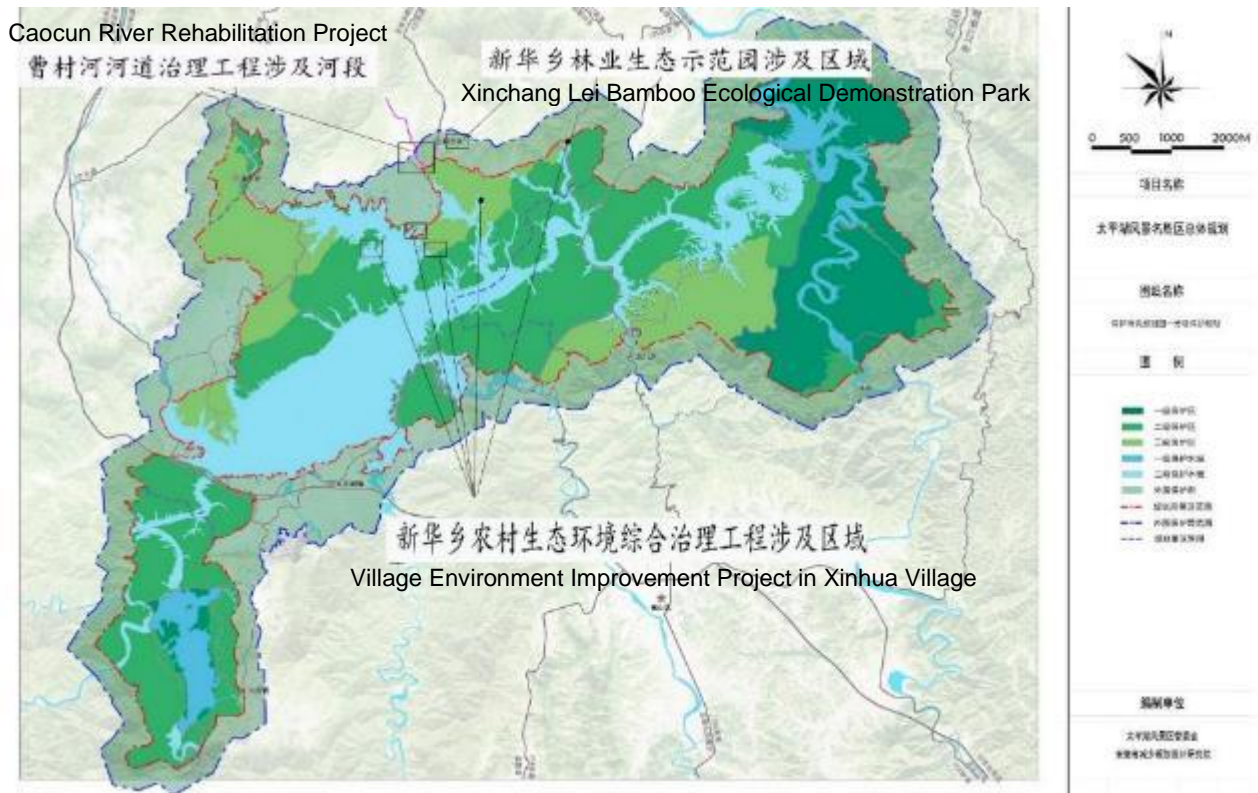


Figure V-2: Project sites located within the protection area of Taiping Lake Scenic Zone (Source: the domestic EIA report)

184. Special precautions will be taken for the subprojects located in the Taiping Lake Scenic Zone and Huashan Mysterious Grottoes Scenic Zone to minimize these risks, as follows.

- (i) Engineering design will be in line with the Taiping Lake Scenic Zone Master Plan (2015-2030) and Huashan Mysterious Grottoes Scenic Zone Master Plan (2007-2025);
- (ii) All works will be carried out within the confirmed “ecological red line” permitted and endorsed by the HMG, which is consistent with national criteria for the demarcation of ecological red lines (defined to protect ecological and water resources). Cross-line construction is not permitted;
- (iii) Temporary storage sites for construction waste will be prohibited in the scenic zones. All construction and operational waste will be transported out for disposal timely;
- (iv) For works near the Xin’an River, construction wastewater will be treated onsite with sedimentation tanks and flocculation. No construction wastewater will be discharged to the Xin’an River;
- (v) Design the location and shape of spoil piles before construction;
- (vi) Vehicles will slow down within scenic zones and frequent water spraying in construction sites will be performed to minimize dust;
- (vii) Restore the vegetation in construction sites timely after the completion of construction works to minimize soil erosion and visual landscape impact in scenic zones. The onsite topsoil will be reserved for vegetation restoration with native plants.

185. These temporary disturbances are assessed to be acceptable given their small and reversible scale and the net benefits of the project activities, which will result in efficient wastewater treatment systems for the villages in the two scenic zones. This will halt the discharge of untreated sewage in the scenic zones, which currently occurs. The proposed activities in the villages, Caocun River and bamboo farm will also improve the landscaping, facilitate ecotourism and promote chemical fertilizer reduction. The planned activities are based

on the Huangshan Municipal master plan for urban and rural development and environmental management, and, comply with the official management and protection requirements for scenic zones, including: (i) no discharge of untreated sewage or construction wastewater into wetlands and rivers; (ii) no works within the strict protection zones; (iii) all works to be suitable for, and aligned with, the objectives and natural “character” of the scenic zone (including no multi-level buildings and industrial development). All project works comply with PRC regulations for scenic zones and ADB’s SPS (2009) requirements for protected areas.

(8) Community and worker health and safety

186. Risks to community and/or worker health and safety include: (i) short-term construction disturbance such as noise and traffic inconvenience to communities; (ii) harassment of local women from external workers and/or spread of sexually transmitted disease; (iii) community safety risks from increased traffic and proximity to works sites and machinery; and (iv) risk of injury to workers during construction. The objective of environmental health and safety is to provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease and avoid to avoid disturbance to local communities. It also covers the establishment of preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities. It is therefore a combination of occupational health and safety of staff/workers at the subproject facilities and community health and safety of people living nearby or potentially affected by failures or poor operation of facilities.

187. In addition to these risks, the project also involves the use of chemicals to treat pine wilt: (i) the application of three chemicals, Emamectin benzoate,¹⁷ Avermectin B1a¹⁸ and Imidacloprid,¹⁹ to be drilled into the trunks of individual trees to prevent pine wilt; and (ii) aerial spraying of 70,000 ha of pine forest using 8% slow-release cypermethrin²⁰ microcapsules and 3% thiacloprid²¹ powder (Section III.C). None of these chemicals are listed as hazardous by the World Health Organization or are prohibited for use in the PRC; however all have the potential to cause impacts to human health if not used correctly.²²

188. **Community safety.** The following measures will be included in the site EMPs by all contractors:

- (i) Signs will be placed at construction sites in view of the public, warning people of potential dangers such as moving vehicles and excavations, and raising awareness on safety issues;
- (ii) Assign personnel to direct pedestrians around dangerous work areas;
- (iii) Ensure that all sites are secure, discouraging access through appropriate fencing;
- (iv) Place clear signs at construction sites in view of the people at risk (including workers and nearby communities), warning people of potential dangers such as moving vehicles, hazardous materials, excavations, and raising awareness on safety issues;
- (v) At the end of each day, all sites and equipment will be made secure (through fencing and/or lock-down of equipment) to prevent public access;
- (vi) Erect safety barricades around all excavations;

¹⁷ <http://apps.sepa.org.uk/spripa/Pages/SubstanceInformation.aspx?pid=171>

¹⁸ <https://pubchem.ncbi.nlm.nih.gov/compound/Avermectin-B1a#section=GHS-Classification>

¹⁹ <http://npic.orst.edu/factsheets/imidagen.html>

²⁰ <http://apps.sepa.org.uk/spripa/Pages/SubstanceInformation.aspx?pid=135>

²¹ <https://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+7268>

²² The environmental risks of applying these chemicals was also assessed. Two (Emamectin benzoate and Avermectin B1a) are known to be highly toxic to aquatic organisms, but both will only be applied manually by drilling to individual trees, avoiding impacts to the environment. The others are low-toxicity chemicals which leave few residues or which break down quickly in the environment.

- (vii) Hold public consultation meeting prior to commencing construction to discuss issues associated with safety of nearby communities in vicinity of the construction site.
- (viii) Train all workers in codes of conduct, safety rules and wear personal protective equipment on site. This includes respectful communication with residents.
- (ix) If female workers hired, install separate toilets for men and women.
- (x) At least three months before civil works, ensure the project GRM is in place and the GRM procedure and contact person, contact numbers are disclosed to all affected persons.
- (xi) Prior to any chemicals use for pine wilt management – either manual application of chemicals to individual trees or aerial spraying – community consultations will be undertaken and signs erected to ensure members of the public, tourists, and other stakeholders are informed of locations where management is occurring. Prior to any aerial spraying, the sites targeted for spraying will first be checked – through direct ground inspections and checking with relevant agencies (e.g. tourism bureaus) of the presence of people within the target sites.

189. **Occupational health.** The contractors will also implement precautions to protect the health and safety of construction workers. The occupational health and safety risks will be managed by applying measures in the following order of preference: avoiding, controlling, minimizing hazards, and providing adequate protective equipment. Each contractor's Site EMP will include measures for health and safety for personnel. The plan will be submitted to the PMO for review and appraisal and will include the following provisions for health and safety:

- (i) Provide personal protection equipment appropriate to the job, such as safety boots, helmets, gloves, protective clothing, goggles, and ear protection, in accordance with relevant health and safety regulations, for workers.
- (ii) An emergency response plan to take actions on accidents and emergencies, including environmental and public health emergencies associated with hazardous material spills and similar events will be prepared by each contractor, and submitted to the PIU for review and appraisal. A fully equipped first-aid base in each construction site will be provided. The following contents will be included in the emergency response plan: (i) fire response/evacuation; (ii) chemical spill/exposure; (iii) biological material spill/exposure; (iv) bomb threat/suspicious package; (v) workplace violence; (vi) weather emergencies; and (vii) utility failure.
- (iii) A records management system will be established to document occupational accidents, diseases, and incidents, that: (a) includes a tracking system to ensure that incidents are followed-up; (b) can easily retrieve records; and (c) can be used during compliance monitoring and audits. The system will be backed up on at least one external hard drive to protect records against loss or damage.
- (iv) Ensure that safety, rescue and industrial health matters are given a high degree of publicity to all persons regularly or occasionally on the Site. Posters drawing attention to site safety, rescue and industrial health regulations will be made or obtained from the appropriate sources and will be displayed prominently in relevant areas of the site.
- (v) Train all construction workers in basic sanitation and health care issues, general health and safety matters, and on the specific hazards of their work and sites and the requirements for community safety. This will be undertaken as part of the EMP training plan.
- (vi) **Use of asbestos.** Under ADB's List of Prohibited Investment Activities (SPS, 2009), the use of asbestos is prohibited *except* for the "purchase and use of bonded asbestos cement sheeting where the asbestos content is <20%" (SPS 2009: 76). However: (i) in practice it is difficult to assess whether asbestos content is <20%; and (ii) international development banks are increasingly banning the use of all asbestos from their projects. To ensure international best practice for human health and safety for this project: no asbestos of any kind will be used in any materials supported by the project.
- (vii) The largest proposed works involve the construction or upgrade of pipelines and small wastewater treatment and water supply stations. It is unlikely that these structures

contain asbestos. In the event that materials containing asbestos are suspected: (i) the contractor will immediately inform the PIU, who will inform the PMO; (ii) the contractor will subcontract the municipal center for hazardous waste, who will be responsible for the safe handling, transport, and disposal of the materials; (iii) such materials will only be disposed in a landfill site certified and designed to receive hazardous materials.

- (viii) **Pine wilt management.** The use of chemicals for pine wilt management will only be undertaken by personnel specifically qualified in the safe handling, application, and disposal of chemicals, and will include the use of all required protective equipment.

(9) Physical Cultural Resources

190. No cultural heritage or archaeological sites are known within 1 km of the project areas. However, construction activities have the potential to disturb unknown underground cultural relics. The EMP mitigation measures include immediate suspension of construction activities if any archaeological or other cultural relics are encountered. The local Cultural Heritage Bureau, PMO, and IAs will be promptly notified. Construction will resume only after investigation and with the permission of the appropriate authority. The clause for protection of unknown underground cultural relics will be included in construction contracts.

E. Operational Phase

(1) River hydrology, water supply, and water quality

191. **Hydrology.** The project works involve 4.95 km of river revetments along two rivers (Zhang and Caocun) and the extraction of old revetment debris from a 109-m section of channel from one of these rivers (the Caocun). Flood control works have already been completed for the downstream sections of both rivers, to 1-in-10 (Caocun) and 1-in-20 year (Zhang) flood control standards. The project works will achieve the same flood protection standards for the sections of river within the project area. Modeling conducted during project preparation confirmed that the project works will not result in new flood risks to downstream communities and river sections.

192. **Rural water supply.** The project includes the establishment of water supply pipelines for 34 villages (Section III). Due diligence for the supply reservoirs and water supply plants has been conducted, including the current storage and supply capacities, current demand, and remaining capacity after the project (Section III.D). This confirms that these facilities have the capacity to meet the project demand and still have surplus capacity afterward. To ensure the operational effectiveness of the designs and that water of the required quality is provided to households, monthly monitoring of water quality delivered to households will be conducted by the water supply companies, in accordance with the PRC Water Quality Standards for Urban Water Supply (CJ/T 206-2005) (Section III.C).

193. **Wastewater.** Wastewater generated during project operation will comprise treated effluent from the WWTS and domestic wastewater from public toilets for tourists.

194. **Effluent from WWTS, and, risk of operational failure.** A total of 85 WWTS will be constructed for 121 villages. The effluent will be reused for irrigation or discharged to surface water bodies. The estimated quantity of effluent and pollutants are summarized in Table V-15. The reduced amounts of COD, BOD₅, SS, NH₃-N and TP discharged into the environment are 202.6 t/a, 113.5 t/a, 156.6 t/a, 25.4 t/a, and 4.1 t/a, respectively. This will result in water quality improvement in project area.

195. A potential operational risk for the WWTS is that infrastructure damage or failure will affect treatment efficiency and result in polluted effluent entering waterways. This may include mechanical failure, such as broken aeration nozzles and clogging of pipes, and/or electrical failure due to rural power blackouts, which may cause failure of automated systems and pumps

to stop running. These risks are assessed to be low, for the following reasons: (i) standard WWTS designs ensure that these issues do not stop entire WWTS operation. The remote nature of rural WWTP requires that designs are mechanically simple, robust, and reliable, and with equipment that can be quickly replaced. Each WWTS is also routinely designed with redundant volumes in the pretreatment units or emergency storage ponds to allow temporary increased storage of untreated effluent, to cope with any power blackout or operation failure; (ii) operation and maintenance (O&M) of the WWTS will be by qualified third-party operators contracted by the implementing agencies. As part of their contracts, the operators will establish standard operational procedures that are consistent with national guidelines for WWTS O&M. This will include an emergency response plan to ensure regular inspections of WWTS condition, and, procedures in the event of operational difficulties; and (iii) the risk of water pollution in the Xin'an River due to operational failure of the WWTS was modeled by the EIA institute, using the "one-dimensional water quality model of non-persistent pollutants". The modeling assessed the results of different scenarios of WWTS operational failure for the four largest WWTS. The modeling results consistently complied with the water quality standard for the Xin'an River (GB3838-2002), reflecting the small size of the project-funded WWTS and limited influence of effluent volumes on river water quality.

Table V-15 Summary of water pollutant discharge amount

Pollutant	COD	BOD₅	SS	NH₃-N	TP
Influent concentration (mg/L)	300	150	200	40	6
Total capacity of WWTS (m ³ /d)	2,359				
Total amount of pollutant (t/a)	258.3	129.2	172.2	34.4	5.2
Effluent concentration (mg/L)					
Class II standards	100	30	30	25	3
Class IB standards	60	20	20	8	1
Class IA standards	50	10	10	5	0.5
Discharged pollutant (t/a)	55.8	15.6	15.6	9.1	1.1
Total reduced amount of pollutant (t/a)	202.6	113.5	156.6	25.4	4.1

196. **Domestic wastewater from tourism toilets.** Septic tanks will be constructed for each tourism toilet. Pre-treated wastewater from septic tanks will be reused for irrigation in surrounding areas or transported to nearby municipal wastewater treatment plants for treatment. No direct discharge of the domestic wastewater is permitted.

(2) Air pollution

197. Air pollution during project operation could comprise: (i) exhaust gas from tourist vehicles in parking lots; (ii) odor from WWTS, public tourist toilets, and/or septic tanks; and/or (iii) garbage bins at tourist sites and agricultural demonstration parks. Ammonia (NH₃) and hydrogen sulfide (H₂S) are the key parameters for odor measurement. Modelling of odor diffusion from WWTS was carried out by the domestic EIA institute, and the results comply with the Grade II standards stipulated in PRC Emission Standards for Odor Pollutants (GB14554-93) (Section II. E). To minimize the odor impacts on sensitive receptors, the following mitigation measures will be implemented:

- (i) Periodical inspection on the performance of WWTS to ensure the normal operation;
- (ii) Garbage bins with cover will be used for enclosed storage of waste.
- (iii) Strengthen the sanitary management of tourism toilets to ensure no water on floor and no residue of human waste on toilet bowls.
- (iv) Layout design of the parking lots will facilitate the driving in and out of vehicles, which can reduce the exhaust gas generated by vehicles during low-speed.
- (v) Improve the landscape greening surrounding the parking lots.

(3) Noise

198. Noise sources during operation are pumping stations for sewage collection. A total of 23 sewage pump stations will be constructed in 23 villages in Xiuning County and Tunxi District (Table V-16). The noise level of lift pumps is 80 dB(A). The predicted noise values generated by the pump at different distances are 58.4 dB(A) at 60m and 48.0 dB(A) at 200m without any mitigation measures (see Section V.D). Modelling of noise level at the boundaries of pumping stations was carried out by the domestic EIA institute considering the attenuation by building envelope and distance, as well as the following mitigation measures. The results comply with the limits for noise emission in Emission Standard for Industrial Enterprise Noise at Boundary (GB 12348-2008), which are 60 dB(A) in daytime and 50 dB(A) at nighttime (Section II. E).

Table V-16 Summary of sewage pump stations

No.	County/District	Location of the pump station	Capacity (m ³ /day)
1	Xiuning County	Hexi Village	20
2		Xizhou Village	30
3	Tunxi District	Yun Village	60
4		Wu Village	100
5		Bangtou Village	100
6		Hansha Village	50
7		Jiangjiatang Village	10
8		Fuduntang Village	10
9		Maquetou Village	10
10		Xiasi Village	10
11		Shulun Village	10
12		Longfu Village	60
13		Xiayao Village	15
14		Huayuan-Shanghe Village	80
15		Changhutou-Wurong Village	40
16		Guangguting Village	10
17		Qianshan-Zhongze Village	30
18		Zhudun-Shangye Village	100
19		Zhuli Village	50
20		Shuidui Village	30
21		Chatang Village	20
22		Lintang-Yantang-Yaoshang Village	50
23		Yaogan Village	10

199. The following measures will be implemented to mitigate the noise risks:

- (i) Each station will install low-noise equipment and thick walls.
- (ii) The pumps will be equipped with anti-vibration pad.
- (iii) Sound insulation windows and doors will be used in the stations.
- (iv) Station operators will maintain the equipment in good working condition as part of standard operating procedures. Periodical check and maintenance will be required. When malfunction of the equipment occurs, the related accessories or parts will be replaced timely to avoid noise from abnormal operation of pumps.

(4) Solid Waste

200. Solid waste generated during operation will comprise domestic waste from tourists and well as sludge from septic tanks and WWTS.

201. Domestic waste generated by tourists will be collected in garbage bins and transported to the Huangshan Municipal Domestic Solid Waste Incineration Plant for disposal. The management committee of the agricultural demonstration parks will be responsible for the waste

management. The sludge from septic tanks and WWTS will be transported to the Huangshan municipal WWTPs for treatment as indicated in the FSR.

202. Overall, risks associated with the solid waste during project operation are assessed to be minimal as: (i) each county or district has existing, well-established procedures for domestic waste collection, transportation and disposal; and (ii) the Huangshan Municipal Domestic Solid Waste Incineration Plant is operating in good condition and has the capacity to meet project demand (Section III.D).

(5) Changes in agricultural practices

203. During project operation, organic fertilizers will be used to reduce the application of chemical fertilizers in the agricultural demonstration parks. Organic fertilizers based on nitrogen and phosphorus are slow release compared with chemical fertilizer and tend not to be leached away by stormwater after application. High organic matter levels in organic fertilizers also aerate soils and maintain soil structure and wetting capacity. This will result in a reduction of about 253 tons of chemical fertilizers per year compared to baseline conditions (Table III-5 in Section III). The project will also reduce the use of pesticides by applying biopesticide and installing solar powered insecticide lamps.

F. Indirect, Induced and Cumulative Impacts

204. Indirect impacts are adverse and/or beneficial environmental impacts which cannot be immediately traced to a project activity but can be causally linked. Induced impacts are adverse and/or beneficial impacts on areas and communities from unintended but predictable developments caused by a project which may occur later or at a different location. Cumulative impacts are the combination of multiple impacts from existing projects, the proposed project, and anticipated future projects that may result in significant adverse and/or beneficial impacts that would not be expected in case of a stand-alone project.²³

205. **Indirect impacts.** A key indirect environmental impact from the project is expected to be improved water quality entering Qiandao Lake in Zhejiang Province, as a result of the project actions for pollutant reduction. The concept and technology of “Low Impact Development” and/or “Sponge City” are incorporated in the FSR for the urban sewerage system upgrading subprojects, including porous pavement and ecological tree pits. In addition to improved capacity of stormwater management, these measures will enhance the landscaping in urban area.

206. **Induced impacts.** Tourist numbers to Huangshan are already increasing; the small scale of the project-supported tourist facilities is not expected to significantly increase this or result in new and induced impacts. Instead, the project facilities are intended to help focus and manage visitation, to manage access, ensure the efficient collection of litter and sewage, and improve the visitor experience. The project facilities that will support this comprise the establishment of better access roads, facilities, and parking lots, which both encourage visitation but also improve control and access; the inclusion of fencing, information signs, and paths, to guide visitors; well defined areas for human access and recreation; and significantly improved sewage drainage and coverage for urban and rural areas.

207. **Cumulative impacts.** The project will promote soil testing formulated fertilization and application of organic fertilizer and biopesticide in six agricultural demonstration parks to reduce the use of agricultural chemicals and protect the water quality from non-point source pollution. In fact, HMG has already made significant efforts in this: by the end of 2017, the coverage rate of soil testing formulated fertilization reached 90%, and the area of organic fertilizer application

²³ ADB. 2011. *Sourcebook for Safeguard Requirement 1: Environment*. ADB, Manila.

accounted for 33% of the total cultivation area in Huangshan.²⁴ The Green Incentive Fund to be implemented under the project will be subsequently scaled up by the HMG to future projects to promote green agriculture. The cumulative benefits of these projects will be reduced agricultural non-point source pollution and improved water quality in Huangshan.

208. For the consideration of cumulative levels of development, numerous, separate and small construction projects are being conducted or planned in the project area, in accordance with municipal development plans. Together with the ADB-funded project, cumulatively larger effects of construction and operation will occur, including levels of noise and dust, wastewater discharge, solid waste disposal, and traffic congestion. The exact locations of other planned construction projects over the next several years (during the construction phase of the ADB-funded project) are unknown. However, as and when these other projects begin, and should they overlap closely with the proposed project, the following mitigation measures will be implemented to minimize cumulative impacts: (i) coordination between projects to share road access and disposal sites; (ii) sharing of any associated and/or existing facilities (e.g. wastewater treatment plants, water supply plants, waste incineration plant) to avoid repeated construction; (iii) coordinated traffic management plans; (iv) participatory planning with local villages and communities; and (v) training of workers to minimize social disturbance.

G. Climate Change and Greenhouse Gas Emissions

209. **Greenhouse gas (GHG) emissions, carbon sequestration, and net emissions.** Project GHG emissions will be generated during construction (vehicles, machinery, workers) and operation (electricity used at the rural wastewater treatment facilities). Electricity will be supplied through the municipal grid. A coarse estimate of the project annual GHG emissions was derived using the following assumptions: construction – full-time three-year schedule (the project is six years but peak construction intensity will be less) employing 1,000 full-time workers, construction vehicles, and generation of construction waste; and operation – electricity use of wastewater treatment facility and emissions of vehicles, for the first 10 years of operation (an arbitrary estimate, applying the precautionary principal; Table V-17). This is not a detailed project GHG inventory and may underestimate total project GHG emissions. Nonetheless, after construction and an arbitrary 10 years of operation, the total estimated emissions are still much less than the level defined by ADB as significant ($\geq 100,000$ t CO₂e) (SPS, 2009), and are small compared with the annual emission of high-risk projects listed by the ADB Environment Safeguards Good Practices handbook (ADB 2012, pp.59–62). This indicates the low risk posed by the project for excessive GHG emissions.

Table V-17: Course Estimation of GHG Emission by the Project

Content	Quantity	CO₂ equivalent (t CO₂e)
Construction period (first 6 years)		
Vehicles	5 diesel large car, 10 petrol medium car and 20 petrol small car ^a for 6 years	567
Electricity consumption	Electricity consumption in all the construction sites during the construction period ^b	49275
Construction Waste	5000 tons of co-mingled mixed construction and demolish waste in the total construction period	1000
Spent on meals of workers	1000 workers, spending \$10 per day on meals for 3 years	6493
Operation period (first 10 years after construction period – arbitrary duration applied to the calculations)		
Vehicles	1 diesel large car, 3 petrol medium car and 5 petrol small car ^a for 10 years	240
Electricity consumption	Electricity consumption of pump stations and rural wastewater treatment facilities in operation for 10 years ^c	6120

²⁴ The draft feasibility study report dated April 2, 2019.

Total GHG emissions for construction period and operation period (first 16 years)	62,695
Total GHG emissions per year	3,918

a. Assuming annual travel distance of 15,000 km per car per year.

b. Assuming 1000 KWh electricity was consumed per site per day in peak construction; 25 working construction sites in average estimated for the construction period of 6 years.

c. Assuming electricity consumption rates during operation period are 8,000 kWh/treatment facility/year; 85 wastewater treatment facilities are proposed in the project.

Source: Estimated using online GHG calculator (www.carbonneutral.au/carbon-calculator/).

210. Carbon sequestration and net project GHG emissions. The total proposed new vegetation area in the project is about 3 ha. National estimates are not available for carbon sequestration by grasslands, and for the current calculation, only the planting area for woody plants (i.e. trees and bushes) was used. In the PRC, annual carbon sequestration capacity of forest is estimated to be 0.3-12 t C/ha²⁵ depending on forest type, species, and age, as well as soil, water and weather (average annual sunshine hours, rainfall and temperature). Considering the weather conditions of Huangshan Municipality, the value of 3.32 t/ha/yr²⁶ was applied for the calculation of carbon sequestration for the project. It is estimated the project tree and shrub plantings will achieve 10.1 tons of carbon sequestration per year (Table V-17).

211. In the green agricultural demonstration project, practices of formulated fertilization, soil amelioration and etc., are proposed to improve the production of croplands and reduce non-point source pollution control. Assuming these agricultural practices adopted uplift 20% biodiversity and the carbon sequestration of cropland NEP²⁷ (25 t/ha/yr), the improved croplands will contribute to additional carbon sequestration of 990 t/year. Thus, the carbon sequestration potential from vegetation plantation and improved croplands is 1,000 t carbon/year (3666.7 t CO₂e per year) and sum up to 91,667 t CO₂e for 25 years. Assuming project GHG emissions of 3,918 t CO₂e per year (Table V-17), the project will result in net GHG emissions of 251 tons CO₂e per year. This is an estimate and the subtraction of carbon sequestration does not account for other, more harmful GHG emissions from construction or operation. Nonetheless, these figures are magnitudes of scale much lower than the SPS threshold of concern of 100,000 t CO₂e per year.

Table V-18: Preliminary Calculation of Carbon Sink from Vegetation Plantation and Improved Croplands

Croplands				
Category	County/District	Area (ha)	Carbon Sink factor (t/ha/yr)	Carbon Sequestration Potential (t/year)
Vegetation plantation	Huangshan District	0.81	3.32	2.7
	Yi County	0.60		2.0
	She County	1.64		5.4
	Sub-total	3.05		10.1
Improved croplands	She County	1300	0.5	650
	Huangshan District	680		340
	Sub-total	1980		990
Total				1000

212. Climate change adaptation. A climate risk vulnerability assessment (CRVA) for Huangshan Municipality was conducted by the TRTA consultant to identify the risk that climate change presents to project viability. According to multidecadal climate change projections, there will be a general increase in temperatures from 2020 to 2100, and the largest decadal average

²⁵ Carbon sequestration capacity comparison. 2011. <http://www.carbontree.com.cn/News/show.asp?bid=5725>

²⁶ C-D. Huang et al. 2008. Dynamics on forest carbon stock in Sichuan Province and Chongqing City. *Acta Ecologica Sinica* 28(3):0966-0975.

²⁷ Galina, C. 2013. An introduction to carbon cycle science. In Brown, D.G. et al. (eds). Land and the carbon cycle. Cambridge University Press.

temperature will be in the 2090s (1.16°C higher than baseline temperatures). Precipitation from 2020 to 2100 is projected to increase in quantity, but varies under different scenarios. Projected annual precipitation and rainy days will increase to a peak of 1,880 mm and 163 days. These projected changes in climate pose several risks for the project. Projected temperature increases may stress physical structures and degrade materials. The increase in rainfall variability and intensity of extreme rainfall events may increase flood risk.

213. To address these issues, the following adaptation measures have been integrated to the project designs: reinforcement of structural materials for roads, drains, pipelines, paths, and wastewater treatment stations, for resilience against increased rainfall or storm events; enhanced pipe flow capacity or emergence outlets at wastewater treatment stations; improved monitoring of forest condition (which will improve early detection of pine wilt spread under rising temperatures); and management information systems (to improve data collection of wastewater and water supply volumes in the project area) (Table V-19). For greenhouse gas emissions, the project presents a low risk. Carbon sequestration potential from the vegetation plantations (3 ha) and improved croplands (1,980 ha) is estimated to be 1,000 t carbon/year (3,666.7 t CO₂e per year). This sequestration will be offset by the emissions generated during project construction and operation, resulting in a net emission of 251 tons CO₂e per year i.e. well below the SPS threshold of concern of 100,000 t CO₂e per year.

Table V-19: Adaptation Measures Adopted by the Project for Climate Resilience

Climate Risk	Adaptation Measure	Output / Component
Damage to project-funded structures from increased storm events	Use of reinforced structural materials in accordance with PRC standard GB 50268-2008 <i>Code for construction and acceptance of water and sewerage pipeline works</i> : <ul style="list-style-type: none"> Strengthen pipeline with flexible joints; flexible high strength pipes (use of steel belt reinforced HDPE pipe); pipelines designed with smooth hydraulic gradients Backflow valves, emergency bypass outfalls in key pipe sections Separation of flood water and wastewater systems 	Outputs 1, 2: sewer/storm pipes/culverts/manholes
Flood, heavy rain, drought, extreme heat	Design for sponge city facilities: <ul style="list-style-type: none"> Pervious surface to allow water flow Sunken green space to absorb more water Bioretention ditch to purify/filter natural runoff Ecological tree pit to collect rainwater for green Environmental catchpit to harvest rainwater for reuse Planting ditch to act a green corridor to interconnect sponge city facilities Vegetation buffer zone as a protective zone against flooding and non-point source pollution Install chambers under manholes to capture coarse debris (sand, gravel) prior to entering stormwater system 	Output 1A-1, 1A-2, 1A-3, 1A4, 1A-5, 1A-6: roads & drains
Flood, heavy rain, drought, extreme heat	Design constructed wetlands using native species	Output 1B-6, 2-2: riverside land use
Green cover, soil erosion, forest fires and pest outbreaks	Forest health monitoring and disease prevention: <ul style="list-style-type: none"> Forestry monitoring and warning system Quarantine and pest/disease prevention Pest/disease mitigation and management Information system for pine tree disease control 	Output 2-4
Monitoring, forecast, and early warning for global warming	Smart management system <ul style="list-style-type: none"> Smart IT system is applied to collect data for forewarn GHGs/electricity usage and capacity building 	Output 4A-3, 4A-4

H. Environmental and Social Management System for Green Investment Fund

214. An environmental and social management system (ESMS) for the Huangshan Trust Investment Company (HTIC) and its associated sub-borrowers was developed (Appendix 2). The ESMS will be implemented by HTIC to screen, categorize, and manage the potential environmental and social risks of loans to be made from the Green Investment Fund. The environmental and social objectives of the ESMS are to: (i) protect the environment and people in the project area which may be affected by the subprojects supported by the Green Investment Fund, (ii) help the HTIC, HMG, and qualified investees, to manage the project environmental and social risks, and (iii) support the project objectives of promoted green development by protecting the water quality and ecological environment in the Xin'an River Basin.

215. The ESMS is written in non-technical language and is simplified and tailored to the capacity of HTIC to implement an ESMS, which is currently low. It provides step-by-step procedures to assess and manage potential environmental and social impacts associated with equity investment applications under the project. The key content includes: institutional framework for the ESMS, implementation steps of the ESMS, integration of the ESMS into HTIC business, GRM, capacity building and training, project assurances and a series of template documents for environmental and social risk assessment and management.

VI. ALTERNATIVE ANALYSIS

216. The selection of project locations in each district and county have taken into consideration local circumstances, such as current pollution distribution and needs of residents. Alternative designs for project interventions were examined during project preparation. The primary objective of alternative analysis was to identify the optimal options considering a balanced approach of minimizing adverse environment and/or social impacts, maximizing the environmental benefits, and least cost.

A. Without-project alternative

217. Without the project, the outcome would be: (i) untreated overflow from existing combined sewer systems and stormwater runoff continues to be discharged directly into the upstream reaches of the Xin'an River, polluting the water supply for large downstream populations; (ii) untreated domestic wastewater in rural areas continues to be discharged into rivers and canals; (iii) the non-point source pollution caused by agricultural activities (chemical fertilizers and pesticides application) will not be decreased in Huangshan and will continue to impair water quality in Xin'an River; (iv) continued soil erosion from upstream of Xin'an River Basin due to insufficient and ineffective management of forest; (v) high flood risk for residents along Caocun River and Zhang River; (vi) weak management capacity for environmental monitoring and emergency response in Huangshan; and (vii) green development in Huangshan, including ecotourism and green agriculture, will not be significantly promoted.

B. Alternatives for rural wastewater treatment process

218. As rural wastewater is decentralized and rural governments have limited financial and technical support, the treatment processes were selected based on cost effectiveness, low energy consumption, and ease of use. Seven processes were assessed (Table VI-1) and based on the current situation in project areas, four processes were selected (Table VI-2),

Table VI-1 Alternatives of Rural Wastewater Treatment Process

Treatment Process	Effectiveness	Footprint	Resistance to Shock Loads	Capital Investment	O&M
Anaerobic biofilm	Poor	Small	Moderate	Low	Simple
Bio-contact oxidation	Moderate	Moderate	High	Moderate	Moderate
Rotating Biological Contactor	Good	Small	High	High	Simple
Constructed wetland	Moderate	Large	Low	Moderate	Simple
Anaerobic biofilm + Constructed wetland	Moderate	Large	High	Moderate	Simple
Bio-contact oxidation + Constructed Wetland	Good	Large	High	Moderate	Moderate
Rotating Biological Contactor + Constructed Wetland	Good	Medium	High	High	Simple

Source: the draft FSR

Table VI-2 Selection of Rural Wastewater Treatment Process

Type	Capacity (m ³ /d)	Treatment Process	Effluent Standard	Treatment process	Effluent Discharge
I	10-100	Rotating Biological Contactor + Constructed Wetland	Class IA	Aerobic. For large treatment volumes and high standards. Unsealed.	Mainstream of Xin'an River (Shuaishui River), Fengle, and Caoxi Rivers

Type	Capacity (m ³ /d)	Treatment Process	Effluent Standard	Treatment process	Effluent Discharge
II	10-100	Bio-contact oxidation + Constructed Wetland	Class IB	As above.	Tributaries of Xin'an River (Shuaishui River)
III	100-250	Rotating Biological Contactor + Constructed Wetland	Class IA	As above.	Mainstream of Xin'an River (Shuaishui River), Fengle, and Caoxi Rivers
IV	100-250	Bio-contact oxidation + Constructed Wetland	Class IB	As above.	Tributaries of Xin'an River (Shuaishui River)
V	10-30	Bio-contact oxidation	Class II	As above.	Reuse for irrigation
VI	1-10	Anaerobic biofilm + Constructed wetland	Class II	Anaerobic. Sealed system. More land required.	Reuse for irrigation

*'Type' refers to the category of wastewater treatment to be applied to each village, based on considerations of location and treatment volumes. See Section III.D.

C. River revetment design

219. Three revetment designs were assessed for the river revetment works (Table VI-3). Concrete river revetment used to be widely constructed in the PRC but has high ecological impacts. Ecological bag revetment and gabion revetment are environmentally friendly and use permeable structures and materials and plantings with native species. Ecological bag is more cost-efficient than gabion but has low stability. Considering these factors, gabion will be adopted for the project revetments. The alternatives in Table VI-3 do not include masonry, which will only be used for the rehabilitation or height expansion of *existing* revetments.

Table VI-3 Alternative river revetment design

Type of revetment	Concrete revetment	Ecological bag revetment	Gabion revetment
Form	Erect	With slope	With slope
Material	Concrete	Geotextile bag	Gabion stone cage
Cost	High	Low	Medium
Advantage	High stability, simple and short construction	Less excavation, plant friendly	Anti-washout, high permeability, plant friendly, high stability, and easy construction
Disadvantage	Not ecologically friendly	Low stability	Need transportation of large amount of pebbles and stones to fill the gabion stone cage

D. Alternatives for drainage pipe material

220. Two types of pipe materials were compared: steel reinforced polyethylene (PE) spiral corrugated pipe, and reinforced concrete pipe. Steel reinforced PE spiral corrugated pipe was adopted for drainage pipes due to easy installation, less scale formation, flexibility, and high resistance to shock, pressure and corrosion.

E. Alternatives for water supply pipe material

221. Four types of water supply pipe materials were compared: nodular cast iron pipe, steel pipe, galvanized plastic-coated pipe and PE pipe. Nodular cast iron pipe was selected due to the easy installation and ability to adapt ground deformation. Galvanized plastic-coated pipe and PE pipe were chosen for branch pipes within villages due to high sanitation performance.

VII. PUBLIC CONSULTATION, PARTICIPATION AND INFORMATION DISCLOSURE

222. Meaningful public participation and consultation during project feasibility study, design and implementation are important safeguard requirements. The PRC Environmental Protection Law and Regulations on the Administration of Construction Project Environmental Protection (Order No. 253 of the State Council) require that a domestic EIA solicits the opinions of organizations concerned and villagers and residents within and in the vicinity of the project sites. In August 2012, the PRC National Development and Reform Commission issued a requirement on “Social Risk Assessment of Large Investment Projects”, which emphasizes the importance of public consultation in an effective manner with the stipulation that the results of public consultation are clearly summarized in the DEIA report, including the dates of consultations, number of stakeholders, who the affected people are, and the comments received.

223. ADB’s SPS (2009) requires meaningful public participation, consultation and information disclosure. The consultation processes for this project followed PRC law and the SPS.

224. This section describes the public consultations for the environmental assessment, undertaken by the domestic EIA institutes, implementing agencies and TRTA team. Consultation included: (i) information disclosure; (ii) questionnaire surveys; (iii) informal visits to villages and households in the project areas; and (iv) public meetings attended by the affected public and other concerned stakeholders, including questionnaire surveys after the meetings. A social and poverty analysis was also conducted by the TRTA social and resettlement experts based on group discussions with key agencies, beneficiaries, and adversely affected communities, with emphasis on poverty villages and potential gender issues. For the preparation of resettlement plans, information disclosure and public consultations were conducted, by questionnaire surveys, community meetings, and focus group discussions.

A. Information Disclosure

225. Information disclosure of project information and related environmental issues will be undertaken in two stages in line with PRC regulatory framework.

226. The initial public announcement of the project was posted via the Huangshan Development and Reform Commission website (Figure VII-1) 20 February 2019.²⁸ Based upon the PRC regulatory requirement, disclosed information included: (i) name and overview of the project; (ii) name and contact information of the construction unit; (iii) name and contact information of the EIA institute; (iv) the form for public opinions collection; and (v) the way for the public to deliver and submit opinions. No public comments were received.

²⁸ <http://fgw.huangshan.gov.cn/Content/show/JA002/30904/1/1052513.html>



黄山市发展和改革委员会
fgw.huangshan.gov.cn

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亚行贷款黄山新安江流域生态保护和绿色发展项目环境影响评价公众参与公示

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根据《中华人民共和国环境影响评价法》等规定和生态环境部2018年7月16日发布《环境影响评价公众参与办法》的要求,对亚行贷款黄山新安江流域生态保护和绿色发展项目有关信息公开如下:

一、建设项目的名称及概要

项目名称: 亚行贷款黄山新安江流域生态保护和绿色发展项目

项目选址: 项目拟选址位于安徽省黄山市,共涉及四县三区:祁门县、黟县、歙县、休宁县、徽州区、黄山区、屯溪区

建设内容: 亚行贷款黄山新安江流域生态保护和绿色发展项目建设内容包括四大类:通过点源污染管理提升流域水质、非点源污染管理提升流域水质、绿色产业发展、加强生态系统和项目管理能力。

二、承办单位的名称和联系方式

单位名称: 黄山市亚行贷款项目办公室

单位地址: 安徽省黄山市市政府大楼

联系人: 殷工

联系电话: 0559-2355872

传 真: 0559-2355370

电子邮箱: hsshxmb@126.com

信函地址: 黄山市市政府大楼四楼亚行贷款项目办公室

三、环境影响评价机构的名称和联系方式

环评机构名称: 中南安全环境技术研究院股份有限公司

单位地址: 武汉市武昌区中南二路2号

联系人: 陈工

联系电话: 15395122142

电子邮箱: 1217429853@qq.com

四、公众意见表的网络连接

附件下载: 公众意见表

五、提交公众意见表的方式和途径

公众可以通过信函、传真、电子邮件的方式将填写的公众意见表等提交建设单位,反映与建议项目环境影响有关的意见和建议。

在环境影响报告书征求意见稿编制过程中,公众均可向建设单位提出与环境影响评价相关的意见。

附件: 建设项目环境影响评价公众意见表

黄山市亚行贷款项目办公室

附件: 公众意见表.docx [13.76 KB]

<http://fgw.huangshan.gov.cn/Content/show/JA002/30904/1/1052513.html>

Figure VII-1: First Round Information Disclosure by Posting on Huangshan Development and Reform Commission website

227. In line with PRC regulations, prior to final review and approval of the domestic EIA by the Huangshan EEB, the updated draft domestic EIA was disclosed on the website of the Huangshan Development and Reform Commission (DRC) for 15 working days (7 to 24 July 2019) at: <http://fgw.huangshan.gov.cn/Content/show/JA002/30904/1/1068277.html>. No public comments were received by the DRC or EIA design institute.

B. First Round of Public Consultation

228. The first round of public consultation for the project was conducted by the domestic EIA institute with the participation of TRTA environmental specialists during March 5 to 8, 2019. Face-to-face interviews, informal visits to villages and households, consultation meetings and questionnaire survey were conducted within the project area. The consultation scope included residents/households within 200 m from the sewer and stormwater drainage pipes, as well as households and/or farmers within 2.5 km from the onsite wastewater treatment stations, agricultural demonstration parks and other proposed construction sites. During the consultation, representatives from the domestic EIA institute introduced the project scope and initial findings on potential environmental impacts with proposed mitigation measures to the questionnaire respondents. The questionnaires were prepared in Chinese and the surveys covered all project locations in the three districts and four counties in Huangshan Municipality. Photos of the consultation and survey are shown in Figure VII-2. In parallel, 598 questionnaires were distributed to potential affected individuals (about 564 questionnaires) and local agencies, including village committees, residential committees, wastewater treatment plants and industrial zone management offices (about 34 questionnaires).



Huangshan District



Tunxi District



Huizhou District



She County



Xiuning County



Yi County



Qimen County

Figure VII-2 The first round of public consultation

229. **Results of the first round of public consultation.** Statistic data of respondents from different age groups, gender, educational backgrounds and occupations are summarized in Table VII-1 and the consultation results are summarized in Table VII-2 and Table VII-3. According to the survey results, all consulted local agencies supported the project and the main requests include: (i) ensure the project compliance with scenic zone management requirements; (ii) enhance the pollution management during construction phase; (iii) take the urban and rural development plan into consideration during project design; and (iv) develop a comprehensive environmental management plan before construction.

230. Of the local residents, 96.8% supported the project, 2.8% had no opinion, and 0.4% (two people) did not support the project. Concerns and/or questions raised by residents comprised: potential noise disturbance, (41.8%), impacts to air quality (24.5%), impacts to water quality (25.2%), impacts to ecology (14.0%) and inefficient management of solid waste (16.5%). The two respondents who did not support the project considered that potential noise and dust during construction may pose adverse impacts on their daily life.

Table VII-1 Respondents of 1st Round of Questionnaire Survey

Information of Consulted APs		Huangshan District		Huizhou District		Tunxi District		She County		Qimen County		Yi County		Xiuning County	
		No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%
Gender	Male	45	54.9	24	58.5	92	55.8	82	58.2	16	39.0	5	33.3	46	58.2
	Female	37	45.1	17	41.5	73	44.2	59	41.8	25	61.0	10	66.7	33	41.8
Age Group	<20	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	21-40	22	26.8	14	34.1	66	40.0	24	17.0	23	56.1	3	20.0	21	26.6
	41-60	51	62.2	22	53.7	86	52.1	88	62.4	18	43.9	10	66.7	50	63.3
	≥60	9	11.0	5	12.2	13	7.9	29	20.6	0	0.0	2	13.3	8	10.1
	Not filled	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Education	Junior school and below	1	1.2	0	0.0	0	0.0	2	1.4	0	0.0	0	0.0	0	0.0
	Junior high school	49	59.8	21	51.2	106	64.2	109	77.3	4	9.8	1	6.7	68	86.1
	High school	17	20.7	9	22.0	29	17.6	11	7.8	12	29.3	1	6.7	2	2.5
	College and above	15	18.3	11	26.8	30	18.2	19	13.5	25	61.0	13	86.7	9	11.4
	Not filled	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Occupation	Education and Research	8	9.8	10	24.4	21	12.7	19	13.5	0	0.0	0	0.0	11	13.9
	Farmer	44	53.7	12	29.3	84	50.9	79	56.0	7	17.1	8	53.3	51	64.6
	Employee	13	15.9	7	17.1	35	21.2	21	14.9	18	43.9	4	26.7	7	8.9
	Others	17	20.7	12	29.3	25	15.2	22	15.6	16	39.0	3	20.0	10	12.7
	Not filled	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of consulted towns/villages		9	/	7	/	30	/	26	/	0	/	3	/	27	/

Table VII-2: Results of 1st Round of Questionnaire Survey (individual)

No.	Question	Option	Huangshan District		Huizhou District		Tunxi District		She County		Qimen County		Yi County		Xiuning County	
			No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%
1	How do you get to know the project?	The internet	9	11.0	1	2.4	23	13.9	18	12.8	3	7.3	0	0.0	16	20.3
		Newspaper	1	1.2	1	2.4	11	6.7	12	8.5	0	0.0	0	0.0	3	3.8
		This public consultation	52	63.4	37	90.2	127	77.0	69	48.9	35	85.4	14	93.3	59	74.7
		Others	20	24.4	3	7.3	8	4.8	50	35.5	3	7.3	1	6.7	3	3.8
2.1	How do you think of the current local environmental quality? -	Very good	64	78.0	35	85.4	129	78.2	110	78.0	34	82.9	7	46.7	45	57.0
		Good	16	19.5	6	14.6	36	21.8	30	21.3	7	17.1	7	46.7	22	27.8
		Not good	2	2.4	0	0.0	0	0.0	1	0.7	0	0.0	1	6.7	12	15.2

No.	Question	Option	Huangshan District		Huizhou District		Tunxi District		She County		Qimen County		Yi County		Xiuning County	
			No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%
	Air															
2.2	How do you think of the current local environmental quality? – Surface water	Very good	45	54.9	27	65.9	119	72.1	92	65.2	22	53.7	4	26.7	26	32.9
		Good	33	40.2	14	34.1	45	27.3	42	29.8	15	36.6	8	53.3	24	30.4
		Not good	4	4.9	0	0.0	1	0.6	7	5.0	4	9.8	3	20.0	29	36.7
2.3	How do you think of the current local environmental quality? – Groundwater	Very good	51	62.2	30	73.2	124	75.2	92	65.2	24	58.5	7	46.7	27	34.2
		Good	29	35.4	11	26.8	39	23.6	43	30.5	13	31.7	8	53.3	23	29.1
		Not good	2	2.4	0	0.0	2	1.2	6	4.3	4	9.8	0	0.0	29	36.7
2.4	How do you think of the current local environmental quality? – Noise	Very good	47	57.3	33	80.5	130	78.8	98	69.5	20	48.8	6	40.0	31	39.2
		Good	33	40.2	8	19.5	35	21.2	40	28.4	17	41.5	5	33.3	37	46.8
		Not good	2	2.4	0	0.0	0	0.0	3	2.1	4	9.8	4	26.7	11	13.9
2.5	How do you think of the current local environmental quality? – Ecology	Very good	52	63.4	36	87.8	140	84.8	96	68.1	28	68.3	7	46.7	37	46.8
		Good	30	36.6	5	12.2	24	14.5	41	29.1	12	29.3	8	53.3	25	31.6
		Not good	0	0.0	0	0.0	1	0.6	4	2.8	1	2.4	0	0.0	17	21.5
3	Are you satisfied with current local environmental quality	Very Satisfied	54	65.9	32	78.0	109	66.1	87	61.7	22	53.7	7	46.7	35	44.3
		Satisfied	26	31.7	9	22.0	55	33.3	49	34.8	18	43.9	8	53.3	22	27.8
		Not satisfied	2	2.4	0	0.0	1	0.6	5	3.5	1	2.4	0	0.0	22	27.8
4	What do you think is the most significant impact to you during project implementation?	Noise	37	45.1	19	46.3	66	40.0	42	29.8	24	58.5	5	33.3	43	54.4
		Air pollution	17	20.7	19	46.3	40	24.2	37	26.2	7	17.1	4	26.7	14	17.7
		Wastewater	32	39.0	5	12.2	43	26.1	26	18.4	5	12.2	4	26.7	27	34.2
		Ecology	12	14.6	4	9.8	19	11.5	36	25.5	1	2.4	0	0.0	7	8.9
		Solid wastes	23	28.0	5	12.2	22	13.3	30	21.3	8	19.5	3	20.0	2	2.5
5	What do you think should be enhanced for impact mitigation measures?	Noise	30	36.6	19	46.3	52	31.5	32	22.7	21	51.2	8	53.3	29	36.7
		Air pollution	10	12.2	18	43.9	39	23.6	33	23.4	9	22.0	5	33.3	10	12.7
		Wastewater	39	47.6	6	14.6	40	24.2	39	27.7	14	34.1	4	26.7	31	39.2
		Ecology	15	18.3	4	9.8	28	17.0	41	29.1	2	4.9	1	6.7	8	10.1
		Solid wastes	24	29.3	4	9.8	25	15.2	26	18.4	18	43.9	3	20.0	13	16.5
6	Do you agree with the	Agree	79	96.3	41	100.0	165	100.0	141	100.0	38	92.7	15	100.0	79	100.0

No.	Question	Option	Huangshan District		Huizhou District		Tunxi District		She County		Qimen County		Yi County		Xiuning County	
			No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%
	sites of the proposed project?	Disagree	3	3.7	0	0.0	0	0.0	0	0.0	3	7.3	0	0.0	0	0.0
7	What is your altitude to the project from environment perspective?	Support	76	92.7	40	97.6	164	99.4	141	100.0	34	82.9	13	86.7	78	98.7
		Not support	1	1.2	0	0.0	0	0.0	0	0.0	1	2.4	0	0.0	0	0.0
		No difference	5	6.1	1	2.4	1	0.6	0	0.0	6	14.6	2	13.3	1	1.3

Table VII-3: Results of 1st Round of Questionnaire Survey (organization)

No.	Question	Option	Huangshan District		Huizhou District		Tunxi District		She County		Qimen County		Yi County		Xiuning County	
			No. of org.	%	No. of org.	%	No. of org.	%	No. of org.	%	No. of org.	%	No. of org.	%	No. of org.	%
1	Does the project design consistent with your villages/agencies' development goal?	Very consistent	7	100.0	2	100	3	100.0	10	83.3	1	100	1	100	8	100
		Consistent	0	0.0	0	0	0	0.0	2	16.7		0		0	0	0
		Not Consistent	0	0.0	0	0	0	0.0	0	0.0		0		0	0	0
2	Are you satisfied with current local environmental quality	Very Satisfied	7	100.0	1	50	3	100.0	8	66.7		0	1	100	3	37.5
		Satisfied	0	0.0	1	50	0	0.0	3	25.0	1	100		0	2	25
		Not satisfied	0	0.0	0	0	0	0.0	1	8.3		0		0	3	37.5
3	What do you think is the main environmental impact during project implementation?	Air pollution	0	0.0	1	50	1	33.3	4	33.3		0		0	4	50
		Water pollution	0	0.0	1	50	1	33.3	0	0.0		0		0	0	0
		Noise	6	85.7	1	50	1	33.3	3	25.0	1	100	1	100	5	62.5
		Ecology	1	14.3	0	0	0	0.0	4	33.3		0		0	0	0
		Solid wastes	0	0.0	0	0	1	33.3	1	8.3		0		0	3	37.5
		Environmental risk	0	0.0	0	0	0	0.0	2	16.7		0		0	2	25
4	What is your altitude to the project from environment perspective?	Support	7	100.0	2	100	3	100.0	12	100.0	1	100	1	100	8	100
		Not support	0	0.0	0	0	0	0.0	0	0.0		0		0	0	0

C. Second Round of Public Consultation

231. The second round of public consultation was undertaken in the three districts and four counties in the form of consultation meetings/discussion forums followed by questionnaire surveys during May 13 to 15, 2019. The public meetings were used as an opportunity to: (i) present the updated project scope and expected environmental benefits; (ii) present the updated impact assessment and proposed mitigation measures, as defined in the updated FSR and DEIA; (iii) introduce the project grievance redress mechanism (GRM); and (iv) collect relevant views of affected people and stakeholders on project design and mitigation measures. Participants included households in the project sites and local agencies.

232. After the meetings, 691 follow-up questionnaires were distributed to the respondents and 691 (100%) completed questionnaires were received. The questionnaires focused on public understanding of the project scope, the potential environmental impacts of the project and opinions on the proposed mitigation measures. Photos of the consultation meetings are shown in Figure VII-3.



Huangshan District



Tunxi District



Huizhou District



She County



Xiuning County



Yi County



Qimen County

Figure VII-3 Consultation meetings of the 2nd round of public consultation

233. **Results of the second round of public consultation.** Details of respondents and the consultation results are summarized in Table VII-4 and Table VII-5, respectively. According to the survey results, 97.7% respondents supported the project, 0.9% had no opinion, and 1.4% (10 people) did not support the project. Key questions and/or concerns raised by participants comprised potential impacts or disturbance related to construction noise (54.7%), air quality (53.7%), water quality (54.7%), ecology (36.3%) and solid waste (32%). About 74.5% (515 people) respondents considered the project will improve local environmental quality. The majority (85.5%; 591 people) felt that the proposed project mitigation measures are adequate and feasible. For the 10 people who did not support the project, the reasons given were due to concern over construction noise and dust during the construction phase. The slightly larger number of people in the second round who did not support the project (10 people) is slightly higher than the first round (two people): this reflects the presence of different individuals in each round of consultations and inevitably, the likelihood of receiving different opinions; as well as a slightly broader geographic spread of sampling in the second round.

D. Summary of Project Public Consultations

234. During the first and second consultations, a total of 1,255 residents were consulted over 7 days and a total of 1,289 questionnaires were distributed to 1,255 residents and 34 agencies. The male : female ratio of participation in the public consultations was well balanced: 690 (55%) men : 565 (45%) women. Most participants (1,243; 99%) supported the project. The majority of residents consulted expressed support for the project. Two major questions and/or concerns raised by residents were: (i) noise level during construction may cause disturbance to adjacent residents; and (ii) dust generated during construction, especially for the sewage system upgrading subprojects, may impact the air quality in/near construction sites.

235. These concerns were addressed in the project designs and safeguards as follows. First, for noise control, construction works will be limited to daytime. Movable noise barriers will be installed and low-noise equipment will be applied during construction. Noise monitoring will be conducted at regular intervals to identify any incompliance of noise emission and implement mitigation measures timely. Second, for dust control, daily water spraying on construction sites is required. Stockpiles will be covered with dust shrouds or tarpaulin to avoid and minimize dust generation. No construction work is allowed during high wind. Timely monitoring of air quality and inspections during construction will also be performed. The majority of residents understood and appreciated these measures, and supported the project. Nonetheless, a small proportion (two residents in the first round and 10 residents in the second round) did not support the project based on concerns over construction impacts to noise or dust, despite the planned mitigation measures. These are residents who will be near the planned works. To address this, additional consultation and mitigation measures have been integrated in the EMP for all households within the noise impact threshold distance (60 m; see Section V.D.3). This includes the installation of noise protective barriers and insulation and regular consultation with residents before and during construction.

Table VII-4 Respondents of 2nd Round of Questionnaire Survey

Information of Consulted APs		Huangshan District		Huizhou District		Tunxi District		She County		Qimen County		Yi County		Xiuning County	
		No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%
Gender	Male	50	54.9	20	52.6	18	48.6	173	58.4	25	49.0	23	46.9	71	55.0
	Female	41	45.1	18	47.4	19	51.4	123	41.6	26	51.0	26	53.1	58	45.0
Age Group	<20	0	0.0	0	0.0	0	0.0	1	0.3	1	2.0	1	2.0	0	0.0
	21-40	29	31.9	10	26.3	12	32.4	67	22.6	36	70.6	25	51.0	37	28.7
	41-60	51	56.0	21	55.3	21	56.8	187	63.2	13	25.5	22	44.9	82	63.6
	≥60	11	12.1	7	18.4	4	10.8	41	13.9	1	2.0	1	2.0	10	7.8
	Not filled														
Education	Junior school and below	0	0.0	0	0.0	0	0.0	1	0.3	5	9.8	3	6.1	0	0.0
	Junior high school	56	61.5	24	63.2	28	75.7	195	65.9	4	7.8	5	10.2	107	82.9
	High school	4	4.4	5	13.2	2	5.4	26	8.8	13	25.5	15	30.6	7	5.4
	College and above	31	34.1	9	23.7	7	18.9	74	25.0	29	56.9	26	53.1	15	11.6
	Not filled														
Occupation	Education and Research	25	27.5	4	10.5	13	35.1	30	10.1	1	2.0	0	0.0	30	23.3
	Farmer	25	27.5	14	36.8	12	32.4	136	45.9	8	15.7	4	8.2	60	46.5
	Employee	13	14.3	9	23.7	7	18.9	62	20.9	10	19.6	12	24.5	22	17.1
	Others	28	30.8	11	28.9	5	13.5	68	23.0	32	62.7	33	67.3	17	13.2
	Not filled														
Number of consulted towns/villages		13	/	11	/	12	/	64	/	6	/	12	/	26	/

Table VII-5: Results of 2nd Round of Questionnaire Survey

No.	Question	Option	Huangshan District		Huizhou District		Tunxi District		She County		Qimen County		Yi County		Xiuning County	
			No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%
1	Do you know the potential environmental impacts of the project?	Yes	89	97.8	34	89.5	36	97.3	289	97.6	31	60.8	48	98.0	105	81.4
		No	2	2.2	4	10.5	1	2.7	7	2.4	20	39.2	1	2.0	24	18.6
2	Do you know the proposed impact mitigation measures in the domestic EIA report?	Yes	88	96.7	36	94.7	35	94.6	283	95.6	27	52.9	49	100.0	103	79.8
		No	3	3.3	2	5.3	2	5.4	13	4.4	24	47.1	0	0.0	26	20.2
3	What do you think is the main concern during	Noise	60	65.9	26	68.4	11	29.7	178	60.1	41	80.4	33	67.3	97	75.2
		Air pollution	56	61.5	22	57.9	14	37.8	161	54.4	36	70.6	31	63.3	88	68.2

No.	Question	Option	Huangshan District		Huizhou District		Tunxi District		She County		Qimen County		Yi County		Xiuning County	
			No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%	No. of persons	%
	project construction? (multi-choice)	Water pollution	43	47.3	25	65.8	29	78.4	164	55.4	24	47.1	36	73.5	93	72.1
		Solid waste	31	34.1	17	44.7	17	45.9	64	21.6	20	39.2	17	34.7	68	52.7
		Ecology (including soil erosion)	33	36.3	17	44.7	6	16.2	113	38.2	10	19.6	14	28.6	44	34.1
4	What do you think is the main concern during project operation? (multi-choice)	Noise	50	54.9	21	55.3	11	29.7	152	51.4	37	72.5	22	44.9	85	65.9
		Air pollution	55	60.4	22	57.9	12	32.4	150	50.7	31	60.8	24	49.0	77	59.7
		Water pollution	43	47.3	19	50.0	27	73.0	148	50.0	25	49.0	38	77.6	78	60.5
		Solid waste	27	29.7	12	31.6	17	45.9	76	25.7	12	23.5	17	34.7	60	46.5
		Ecology (including soil erosion)	32	35.2	19	50.0	5	13.5	119	40.2	12	23.5	16	32.7	48	37.2
5	Are you satisfied with the proposed impact mitigation measures?	Satisfied	84	92.3	33	86.8	31	83.8	265	89.5	29	56.9	47	95.9	102	79.1
		Partially satisfied	6	6.6	5	13.2	6	16.2	29	9.8	21	41.2	2	4.1	27	20.9
		Not satisfied	1	1.1	0	0.0	0	0.0	2	0.7	1	2.0	0	0.0	0	0.0
6	Do you know the grievance redress mechanism of the project?	Yes	82	90.1	30	78.9	31	83.8	271	91.6	22	43.1	43	87.8	105	81.4
		No	9	9.9	8	21.1	6	16.2	25	8.4	29	56.9	6	12.2	24	18.6
7	What impact do you think will the project bring to local environment?	Positive impact	69	75.8	20	52.6	33	89.2	226	76.4	40	78.4	35	71.4	92	71.3
		Adverse impact	6	6.6	6	15.8	1	2.7	0	0.0	6	11.8	3	6.1	13	10.1
		No impact	16	17.6	12	31.6	3	8.1	70	23.6	5	9.8	11	22.4	24	18.6
8	What is your attitude to the project?	Support	91	100.0	37	97.4	36	97.3	294	99.3	46	90.2	49	100.0	122	94.6
		Not support	0	0.0	0	0.0	0	0.0	1	0.3	3	5.9	0	0.0	6	4.7
		Not sure	0	0.0	1	2.6	1	2.7	1	0.3	2	3.9	0	0.0	1	0.8

E. Future Information Disclosure and Public Consultation

236. Consultation and information disclosure to safeguard the local environment and residents will continue throughout the construction and operation phases. The PMO and IAs will be responsible for organizing the public consultations with support of the LIEC. The detailed consultation and communication plan is defined in the EMP (Appendix 1). The project's environmental information will be disclosed as follows:

- (i) Public notice boards will be set at each work site to provide information on the purpose of the project activity, responsible entities on site, and the project level GRM. Contact information of all GRM entry points will be disclosed on the construction site information boards.
- (ii) Domestic EIA reports (in Chinese) will be disclosed on Huangshan EEB's websites before formal approval by Huangshan EEB.
- (iii) Copies of the domestic assessments are available on request in the PMO.
- (iv) This IEE is available at www.adb.org
- (v) The project semi-annual environmental monitoring reports will be available at www.adb.org

VIII. GRIEVANCE REDRESS MECHANISM

237. Public participation, consultation, and information disclosure are undertaken as part of the local EIA process. Consultations undertaken by the project consultants have discussed and addressed major community concerns. Continued public participation and consultation has been emphasized as a key component of successful project implementation. As a result of this public participation and safeguard assessment during the initial stages of the project, major issues of grievance are not expected. However, unforeseen issues may occur. To settle such issues effectively, an effective and transparent channel for receiving and resolving complaints and grievances has been discussed and will be established to address environmental, health, safety and social concerns associated with project construction, operation and land acquisition.

238. The GRM is designed to achieve the following objectives: (i) provide channels of communication for local communities to raise concerns about environmental and social related grievances which might result from the project; (ii) prevent and mitigate adverse environmental and social impacts to communities caused by project construction and operation, including those associated with resettlement; (iii) improve mutual trust and respect and promote productive relationships between the IAs and local communities; and (iv) build community acceptance of the project.

239. Public grievances to be addressed by the GRM will most likely include dust emissions, construction noise, odor from onsite wastewater treatment stations, inappropriate disposal of construction wastes, disturbance of traffic, damage to private houses, safety measures for the protection of the public and construction workers, and water quality deterioration. Grievances related to involuntary resettlement may relate to the lack, or un-timely payment of, compensation monies, other allowances, and/or lease monies as per entitlements described in the resettlement plan and associated documents.

240. Currently in the PRC, when residents or organizations are negatively affected by a development, they may complain, by themselves or through their community committee, to the contractors, developers, the Township Government, the local EEB, or by direct appeal to the local courts. The main weaknesses of this system are: (i) the lack of a specialized unit to address grievances; and (ii) the lack of a specific timeframe for the redress of grievances. The project GRM addresses these weaknesses.

241. The GRM meets the regulatory standards of the PRC that protect the rights of citizens from construction-related environmental and/or social impacts. Decree No. 431 Regulation on Letters and Visits, issued by the State Council of PRC in 2005, codifies a complaint acceptance mechanism at all levels of government and protects the complainants from retaliation. Based on the regulation, the Ministry of Environment and Ecology published updated Measures on Environmental Letters and Visits (Decree No. 15) in December 2010.

242. The GRM is accessible to all members of the community, including women, youth, and poverty-stricken residents. Multiple points of entry are available, including face-to-face meetings, written complaints, telephone conversations, e-mail, and social media. The details of the GRM, including a time-bound flow chart of procedures, are included in the EMP (Appendix 1 of this IEE).

IX. ENVIRONMENTAL MANAGEMENT PLAN AND ESMS

243. **EMP.** This IEE contains an EMP for the overall project (Appendix 1), summarizing roles and responsibilities, potential environmental impacts and mitigation measures, environmental monitoring and reporting arrangement, trainings, public consultation program, GRM, estimated cost for EMP implementation, and mechanisms for feedback and adjustment. The objective of establishing an EMP is to propose appropriate mitigation measures and establish the institutional arrangements to monitor and ensure compliance with the PRC environmental regulations, ADB's SPS, and the project documents. Such institutional mechanisms will seek to ensure continuous improvement of environmental protection activities during preconstruction, construction, and operation to prevent, reduce, or mitigate adverse impacts.

244. The EMP draws on the domestic EIA report, TRTA discussions and agreements with the PMO, IAs and relevant government agencies. The EMP will be updated after completion of detailed design and included as a separate annex in all bidding and contract documents. Contractors will be required to develop site-EMPs that are fully responsive to the EMP.

245. The EMP is the over-arching document for environmental safeguards, but the mitigation and monitoring measures focus on civil works under outputs 1 and 2. Subprojects under output 3, which will be designed during project implementation, will be managed under an ESMS.

246. **ESMS.** Under project output 3, the environmental and social safeguard requirements for all subprojects to be funded under the Green Investment Fund will be subject to an ESMS (Appendix 2). The ESMS describes the required procedures for safeguard screening, categorization, impact assessment, mitigation, monitoring, and reporting for the future activities to be funded under the Green Investment Fund. It also defines the types of subprojects which may be supported. Proposed activities which may meet category "A" risk level for social or environmental impacts or category "B" risk level for social impacts (i.e. issues related to resettlement, land use rights transfer, and/or indigenous peoples) under ADB's SPS will not be supported. The ESMS has been designed in consultation with the PMO and Huangshan Trust Investment Company (HTIC), the implementing agency for the Green Investment Fund. The HTIC will implement the ESMS, with guidance from the PMO and loan implementation consultants.

247. Consolidated semi-annual environmental safeguard progress reports will be provided to ADB to report on implementation progress for the EMP and ESMS.

X. PROJECT ASSURANCES

248. All ADB-funded projects are required to comply with a standard set of loan assurances for environmental safeguards, which focus on compliance with national laws and the project EMP. In addition, the following project-specific assurances are included in the project agreement between ADB and the HMG. Refer to the loan and project agreements for the final wording of the assurances. For definition of the technical terms used in the assurances for the ESMS, refer to Appendix 2.

- (i) HMG will ensure that the Implementing Agency implements all of the following measures before the Project Implementing Agency provide any funds to the SPMOs: (a) appoint at least one qualified environment officer and one social officer as full time Project management office staff to coordinate implementation of the EMP, LURTF, RP, and GAP; (b) recruit a start-up loan implementation consultant to support the Project management office; (c) ensure that the Project management office has engaged one external social monitoring specialist; (d) ensure that all SPMOs have (i) assigned one social and environmental focal staff to be responsible for daily coordination and implementation of the EMP, LURTF, RP, and GAP, and (ii) entered into contracts with certified environment monitoring agency that will conduct the environmental impact monitoring for each SPMO

described in the EMP; and (e) ensure that the SPMOs' contracts with the external environment monitoring agencies require them to report their monitoring results to the Project management office at the same time as they report them to the SPMOs.

- (ii) Before and during the implementation of Works, HMG shall cause the Implementing Agency to organize and conduct training on implementation and supervision of the EMP for the Implementing Agency, the SPMOs, construction supervision companies, and contractors, and shall ensure that the appropriate staff and officers receive such training.
- (iii) HMG will ensure that: (i) sustainable financial support for operation and maintenance of all Project facilities will be provided after construction, including the rural wastewater treatment stations (WWTS), water supply plants (WSP), and pipeline networks; (ii) qualified operation and maintenance personnel will be assigned for WWTS and WSP during the Project implementation and thereafter; and (iii) periodical inspection on the performance of WWTS and WSP is conducted to identify and promptly resolve any operational issues.
- (iv) For the linked facilities the project will be involved with (e.g. through physical connections for wastewater treatment and water supply), HMG shall ensure that such facilities shall continue to be maintained in accordance with domestic requirements for environmental management, including, but not limited to, environmental safety measures, treated wastewater discharge approvals, and worker and community health and safety. Further, HMG shall immediately advise ADB if any changes are made to such facilities that adversely impact their capacity or function and affect the viability of the Project. In such event, HMG and ADB shall agree on any necessary corrective actions.
- (v) HMG shall ensure, and shall cause the Implementing Agencies to ensure that that agricultural chemicals listed as hazardous under Classes I or II by the World Health Organization or listed as prohibited or strictly controlled use under the Borrower's national regulations for pesticide management are not be used within the Project area.

Additional specific requirements for the ESMS

- (vi) HTIC shall ensure that the [Limited Partnership] comply with and implement the Presidential Directive. ADB shall be notified and consulted immediately should there be any changes to the Presidential Directive.
- (vii) HTIC [shall cause the Limited Partnership to] appoint one qualified environment staff and one qualified social staff for coordination and implementation of the ESMS for the Green Investment Fund, at least three months before the signing of the first Equity Investment Agreement.
- (viii) HMG and HTIC shall ensure that the [Limited Partnership] requires all the Qualified Investees comply with the ESMS.
- (ix) HMG shall, through HTIC, shall ensure that (a) all Qualified Subprojects to be financed under the Green Investment Fund are screened as per the procedures set out in the ESMS and (b) as part of the ESMS, HTIC and [the Limited Partnership] submits to ADB for prior review and approval the proposed safeguards screening documents and proposed safeguard classification, together with the project description for the first two Qualified Subprojects from each type of project category (e.g. agro-forestry, ecotourism), as set out in PAM. If such proposed Safeguards classifications and the project description are satisfactory to ADB, any subsequent Qualified Subproject shall only be subject to post review in the annual ESMS performance report required to be submitted to ADB as described in the ESMS. Further, HMG shall, through HTIC, ensure that before

any Qualified Subproject is approved, an IEE and RP, as applicable, are prepared for such Qualified Subproject, as required pursuant to ESMS.

- (x) HMG shall and shall cause the HTIC and [the Limited Partnership] to ensure that (i) Qualified Investee prepare, design, construct, implement, operate and decommission the Qualified Subproject in accordance with (a) all applicable laws and regulations of the Borrower relating to environment, health and safety; (b) the ESMS adopted by the HTIC [and the Limited Partnership]; and (c) all measures and requirements set forth in an IEE, where such measures are required for an Qualified Subproject with Environmental Safeguards Category B under applicable law and/or the ESMS and (d) any corrective or preventative actions set forth in a Safeguards Monitoring Report, and (ii) the institutional arrangements for effective implementation of environmental and social safeguards as described in the ESMS are in place before commencement of any Works under the Qualified Subproject, and (iii) any adverse impact on the environment that may arise from Qualified Subproject implementation activities is promptly mitigated or minimized and reported to ADB in accordance with the ESMS.
- (xi) HMG shall and shall cause HMG to ensure that (a) necessary budgetary and human resources are made available to fully implement the ESMS; and (b) each Qualified Investee under the Qualified Subproject makes necessary budget and human resources to fully implement the respective EMP and RP, as applicable.
- (xii) HMG shall and shall cause the HTIC and [the Limited Partnership] to ensure that throughout the duration of the Qualified Subproject, so long as any equity investment is remaining in the Qualified Investee (a) any changes to the design of the Qualified Subproject that may potentially cause negative environmental impacts will be screened and assessed, and environmental monitoring and mitigation measures shall be revised pursuant to procedures as set out in ESMS.
- (xiii) HMG shall and shall cause the HTIC and [the Limited Partnership] to ensure that each Qualified Subproject that relates to the establishment or development of a new production base includes sustainable and climate smart farming practice screening, including water-saving technologies, as more fully described in the ESMS.
- (xiv) HMG shall, through HTIC, submit semi-annual progress reports on the implementation of the ESMS. HMG and HTIC shall review the effectiveness of its ESMS implementation after 12 months of Project implementation, and make any necessary changes as required by ADB and HTIC following such review.
- (xv) HMG shall, through HTIC, ensure that measures to avoid, reduce and/or mitigate environmental and/or social impacts, as applicable, in each Qualified Subproject are included in the Equity Investment Agreement with respective Qualified Investee or in a separate written undertaking from the Qualified Investee that gives HTIC the right to exercise any remedies for failure to comply with any such measures by the the Qualified Investee.
- (xvi) HMG shall, through HTIC, shall ensure that all personnel with responsibility for approving Qualified Subprojects and Qualified Investees complete all training provided by the Project for implementation of the ESMS.
- (xvii) Financing of Any Qualified Subproject after the Loan Closing Date, HMG shall ensure that after the Loan Closing Date, any subproject to be financed through the Green Investment Fund shall be selected and implemented in accordance with all the provisions under the Loan Agreement and this Project Agreement to the extent that they are applicable to such subprojects. In particular, all such subprojects shall be selected in accordance with the Selection Criteria and implemented in accordance with the ESMS.

XI. CONCLUSION

249. The project will bring significant environmental and ecological benefits to residents in the three districts and four counties in Huangshan Municipality by significantly contributing to improving wastewater collection in urban area, wastewater treatment in rural area, agricultural-related non-point source pollution control, flood protection, and water quality of the Xin'an River and its tributaries.

250. Key environmental risks during construction are from the proposed construction of new sewage and stormwater drainage pipes, onsite wastewater treatment stations, water supply pipes, river revetment, and agricultural and tourism infrastructure. These construction works may cause wastewater discharge, increased noise level, air pollution (mainly fugitive dust), soil erosion from uncontrolled earthworks, and uncontrolled solid waste disposal. Other risks include interference with traffic and municipal services during wastewater pipe construction, permanent and temporary acquisition of land, involuntary resettlement, and occupational and community health and safety. Measures to avoid, minimize, and mitigate potential project impacts have been developed within the EMP (Appendix 1) and ESMS (Appendix 2), which are the key documents to manage, monitor and report on environmental impacts of the project. A project-specific GRM has been developed, and will be implemented at the municipal, county/district, and site levels.

251. Project assurances have been developed to strengthen confidence in the implementation of key measures in the project EMP, and, to address potential issues that are beyond the project scope. The assurances have been agreed between the HMG and ADB and are described in Section X.

252. Based on the information presented in this IEE, and assuming full and effective implementation of the project EMP and ESMS, loan assurances, and training, potential adverse environmental impacts are expected to be minimized and/or mitigated to the levels and standards applied in this IEE.

APPENDIX 1. ENVIRONMENTAL MANAGEMENT PLAN (OUTPUTS 1, 2 AND 4)**ENVIRONMENT MANAGEMENT PLAN FOR THE
ANHUI HUANGSHAN XIN'AN RIVER ECOLOGICAL
PROTECTION AND GREEN DEVELOPMENT PROJECT****People's Republic of China****August 2019****Prepared by the Huangshan Municipal Government for the Asian Development Bank**

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A. Objectives

1. This environmental management plan (EMP) is for the Anhui Huangshan Xin'an River Ecological Protection and Green Development Project (the project). The EMP is to be implemented in all phases of the project: design, pre-construction, construction, and operation. The EMP is to ensure project compliance with PRC environmental laws and ADB's Safeguard Policy Statement (SPS 2009). The EMP describes: the roles and responsibilities of all project agencies to implement this EMP; anticipated impacts and mitigation measures; inspection, monitoring, and reporting arrangements; training and institutional strengthening; grievance redress mechanism (GRM); and future public consultation.

2. In the engineering design stage, the Huangshan Municipal Project Management Office (PMO) will pass this EMP to the design institutes for incorporating mitigation measures into the detailed engineering designs. The EMP will be updated at the end of the detailed design, as needed. To ensure that bidders will respond to the EMP's provisions, the PMO and the project implementation units (PIUs) of the three districts and four counties will prepare and provide the specification clauses for incorporation into the bidding documents: (i) a list of environmental management requirements to be budgeted by the bidders in their bids; (ii) environmental clauses for contractual terms and conditions; and (iii) the project domestic EIA report and updated EMP.

B. Organizations and Their Responsibilities for EMP Implementation

3. The Huangshan Municipal Government (HMG) is the executing agency of the project. At the municipal-level, HMG has established the: (i) Huangshan Municipal Project Leading Group (HPLG), to provide policy guidance, overall oversight and coordination for the project. The group is chaired by the HMG executive vice mayor and comprised of officers from Huangshan Municipal Development and Reform Commission, Huangshan Finance Bureau, and other municipality bureaus; and (ii) PMO, to manage, supervise and coordinate overall project implementation. The PMO is established with membership of all key agencies and departments involved in project management and implementation. The project activities will be carried out at the city level or county or district level.

4. For the project activities at city level (e.g. capacity development and forest health protection), PMO will be the implementing agency, except for the Green Investment Fund, which will be implemented by the Huangshan Trust Investment Company (HTIC). For subprojects to be implemented at the county or district level, the county or district governments will be the implementing agency. Each county or district government has set up a project implementation unit (PIU), which will be responsible for daily project implementation with guidance of PMO. The project will have 8 implementing agencies: HTIC; and, the local governments of the three districts and four counties. EMP implementation arrangements and responsibilities are summarized in Table EMP-1. Environmental and social safeguards for the Green Investment Fund (output 3) will be managed under an environmental and social management system (Appendix 2).

Table EMP-1: Institutional Responsibilities for Implementation of the Project Environmental Safeguards

Agency	Roles and Responsibilities
Huangshan Municipal Project Leading Group	<ul style="list-style-type: none"> • Ensure timely national, provincial, and inter-agency coordination and support for the project as needed • High-level support to executing agency • Provide advice on project implementation • Review project progress
Huangshan Municipal Government	<ul style="list-style-type: none"> • Project executing agency • Overall accountability and responsibility for project planning, management, and implementation • Ensure timely and effective execution of the loan agreements • Coordinate with ADB

Agency	Roles and Responsibilities
Huangshan Municipal Project Management Office	<ul style="list-style-type: none"> • Supervise and manage daily project implementation • Recruit and manage design institutes, procurement agents, consultants, contractors, CSCs, in accordance with government and ADB regulations • Submit bidding documents, bid evaluation reports and other documents as needed to ADB for endorsement • Supervise construction and monitor quality control • Coordinate with ADB on all aspects of project implementation <p>Environment safeguards – all project outputs</p> <ul style="list-style-type: none"> • Engage the LIEC; and, EMA for external environmental monitoring • Assign 1 PMO Environment Officer and 1 PMO Social Officer • Respond to any unanticipated safeguard issues and take corrective actions as needed • Ensure project compliance with the loan and project agreements (including all safeguard provisions), EMP, and ESMS • Prepare semiannual environment monitoring reports to ADB <p>IEE and EMP – all project outputs except Green Investment Fund (output 3)</p> <ul style="list-style-type: none"> • Update IEE and/or EMP as needed, especially during the stage of detailed engineering designs • Ensure that the EMP, especially all relevant mitigation measures, are included in the detailed engineering designs • Establish the EMP grievance redress mechanism <p>ESMS – for Green Investment Fund (output 3)</p> <ul style="list-style-type: none"> • Support HTIC to finalize the ESMS; and submit updated draft ESMS to ADB for endorsement • Support HTIC to implement the Green Investment Fund and ESMS • For the first batch of each subproject type (see ESMS) from each project county and district, submit the draft safeguard screening and categorization documents to ADB for endorsement • Facilitate safeguard training for HTIC • Establish the ESMS grievance redress mechanism • Incorporate monitoring and progress on ESMS implementation from HTIC in the semiannual environment monitoring reports to ADB
<p>Huangshan District Government Huizhou District Government Tunxi District Government Xiuning County Government She County Government Yi County Government Qimen County Government</p> <p>and their respective Project Implementing Units</p> <p>(all project outputs except Green Investment Fund under output 3)</p>	<ul style="list-style-type: none"> • Implement subprojects, including finance, administration, technical and procurement matters, monitoring, evaluation, safeguards • Coordinate with PMO for project implementation • Assign PIU environment officer (1 per PIU) • Prepare tendering contracts; and submit bidding documents, bid evaluation reports and other documents to PMO • Recruit design institutes, contractors, CSCs; and manage contractors and suppliers • Incorporate EMP into bidding documents • Supervise and monitor EMP implementation • Participate in capacity building and training programs • Construction supervision and quality control • Submit withdrawal applications to finance bureau • Commission the constructed facilities
Huangshan Trust Investment Company	<ul style="list-style-type: none"> • Implementing agency for the Green Investment Fund (project output 3) • Establish, manage, and implement the Green Investment Fund and ESMS • Prepare semiannual environment monitoring reports to PMO, for consolidation within progress reports by PMO to ADB

Agency	Roles and Responsibilities
Project Facility Operators - the municipal agencies, town / village governments, or district/county Housing and Urban-Rural Development Bureaus, Urban Construction and Investment Companies, Ecology and Environment Bureau, Commission of Tourism, and commission of industrial parks	<ul style="list-style-type: none"> • With PIUs, commission the constructed facilities • Operate and maintain the completed facilities, including environmental management, monitoring and reporting responsibilities
"Start-up" environment safeguard consultant	<ul style="list-style-type: none"> • Short-term national position to support PMO and PIUs with start-up support for EMP and ESMS establishment while the LIEC is being recruited • Assess whether the detailed engineering designs are within the scope of the EMP and/or whether new safeguard assessments are required • Help integrate the EMP within the project bidding documents • Assist PMO and HTIC to establish the GRMs for the EMP and ESMS respectively • Provide initial training to project agencies for EMP and ESMS implementation
Loan Implementation Environmental Consultant	<ul style="list-style-type: none"> • Support the executing and implementing agencies in their tasks to coordinate and implement the EMP and ESMS • Provide ongoing training for EMP and ESMS implementation, including the EMP capacity building described in Table EMP-6 • Review the detailed engineering designs and assess whether the IEE and/or EMP requires updating • Support the updating of the IEE and/or EMP as needed • Review bidding documents to ensure that EMP clauses are incorporated • Review site-specific EMPs (prepared by contractors) to ensure compliance with the EMP • Conduct site inspections to assess compliance with the EMP • Review environment monitoring reports prepared by contractors • Assist PMO to prepare the semiannual environmental monitoring reports to ADB
External environment monitoring agency	<ul style="list-style-type: none"> • Certified agency that will conduct the external environment monitoring described in Table EMP-5 • Monitor compliance of the identified parameters with the required project targets and standards; identify non-compliance • Submit independent progress reports to PMO, PIUs, ADB
Contractors	<ul style="list-style-type: none"> • Ensure sufficient funding and human resources for full implementation of mitigation and monitoring measures in the EMP • Develop site-specific EMPs based on this EMP, including the specific contractor performance targets listed in Table EMP-2 • Timely and effective implementation of EMP measures for works
Construction supervision company	<ul style="list-style-type: none"> • Ensure sufficient funding and human resources for supervising and instructing contractors for proper and timely implementation of required mitigation and monitoring measures in the EMP • Supervise construction progress and quality • Appoint EHS officer for regular onsite supervision of contractors • Supervise the contractor's EMP implementation performance • Undertake simple and cost-effective on-site quantitative measurements to regularly check that construction complies with the project environmental monitoring standards and targets, especially for noise and air quality (especially during excavation of pipe trenches in urban area and villages), using a basic hand-held meter • Submit monthly EMP monitoring reports to PIU and PMO

Agency	Roles and Responsibilities
Asian Development Bank	<ul style="list-style-type: none"> • Oversee project administration and timely execution of the loan agreements by the executing and implementing agencies • Disburse loan proceeds • Review procurement, consultant recruitment, progress reports, and audit reports • Review project compliance and targets against the design and monitoring framework, EMP, ESMS, social plans, and project administration manual • Review and endorse updated IEE, EMP and/or ESMS as needed • Monitors project progress and conducts review missions • Discloses monitoring reports on ADB public website

ADB = Asian Development Bank, CSC = construction supervision company, EHS = environment, health and safety, EMA = environment monitoring agency, EMP = environment management plan, ESMS = environmental and social management system, GRM = grievance redress mechanism, HTIC = Huangshan Trust Investment Company, LIEC = loan implementation environment consultant, PIU = project implementation unit, PMO = Huangshan Municipality project management office.

5. **Environment staff within PMO and PIUs.** One full-time PMO environment officer and seven district or county project implementation unit (PIU) environment officers (one per implementing agency) will be appointed. These personnel will be responsible for coordination and implementation of the EMP; and will also support the environmental and social staff to be recruited for the ESMS. The PMO Environment Officer will be responsible for overall EMP coordination. The officer will work full-time for the project and will take charge of: (i) supervising the implementation of mitigation measures during project design, construction and operation; (ii) ensuring that environmental management, monitoring, and mitigation measures are incorporated into bidding documents, construction contracts and operation management manuals; (iii) submitting semi-annual EMP monitoring and progress reports to ADB; (iv) coordinating the GRM; and (v) responding to any unforeseen adverse impacts. The PMO Environment Officer will be technically supported by the loan implementation environment consultant. Each PIU will nominate one environmental officer and one social officer to check the overall implementation of environmental management provisions of the EMP, and to work in close coordination with the PMO Environmental Officer.

6. **Loan implementation consultants.** PMO will engage a loan implementation environmental consultant (LIEC) and loan implementation social consultant (LISC), as part of the loan consultancy implementation services. The consultants will support the PMO to provide capacity building for, and coordination of, the EMP and ESMS implementation. The need to extend consultant support for the HTIC will be reviewed after about 24 months of project implementation.

7. Draft terms of reference for the positions of PMO Environment Officer, PMO Social Officer, PIU Environment Officer, and the LIEC, are described in Appendix EMP-1. Terms of reference for the HTIC environment and social positions are described in the ESMS (Appendix 2).

C. Potential Impacts and Mitigation Measures

8. Tables EMP-2 and EMP-3 list the potential impacts of the subprojects in the three districts and four counties during project preparation, design, construction and operation, and proposed mitigation measures. The mitigation measures will be incorporated into detailed design, bidding documents, construction contracts and operational management manuals, by the design institutes (during detailed design) and contractors (during construction), under the supervision of CSCs and PIUs, with technical support from the LIECs. The effectiveness of these measures will be evaluated based on environmental inspections and monitoring to determine whether they should be continued, improved or adjusted.

Table EMP-2: Potential Impacts and Mitigation Measures during Pre-construction and Construction Phases

Item	Potential impacts / issues	Mitigation measures	Implement	Supervise
A. DESIGN AND PRE-CONSTRUCTION PHASES				
Detailed design stage	Institutional strengthening for EMP Implementation and supervision	<ul style="list-style-type: none"> • At least 1 month before construction: (i) reconfirm the full-time status of the PMO Environmental Officer for the project; (ii) appoint at least one environment officer in each of the 7 PIUs (excluding HTIC, which will separately engage an environment officer for the ESMS). • At least 2 months before any construction, engage LIEC. • At least 2 months before any construction, provide training to all environmental staff for EMP implementation. • Confirm that at least one certified EMA has been recruited for the project at least 2 months before any construction. • When the contractors and CSCs have been engaged, conduct training on the project EMP. 	PMO, PIUs	EA, ADB
	Updating the EMP	<ul style="list-style-type: none"> • Update the mitigation measures defined in this EMP based on final detailed design. This will include the specific designs for the use of biopesticides which have been prepared during the detailed designs (see IEE Section V.D.6 and Section X). • Asbestos. Under ADB's List of Prohibited Investment Activities (SPS, 2009), the use of asbestos is prohibited except for the "purchase and use of bonded asbestos cement sheeting where the asbestos content is <20%" (SPS 2009: 76). However: (i) in practice it is difficult to assess whether asbestos content is <20%; and (ii) international development banks are increasingly banning the use of all asbestos from their projects. To ensure international best practice for human health and safety for this project: no asbestos of any kind will be used in any materials supported by the project. • Check with the design institute and PMO to ensure the proposed materials do not include the use of asbestos. • Submit the updated EMP to ADB for review; • In case of major changes of project location and/or additional physical components, form a DEIA team to conduct additional DEIA and public consultation. The revised DEIA should be submitted to Huangshan and district/county EEBs and ADB for approval and disclosure. To determine if the change is minor or major the PMO will consult with ADB. 	PMO, LIEC	EEBs, ADB
Construction Preparation	Environmental monitoring plan	<ul style="list-style-type: none"> • Prior to construction, the PMO will hire an EMA for environmental monitoring; • Prepare detailed monitoring plan in accordance with the monitoring plan in this EMP. 	PMO	PMO, PIUs
	Bidding and contract documents	<ul style="list-style-type: none"> • Mitigation measures in the EMP are incorporated in all bidding documents; • Bidding documents are sent to ADB for review; • Prepare environmental contract clauses for contractors. 	DIs, PMO, PIUs	LIEC, ADB
	EMP training	<ul style="list-style-type: none"> • LIEC, or invited environment specialists and/or officials from EEBs provide training on construction environmental management, implementation, supervision, to contractors and CSCs, in accordance 	LIEC, EEBs	PMO

Item	Potential impacts / issues	Mitigation measures	Implement	Supervise
		with the training plan in this EMP		
	Establish GRM	<ul style="list-style-type: none"> Responsibility for GRM implementation is assigned to the PMO and PIU Environmental Officers and PMO Social Officers, and is included in their terms of reference; PMO and PIU personnel will be aware of, and trained in, the GRM, and will help support the environmental and social officers when necessary. Key contact details for the GRM (phone number, fax, address, email) will be provided on the PMO, PIUs and/or EEB public websites and information boards at construction sites. 	PMO, PIUs	LIEC
	Site EMPs	<ul style="list-style-type: none"> Prior to any works, prepare site-specific EMP for individual construction sites 	Contractor	CSC
		<ul style="list-style-type: none"> Review and ensure site EMP complies with the measures in this EMP 	PMO, PIU	
B. CONSTRUCTION PHASE				
Wastewater management	Construction wastewater and domestic wastewater generated from construction activities	<ul style="list-style-type: none"> Sedimentation tanks will be installed on site and, after settling out of solids, the upper clear liquid will be recycled for spraying the construction site (dust control), and the waste residue in the tank will be cleared and transported to the construction spoil disposal sites. Oil-water separators will be installed before the sedimentation tank for oily wastewater treatment. All sites for washing of construction equipment will be equipped with water collection basins and sediment traps. Domestic wastewater generated from construction camps will be disposed in three ways: (i) for project sites nearing septic tanks in surrounding villages, domestic wastewater will be treated by the septic tanks before being used for irrigation; (ii) for project sites accessible to municipal sewerage systems, domestic wastewater will be discharged into the nearest sewerage system; (iii) for project sites neither close to villages nor sewerage systems, temporary septic tanks will be constructed for the centralized treatment of domestic wastewater. Fuel storage, machinery maintenance workshop and vehicle cleaning areas must be stationed at least 500 m away from the waterbody. Storage facilities for fuels, oil, and other hazardous materials will be within secured areas on impermeable surfaces and provided with bunds and cleanup installations. Contractors will develop actions for control of oil and other dangerous substances as part of their site EMPs. Contractors' fuel suppliers must be properly licensed. They shall follow proper protocol for transferring fuel and the PRC standard of JT3145-91 (Transportation, Loading and Unloading of Dangerous or Harmful Goods. revised). Labor camps will be located at least 500 m from waterbody. Portable toilets and on-site wastewater pre-treatment systems will be installed at construction camps along with proper maintenance protocols. 	Contractors	CSCs, PIUs, LIEC
Water supply	Interruption to existing	<ul style="list-style-type: none"> Ensure that existing water and wastewater services continue to be provided to communities 	Contractors	CSCs,

Item	Potential impacts / issues	Mitigation measures	Implement	Supervise
	water supply due to works	<p>during the civil works.</p> <ul style="list-style-type: none"> Any interruptions to such services as a result of the project works are as limited as possible. Prior to any such interruptions, consultations are held with all affected communities. 		PIUs, PMO
Ambient Air	Dust generated by construction activities, gaseous air pollution (CO, CH and NO ₂) from construction machinery, and fugitive emission of odor (NH ₃ and H ₂ S) from existing sewage pipes	<ul style="list-style-type: none"> Establish a series of measures for dust control in construction sites before work commencement. Install barriers at the boundary of construction sites with a height no less than 2.5m. Spraying water daily on construction sites where fugitive dust is being generated. Before excavation, proper spraying shall be performed on the working surface to maintain a certain humidity to reduce dust generation. Cover stockpiles with dust shrouds or tarpaulin to avoid spillage or dust generation. For the earthwork management for backfill, measures will include surface press and periodical spraying and covering. Extra earth will be cleared from the project site in time to avoid long term stockpiling. Vehicles with a closed load-carrying case shall be used to transport potentially dust-producing materials. Design haulage routes and schedules to avoid transport occurring in the central areas, traffic intensive areas or residential areas. Install vehicle washing equipment or conduct wheel washing manually at each exit of the work area to prevent trucks carrying mud and soils onto public roads. Keep construction vehicles and machinery in good working order, regularly service and turn off engines when not in use. Ensure vehicle and machinery emissions comply with PRC standards of GB18352-2005, GB17691-2005, GB11340-2005, and GB18285-2005. During high wind, dust-generating operations shall not be performed and onsite construction materials shall be covered with shrouds. When wind speed exceeds PRC Levels 4 or 5, excavation, soil transportation and demolition works are not permitted. Special precautions need to be applied in the vicinity of sensitive receptors such as schools, kindergartens and hospitals. Transport the sludge from existing sewer pipes offsite timely to reduce fugitive odor emission. Use exhaust fans at welding sites to increase ventilation and promote the diffusion of organic exhaust gas onsite. Timely monitoring of air quality and inspections during construction. 	Contractors , EMAs	CSCs, PIUs, LIEC

Item	Potential impacts / issues	Mitigation measures	Implement	Supervise
Noise	Noise generated from construction and transportation activities	<ul style="list-style-type: none"> Construction activities will be planned in consultation with local authorities and communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in the least disturbance. Construction works will be limited to daytime and will be strictly prohibited during the nighttime (22:00 h to 06:00 h) and noon (12:00 h to 14:00 h). Exceptions will only be allowed in exceptional cases, and only after getting the approval of the surrounding residents, local environmental authority and other relevant departments. The contractor shall apply for the approval seven days before the construction works. Nearby residents will be notified of such nighttime activities well in advance. When preparing construction planning, simultaneous high-noise activities will be avoided. High noise activities will be scheduled during the day rather than evening hours. Similarly, the construction sites will be planned to avoid multiple high noise activities or equipment from operating at the same location. Movable noise barriers will be adopted during construction at daytime. The barriers will: (i) be of adequate size and thickness to reduce construction noise to the required standards; and (ii) be placed to maximize noise absorption. Low-noise equipment will be selected as much as possible. Equipment and machinery will be equipped with mufflers and will be properly maintained to minimize noise. Transportation routes and delivery schedules will be planned to avoid densely populated and sensitive areas and high traffic times. Vehicles transporting construction materials or waste will slow down and not use their horn when passing through or nearby sensitive locations, such as residential communities, schools and hospitals. No honking is permitted during nighttime. Monitor noise at sensitive areas at regular intervals. If noise standards are exceeded, equipment and construction conditions shall be checked, and mitigation measures shall be implemented to rectify the situation. Conduct regular interviews with residents/villagers adjacent to construction sites to identify noise disturbance. Community feedback will be used to adjust work hours of noisy machinery. For the households that will be within 60 m of construction works (Section V.D.3 of IEE), particular attention will be provided. This will include: (a) follow-up consultations with these households prior to the start of any works, to specify the exact planned dates and schedule of works, nature of works, equipment to be used, safety measures, and public access during construction; (b) installation of noise barriers to reduce as much of the emissions as possible, and/or installation of additional layers on the windows of the affected homes as necessary, based on the assessment of the most technically effective method and feedback from the community consultations; (c) agreement on the duration of daily works. 	Contractors , EMAs	CSCs, PIUs, LIEC
Soil erosion	Soil erosion caused by construction activities,	<ul style="list-style-type: none"> Prepare site soil erosion management plans before works begin. Level the ground for the temporary spoil storage sites with proper blocking measures. 	Contractors	CSCs, PIUs, LIEC

Item	Potential impacts / issues	Mitigation measures	Implement	Supervise
	earthworks	<ul style="list-style-type: none"> During construction phase, the earthwork will be reasonably planned and balanced to reduce the stockpiling of spoil onsite as much as possible. Spoil will be reused onsite to the maximum extent feasible as fill. The spoil sites will be away from roads and be restored after storage activities. Limit construction during rainy season and high winds. Appropriate stormwater drainage systems and slope protection measures will be implemented to minimize soil erosion, such as perimeter bunds and temporary detention and settling ponds to control topsoil runoff. The construction schedule will be well designed to minimize the exposure time of bare land surface and stabilize all earthwork disturbance areas timely after the earthworks are completed. Minimize open excavation areas and slope during trenching. Construction camps, storage areas and access roads will be located within the acquired land to minimize the impacts on the soil and land vegetation in surrounding area. Landscaping will only use native plant species. Construct intercepting channels and drains to prevent runoff entering construction sites and divert runoff from sites to existing drainage or open ground for watering the vegetation. Rock material for the gabion cages for river revetment will be sourced from: (i) licensed suppliers of construction materials; and (ii) the old revetment material extracted from the Caocun River as part of the project works. 		
Solid Waste	Solid waste generated by construction activities and from workers' camps	<ul style="list-style-type: none"> Provide appropriate waste collection and storage containers at locations away from surface water or sensitive spots; Arrange with municipal waste collection services for regular collection of waste; Properly remove and dispose residual materials, wastes and contaminated soils. Paving or vegetating shall be done as soon as the materials are removed to stabilize the soil; Burning of waste is strictly prohibited; Provide sufficient garbage bins at strategic locations and ensure that they are protected from birds and vermin, and emptied regularly by the municipal waste collection systems. <p>CONTRACTOR PERFORMANCE TARGET:</p> <ul style="list-style-type: none"> No uncollected waste at close of construction activities each day. 	Contractors	CSCs, PIUs, LIEC
Ecology	Protection of flora and fauna around construction sites	<ul style="list-style-type: none"> Minimize damage to vegetation. Minimize the damage to existing vegetation and recover the vegetation timely after the completion of construction works. Native plant species will be used for replanting and site rehabilitation. The surface soil (0-30 cm) will be stored separately for reuse for landscape greening or agriculture. The stockpiling shall have a height less than 5m and a slope less than 1:1.5 with proper compaction to avoid soil erosion. Minimize damage to aquatic habitats. For the stone debris removal from river channel in Caocun River, only debris from previous river revetment works will be removed, and all works shall be conducted manually without intervention of any mechanical equipment to prevent 	Contractors	CSCs, PIUs, LIEC

Item	Potential impacts / issues	Mitigation measures	Implement	Supervise
		<p>mechanical damage to the riverbed.</p> <ul style="list-style-type: none"> All river channel related works will be carried out during dry season (October to March) to minimize potential impacts on the aquatic habitat. Landscaping and site rehabilitation. All planting activities under the project, including re-vegetation, landscaping, and rehabilitation of construction sites, will only use plant species which are (i) native (i.e. naturally occurring) to the Xin'an River basin, and (ii) are sourced from local stock within Huangshan Municipality. In the event that non-native seedlings are required for rapid stabilization of exposed soils and sites, HMG will and will cause the IAs to ensure that only sterile seedlings are used to prevent the spread of weeds. Training. Provide trainings to contractors and workers to increase their awareness on the need to protect the environment, wildlife and vegetation around the construction sites. Site inspection. The CSCs and the environmental officer of the PMO will regularly inspect construction sites to ensure that habitats are well demarcated, and workers are fully informed of "no-go" areas. Biopesticides. Before any use of biopesticides, confirm that: (a) a complete inventory of the pest species to be addressed for each demonstration site has been prepared; (b) any "pest" species which are rare, threatened, restricted range, or protected species have be excluded from the pest management program; (c) the specific organisms or other agents to be used as biopesticides have been identified during the detailed engineering designs; (d) each proposed agent or method has been confirmed to be highly crop-specific and will only act on the intended pest species, and will not affect local flora and fauna (e.g. the use of water mixed with tobacco will not be used as it may impact aquatic organisms in nearby streams); (e) specific application procedures, volumes, and post-application monitoring have been detailed, to ensure safe and responsible use of the biopesticides. 		
Protected Area	Damage to protected area during construction	<ul style="list-style-type: none"> Engineering design will be in line with the Taiping Lake Scenic Zone Master Plan (2015-2030) and Huashan Mysterious Grottoes Scenic Zone Master Plan (2007-2025); All works will be conducted within the confirmed ecological red line only; Avoid setting up temporary storage sites for construction waste within scenic zones, and all waste generated will be transported out for disposal timely; For subprojects near riverway, proper onsite wastewater treatment facilities (e.g. sedimentation tank) will be set up to avoid direct discharge of wastewater and impairing of aquatic ecosystem along the river; Design the location and shape of spoil piles before construction; Vehicles will slow down within scenic zones and frequent water spraying in construction sites will be performed to minimize dust; Recover the vegetation in construction sites timely after the completion of construction works to 	Contractors	CSCs, PIUs, LIEC

Item	Potential impacts / issues	Mitigation measures	Implement	Supervise
		minimize soil erosion and visual landscape impact in scenic zones.		
Physical cultural resources	Damage to known or unknown above or below-ground cultural relics	<ul style="list-style-type: none"> • Establish chance-find procedures for physical cultural resources; • If a new site is unearthed, work shall be stopped immediately and the IA, PMO and local CRB promptly notified. The construction will resume only after a thorough investigation and with the permission of appropriate authority. 	Contractors	CSCs, PIUs LIEC, cultural relic bureaus
Community and occupational health and safety	Site and access safety	<ul style="list-style-type: none"> • Erect signs will be placed at construction sites in view of the public, warning people of potential dangers such as moving vehicles and excavations, and raising awareness on safety issues; • Assign personnel to direct pedestrians around dangerous work areas; • Ensure that all sites are secure, discouraging access through appropriate fencing; • Place clear signs at construction sites in view of the people at risk (including workers and nearby communities), warning people of potential dangers such as moving vehicles, hazardous materials, excavations, and raising awareness on safety issues; • At the end of each day, all sites and equipment will be made secure (through fencing and/or lock-down of equipment) to prevent public access; • Erect safety barricades around all excavations; • Hold a public consultation meeting prior to commencing construction to discuss issues associated with ensuring the safety of nearby communities in vicinity of the construction site. • Pine wilt management. Prior to any chemical use (either manual or aerial spraying), conduct community consultations and install signs to ensure the public, tourists, and other stakeholders are informed of locations where use of chemicals will occur. • Prior to any aerial spraying: (i) close the target site to all human visitation; (ii) on the planned day of spraying, first check the target site to assess the presence of people, through direct ground inspections and checking with relevant agencies (e.g. tourism bureaus). 	Contractors	CSCs, PIUs, LIEC

Item	Potential impacts / issues	Mitigation measures	Implement	Supervise
	Occupational health	<ul style="list-style-type: none"> • Provide personal protection equipment to workers as needed, e.g. safety boots, helmets, gloves, protective clothing, goggles, ear protection in accordance with health and safety regulations. • An emergency response plan to take actions on accidents and emergencies, including environmental and public health emergencies associated with hazardous material spills and similar events will be prepared by each contractor before construction, and submitted to the PIU for review and appraisal. A fully equipped first-aid base in each construction site will be provided. The following contents will be included in the emergency response plan: (i) fire response/evacuation; (ii) chemical spill/exposure; (iii) biological material spill/exposure; (iv) bomb threat/suspicious package; (v) workplace violence; (vi) weather emergencies; and (vii) utility failure. • A records management system will be established to document occupational accidents, diseases, and incidents, that: (a) includes a tracking system to ensure that incidents are followed-up; (b) can easily retrieve records; and (c) can be used during compliance monitoring and audits. The system will be backed up on at least one external hard drive to protect records against loss or damage. • Ensure that safety, rescue and industrial health matters are given a high degree of publicity to all persons regularly or occasionally on the Site. Posters drawing attention to site safety, rescue and industrial health regulations will be made or obtained from the appropriate sources and will be displayed prominently in relevant areas of the site. • Train all workers in basic sanitation and health care issues, general health and safety matters, and on the specific hazards of their work and sites and the requirements for community safety. • Asbestos. In the event that materials containing asbestos are suspected: (i) the contractor will immediately inform the PIU, who will inform the PMO; (ii) the contractor will subcontract the municipal center for hazardous waste, who will be responsible for the safe handling, transport, and disposal of the materials; (iii) such materials will only be disposed in a landfill site certified and designed to receive hazardous materials. • Pine wilt management. The use of chemicals for pine wilt management will only be undertaken by personnel specifically qualified in the safe handling, application, and disposal of chemicals, and will include the use of all required protective equipment. 	Contractors	CSCs, PIUs, LIEC

Item	Potential impacts / issues	Mitigation measures	Implement	Supervise
	Community health and safety - COVID-19 prevention and control	<p>Prevention and Control Strategies and Measures for the COVID-19.</p> <p>(a)Organization and mobilization</p> <ul style="list-style-type: none"> Establish street (township) and community (village) level prevention and control work teams, with cadres, community health service centers and family doctors as the main force, supplemented by residents and volunteers, and full-time and part-time staff, so as to implement grid-based management and carpet-style management, with responsibility attributable to corresponding person, so as to fully cover communities (villages), buildings (natural villages) and families, and to implement prevention and control measures. <p>(b)Health education</p> <ul style="list-style-type: none"> Make full use of a variety of methods to carry out targeted publicity on the prevention and control of pneumonia caused by novel coronavirus infection. Raise the awareness of the masses on the health knowledge, the key points of protection, the importance of healthy habits and protection in time. <p>(c)Information notification</p> <ul style="list-style-type: none"> Release the information of medical treatment to the public, and remind all kinds of patients to go to designated institutions for medical treatment by classification and levels. Release local pandemic information, information on traffic and travel risks on a daily basis . <p>(d)Management of returnees from affected areas</p> <ul style="list-style-type: none"> Issue a notice, requiring people returning from affected area to register for physical examination immediately, and take the initiative to self isolate for 14 days. People with respiratory symptoms such as fever should seek medical treatment nearby in time, and be isolated at home or go to designated institutions for isolation as required. <p>(e)Environmental sanitation management</p> <ul style="list-style-type: none"> Clean up key places and dispose of garbage and dirt. Organize and carry out comprehensive vector control and disinfection in time to effectively reduce vector density. <p>(f)Material preparation;</p> <ul style="list-style-type: none"> Provide necessary prevention and control items and materials, such as thermometers, masks, disinfection supplies, etc. <p>(g)Close contact management</p> <ul style="list-style-type: none"> Close contacts of confirmed cases of pneumonia caused by novel coronavirus should be investigated and observed at home or subject to centralized medical observation. Where conditions permit, the centralized observation place should be clearly defined. Follow up the health status of close contacts every day, guide the observation subjects to monitor the changes of their own status properly and timely, and make records at any time. Make proper preparations for patient isolation control and transfer to designated hospitals. <p>(h)Disinfection</p> <ul style="list-style-type: none"> Properly carry out disinfection of pandemic spots such as the home, building units, offices and 	PIUs, contractors	PMOs, CSCs

Item	Potential impacts / issues	Mitigation measures	Implement	Supervise
		<p>conference rooms of the employer of the confirmed case, and clean and disinfect public places.</p> <p>(i) Blockade of affected area</p> <ul style="list-style-type: none"> For communities defined as affected areas, when necessary, measures can be taken to block the affected areas, where efforts should be made to restrict the access by personnel, and temporarily requisition houses and transportation tools. <p>(j) Restrict the gathering of people</p> <p>In the community, fairs and gatherings shall be restricted or suspended, and public places such as public baths, hot springs, cinemas, Internet cafes, KTVs and shopping malls should be closed. Suspend work, business or classes when necessary.</p>		
	Occupation health and safety - COVID-19 prevention and control	<p>To prevent and control COVID-19 outbreak, the project contractor shall:</p> <p>(a) ASSESSING WORKFORCE CHARACTERISTICS</p> <ul style="list-style-type: none"> The Contractor should prepare a detailed profile of the project work force, key work activities, schedule for carrying out such activities, different durations of contract and rotations (e.g. 4 weeks on, 4 weeks off). This should include a breakdown of workers who reside at home (i.e. workers from the community), workers who lodge within the local community and workers in on-site accommodation. Where possible, it should also identify workers that may be more at risk from COVID-19, those with underlying health issues or who may be otherwise at risk. Consideration should be given to ways in which to minimize movement in and out of site. This could include lengthening the term of existing contracts, to avoid workers returning home to affected areas, or returning to site from affected areas. Workers accommodated on site should be required to minimize contact with people near the site, and in certain cases be prohibited from leaving the site for the duration of their contract, so that contact with local communities is avoided. Consideration should be given to requiring workers lodging in the local community to move to site accommodation (subject to availability) where they would be subject to the same restrictions. Workers from local communities, who return home daily, weekly or monthly, will be more difficult to manage. They should be subject to health checks at entry to the site (as set out above) and at some point, circumstances may make it necessary to require them to either use accommodation 	Contractors	PIUs, CSCs

Item	Potential impacts / issues	Mitigation measures	Implement	Supervise
		<p>on site or not to come to work.</p> <p>(b) ENTRY/EXIT TO THE WORK SITE AND CHECKS ON COMMENCEMENT OF WORK</p> <ul style="list-style-type: none"> • Establishing a system for controlling entry/exit to the site, securing the boundaries of the site, and establishing designating entry/exit points (if they do not already exist). Entry/exit to the site should be documented. • Training security staff on the (enhanced) system that has been put in place for securing the site and controlling entry and exit, the behaviors required of them in enforcing such system and any COVID -19 specific considerations. • Training staff who will be monitoring entry to the site, providing them with the resources they need to document entry of workers, conducting temperature checks and recording details of any worker that is denied entry. • Confirming that workers are fit for work before they enter the site or start work. While procedures should already be in place for this, special attention should be paid to workers with underlying health issues or who may be otherwise at risk. Consideration should be given to demobilization of staff with underlying health issues. • Checking and recording temperatures of workers and other people entering the site or requiring self-reporting prior to or on entering the site. • Providing daily briefings to workers prior to commencing work, focusing on COVID-19 specific considerations including cough etiquette, hand hygiene and distancing measures, using demonstrations and participatory methods. • During the daily briefings, reminding workers to self-monitor for possible symptoms (fever, cough) and to report to their supervisor or the COVID-19 focal point if they have symptoms or are feeling unwell. • Preventing a worker from an affected area or who has been in contact with an infected person from returning to the site for 14 days or (if that is not possible) isolating such worker for 14 days. • Preventing a sick worker from entering the site, referring them to local health facilities if necessary or requiring them to isolate at home for 14 days. <p>(c)GENERAL HYGIENE</p> <ul style="list-style-type: none"> • Workers should wear appropriate personal protective equipment (PPE), which includes protective outerwear, gloves, boots, goggles or a face shield, and a mask; they should perform hand hygiene frequently; and they should avoid touching eyes, nose, and mouth with unwashed hands. • Train field workers and staff • Placing posters and signs around the site, with images and text in local languages. • Ensuring handwashing facilities supplied with soap, disposable paper towels and closed waste bins exist at key places throughout site, including at entrances/exits to work areas; where there 		

Item	Potential impacts / issues	Mitigation measures	Implement	Supervise
		<p>is a toilet, canteen or food distribution, or provision of drinking water; in worker accommodation; at waste stations; at stores; and in common spaces. Where handwashing facilities do not exist or are not adequate, arrangements should be made to set them up. Alcohol based sanitizer (if available, 60-95% alcohol) can also be used.</p> <ul style="list-style-type: none"> • Setting aside part of worker accommodation for precautionary self-quarantine as well as more formal isolation of staff who may be infected. <p>(d) CLEANING AND WASTE DISPOSAL</p> <ul style="list-style-type: none"> • Conduct regular and thorough cleaning of all site facilities, including offices, accommodation, canteens, common spaces. • Providing cleaning staff with adequate cleaning equipment, materials and disinfectant. • Review general cleaning systems, training cleaning staff on appropriate cleaning procedures and appropriate frequency in high use or high-risk areas. • Where it is anticipated that cleaners will be required to clean areas that have been or are suspected to have been contaminated with COVID-19, providing them with appropriate PPE: gowns or aprons, gloves, eye protection (masks, goggles or face screens) and boots or closed work shoes. If appropriate PPE is not available, cleaners should be provided with best available alternatives. • Training cleaners in proper hygiene (including handwashing) prior to, during and after conducting cleaning activities; how to safely use PPE (where required); in waste control (including for used PPE and cleaning materials). <p>(e) INSTANCES OR SPREAD OF THE VIRUS</p> <ul style="list-style-type: none"> • If a worker has symptoms of COVID-19 (e.g. fever, dry cough, fatigue) the worker should be removed immediately from work activities and isolated on site. • If testing is available on site, the worker should be tested on site. If a test is not available at site, the worker should be transported to the local health facilities to be tested (if testing is available). • If the test is positive for COVID-19 or no testing is available, the worker should continue to be isolated. This will either be at the work site or at home. If at home, the worker should be transported to their home in transportation provided by the project. • Extensive cleaning procedures with high-alcohol content disinfectant should be undertaken in the area where the worker was present, prior to any further work being undertaken in that area. Tools used by the worker should be cleaned using disinfectant and PPE disposed of. • Co-workers (i.e. workers with whom the sick worker was in close contact) should be required to stop work, and be required to quarantine themselves for 14 days, even if they have no symptoms. • Family and other close contacts of the worker should be required to quarantine themselves for 14 days, even if they have no symptoms. • If a case of COVID-19 is confirmed in a worker on the site, visitors should be restricted from 		

Item	Potential impacts / issues	Mitigation measures	Implement	Supervise
		<p>entering the site and worker groups should be isolated from each other as much as possible.</p> <ul style="list-style-type: none"> • If workers live at home and has a family member who has a confirmed or suspected case of COVID-19, the worker should quarantine themselves and not be allowed on the project site for 14 days, even if they have no symptoms. • Workers should continue to be paid throughout periods of illness, isolation or quarantine, or if they are required to stop work, in accordance with national law. • Medical care (whether on site or in a local hospital or clinic) required by a worker should be paid for by the employer. <p>(f) TRAINING AND COMMUNICATION WITH WORKERS</p> <ul style="list-style-type: none"> • Training of workers should be conducted regularly, providing workers with a clear understanding of how they are expected to behave and carry out their work duties. • Training should address issues of discrimination or prejudice if a worker becomes ill and provide an understanding of the trajectory of the virus, where workers return to work. • Training should cover all issues that would normally be required on the work site, including use of safety procedures, use of construction PPE, occupational health and safety issues, and code of conduct, taking into account that work practices may have been adjusted. 		

CSC = construction supervision company, CRB = cultural relic bureau, DI = design institute, EA = executing agency, EEB = ecology and environment bureau, EMA = Environmental Monitoring Agency, PMO = Huangshan Municipal project management office (municipal-level PMO), IA = implementing agency, LIEC = loan implementation environment consultant, PIU = project implementation unit (under project implementing agency).

Table EMP-3: Potential Impacts and Mitigation Measures during Operation

Item	Potential impacts / issues	Mitigation Measures and/or Safeguards	Implement	Supervise
Point source water pollution	Treated effluent from rural onsite wastewater treatment stations and domestic wastewater from tourism toilets	<ul style="list-style-type: none"> Establish O&M procedures for rural WWTS. This will include: (a) routine inspection of WWTS performance and condition, to reduce the risk of operational failures; (b) emergency response plan, for clear procedures to quickly address mechanical or electrical failure (e.g. clogged pipes or rural power blackouts). 	O&M units of the relevant MAB. A third-party will be commissioned by MAB for daily work.	PIUs
Sludge disposal	Inadequate disposal of sludge from the project-supported WWTS	<ul style="list-style-type: none"> In accordance with national regulations, the raw sludge will be transported by sealed truck one to two times per year to the five county and district wastewater treatment plants that are operating in each project county and district. Upon completion of the Huangshan Municipal WWTP Sludge and Kitchen Waste Treatment Plant (estimated to be in August 2020), all project sludge will be transported to this new plant. Due diligence has been conducted on these plants (Section III.D). All are operating in compliance with regulatory requirements. The treated sludge will be disposed in landfill or used as fertilizer for landscaping 	As above	PIUs
Non-point source pollution	Soil and water pollution due to use of agricultural chemicals	<ul style="list-style-type: none"> All use of agricultural chemicals under the project will be subject to the project training and measures to reduce the use of chemical fertilizers and pesticides No agricultural chemicals listed as hazardous under Classes I or II by the World Health Organization²⁹ or listed as prohibited or strictly controlled use under PRC national regulations for pesticide management (see Appendix 1-2) will not be used for any project-supported activities 	O&M units	PIUs
Ambient air	Exhaust gas from vehicles and odor from WWTS with associated septic tanks and pumping stations, tourism toilets, and garbage bins	<p>Tourist facilities (parking lots, toilets, bins)</p> <ul style="list-style-type: none"> Design and implement strict and clear procedures for O&M of the public tourism toilets, including daily cleaning, to maintain hygiene and minimize disease risks. Install garbage bins at each public toilet. Bins will have covers, to prevent flies and rodents accessing the litter. Implement daily waste collection schedule for the emptying and removal of litter from the garbage bins. Garbage bins with cover will be used for enclosed storage of waste Layout design of the parking lots will facilitate efficient entry and exit of vehicles, to reduce traffic congestion and gas emissions from vehicle exhaust gas caused by idling. Implement procedures for O&M of landscaping around the parking lots and toilets. Periodical inspection on the condition and O&M of the public toilets, litter bins, parking lots, landscaping to ensure efficient operation <p>Wastewater treatment stations</p>	O&M Units: management committee of each scenic spot	PIUs

²⁹ www.who.int/ipcs/publications/pesticides_hazard_2009.pdf?ua=1

Item	Potential impacts / issues	Mitigation Measures and/or Safeguards	Implement	Supervise
		<ul style="list-style-type: none"> Regular O&M of facilities to ensure optimal performance Periodical inspection on performance Periodical sampling of air quality and odor at established distances from each station (Table EMP-5) Consultations with nearby communities as needed to assess whether there are odor-related issues 		
Noise	Noise from the 23 wastewater pumping stations	<ul style="list-style-type: none"> Each station will install low-noise equipment and thick walls. The pumps will be equipped with anti-vibration pad. Sound insulation windows and doors will be used in the stations. Station operators will maintain the equipment in good working condition as part of standard operating procedures. Periodical check and maintenance will be required. When mal-function of the equipment occurs, the related accessories or parts will be replaced timely to avoid noise from abnormal operation of pumps. 	O&M units of the relevant MAB. A third-party will be commissioned by MAB for daily work.	PIUs
Solid waste	Domestic waste from tourists	<ul style="list-style-type: none"> Arrange with municipal waste collection services for regular collection of the tourism waste. Burning of waste is strictly prohibited. Ensure the garbage bins in tourism area are protected from birds and vermin, and emptied daily by the municipal waste collection systems. 	O&M units of the management committee of each scenic spot	PIUs
Health and safety of operating staff	Health and safety of operating staff	<p>The COVID-19 outbreak prevention and control measures are as following:</p> <ul style="list-style-type: none"> Enterprises shall equip sufficient protective materials including masks, alcohol, disinfectant and thermometers, arrange employees to work and dine in different periods, and prevent employees from having activities and conferences together. The employees at work shall take temperatures twice a day and be recorded, and shall be supervised to wear masks during office time. The plant area, office area and other key areas shall be cleaned and sterilized regularly. If symptoms of acute respiratory infections such as fever, cough and shortness of breath occur to any employees, please go to the designated medical institutions in our city for test, diagnosis and treatment, and report to PMO at first time. Enterprises hang slogans of pandemic prevention and control in plant areas and office areas, send short messages and post texts on WeChat, in order to provide employees with science knowledge about the pandemic and ease them from unnecessary panic. Employees shall be urged to protect themselves, and accept temperature testing and recording when they go into and out of the industrial park. Further carrying out training on pandemic prevention and control. On the principles of precise resumption of work and production in different divisions and levels according to the requirements for pandemic prevention and control, a training program of medical staff against the pandemic shall be carried out in key units and industries related to the national economy and people's livelihood. The trainees will be designated by relevant district sectors and towns/sub- 	O&M units of the management committee of each scenic spot	PIUs

Item	Potential impacts / issues	Mitigation Measures and/or Safeguards	Implement	Supervise
		districts according to the status of resumption of work, production and school. Each unit/enterprise shall designate one medical staff against the pandemic to join the training.		

MAB = municipal administration bureau, O&M = operation and maintenance, PIU = project implementation unit, WWTS = wastewater treatment station.

D. Environmental Monitoring, Inspection and Reporting

9. Three types of project monitoring will be conducted under the EMP: (i) internal monitoring – to be conducted by the seven PIUs and the CSCs; (ii) external monitoring – of air, water and noise standards – to be conducted by the certificated EMA in each project county/district; and (iii) compliance monitoring – to be conducted by both the EMA and LIEC, to ensure the EMP is being implemented.

10. The project monitoring program focuses on the environment in the project areas of influence in the seven county/districts (Table EMP-5). The program covers the scope of monitoring, monitoring parameters, time and frequency, implementing and supervising agencies, and estimated costs. The monitoring shall comply with the methodology provided in the relevant national environmental monitoring standards. Other associated standards to be followed are the national environmental quality standards of ambient air, surface water and noise, and the pollutant discharge standards.

11. **Internal monitoring.** During construction, the CSCs and seven PIUs will be responsible for conducting internal environmental monitoring in accordance with the monitoring plan (Table EMP-5). Results will be reported through the CSC monthly reports to the PIUs and PMO.

12. **External monitoring.** The PIUs will contract at least one EMA to conduct environmental monitoring in accordance with the monitoring program (Table EMP-5). A detailed cost breakdown will be provided by the EMA when the environmental monitoring program is updated at the start of each component implementation. Monitoring will be conducted during construction and operation periods, until a project completion report is issued. Semi-annual monitoring reports will be prepared by the EMAs and submitted to PMO and the PIUs.

13. **Compliance monitoring for EMP and progress reporting.** The LIEC will review project progress and compliance with the EMP based on field visits, and the review of the environmental monitoring reports provided by the EMAs. The findings of the LIEC will be reported to ADB through the semi-annual EMP monitoring and progress reports. The reports will include (i) progress made in EMP implementation, (ii) overall effectiveness of the EMP implementation (including public and occupational health and safety), (iii) environmental monitoring and compliance, (iv) institutional strengthening and training, (v) public consultation (including GRM), and (vi) any problems encountered during construction and operation, and the relevant corrective actions undertaken. The LIECs will help the PMO prepare the reports and submit the English report to ADB for disclosure.

14. **Project completion environmental audits.** Within three months after each subproject completion, environmental acceptance monitoring and audit reports of each subproject shall be (i) prepared by the construction unit or a capable technical agency commissioned by the construction unit in accordance with the *Tentative Procedure of Project Completion Environmental Inspection and Acceptance for Construction Project* (2017); (ii) disclosed to the

public within 5 days after report completion with a duration no less than 20 working days; and
(iii) reported to ADB through the semiannual EMP monitoring and progress reporting process.

15. **Quality assurance (QA) /quality control (QC) for compliance monitoring.** To ensure accuracy of the monitoring, QA/QC procedures will be conducted in accordance with the following regulations:

- i) Regulations of QA/AC Management for Environmental Monitoring issued by the State Environmental Protection Administration in July 2006;
- ii) QA/QC Manual for Environmental Water Monitoring (Second edition), published by the State Environmental Monitoring Centre in 2001; and
- iii) QA/QC Manual for Environmental Air Monitoring published by the State Environmental Monitoring Centre in 2001.

Table EMP-4: Environmental Reporting Plan

Report	From	To	Frequency of Reporting
A. Construction Phase			
Internal progress reports	CSCs	PIUs	Monthly
External reports	EMAs	PIUs, PMO	Semi-annual
Compliance monitoring with EMP – progress reports	PMO / LIEC	ADB	Semi-annual
Environmental acceptance monitoring and audit reports	construction units	EEBs, PIUs, PMO	Within three months after subproject completion
B. Operation Phase			
EMP progress reports	PMO	ADB	Semi-annual

CSC = construction supervision company, EEB = ecology and environment bureau, EMA = environmental monitoring agency, EEB = the municipal and district/county environment protection bureau, PMO = Huangshan Municipal project management office (municipal-level PMO), IA = implementing agency, LIEC = loan implementation environment consultant, PIU = project implementation unit (under project implementing agency).

Table EMP-5: Environmental Monitoring Program

Subject	Parameter	Location	Frequency	Implement	Supervise
1. Construction phase – compliance with measures in Table EMP-2					
Internal monitoring (contractors, CSCs, PMO and PIU Environment Officers)					
Ambient air quality	Dust mitigation	Visual inspection at all construction sites	1 time / week	Contractors, CSCs	PIU, LIEC
Noise	<ul style="list-style-type: none"> • LAeq: measured with hand-held meter • Consultations with affected residents 	<ul style="list-style-type: none"> • At each construction site boundary • Settlements within 60 m of construction works – see Table EMP-2 and IEE Section V.3 	Daily measurements and consultations or as needed during peak construction levels at individual sites	Contractors, CSCs	PIU, LIEC
Solid waste	Domestic and construction waste	Visual inspection at all construction sites and work-camps	Daily	Contractors, CSCs	PIU, LIEC
Soil erosion	On-site management of soil erosion	Visual inspection at spoil sites and all construction sites	1 time / week; and immediately after heavy rainfall	Contractors, CSCs	PIU, LIEC
Community health and safety	Measures for traffic management and on-site safety described in Table EMP-2	Construction sites and public roads and paths	Daily during construction at all individual sites	Contractors, CSCs	PIU, LIEC
Occupational health and safety	Camp hygiene, safety, availability of clean water	Inspection at all construction sites and work-camps	1 time / week	Contractors, CSCs	PIU, LIEC

Subject	Parameter	Location	Frequency	Implement	Supervise
	COVID-19 prevention and control measures				
External monitoring (certified environment monitoring agency)					
Water quality	SS, petroleum	Onsite treated construction wastewater (by oil-water separator and/or sedimentation tank)	1 time / month during construction	EMA	EEB, PIU, LIEC
Ambient air quality	Dust: TSP	All construction sites (at least 1 point upwind and 1 point downwind) and the nearest sensitive receptor	1 time / month during construction	EMA	EEB, PIU, LIEC
Noise	LAeq	Boundaries of all construction sites and the nearest sensitive receptor for each construction site	1 time / month (twice a day: once in daytime and once at nighttime, for 2 consecutive days) during construction	EMA	EEB, PIU, LIEC
2. Operation phase					
Water quality of effluent from WWTS	pH, COD _{cr} , SS, NH ₃ -N, TP	Influent and effluent from WWTS	4 times / year	EMA; facility operator	EEB, PIU
Ambient air quality	Odor: NH ₃ and H ₂ S	At the nearest sensitive receptor from WWTS (1 point upwind and 2 points downwind)	2 times / year	EMA; facility operator	EEB, PIU
Noise	LAeq	At boundary of pump stations (IEE Section V.E) and the nearest sensitive receptor	2 times / year (twice a day: once in daytime and once at night time for 2 consecutive days)	EMA; facility operator	EEB, PIU

BOD₅ = 5-day biochemical oxygen demand, COD_{cr} = chemical oxygen demand, CSC = construction supervision company, EMA = environmental monitoring agency; EEB = ecology and environmental bureau, LAeq = equivalent continuous A-weighted sound pressure level, LIEC = loan implementation environment consultant, NH₃-N = ammonia nitrogen, PM₁₀ = particles measuring ≤10µm; PMO = Huangshan Municipal project management office; SS = suspended solids; TN = total nitrogen; TP = total phosphorus; TSP = total suspended particle, WWTS = wastewater treatment station.

E. Training and Capacity Building

16. Project agencies in the three districts and four counties in Huangshan Municipality have no previous experience with ADB-funded projects and safeguard requirements. The experience of individual staff within the district and county EEBs for environmental management varies considerably. Domestic procedures for EIA preparation and project approval do not, in general, have a strong focus on practical and time-based mitigation measures or corrective actions, and there is not yet a regulatory requirement in the PRC for EMPs of the scope required by ADB. Implementation of the current EMP represents a significant new task for the local agencies.

17. A capacity building program will be implemented on: (i) the EMP, including the mitigation measures, monitoring, and reporting; (ii) the grievance redress mechanism, including roles, responsibilities and procedures; (iii) procurement and contract management, focusing on EMP incorporation and implementation; (iv) operation and maintenance of the WWTS; and (v) measures for improved efficiency in the use of agricultural chemicals and water resources for agriculture. Training will be provided by the LIEC with the support of other experts under the loan

implementation consultant services. Trainees will be the PMO, IAs, PIUs, contractors and CSCs. The PMO will arrange the training programs, supported by the LIEC and other loan implementation consultants.

Table EMP-6: Project Environment Training Program

Training program	Scope of Training	Trainer	Trainee	Time	Days	Persons
Procurement and contract management (emphasize EMP implementation)	<ul style="list-style-type: none"> • ADB procurement guidelines • Bidding document and contract preparation, including EMP clauses • Risk of improper procurement and mitigation measures, and handling variation orders and contract management 	LIC	PMO, IAs, PIUs	2	2	40
Implementation of EMP	<ul style="list-style-type: none"> • Roles, responsibilities, monitoring, inspection, reporting in EMP • Environment monitoring program; • Public consultation and participation; • GRM implementation, coordination and reporting; • Environment, health and safety during project construction and operation for workers and the community; • Prevention and control of transmissible diseases and HIV/AIDS 	LIEC	PMO, IAs, PIUs, Contractors, CSCs	2	2	40
Grievance redress mechanism	<ul style="list-style-type: none"> • Roles and responsibilities; • Procedures 	LIEC	PMO, IAs, PIUs, Contractors, CSCs	2	2	40
O&M of WWTS	<ul style="list-style-type: none"> • Operation of WWTS; • Environmental management requirements • Key issues and best practices. 	LIEC and LIC	PMO, IAs, PIUs	2	2	30
Green agriculture	<ul style="list-style-type: none"> • Agricultural non-point source pollution control; • Environmental management requirements • Key issues and best practices. 	LIEC and LIC	PMO, IAs, PIUs,	2	2	30
Total				10	10	180

ADB = Asian Development Bank, CSC = construction supervision company, EMP = environment management plan, GRM = grievance redress mechanism, IA = implementing agency, LIC = loan implementation consultant, O&M = operation and maintenance, PMO = Huangshan Municipal project management office, WWTS = wastewater treatment station.

F. Grievance Redress Mechanism

18. This project grievance redress mechanism (GRM) is a joint GRM for: (i) the initial identification, documentation, and preliminary management of both environmental and social safeguard-related grievances; (ii) the resolving of environmental safeguard-related grievances; and (iii) the resolving of, and/or referral of, social safeguard-related grievances. Environmental and social safeguard-related grievances may differ considerably in the nature of grievances and agencies, procedures, and timing required to address them: the GRM provides a simple, time-based mechanism to meet project needs as required. Social safeguard issues beyond the scope of the GRM procedures will be referred to relevant agencies as needed.

19. The environment and social officers of the PMO and seven PIUs in the three districts and four counties will be the lead coordinators for GRM implementation. However, all project agencies and staff will be trained in the GRM and will take an active role in supporting these staff as and when necessary. At the PMO level, the PMO environment officer and PMO social officer will establish a GRM tracking and documentation system, conduct daily coordination with the PIU officers, arrange meetings and conduct site visits as necessary, maintain the overall project GRM database, and prepare the reporting inputs for progress reports to ADB. At the PIU level, the environment and social officers will instruct contractors and CSCs on the GRM procedures, and coordinate with the local EEBs and other government divisions as necessary. PMO and PIU

staff will be trained and supported by the LIEC and loan implementation social consultant.

20. The contact persons for different GRM entry points, such as the PMO and PIU environmental and social officers, contractors, operators of project facilities, and EEBs, will be identified prior to construction. The contact details for the entry points (phone numbers, addresses, e-mail addresses) will be publicly disclosed on information boards at construction sites and on the websites of the local EEBs.

21. If a complaint is received and filed, the PMO and PIU officers will identify if the complaint is eligible for management under the GRM. Eligible complaints under the GRM include those where: (i) the complaint pertains to the project; and (ii) the issues arising in the complaint fall within the scope of environmental and/or social issues that the GRM is authorized to address. Ineligible complaints include those where: (i) the complaint is not project-related; (ii) the nature of the issue is outside the mandate of the GRM (such as fraud or corruption); and/or (iii) other procedures would be more appropriate to address the issue. Ineligible complaints will be documented and provided to the relevant authorities and the complainant will be informed of these steps. The procedure and timeframe for the GRM is as follows and summarized in Figure EMP-1.

- **Stage 1 (5 calendar days):** If a concern arises during construction or operation, the affected person may submit a written or oral complaint to the contractor (construction phase) or operator of the project facility (operation phase). The contractor will: (i) respectfully acknowledge the issue and immediately stop the causal activity (e.g. on-site construction causing high noise levels to a nearby household); (ii) not resume the activity until the complaint has been resolved; (iii) inform the PIU of the incident on the same day of the incident occurring and how the contractor has responded or will respond; (iv) give a clear reply to the affected person within two calendar days; and (v) as far as possible, resolve the problem within five calendar days from receiving the complaint. The contractor will keep the PIU fully informed at all stages. The PIU will: inform the PMO, local village committee, and Ecology and Environment Bureau of the incident within one working day of being informed by the contractor; and, subsequently keep these parties informed at all stages.
- **Stage 2 (5 calendar days):** If the issue cannot be resolved in Stage 1, after five calendar days, the PIU and/or PMO will take over responsibility. Eligibility of the complaint will be assessed and a recommended solution given to the complainant and contractors within two calendar days. If the solution is agreed by the complainant, the contractors and/or facility operators (in operation) will implement the solution within five calendar days from the PIU or PMO taking over responsibility of the complaint. Written records will be made of all stages and outcomes. At the expiration of Stage 2, PMO will inform ADB of the outcome.
- **Stage 3 (15 calendar days):** If no solution can be identified by the PMO and/or PIU, and/or the complainant is not satisfied with the proposed solution, the PMO and/or PMO will organize, within seven (7) calendar days, a stakeholder meeting (including the complainant, contractor and/or operator of the facility, EEB, PIU, PMO). A solution acceptable to all shall be identified including clear steps. The contractors (during construction) and facility operators (during operation) will immediately implement the agreed solution. All attempts will be made to fully resolve the issue within 15 calendar days. Written records will be made of all stages and outcomes. At the expiration of Stage 3, PMO will inform ADB of the outcome.

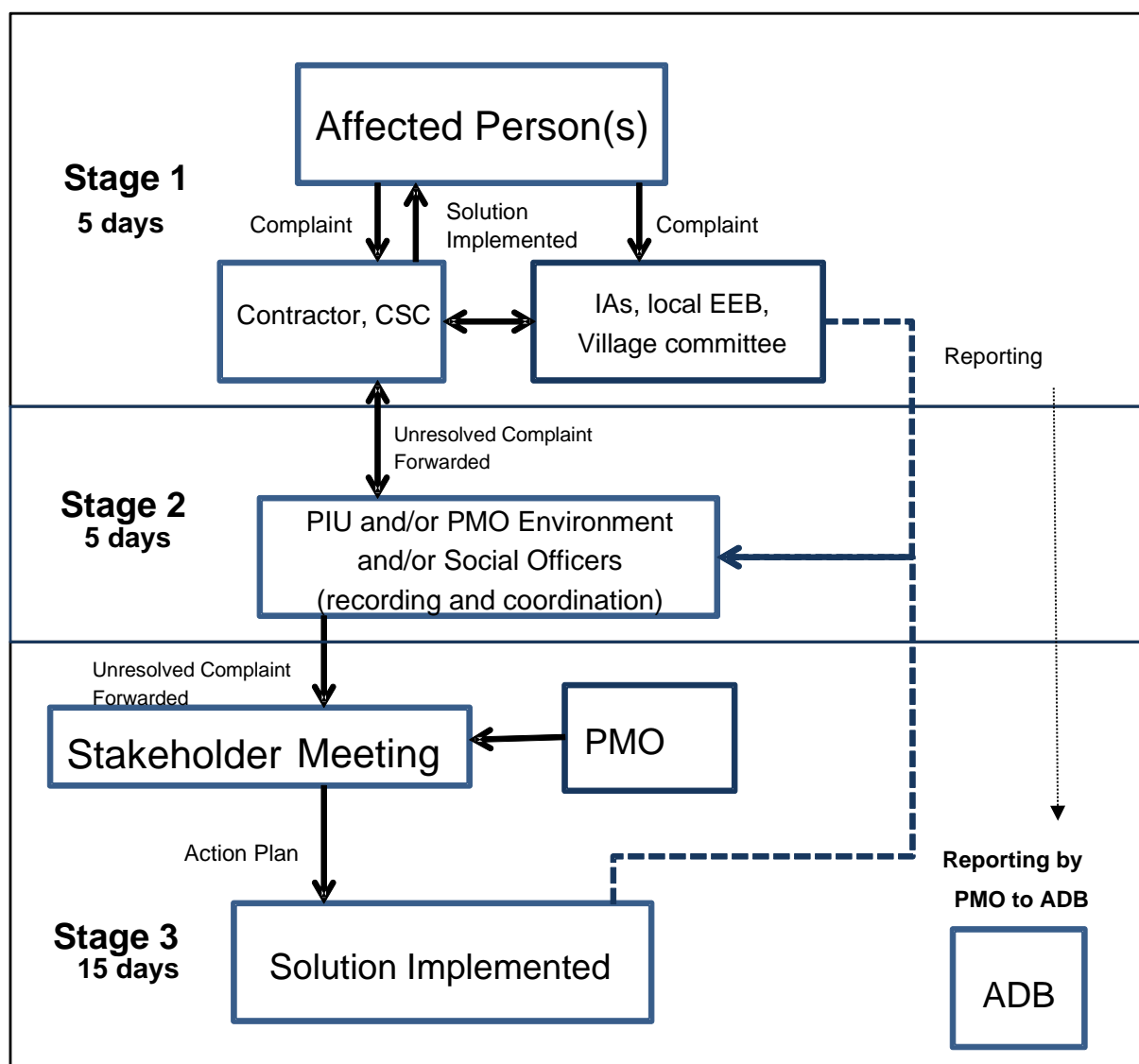


Figure EMP-1: Operation Chart of the Grievance Redress Mechanism

ADB = Asian Development Bank, CSC = construction supervision company, EEB = ecology and environmental bureau, GRM = grievance redress mechanism, IA = implementing agency, PMO = Huangshan Municipal project management office.

22. The GRM does not affect the right of an affected person to submit their complaints to any agency they wish to, for example the local village committee, community leaders, courts, PMO, PIU, HMG, district/county government, and/or ADB.

23. The PMO and PIUs shall bear any and all costs of implementing the GRM, including meeting, travel, and/or accommodation costs of the project staff or affected person. The GRM will be implemented throughout project construction and at least the first year of operation for each project facility.

G. Public Consultation and Awareness Raising

24. Two rounds of public consultation were conducted during project preparation (Section VII of the IEE). During construction, the project will continue to seek public consultation and raise

awareness of project activities, especially those may impact the public such as noise and dust from excavation of pipe trenches. The public consultation plan is in Table EMP-7 and includes public participation in evaluating environmental benefits and impacts. The PIUs are responsible for public participation during project implementation. They will be supported by the PMO Environment and Social Officers and the LIEC.

Table EMP-7: Public Consultation and Participation Plan

Organizer	Approach	Times/Frequency	Subjects	Participants
Construction				
PMO, PIUs, LIEC	Site visits, informal interviews	At least once a week during peak construction	Construction impacts; adjusting mitigation measures if necessary; feedback	Affected persons Workers
	Site-specific basis	At least one month before the start of construction at any new site	Anticipated risks – noise, dust, etc.	Affected persons
	Public workshops	At least once during peak construction period	EMP implementation progress; construction impacts; adjusting mitigation measures if necessary; feedback	Affected persons
Operation				
PMO, PIUs, OPFs	Consultation and site visits	At least once in first year of operation	Effects of mitigation measures, impacts of operation, feedback	Affected persons
	Public workshop	As needed based on consultations	As above	As above
	Public survey	At least once after 1 year of operation	Comments and suggestions	Project beneficiaries

EMP = environmental management plan, OPF = operator of project facilities, PIU = project implementation unit, PMO = Huangshan Municipal project management office, LIEC = loan implementation environmental consultant.

H. Cost Estimates

25. This section provides an estimate of the cost of EMP implementation. The cost comprises three categories: mitigation measures (Tables EMP-2; EMP-3); monitoring (Table EMP-5); and training (Table EMP-6). Costs are presented for the construction phase of five years and the first year of operation (i.e. a total of six years). The costs do not include: (i) detailed design revisions and adjustments; (ii) internal monitoring/inspection during construction, as this will be included in the construction supervision contracts; and (iii) salaries of PMO and PMO staff. Costs for mitigation measures and trainings are based on estimates of the DEIA institute and/or the experience of the TRTA consultants from other similar projects. All costs were discussed with the DEIA Institute, PMO and IAs.

Table EMP-8. Estimated Cost for EMP Implementation for Five Years Construction and First Year Operation (x CNY10,000)^a

No.	Item	PMO	Huangshan	Huizhou	Tunxi	She	Yi	Xiuning	Qimen	Total Cost
A	Mitigation measures									
A1	Consulting service									
A1	LIEC	72								72
A2	Public consultation	10								10
A3	GRM	1	1	1	1	1	1	1	1	8
A2	Physical mitigation measures									
A2.1	Wastewater management		29	54	44	130	28	98	39	423
A2.2	Air pollution control (dust)		26	48	39	115	25	87	35	376
A2.3	Noise		19	36	29	87	18	66	26	282
A2.4	Soil erosion		40	76	61	180	38	136	55	587
A2.5	Solid waste		16	30	25	72	15	55	22	235
A2.6	Ecology protection		6	12	10	29	6	22	9	94
A2.7	Community and occupational health & safety		24	45	37	108	23	82	33	352
	Subtotal	83	161	304	246	723	155	547	219	2438
B	Environmental monitoring									
B1	External monitoring during construction									
B1.1	Construction wastewater quality		6	4	6	15	6	4	11	54
B1.2	Ambient air quality		6	4	6	15	6	4	11	54
B1.3	Noise		5	4	5	13	5	4	9	45
	Subtotal	0	18	12	18	43	18	12	31	153
B2	Monitoring during operation									
B2.1	Water quality (WWTSs)		15	12	4	24	0	26	0	82
B2.2	Ambient air quality (WWTSs)		4	3	1	6	0	6	0	20
B2.3	Noise (pumping stations)		0	0	2.2	0	0	0.2	0	2

No.	Item	PMO	Huangshan	Huizhou	Tunxi	She	Yi	Xiuning	Qimen	Total Cost
	Subtotal	0	19	16	7	30	0	33	0	104
C	Training									
C1	Procurement and contract management - emphasize EMP implementation	9.6								
C2	EMP implementation	9.6								
C3	GRM	9.6								
C4	WWTS - operation and env. management	7.2								
C5	Green agriculture - env. management	7.2								
	Subtotal	43.2								
	Grand Total (x10,000 CNY)	126.2	198.8	331.4	271.4	795.7	173.1	591.7	249.7	2694.9
	Total x10,000 EURO (1 EURO=7.6924 CNY)	16.4	25.9	43.1	35.3	103.4	22.5	76.9	32.5	350.3
	Proportion of total (%)	4.68%	7.38%	12.30%	10.07%	29.53%	6.42%	21.96%	9.27%	100.00%

CSC = construction supervision company, DI = design institute, EA = executing agency, EEB = ecology and environment bureau, EMA = Environmental Monitoring Agency, IA = implementing agency, LIEC = loan implementation environment consultant, PIU = project implementation unit, PMO = Huangshan Municipal project management office, WWTS = wastewater treatment station.

^aCostings were based on the following assumptions: (i) a construction duration for each project site of 1.5 years; (ii) a construction season of 6 months per year; and (iii) an operational duration of one year (first year of operation).

I. Mechanisms for Feedback and Adjustment

26. Based on environmental inspection and monitoring reports, the PMO and PIUs shall decide, in consultation with the LIEC, whether (i) further mitigation measures are required as corrective actions, or (ii) some improvements are required for environmental management practices. The effectiveness of mitigation measures and monitoring plans will be evaluated by a feedback reporting system. Adjustment to the EMP and/or ESMS will be made, if necessary. The PMO Environmental Officer and the LIEC will play critical roles in the feedback and adjustment mechanism.

27. If during inspection and monitoring, substantial deviation from the EMP and/or ESMS is observed or any changes are made to the project that may cause substantial adverse environmental impacts or increase the number of affected people, then the PMO and PIUs will immediately consult with ADB and form an environmental assessment team to conduct additional environmental assessment. If necessary, further public consultation will be undertaken. The revised DEIAs and project IEE, including this EMP and/or ESMS, will be submitted to the ADB for review, appraisal, and public disclosure. The revised EMP and/or ESMS as relevant will be passed to the contractors, CSCs and operators of project facilities for implementation.

APPENDIX EMP-1. DRAFT TERMS OF REFERENCE FOR ENVIRONMENTAL POSITIONS

1. HUANGSHAN MUNICIPAL PMO ENVIRONMENT OFFICER

A. Background

1. Development projects supported by the Asian Development Bank (ADB) routinely include a project management office (PMO). For this project, the Huangshan Municipal PMO is responsible for project implementation and comprises the municipal agencies involved in the project. Compliance with the loan and project agreements include implementation of: (i) an environment management plan (EMP), which is prepared as part of the project initial environment examination; and (ii) an environmental and social management system (ESMS). The EMP is the critical guiding document to manage, monitor, and report upon potential project environmental impacts. Implementation of the EMP is a full-time task. The ESMS will be implemented for output 3 of the project. The PMO environment officer will oversee the implementation of the EMP and ESMS. These terms of reference describe the position requirements.

B. Scope and Duration of Work

2. The officer will work on behalf of the PMO to implement the project EMP. The officer will report directly to the PMO. The position is full-time for the entire project duration.

C. Qualifications

3. The officer will have: (i) a master's degree or higher in environmental management or related field; (ii) at least 10 years of experience in environmental management, monitoring, and/or impact assessment, including specific experience on the management and monitoring of green agriculture projects; (iii) ability to communicate and work effectively with local communities, contractors, and government agencies; (iv) ability to analyze data and prepare technical reports; (v) willingness and health to regularly visit the project construction sites and in different seasons; and (vi) ideally, proficiency in spoken and written English.

D. Detailed Tasks

4. The PMO Environment Officer will have a detailed understanding of the project EMP and ESMS and supporting documents, including the domestic environmental reports, the project initial environmental examination (IEE), and project environmental assurances. The officer will have the following tasks.

For the EMP

- (i) Assess whether the EMP requires updating due to any changes in project design, which may have occurred after the EMP was prepared.
- (ii) Distribute the Chinese language version of the EMP to all relevant agencies, including the implementing agencies, and municipal agencies for environment protection. This should occur at least 3 months before construction begins.
- (iii) Conduct meetings with agencies as necessary to ensure they understand their specific responsibilities described in the EMP.
- (iv) Ensure that relevant mitigation, monitoring, and reporting measures in the EMP are included in the bidding documents, contracts, and relevant construction plans.
- (v) Confirm that the implementing agencies responsible for the internal environment monitoring described in the EMP understand their tasks and will implement the monitoring in a timely fashion.
- (vi) At least 2 months before construction begins, establish and implement the project grievance redress mechanism (GRM) described in the EMP. This will include: (a) preparation of a simple

table and budget identifying the type, number, and cost of materials needed to inform local communities about the GRM and starting dates and scope of construction; (b) design, prepare, and distribute these materials, and plan and conduct the community meetings; (c) prepare a form to record any public complaints; (d) preparation of a summary table to record all complaints, including dates, issues, and how they were resolved; and (e) ensure that all relevant agencies, including contractors, understand their role in the GRM.

- (vii) Prior to construction, ensure that the implementation agencies and their contractors have informed their personnel, including all construction workers, of the EMP requirements. This will include all mitigation measures relating to impacts to air, water, noise, soil, sensitive sites, ecological values, cultural values, worker and community health and safety, respectful behavior when communicating with local communities, and responding to and reporting any complaints.
- (viii) During project construction, make regular site visits with the loan implementation environment consultant (LIEC) to assess progress, meet with contractors and/or local communities, and assess compliance with the EMP.

For the ESMS

- (ix) Distribute the Chinese language version of the ESMS to all relevant agencies, including HTIC, at least three months before the ADB loan comes into effect.
- (x) Assist HTIC and all other relevant agencies to implement the ESMS.
- (xi) Coordinate and provide support as needed for the HTIC environmental and social officers recruited by the implementing agency for project output 3.
- (xii) Conduct meetings with HTIC and other agencies as necessary to ensure they understand their specific responsibilities described in the ESMS.
- (xiii) Provide training to HTIC, potential equity investment applicants, and other project agencies as necessary to facilitate implementation of the ESMS.
- (xiv) Assist HTIC to ensure that candidate subprojects are correctly categorized and comply with the selection criteria for environment.
- (xv) With the PMO Social Officer, implement the project grievance redress mechanism (GRM), including: (i) instruct the other project agencies on their responsibilities in the GRM; (ii) establish a simple registry system, to document and track grievances received (including forms to record complaints and how they have been resolved); and (iii) prepare reports on progress of the GRM for inclusion in the semi-annual environmental and social monitoring and progress reports to ADB.
- (xvi) Ensure the officers provide progress reports on a semi-annual basis, in time for consolidation with the overall environment monitoring report to be submitted by PMO to ADB.

Overall

- (xvii) Ensure that all relevant agencies submit required progress reports and information, including environmental monitoring and reports of any issues or grievances.
- (xviii) Compile, review, and store environmental progress reports from the implementation agencies, records of any grievances, and any other relevant issues. Maintain digital copies of all information. When necessary, enter data into summary tables in digital format (e.g., to transfer records of grievances from hard copy forms). Ensure that all information is stored in the PMO filing system, backed up, and can be easily retrieved.
- (xix) Prepare semiannual environment progress reports.
- (xx) Work closely with the PMO, district and county PIUs, loan implementation consultants, and other agencies as necessary to conduct these tasks.

E. Reporting Requirements

5. Semiannual environment monitoring reports using the template provided by ADB or a domestic format reviewed and approved by ADB.

F. Logistical Support Provided by the PMO to the Environment Officer

- (i) Provision of hard and soft copies of the project EMP and ESMS, domestic and project

- environmental reports, feasibility study reports, loan and project agreements, maps, and other supporting materials as necessary to ensure the officer can implement the tasks.
- (ii) Vehicle transport, office materials, and other logistical support, as necessary for the officer to visit the project construction sites and local communities, arrange and conduct meetings, and prepare and distribute consultation materials.
 - (iii) Overall coordination, including review of the draft semiannual monitoring reports, and final responsibility for submission of the monitoring reports to ADB.

2. PMO SOCIAL OFFICER (tasks for the ESMS)

I. BACKGROUND

6. Part of the ADB project loan will be on-lent from the government to the Huangshan Trust Investment Company (HTIC), a financial intermediary, to establish a Green Investment Fund. HTIC will on-lend the funds directly to qualified investees (small and medium-sized enterprises in areas of green farming and ecotourism). To oversee the project implementation, the Huangshan Municipal project management office (PMO) has been established in the Huangshan Municipal Government. An Environmental and Social Management System (ESMS) has been developed by the government and HTIC. HTIC will establish the ESMS within their business procedures. The ESMS is the key guiding document to assess and manage the potential environmental and social impacts of subprojects. This is the first ESMS to be conducted by the HTIC. The PMO will appoint or recruit a full-time environmental officer to help implement the project safeguards, including the ESMS. These terms of reference describe the requirements for this position.

II. SCOPE AND DURATION OF WORK

7. The officer will work on behalf of the PMO with HTIC environmental and social officers, to implement the project ESMS. The officer will report directly to the PMO. The position is for the overall project duration of 6 years.

III. QUALIFICATIONS

8. The officer will have: (i) an undergraduate degree or higher in applied social science; (ii) at least five years of experience in social management, monitoring, and/or impact assessment; (iii) ability to communicate and work effectively with local communities, contractors, and government agencies; (iv) ability to analyze data and prepare technical reports; (v) willingness and health to regularly visit the subproject sites; and (vi) ideally, proficiency in spoken and written English.

IV. DETAILED TASKS

9. The officer will have a detailed understanding of the ESMS and the supporting documents to be produced (land acquisition/resettlement and ethnic minority people impact checklists, categorization forms, land use rights transfer framework, social and gender action plan). Working closely with the PMO Environment Officer, HTIC environmental and social officers, and other agencies, the officer will:

- (i) Distribute the Chinese language version of the ESMS to all relevant agencies, including HTIC, at least three months before the ADB loan comes into effect.
- (ii) Assist HTIC and all other relevant agencies to establish and implement the ESMS.
- (iii) Meet with HTIC and other agencies as necessary to ensure they understand their specific responsibilities described in the ESMS.
- (iv) Provide training to HTIC and other project agencies as necessary to implement the ESMS.
- (v) Assist HTIC to ensure that candidate subprojects are correctly categorized and comply with the social selection criteria.
- (vi) With the PMO Environment Officer, implement the project grievance redress mechanism (GRM), including: (i) instruct the other project agencies on their responsibilities in the GRM; (ii) establish a simple registry system, to document and track grievances received (including forms to record

complaints and how they have been resolved); and (iii) prepare reports on progress of the GRM for inclusion in the semi-annual environmental and social monitoring and progress reports to ADB.

- (vii) Prepare semi-annual social progress reports for the PMO to submit to ADB.
- (viii) Provide social and gender indicators and targets for the project performance monitoring system.
- (ix) Regularly visit subprojects where there are special social or ethnic issues, impacts or benefits.
- (x) Prepare semi-annual social progress reports, and other ESMS issues that may arise.

V. REPORTING REQUIREMENTS

Semi-annual monitoring reports on the implementation and progress of the ESMS should be submitted to ADB within 1 months after each reporting period, using the template provided by ADB or a domestic format reviewed and approved by ADB.

3. PROJECT IMPLEMENTATION UNIT ENVIRONMENT OFFICERS

A. Background

1. The project will be coordinated by the Huangshan Municipal PMO. Compliance with the loan and project agreements include implementation of: (i) an environment management plan (EMP), which is prepared as part of the project initial environment examination; and (ii) an environmental and social management system (ESMS). The EMP is the critical guiding document to manage, monitor, and report upon potential project environmental impacts. Implementation of the EMP is a full-time task. The ESMS will be implemented for output 3 of the project. Overall coordination of the project EMP is the responsibility of the PMO environment officer. At the field level, implementation of the EMP will be undertaken by the project implementation units (PIUs) of the implementing agencies in the three districts and four counties. For this purpose, each PIU requires a PIU Environment Officer.

B. Scope and Duration of Work

2. The seven PIU Environment Officers will work on behalf of the PIUs to implement the project EMP in Huangshan District, Huizhou District, Tunxi District, She County, Yi County, Xiuning County and Qimen County, respectively. The officers will report directly to each of their PIU managers and work closely with the district or county environment protection bureaus (EEBs), environment monitoring agencies (EMAs), and PMO Environment Officer. The positions are for the entire project duration (6 years).

C. Qualifications

3. The officers will have: (i) a bachelor degree in environmental management or related field, and/or equivalent experience; (ii) at least 5 years of experience in environmental management, monitoring, and/or impact assessment, including specific experience on the management and monitoring of green agriculture projects; (iii) ability to communicate and work effectively with local communities, contractors, and government agencies; (iv) ability to analyze data and prepare technical reports; and (v) willingness and health to regularly visit the project construction sites and in different seasons.

D. Detailed Tasks

4. The PIU Environment Officers will have a detailed understanding of the project EMP and supporting documents, including the domestic environmental reports, project IEE, and project environmental assurances. The officers will have the following tasks.

For the EMP

- (i) Work closely with the PMO Environment Officer, EEB, environment monitoring agency, contractors, construction supervision companies, and all other relevant agencies to implement the EMP.
- (ii) Distribute the Chinese language version of the EMP to all relevant agencies, including the implementing agencies, municipal agencies for environment protection. This should occur at least 3 months before construction begins.
- (iii) Conduct meetings with agencies as necessary to ensure they understand their specific responsibilities described in the EMP.
- (iv) Ensure that contractors implement the relevant mitigation measures in the EMP.
- (v) Implement the monitoring and reporting requirements in the EMP, including timely submission of progress reports to the PMO Environment Officer.
- (vi) Implement the project GRM.
- (vii) Make regular inspections of construction sites to assess progress, meet with contractors and/or local communities, and assess compliance with the EMP.
- (viii) Maintain digital records of all progress and information.

For the ESMS

- (xxi) Coordinate and provide support as needed for the ESMS environmental and social officers recruited by the implementing agency for project output 3.
- (xxii) Ensure the officers provide progress reports on a semi-annual basis, in time for consolidation with the overall environment monitoring report to be submitted by PMO to ADB.

Overall

- (ix) Support the PMO environment officer in all their tasks.

E. Reporting Requirements

- 5. Monthly reports to the PMO Environment Officer.

4. LOAN IMPLEMENTATION ENVIRONMENTAL CONSULTANT

A. Background

1. The project will be coordinated by the Huangshan Municipal PMO, whose overall responsibility includes implementation of the project EMP. At the field level, the project will be implemented by a PMO in the three districts and four counties. The PMO and PIUs will be assisted by a loan implementation consultant team. The loan implementation environmental consultant (LIEC) will be a part of this team and will support the PMO and PIUs to implement the project EMP and oversee the environmental and social management system (ESMS).

B. Scope and Duration of Work

2. This position could be a firm or an individual engaged by the PMO. It is an independent position. It is not part of the PMO in-house environmental team or the implementing agencies. The specialist will report directly to the PMO. The position will be spread over the entire project duration of 6 years of construction. The LIEC should be recruited as soon as possible after loan effectiveness, as the first task is to confirm project environmental readiness.

C. Qualifications

- 3. The specialist will have: (i) a master's degree or higher in environmental management or

related field; (ii) at least 12 years of experience in environmental management, monitoring, and/or impact assessment, including specific experience on the management and monitoring of green agriculture projects; (iii) familiarity with ADB project management requirements and national environmental management procedures; (iv) ability to communicate and work effectively with local communities, contractors, and government agencies; (v) ability to analyze data and prepare technical reports; (vi) willingness and health to regularly visit the subproject sites; and (vii) proficiency in spoken and written English.

D. Tasks

4. Working closely with the PMO and PMO Environmental Officers, the LIEC will do the following.

For the EMP

5. Before construction:

- (i) Ensure project environmental readiness, including: (i) all contractor contracts include, and will comply with, the EMP; and (iii) relevant sections of the EMP are incorporated in construction plans and contracts.
- (ii) Assist the PMO and PIUs to implement the GRM, including: (i) establish and publicize the GRM; and (ii) collate and evaluate grievances received.
- (iii) Develop procedures to: (i) monitor EMP implementation progress; (ii) collate and evaluate data collected in the EMP environmental monitoring program; and (iii) prepare and submit the semiannual environmental monitoring reports to ADB (to continue until project completion report).
- (iv) Undertake training of project agencies as required by the EMP training plan.
- (v) Provide hands-on support and on-the-job training to the PMO, implementing agencies, and contractors on the specific requirements of the EMP as required.

6. During project implementation:

- (i) Undertake site visits to all implementing agencies during subproject construction and operating phase.
- (ii) Assist in the ongoing public consultation process as described in the project IEE.
- (iii) Conduct EMP compliance assessments, identify any environment-related implementation issues, and propose necessary responses in corrective action plans.
- (iv) Undertake training of project agencies as required by the EMP training plan.
- (v) Undertake simple and cost-effective on-site quantitative measurements to regularly check that the construction complies with the environmental monitoring standards and targets, especially for noise and dust (during the pipe trenches construction), using a basic hand-held meter

For the ESMS

- (vi) Support the PMO environment officer and the ESMS environmental and social officers to oversee implementation of the ESMS.
- (vii) Ensure that the steps of the ESMS are incorporated into the business procedures of HTIC.
- (viii) Deliver training in (i) ESMS procedures for screening, categorizing and assessing environmental impact; (ii) the setting and monitoring of environmental safeguards in loan conditions; and (iii) ESMS record-keeping and reporting.
- (ix) Assist HTIC to establish and publicize the grievance redress mechanism (GRM) for subprojects, ensuring that the GRM publicity is appropriate to the scale and complexity of the subproject and includes, as a minimum, the disclosure of all contact persons for lodging complaints.
- (x) Review the operation of the GRM for a range of subprojects and locations and make revisions to GRM procedures as required.
- (xi) Conduct regular checks on ESMS compliance by HTIC: review ESMS workbooks, undertake site visits as required, identify problems, and propose necessary corrective action.
- (xii) Assist the PMO to prepare semi-annual project monitoring progress reports for submission to

ADB within 1 months after each reporting period.

Overall

- (xiii) Assist the PMO to prepare semiannual environmental monitoring progress reports for submission to ADB.
- (xiv) Work closely with the PMO, district and county PIUs, loan implementation consultants, and other agencies as necessary to conduct these tasks.

5. LOAN IMPLEMENTATION SOCIAL CONSULTANT

I. BACKGROUND

The Huangshan Municipal Government will apply a \$100 million loan from Asian Development Bank (ADB) to implement the Anhui Huangshan Xin'an River Ecological Protection and Green Development Project. Overall project implementation will be coordinated by the Huangshan Municipal project management office (PMO). Of the loan, \$8 million will be on-lent to the Huangshan Trust Investment Company (HTIC), to establish a Green Investment Fund with an amount of CNY100 million. HTIC will on-lend the funds directly to qualified investees (small and medium-sized enterprises in green farming and ecotourism). An Environmental and Social Management System (ESMS) has been developed to regulate safeguards for the Green Investment Fund and will be established by HTIC within their business procedures. The ESMS is the key guiding document to assess and manage the potential environmental and social impacts of subprojects. This is the first ESMS to be conducted by the HTIC. HTIC will appoint or recruit specific staff to be responsible for implementing the ESMS. The PMO will recruit a loan implementation social consultant (LISC) to help implement the ESMS. These terms of reference describe the requirements for the LISC.

II. SCOPE AND DURATION OF WORK

External position recruited as an individual or through a firm. The specialist will report directly to the PMO. Duration: at least 10 person-months, within the first 48 months of project implementation.

III. QUALIFICATIONS

The specialist will have: (i) an undergraduate degree or higher in social, gender, or related field; (ii) at least 10 years of experience in social management, monitoring, and/or impact assessment; (iii) familiarity with ADB Project management requirements and national social management procedures; (iv) ability to communicate and work effectively with local communities, contractors, and government agencies; (v) ability to analyze data and prepare technical reports; (vi) willingness and health to regularly visit the subproject sites; and (vii) proficiency in spoken and written English.

IV. TASKS

Working closely with the PMO Social Officer, HTIC Social Officer and other relevant personnel and agencies, the consultant will assist in all aspects of the implementation of the ESMS. The consultant will:

1. Ensure that the steps of the ESMS are incorporated into the business procedures of the HTIC.
2. Deliver training in (i) ESMS procedures for screening, categorizing and assessing social impacts; (ii) the setting and monitoring of social safeguards in loan conditions; and (iii) ESMS record-keeping and reporting.
3. Assist HTIC to establish and publicize the grievance redress mechanism (GRM) for subprojects, ensuring that the GRM publicity is appropriate to the scale and complexity of the subproject and includes, as a minimum, the disclosure of all contact persons for lodging complaints.
4. Review the operation of the GRM for a range of subprojects and locations and revise GRM procedures as required.
5. Conduct regular checks on ESMS compliance by HTIC: review ESMS workbooks, undertake site visits as required, identify problems, and propose necessary corrective action.

6. Assist the PMO to prepare semi-annual project monitoring progress reports for submission to ADB within 1 months after each reporting period.

V. REPORTING REQUIREMENTS

Assist the PMO and HTIC to prepare their safeguard reporting requirements.

APPENDIX EMP-2: RESTRICTED-USE PESTICIDES IN THE PEOPLE'S REPUBLIC OF CHINA

Pesticide use in the PRC is guided by a wide range of regulations. Key regulations and sources are as follows.

Directory for restricted use pesticides (2017) issued by the former Ministry of Agriculture (MoA); now the Ministry of Agriculture and Rural Affairs:

Order 2567 of former MoA issued in August 2017:

http://www.moa.gov.cn/govpublic/ZZYGLS/201709/t20170911_5810706.htm

Prohibited pesticides in China which are issued in different orders from the Ministry of Agriculture and Rural Affairs and former Ministry of Agriculture (MoA):

Order 194 of former MoA issued in April 2002 :

http://jiuban.moa.gov.cn/zwlrm/tzgg/gg/200210/t20021016_14307.htm

Order 199 of former MoA issued in June 2002 :

http://jiuban.moa.gov.cn/zwlrm/tzgg/gg/200210/t20021016_14307.htm

Order 274 of former MoA issued in April 2003 : The link is missing in MoA's website.

Order 322 of former MoA issued in December 2003: The link is missing in MoA's website.

Order 747 of former MoA issued in November 2006:

http://jiuban.moa.gov.cn/zwlrm/tzgg/gg/200612/t20061213_739003.htm

Order 1157 of former MoA issued in February 2009:

http://jiuban.moa.gov.cn/zwlrm/tzgg/gg/200902/t20090227_1226994.htm

Order 1586 of former MoA issued in July 2011:

http://jiuban.moa.gov.cn/zwlrm/tzgg/gg/201107/t20110705_2045813.htm

Order 2032 of former MoA issued in December 2013:

http://www.moa.gov.cn/govpublic/ZZYGLS/201312/t20131219_3718683.htm

Order 2289 of former MoA issued in August 2015:

http://www.moa.gov.cn/govpublic/ZZYGLS/201508/t20150825_4803203.htm

Order 2445 of former MoA issued in September 2016:

http://jiuban.moa.gov.cn/zwlrm/tzgg/gg/201609/t20160913_5273423.htm

Order 2552 of former MoA issued in September 2017:

http://www.moa.gov.cn/govpublic/ZZYGLS/201707/t20170721_5757240.htm

ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM

FOR THE

Huangshan Trust Investment Company

Prepared by the Huangshan Municipal Government for the
PRC: Anhui Huangshan Xin'an River Ecological Protection and Green Development
Project

September 2019

CURRENCY EQUIVALENTS

(as of 23 September 2019)

Currency unit	–	yuan (CNY)
CNY1.00	=	€0.1280
€1.00	=	CNY7.8135

ABBREVIATIONS

ADB	- Asian Development Bank	HMG	- Huangshan Municipal Government
BOD	- Biochemical Oxygen Demand	HTIC	- Huangshan Trust Investment Company
COD	- Chemical Oxygen Demand	GHG	- Greenhouse Gas
CNY	- Chinese Yuan	LIEC	- Loan implementation environment consultant
CSC	- Construction supervision company	IA	- Implementing Agency
DEIA	- Domestic EIA	IEE	- Initial Environmental Examination
EA	- Executing Agency	MSW	- Municipal Solid Waste
EHS	- Environmental, health and safety	Mu	- Chinese land unit (1 ha = 15 mu)
EIA	- Environment impact assessment	PM	- Particulate matter
EMA	- Environmental monitoring agency	PMO	- Huangshan municipal project management office
EMP	- Environmental management plan	PRC	- People's Republic of China
EPD	- Environmental protection department	SPS	- Safeguard Policy Statement
EEB	- Ecology and environment bureau	TOR	- Terms of Reference
ESMS	- Environmental and Social Management System	TRTA	- Transaction Technical Assistance
FSR	- Feasibility Study Report	WSCP	- Water and soil conservation plan
GAP	- Gender action plan	WSP	- Water supply plant
GDP	- Gross Domestic Product	WWTP	- Wastewater treatment plant
GHG	- Greenhouse Gas		
GRM	- Grievance redress mechanism		

This environmental and social management system is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

In preparing any country program or strategy, financing any Project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

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I. INTRODUCTION

1. This document is the Environmental and Social Management System (ESMS) for the Huangshan Trust Investment Company (HTIC), and its borrowers, as part of the Anhui Huangshan Xin'an River Ecological Protection and Green Development Project (the project). An ESMS is an internal management system implemented by a financial institution to manage the potential environmental and social impacts of its equity investments.

2. The Green Investment Fund component under the project is to provide financial support for environmentally friendly business and services sectors, including green agriculture and ecotourism, for small and medium sized enterprises in three districts and four counties of Huangshan Municipality, Anhui Province, the People's Republic of China (PRC). Issues involving development and natural resources management in the project area include inefficient and/or outdated farming technology, excessive use of agricultural chemicals, insufficient infrastructure for ecotourism, and lack of protection of natural resources.

3. The project is supported by a €89.69 million loan from the Asian Development Bank (ADB) to the Huangshan Municipal Government (HMG). The HMG is the executing agency. A total of €13.00 million of the loan will be on-lent from the government to HTIC, the financial intermediary (FI), to establish a Green Investment Fund with a total amount of €26 million (CNY200 million).³⁰ The HTIC will on-lend the funds directly to qualified investees. The qualified investees comprise small and medium-sized enterprises in areas of green farming and ecotourism. Investment proceeds via HTIC will be used for environmentally sustainable and socially responsible development, including improved practices for tea gardens, organic rice, bamboo forestry, orchards, and ecotourism.

4. This ESMS is to help the HTIC, HMG, and qualified investees to manage the environmental and social risks of individual subprojects, and to support the overall project objectives of promoting green development and natural resources management in the Xin'an River Basin.

5. The Green Investment Fund will encourage and favor subprojects which promote agricultural innovation, efficiency, and the sustainable use of water, soil and energy. Projects may unintentionally result in impacts to surface water, groundwater, soil, air quality, noise levels, ecology, communities, physical cultural resources, and/or land use rights transfer. The identification, screening and management of such risks are key objectives of the ESMS.

6. This is the first time any banking institution in Huangshan Municipality has implemented an ESMS. The ESMS is written in non-technical language and is simplified and tailored to the capacity of HTIC to implement an ESMS, which is currently low. It provides step-by-step procedures to assess and manage potential environmental and social impacts associated with equity investment applications under the Green Investment Fund.

II. INSTITUTIONAL FRAMEWORK FOR THE ESMS

A. Legislative and policy framework

7. The project, including the Green Investment Fund and this ESMS, is being implemented within the context of relevant policies and laws of the PRC and policies of the ADB. Within the PRC, over 40 laws, regulations, standards and guidelines concerning agricultural production and natural resources management are relevant to this project (ESMS-Appendix 1). For the environment, these include environmental protection, planning, and impact assessment, water resources management, quality standards and guidelines for air, water, soil, and noise,

³⁰ Comprising funding from the ADB loan (50.0%), a loan from KfW (25.0%) and HMG funding (25.0%).

disposal of solid waste, and protection of flora, fauna and cultural resources. For social issues, these include the management of land use rights transfer, involuntary resettlement, ethnic minorities and protecting the rights of vulnerable groups including women, the poor, the low-income and the disabled.

8. The ESMS complies with the requirements of the ADB Safeguard Policy Statement (SPS, 2009). The SPS comprises three operational policies, for the environment, indigenous peoples, and involuntary resettlement. These seek to avoid, minimize, or mitigate adverse environmental and social impacts. Under the SPS, projects categorized “financial intermediation loan” (FIL) require the preparation of an ESMS, which includes: environmental and social policies; screening, categorization, and assessment; document preparation requirements and review procedures; organizational structure and staffing including skills and competencies in environmental and social areas; training requirements; and monitoring and reporting.

B. Definitions of terms used

9. This section provides the definitions of key terms used in the ESMS.

Affected person. A person directly or indirectly affected by a subproject activity.

Applicant. SME or individual that applies for an equity investment under the Green Investment Fund. After the application is endorsed, the applicant is termed a “qualified investee” (see below).

Small and medium-sized enterprise (SME). Defined by the PRC Ministry of Industry and Information Technology and National Development and Reform Commission as: small enterprise – annual revenue CNY<5 million; medium enterprise – annual revenue CNY5–200 million.

Huangshan municipal project management office (PMO). Established under Huangshan Municipal Government. See Section II.C for role in project.

PMO environmental officer and social officer. Qualified officers appointed by the PMO to assist the PMO, HTIC, and qualified investees to implement the ESMS. See Section II.C for role in project.

Equity investment. A subproject which receives financial support from the Green Investment Fund after successfully completing the required screening and approval procedures including the ESMS.

Equity investment agreement. Signed agreement between the HTIC and a qualified investee describing the terms and conditions of the financial support provided under the Green Investment Fund.

Executing agency (EA). The municipal agency responsible for the project, the Huangshan Municipal Government.

Financial intermediary (FI). An entity that provides finance as its principal or subsidiary function. The FI for the Green Investment Fund is HTIC. It will channel the project loan proceeds between the Huangshan Municipal Government and the qualified investees.

FI environmental officer and social officer. Qualified officers appointed by the FI to assist the FI and qualified investees to implement the ESMS. See Section II.C for role in project.

Finance officer. Qualified officer appointed by HTIC responsible for equity investment management. See Section II.C for role in project.

Gender action plan (GAP). Project plan with measurable indicators to strengthen gender-inclusive designs. The GAP is within the project administration manual.

Grievance redress mechanism (GRM). A mechanism to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the project's environmental or social performance. See Section V.

Implementing agency (IA). An agency which implements the project activities. For the Green Investment Fund, HTIC is the implementing agency.

Involuntary resettlement. Defined by the SPS (2009) as: physical displacement (relocation, loss of residential land, or loss of shelter) and/or economic displacement (loss of land, assets, access to assets, income sources, or means of livelihoods), as a result of: (i) involuntary acquisition of land, or (ii) involuntary restrictions on land use or on access to legally designated parks and protected areas.

Indigenous Peoples (IP). Defined by ADB's SPS (2009) as: a distinct, vulnerable, social, and cultural group. Safeguards are triggered if a project directly or indirectly affects the dignity, human rights, livelihood systems, culture or cultural resources of such groups.³¹

Land use rights transfer (LURT). Leasing or renting farmland use rights without any change in the land ownership and/or the agricultural use.

Loan implementation environmental consultant (LIEC) and social consultant (LISC). External environment and social specialists hired under the loan implementation consultancy services. See Section II.C for roles in project.

Project Administration Manual (PAM). Summary document describing all administrative, financial, procurement, and safeguard procedures for the overall project. The PAM and other project documents are available on the ADB public website.

Qualified investee. The final recipient of an equity investment, whose application has been completed (including the steps in the ESMS) and approved by HTIC.

Safeguards Commitment Letter (SCL). An agreement ancillary to the loan agreement signed between a FI and qualified investee, whereby the qualified investee undertakes to use its loan to carry out the subproject in accordance with: (i) the approved subproject design; (ii) in compliance with all requirements in the ESMS; and (iii) which gives the FI the right under applicable PRC law to exercise remedies against the qualified investee under the loan agreement.

Social development action plan (SDAP). Project plan with measurable indicators to strengthen socially-inclusive designs. The SDAP is within the project administration manual.

Subproject. Any activity financed by the Green Investment Fund under the project. Also referred to as a "qualified subproject".

³¹ The PRC Government uses the term "ethnic minorities". This may trigger ADB's safeguard requirements in accordance with the above definition.

C. Roles and responsibilities for the ESMS

10. This section identifies the roles and responsibilities of the agencies in implementing the ESMS.

Table II.1. Institutional Responsibilities for Implementation of the Environmental and Social Management System

Agency	Roles and Responsibilities
Huangshan Municipal Project Leading Group	<ul style="list-style-type: none"> • Ensure timely national, provincial, and inter-agency coordination and support for the project as needed • High-level support to executing agency • Provide advice on project implementation • Review project progress
Huangshan Municipal Government	<ul style="list-style-type: none"> • Project executing agency • Overall accountability and responsibility for project planning, management, and implementation • Ensure timely and effective execution of the loan agreements • Coordinate with ADB
Huangshan Municipal Project Management Office	<ul style="list-style-type: none"> • Support HTIC to establish and implement the ESMS • Submit updated draft ESMS to ADB for endorsement • Establish project grievance redress mechanism • Support HTIC to review and strengthen the environmental and social design of equity investment applications before approval • For the first 2 applications of each development category, submit the draft safeguard screening and categorization documents to ADB for endorsement • Facilitate safeguard training for HTIC • Prepare semiannual environment monitoring reports to ADB including on ESMS implementation progress • Ensure project compliance with the loan and project agreements – including all safeguard provisions – and ESMS • Terms of reference for the PMO environmental officer and social officer are in EMP Appendix 1-1 and the PAM

Agency	Roles and Responsibilities
Huangshan Trust Investment Company	<ul style="list-style-type: none"> • Implementing agency for the Green Investment Fund and ESMS • Recruit at least one qualified environment officer and one social officer to oversee establishment and implementation of ESMS • Establish, manage, and implement the Green Investment Fund and ESMS • Integrate the ESMS within HTIC business procedures • Support PMO to implement the grievance redress mechanism • Monitor and report compliance of qualified investees with the safeguard conditions of each equity investment • Prepare semiannual environment monitoring reports to PMO, for consolidation within progress reports by PMO to ADB <p>The HTIC environment officer and social officer will:</p> <ul style="list-style-type: none"> • Work closely with HTIC finance officers and qualified investees to implement the ESMS, review equity investment applications against ESMS steps A-F (Section III), and manage the ESMS database • Support PMO to implement the GRM • Facilitate training related to safeguards and project design • Monitor ESMS implementation of the qualified investees • Compile ESMS progress reports • Submit semi-annual safeguard progress reports to PMO • Provide information as requested by PMO to assist with queries and/or preparation of progress reports to ADB • Terms of reference are in ESMS-Appendix 6 <p>The HTIC financial officers will:</p> <ul style="list-style-type: none"> • Receive and review equity investment applications against ESMS steps A-F (Section III), working with qualified investees, PMO and other agencies as necessary • Document the results of Steps A-F for each equity investment application in the HTIC ESMS database • Liaise with qualified investees, PMO and other agencies as necessary to ensure relevant safeguard approvals and design considerations are achieved
Investee (potential applicant of equity investment)	<ul style="list-style-type: none"> • Work with HTIC to complete the screening, categorization, and subproject design • Provide HTIC and PMO access to the subproject designs and sites • Implement and comply with any environmental or social conditions required as part of the equity investment
“Start-up” Environment Safeguard Consultant (external technical support provided under the ADB loan)	<ul style="list-style-type: none"> • Short-term national position to support PMO and implementing agencies with start-up support, including for ESMS establishment, while the loan implementation consultants are being recruited • Assist PMO and HTIC to establish the GRM for the ESMS • Provide initial training to HTIC for ESMS implementation
Loan Implementation Environmental Consultant and Social Consultant (external technical support provided under the ADB loan)	<ul style="list-style-type: none"> • Assist HTIC to establish and implement the ESMS • Provide ongoing training to HTIC staff for ESMS implementation • Review environment monitoring reports prepared by contractors • Assist PMO to prepare semiannual environmental monitoring reports to ADB • Terms of reference are in EMP Appendix 1-1 and the PAM
Asian Development Bank	<ul style="list-style-type: none"> • Oversee project administration and timely execution of the loan agreements by the executing and implementing agencies • Review project compliance and targets against the design and monitoring framework, EMP, ESMS, social plans, and project administration manual • Review and endorse updated ESMS as needed • Monitor project progress and conduct review missions • Disclose monitoring reports on ADB public website

ADB = Asian Development Bank, EMP = environment management plan, ESMS = environmental and social management system, GRM = grievance redress mechanism, HTIC = Huangshan Trust Investment Company, LIEC = loan implementation environment consultant, PAM = project administration manual, PMO = Huangshan Municipality project management office.

11. The relationship among the project agencies for the ESMS is shown in Figure II.1.

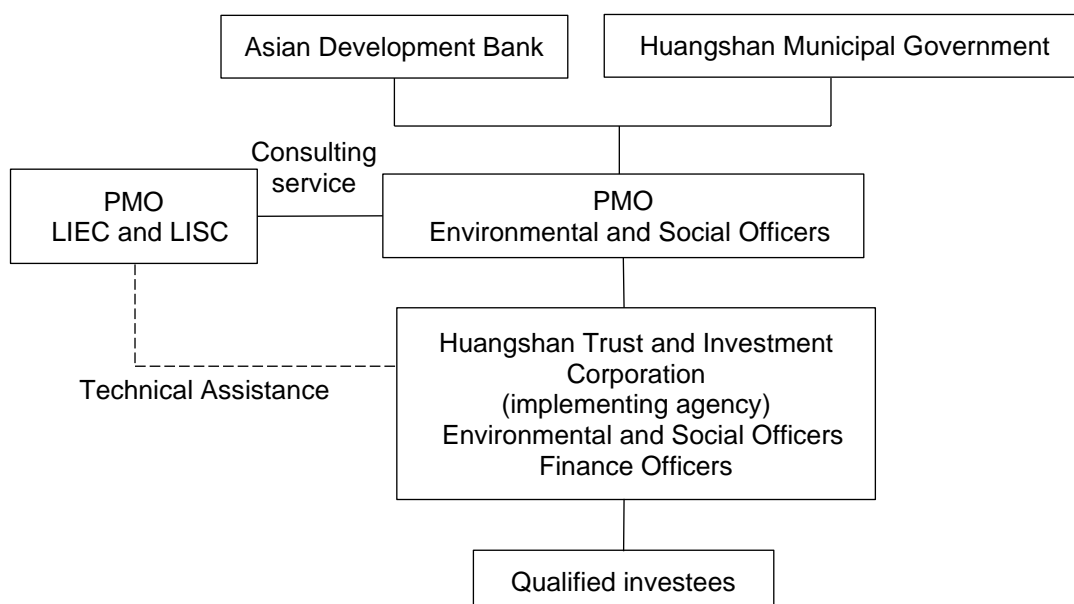


Figure II.1: Organization Chart of the project Agencies for the ESMS

PMO = Huangshan Municipality project management office, LIEC = loan implementation environment consultant, LISC = loan implementation social consultant.

D. What the project will and will not support

12. The Huangshan Municipal Government and HTIC agree to the following terms and restrictions for the Green Investment Fund.

13. THE GREEN INVESTMENT FUND WILL ONLY SUPPORT subprojects which:

- have minimal or no environmental impacts. Subprojects must meet the ADB definition of “Category B” or “Category C” for the Environment. “Category A” activities are excluded (Worksheet 1–Appendix 3);
- have all relevant domestic environmental approvals and/or land permits, as well as for any associated facilities or operations;
- have a clearly defined geographic location;
- are clearly based on participatory consultation and agreement with other stakeholders, especially affected persons [for subprojects involving multiple parties and lands];
- do not result in changes to land ownership (e.g. from village land to other categories) or official land use category (e.g. from agricultural to other land use); and,
- demonstrate compliance with the project social and gender action plans (SDAP and GAP – see the project administration manual).

14. HTIC THROUGH THE GREEN INVESTMENT FUND WILL ENCOURAGE AND FAVOR

subprojects which demonstrate the sustainable use of natural resources, including:

- water use efficiency;
- sustainable water supply;
- soil conservation practices;
- energy efficiency;
- reduced use of agricultural chemicals;
- improved pest control methods e.g. integrated pest management;
- manure processed as organic fertilizer;
- production, processing and marketing of local special products;
- adoption of traditional ethnic practices;
- involvement and/or support to women, the poor, and/or ethnic minorities.

15. THE GREEN INVESTMENT FUND WILL NOT FUND any activities which:

- are listed in the ADB Prohibited Investment Activity List (ESMS-Appendix 2);
- may cause significant and irreversible impacts to the environment i.e. meet the definition of ADB “Category A” for Environment;
- are located in or next to a designated water source protection zone, protected area, cultural heritage site, or critical natural habitat;
- involve large-scale landscape alteration e.g. quarrying, or terracing on slopes greater than 25°;
- involve involuntary land acquisition impacts;
- involve demolition of residential or private commercial buildings;
- involve involuntary resettlement, and which meet the definition of ADB “Category A” or “Category B” for resettlement, and any involuntary resettlement issues from past land acquisition or existing facilities as defined under ADB’s SPS;
- have impacts on vulnerable ethnic minorities (“Category A” or “B”) and any issues of indigenous peoples or ethnic minority communities from past activities or existing facilities as defined under ADB SPS;³² and/or,
- involve on-lending to other financial intermediaries or banking institutions.

E. Pre-readiness for establishment of the ESMS

16. At least three months prior to establishing the Green Investment Fund, HTIC shall issue a formal Presidential Directive to integrate the ESMS into HTIC business procedures and submit this directive to HMG and ADB. The directive shall: (a) officially recognize the ESMS as HTIC policy in the project districts and counties from the date of the Directive; (b) instruct the finance officers of the Green Investment Fund that the ESMS steps are now part of equity investment assessment and approval procedures; (c) identify by name and position the managerial and review arrangements for steps and decisions taken while implementing the ESMS; (d) confirm that breaches of environmental and social conditions by qualified investees will be treated by HTIC in the same way as breaches in other loan conditions – attracting similar penalties; (e) confirm the working relationship between HTIC and PMO and its loan implementation consultants; (f) ensure the wide dissemination within HTIC of the Chinese-language ESMS documents (including instructing the finance officers to print copies of the ESMS Workbook in ESMS-Appendix 3 to use in the field and fill out as part of their duties); and, (g) commit to the training plan in the ESMS by facilitating HTIC officers’ attendance at training courses as required.

17. Application of the ESMS procedures is described in Section III.

³² The due diligence during the preparation of the overall project has confirmed that the project area does not involve ethnic minority communities that would trigger ADB SPS requirements on indigenous peoples. The Green Investment Fund activities are also not expected to involve such impacts.

III. IMPLEMENTATION OF THE ESMS – SIX STEPS

18. This section describes six steps to implement the ESMS. The steps are conducted for all equity investment applications. The six steps are: A–screening; B–categorization; C–improving the subproject design for environmental and social benefits; D–assessment; E–safeguard implementation; and F–monitoring and reporting. Steps A to D are conducted as part of the due diligence before an equity investment is approved. Steps E to F are conducted during implementation of the subproject. All steps are conducted by the HTIC finance officer and environmental and social officers, working with the qualified investees, PMO Environment and Social Officers, and Loan Implementation Environmental and Social Consultants. Information disclosure, public consultation, and participation of affected persons are key requirements under PRC laws and the ADB Safeguard Policy Statement (2009). Information disclosure and public consultation are included under Steps D to E.

19. The six steps are to be performed by HTIC, except where stated otherwise. The steps are summarized in Figure III.2.

STEP A: SCREEN TO IDENTIFY POTENTIAL IMPACTS

First filter – compliance with national and international laws and regulations

- A.1. Does the equity investment application include any activities prohibited under PRC laws?
- A.2. Does the equity investment application include any activities on the ADB Prohibited Investment Activity List (Appendix 2)?
- A.3. Does the applicant have existing or pending lawsuits for violation of PRC laws related to environment or land?
- A.4. If the answer is “yes” to any of the above: reject the application, or, invite the applicant to re-apply after the application has been re-designed to meet compliance.
- A.5. If the answer is “no” to all of the above, continue with the next steps.

Second filter – environmental and social screening

- A.6. Meet with the loan applicant and conduct a site visit.
- A.7. Complete Worksheets 1-4 in Appendix 3 (environment, land acquisition, resettlement, land use rights transfer, ethnic minorities).
- A.8. Proceed to Step B. Note: do not proceed until Step A is fully completed.
- A.9. Document all applications, whether they pass Step A or not. Include them in the progress reports to the PMO.
- A.10. HTIC pays for the cost of Step A (i.e. mainly the work time of the HTIC finance officers).

STEP B: CATEGORIZE THE LEVEL OF POTENTIAL IMPACTS

- B.1. Use the information in Step A to identify the level of potential environmental and social impacts and the “impact category” of the subproject, according to PRC and ADB criteria.

First categorization – environment (PRC criteria)

B.2. The PRC defines three classes of impact assessment and reporting (based on scale, investment level, and environmental sensitivity): environmental impact assessment report (EIAR; high potential impacts); environmental impact table (EIT; moderate potential impacts) and environmental impact registration form (EIRF; low potential impacts). See definitions in Table 2a in ESMS-Appendix 1.

B.3. Request the applicant to consult with the local ecological and environment bureau (EEB) for preliminary guidance on steps B.3–B.4 for environmental risk categorization. First, the applicant and EEB should use Table 2a in ESMS-Appendix 1 to identify which category the application is within. Then, EEB will apply the national standards (Table 2b in ESMS-Appendix 1) to identify the risk level and environmental categorization for the proposed activities. The applicant should seek initial guidance from the EEB for the risk categorization and any comments, and submit this information to the HTIC.

B.4. The Green Investment Fund can potentially work with a subproject in any of these three classes. However, subprojects classed as EIT or EIRF are preferred as they are expected to have lower environmental impacts. Subprojects classed as EIAR are likely to involve environmental impacts equivalent to ADB's "category A" (see below): in this case, the application will be rejected.

Second categorization – environment (ADB criteria)

B.5. ADB applies three impact categories to Projects: A, B, or C. See definitions in Worksheet 1 of ESMS-Appendix 3. In Worksheet 1, complete the final column in the table. Assign the ranking A, B, or C to each potential impact relevant to the loan application.

B.6. Using these results, circle the summary impact category underneath the table. Clearly state the reasons for this conclusion.

B.7. The project will only work with Category B or C subprojects. Preferably Category C. If the final category is A, reject the application, or, invite the applicant to re-apply after the application has been re-designed to meet B or C level.

Third categorization – involuntary resettlement

B.8. ADB applies three impact categories to Projects: A, B, or C. Screening and categorization standards are defined in Worksheets 2 and 3 in Appendix 3.33 Use these worksheets to assess the subproject category as A, B, or C.

B.9. Reject all equity investment applications for subprojects which are Category A or B; and if they involve any involuntary resettlement issues from past land acquisition or existing facilities. These include subprojects which cause physical displacement and/or economic displacement or losses which result from involuntary acquisition of land or involuntary restriction of land use.

Fourth categorization – indigenous peoples (ethnic minorities)

B.10. ADB applies three impact categories to Projects: A, B, or C. Screening and categorization standards are defined in Worksheet 4 in Appendix 3.34 Use these worksheets to assess the subproject category as A, B, or C.

³³ See also: <http://www.adb.org/site/safeguards/safeguard-categories>

³⁴ See also: <http://www.adb.org/site/safeguards/safeguard-categories>

B.11. Equity investment applications for subprojects which are Category A or B are not expected, neither any subprojects are expected to involve any issues of indigenous peoples or ethnic minority communities from past activities or existing facilities. Otherwise, invite the applicant to re-apply after the application has been re-designed to meet compliance.

Fifth categorization –land use rights transfer³⁵ issues

B.12. Any subproject that involves land with an existing or proposed land use rights transfer (LURT) agreement will be reviewed by the PMO and HTIC loan and social officers. Use Worksheet 3 in ESMS-Appendix 3 to determine whether there are any issues or pending disputes. If the answer is “yes”, reject the application, or, invite the applicant to re-apply after all such issues have been legally settled and such evidence is provided in accordance with the LURT Framework in ESMS-Appendix 7.

B.13. HTIC pays for the cost of Step C. This should mainly be the work time of the HTIC loan and social officers to meet the applicant and conduct a site visit.

Endorsement by Government and ADB of the Proposed Risk Categorizations

B.14. Include all information in Step C in the progress reports to PMO.

B.15. For the first 2 applications under each new type of subproject category, submit the screening documents and proposed risk categorizations to the PMO and ADB for endorsement. The PMO will provide the documents to ADB. The subproject categories include but are not limited to: tea plantations; bamboo forestry; orchards; and, ecotourism.

B.16. Do not proceed with the application until the Government and ADB has provided feedback and endorsement on the application.

B.17. Do not proceed to Step C until Step B is fully completed.

STEP C: PROMOTE GREEN AGRICULTURE AND ECOTOURISM

C.1. Worksheet 5 in ESMS-Appendix 3 identifies the types of green development activities the Green Investment Fund aims to support. Identify those relevant to the loan application. Improve the proposed subproject design to achieve sustainable and climate-smart design which meets the practices in Worksheet 5. Note: This step is primarily carried out by the applicant, in consultation with the PMO Environmental and Social Officers, LIEC and LISC as necessary.

C.2. Check with the applicant (and if necessary the PMO) that Step B.1 has been conducted.

C.3. Include the design measures for green agriculture and ecotourism in the equity investment conditions (see Step D).

C.4. Include all information in Step B in the progress reports to PMO.

C.5. Do not proceed to Step D until Step C is fully completed.

³⁵ See Section II.B for definition of “land use rights transfer”.

STEP D: IMPACT ASSESSMENT, MITIGATION, AND SUBPROJECT APPROVAL

Environmental assessment

D.1. If the subproject is ADB Category B for environment, an Initial Environmental Examination (IEE), including Environmental Management Plan (EMP), is required.

D.2. If the subproject is ADB Category C for environment, the following is required: (i) preparation of the relevant PRC environmental assessment (EIAR, EIT, EIRF; see Step C); and (ii) a brief environmental checklist to help manage potential impacts. A sample checklist is given in ESMS-Appendix 5.

D.3. Advise the applicant: (i) it is the responsibility of the applicant to arrange and pay for the IEE, EIAR, EIT or EIRF; (ii) the assessment must be prepared by an accredited EIA institute; (iii) the assessment will be submitted to HTIC and PMO for review; (iv) for an IEE, the content will include the details listed in ESMS-Appendix 4 and include an English-language version; (v) for an IEE, PMO will submit the draft to ADB for review and approval; (vi) for the EIAR, EIT or EIRF, the contents will be in Chinese-language only and will be submitted to the local Ecology and Environment Bureau (EEB) for approval.

D.4. All domestic environmental assessment documents require the review and approval of the relevant county bureaus, including the EEB.

D.5. Preparing an IEE takes time and is expensive. The project will favor subprojects which are “Category C” and which only require domestic EIA documents (EIAR, EIT or EIRF).

D.6. If the applicant for a “Category B” subproject wishes to proceed, arrange a meeting between HTIC, PMO Environment and Social Officers, and applicant, and agree on: (i) the assessment process; and (ii) any changes in subproject design to achieve promotion of green agriculture and ecotourism development. HTIC will provide and (if necessary) pay for a venue for the meeting. For transport to/from the meeting, each party will pay for their own costs.

D.7. The applicant proceeds with preparation of the IEE (with EMP) and/or EIAR, EIT, or EIRT. The applicant is responsible for all costs of preparing the documents, including field surveys, baseline monitoring, and public consultation (see below).

Social assessments and preparation of mitigation actions

D.8. (i) If the proposed subproject involves land use rights transfer, the applicant must prepare a LURT agreement in accordance with the LURT Framework, and submit a copy to PMO and HTIC. (ii) If the proposed land has been the subject of any previous land transfer, the applicant must submit the LURT agreement and related evidence to confirm there are no pending disputes. Such due diligence will be done in accordance with the LURT Framework.

D.9. The subprojects should be implemented in accordance with the project Social Development Action Plan and Gender Action Plan (SDAP and GAP) that are included in the PAM. For the actions in the SDAP and GAP that are relevant to the subproject activities, HTIC will ensure the applicant implements them and reports on results, with assistance from PMO and LISC.

D.10. Include all relevant requirements (action) of the SDAP and GAP in the social conditions of the contract for the equity investment.

Information disclosure and public consultation and participation

D.11. For all subprojects, regardless of impact category, check with the applicant if they have publicized the proposed project within the project area.

D.12. If the answer is “no”, then inform the applicant that he or she must:

- publicize the basic project details – location, activities, potential impacts, contact details for the applicant, HTIC and PMO Environmental and Social Officers;
- publicize these details for at least 10 days to enable the general public sufficient time to submit any verbal or written comments;
- use disclosure materials and media which local communities near the project area can access e.g. signboard or poster in the village, website.
- at the end of the disclosure period, summarize any public comments received (by HTIC, PMO and/or applicant); and,
- address these comments in line with the EIT or EIRF or SDAP or GAP.

D.13. The applicant pays for the cost of the distribution materials.

D.14. For subprojects which are Category C for environment, involuntary resettlement and indigenous peoples, the above is sufficient.

D.15. For subprojects which are Category B for environment, ensure that the applicant undertakes information disclosure to the local community and meaningful public consultation. Instruct the applicant to tailor the scope and extent of information disclosure and public consultation to reflect the nature of the subproject and potential impacts, working also with the PMO Environment and Social Officers and EIA institute. The EIA institute preparing the IEE will coordinate the information disclosure and public consultation. The applicant will be responsible for the information disclosure and public consultation of relevant SDAP and GAP. The applicant pays for the costs and addresses any comments received.

D.16. Ensure that the applicant has: (i) submitted the draft IEE to PMO for disclosure on the PMO website; and (ii) publicized the draft IEE (or at least a Chinese-language summary) in the local media and/or village boards.³⁶

Endorsement by Government and ADB of the Documents

D.17. Include all information in Step D in the progress reports to PMO.

D.18. For all applications rated as category B for environment, submit the draft final IEE to the PMO and ADB for endorsement. The PMO will provide the documents to ADB. Do not proceed with the application until the Government and ADB has provided feedback and endorsement on the draft IEE.

D.19. Obtain and verify copies of other relevant documents and approvals for the application:

- local EEB approval and requirements;
- PMO concurrence of final subproject design; and,
- ADB approval of subprojects.

D.20. Do not proceed to Step E until Step D is fully completed.

³⁶ The IEE will be submitted to ADB in English language. It will be based on the domestic environment assessment documents prepared in Chinese language.

STEP E: IMPLEMENT SAFEGUARD MEASURES

E.1. For the equity investment agreement with the applicant, prepare a Safeguard Commitment Letter (SCL), which lists all measures to be implemented by the applicant for mitigation, monitoring and reporting from the environmental assessments, SDAP and GAP as relevant.³⁷ At this stage, the applicant is now a “qualified investee” i.e. is eligible to receive funding support under the Green Investment Fund.

E.2. The qualified investee begins the subproject, including the measures in the SCL. The qualified investee is responsible for paying these costs.

E.3. For subprojects which are “Category B” for environment, inform the qualified investee that if they hire a contractor: (i) the EMP, GRM, and Safeguards Commitment Letter must be included in the bidding documents; (ii) the contractor must agree to fulfill the EMP, GRM, and Safeguards Commitment Letter as a condition of accepting the contract, and should include the costs in their tender.³⁸

E.4. Support the PMO Environmental and Social Officers to implement the Grievance Redress Mechanism (GRM) throughout the implementation stage (see Section V).

E.5. Any changes to the design of the subproject that may potentially cause negative environmental impacts will be screened and assessed and additional environmental monitoring and/or mitigation measures will be developed as needed.

STEP F: MONITORING AND REPORTING

F.1. Monitor whether the qualified investee is implementing the measures in the Safeguards Commitment Letter.

F.2. Develop and maintain an internal FI recording system for the results of Steps A-F for each equity investment application and approved subproject. This should be a simple database (e.g. in excel).

F.3. For subprojects which require an IEE, an environmental monitoring plan is described in the EMP. This should be implemented by the qualified investee. The results should be reported to HTIC at the frequency described in the EMP.

F.4. The PMO is responsible for monitoring of the SDAP and GAP implementation for the overall project. The Loan Implementation Consultants will help the PMO to develop the monitoring and reporting mechanism.

F.5. During at least the first two years of the project, the following agencies meet every six months, and then at least annually from year 4 onwards:

- HTIC and qualified investee meet, to review progress against the equity investment contract conditions in the Safeguards Implementation Commitment; and,
- HTIC, PMO and relevant county bureaus, meet, to review safeguard compliance of all the subprojects being supported and lessons learned.

³⁷ Environmental impact mitigation measures are listed in the IEE Appendix 1: Environmental Management Plan. Many of the mitigation measures in the EMP for other project activities will be applicable to subprojects under the Green Investment Fund and ESMS. Social safeguard measures are listed in Step D.

³⁸ The bidding documents will show if the contractor has included costs for these conditions. A construction supervision company will monitor contractor performance.

F.6. HTIC submits a semi-annual safeguard progress report to the PMO, which includes progress with HTIC's ESMS, GRM and safeguard training. Submission dates: for the report for January-June – submit by 31 July latest; for the report for July-December – submit by 31 January latest.

F.7. The PMO submits a semi-annual safeguard progress report to ADB, which includes progress with HTIC's ESMS. Submission dates: for the report on January-June – by 15 August latest; for the report on July-December – by 15 February latest (i.e. two weeks after HTIC submits its reports to the PMO).

F.8. The reporting procedure is shown in Figure III.1.

F.9. HTIC pays for the costs of internal ESMS monitoring and reporting. The PMO pays for the costs of preparing semi-annual progress reports to ADB.

F.10. **Penalties.** The failure of a qualified investee to implement the environmental and social requirements set out in the equity investment conditions will result in penalties e.g. equity investment foreclosure, accelerated repayments, and/or other measure deemed appropriate by HTIC and under PRC law.

Table III.1: Reporting Plan for ESMS

Report	Timing	Responsibility
For environment category B subproject, report on results of EMP implementation and monitoring	As required in the project EMP for reporting	Qualified investee submits to HTIC
HTIC semi-annual safeguard report to PMO, including ESMS progress, SDAP and GAP	Semi-annual. For January-June: by 31 July. For July-December: by 31 January	HTIC submits to PMO
PMO semi-annual safeguard report to ADB	Semi-annual. For January-June: by 15 August. For July-December: by 15 February	PMO submits to ADB. ADB reviews; discloses on ADB website

ADB = Asian Development Bank, HTIC = Huangshan Trust Investment Company, EMP = environmental management plan, ESMS = environmental and social management system, PMO= Huangshan Municipal project management office, SDAP = social development action plan, GAP = gender action plan.

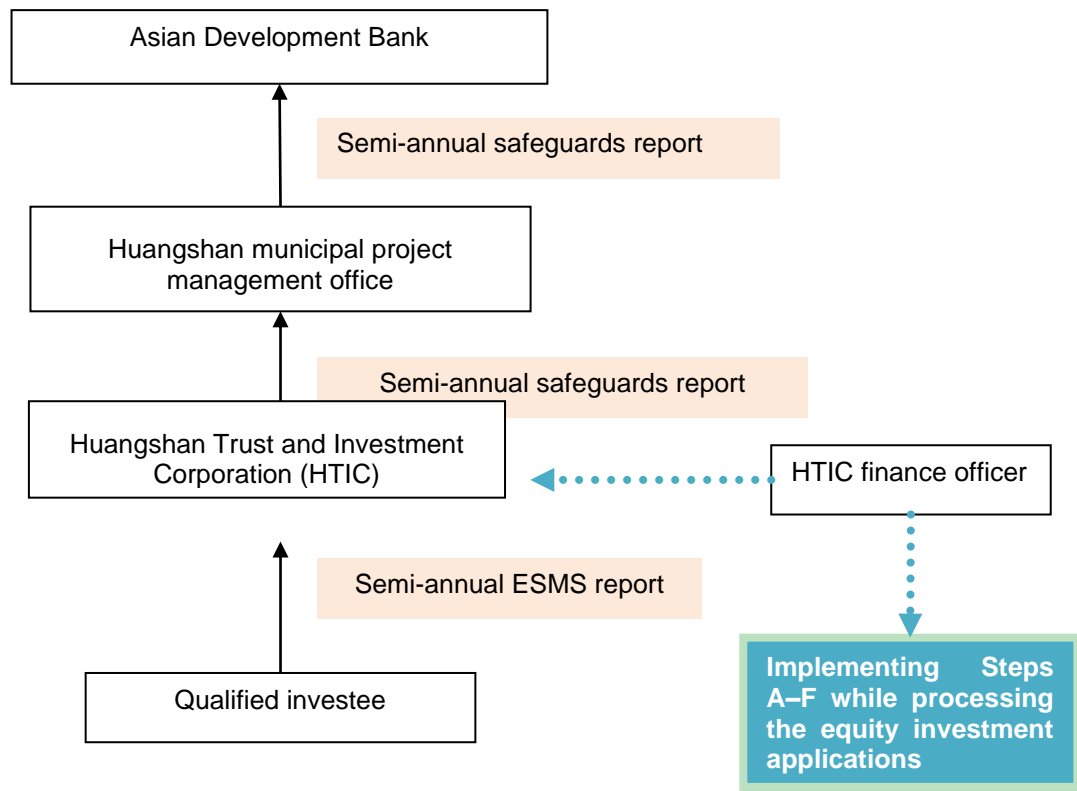


Figure III.1. Reporting Procedures for the Environmental and Social Management System

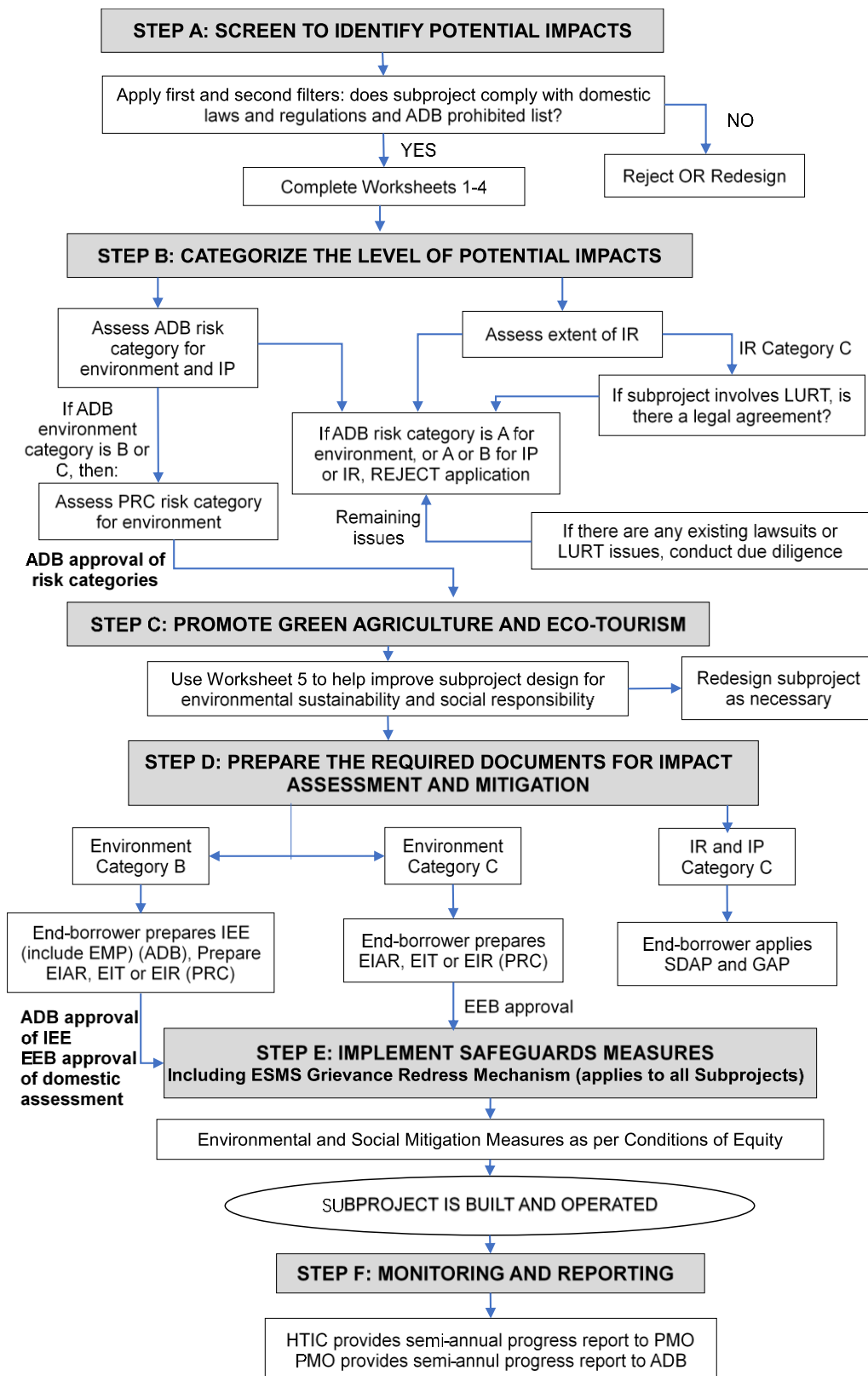


Figure III.2. Steps A–F of the Environmental and Social Management System

ADB = Asian Development Bank, EEB = ecology and environment bureau, EIAR = environmental impact assessment report, EIR = environmental impact report, EIT = environmental impact table, EMP = environment management plan, ESMS = environment and social management system, GAP = gender action plan, HTIC = Huangshan Trust Investment Company, IEE = initial environmental examination, IP = indigenous peoples, IR = involuntary resettlement, PMO = Huangshan Municipal project management office, PRC = People's Republic of China, SDAP = social and development action plan.

IV. INTEGRATION OF THE ESMS INTO FI BUSINESS PROCEDURES

A. Existing safeguard capacity and procedures of HTIC

20. The Huangshan Trust Investment Company (HTIC) is a state-owned enterprise (SOE), fully owned by Huangshan Municipality Government. It was incorporated in January 2016 in Huangshan Municipality, with a registered capital of CNY20 million. The business of HTIC covers investment management, investment consulting, and cooperate equity investment. HTIC is operating under PRC's commercial law and is financially autonomous. HTIC has a track record of operating funds and equity financing and is expected to provide a sound base for the Green Investment Fund.

21. The HTIC comprises a Board of Directors, a Management Committee, and seven departments: General, Legal, Human Resources, Business Operation, Risk, Finance, and Information Technology. As of August 2019, HTIC had 48 employees, comprising 5 managers, 11 administrative personnel and 32 business personnel. There are currently no staff with qualifications or experience in environmental or social safeguards.

22. When a loan application is received by HTIC, it is categorized as for “operating capital” or a “project”. If the investment is for a project (i.e. new construction or expansion or intensification of existing development), a feasibility study report (FSR) approved by the Development and Reform Commission (DRC; provincial or county level depending upon scale) is required. Before DRC will approve a FSR, an environmental assessment, approved by the Huangshan Ecology and Environment Bureau (EEB), must be obtained. The environmental approval is appended to the DRC approval.

23. The finance officer at HTIC receiving the application conducts the following safeguard due diligence: (i) whether the proposed application has DRC and environmental approvals; (ii) whether any land use rights are involved; (iii) whether any resettlement is involved; and (iv) preliminary assessment of potential impacts on livelihoods and welfare of people in the project area. Processing of the application does not proceed without the DRC and environmental approvals and/or if unresolved issues of land use rights transfer or resettlement are identified. Copies of the DRC and environmental approvals are held by HTIC. The current business procedure of HTIC in approving loan applications is summarized as follows:

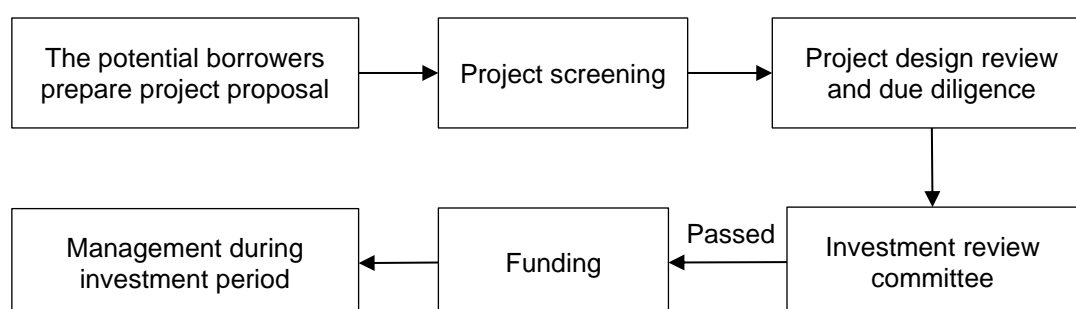


Figure IV-1 Current Business Procedures of HTIC for Investment Applications

24. As required under the PRC *Tentative Procedure of Project Completion Environmental Inspection and Acceptance for Construction Project (2017)*, within three months of project completion, the qualified investee or its commissioned technical agency assesses if the subproject has been constructed in compliance with the environmental approval conditions; submits related documents to the Huangshan EEB; and uploads required information onto the national project completion environmental acceptance platform. EEB is responsible for supervision. HTIC is not involved in this step. If the subproject is not compliant, the qualified

investee is required to take corrective actions. Without this it will not obtain final environmental approval and cannot become operational.

25. Monitoring by HTIC during the duration of an equity investment includes site visits and meetings with the management and chief accountant of the qualified investee, one to two times in the first month and subsequent inspections dependent on the risk judgment of the HTIC finance officer. There is no monitoring of safeguards.

B. Integrating the ESMS

26. HTIC has clarified that there are no existing policies or practices within its operations which would constrain the adoption and implementation of the ESMS. To establish the ESMS and ensure its operation, HTIC will recruit one qualified environment officer and one qualified social officer. These personnel will facilitate the establishment of the ESMS and integration into the existing HTIC business procedures, and, support the HTIC finance officers to complete the ESMS requirements for individual loan applications.

27. To integrate the ESMS into the HTIC business procedures, HTIC will issue a formal Presidential Directive at least three months prior to establishing of the Green Investment Fund and receiving loan proceeds from the project. This period also includes prior review and approval of HTIC's ESMS by the PMO and ADB.

28. This Directive will:

- i. officially recognize the ESMS as HTIC policy in the project districts and counties from the date of the Directive;
- ii. instruct the finance officers of the Green Investment Fund that the ESMS steps are now part of equity investment assessment and approval procedures;
- iii. identify by name and position the managerial and review arrangements for steps and decisions taken while implementing the ESMS;
- iv. confirm that breaches of environmental and social conditions by qualified investees will be treated by HTIC in the same way as breaches in other loan conditions – attracting similar penalties;
- v. confirm the working relationship between HTIC and PMO and its loan implementation consultants;
- vi. ensure the wide dissemination within HTIC of Chinese-language ESMS documents;
- vii. instruct finance officers to print copies of the ESMS Workbook (ESMS-Appendix 3) to use in the field and fill out as part of their duties; and,
- viii. commit to the training plan in the ESMS by facilitating HTIC officers' attendance at training courses as required.

29. At least three months before the first equity investment disbursement, HTIC will recruit the HTIC environment officer and social officer. These officers will oversee the ESMS implementation. They will work directly with the HTIC finance officers to guide their activities, undertake regular checks of ESMS implementation internally, and provide and participate in the training. They will prepare the ESMS progress reports for submission by HTIC to the PMO. The HTIC environment officer and social officer will also work with the LIEC and LISC to establish the ESMS.

30. Upon receipt of an application for an equity investment, a HTIC finance officer will commence the safeguard screening procedure. The screening and categorizing will be integrated into the initial site visit and due diligence examination of the equity investment application. After the qualified investee has completed the required assessments, impact mitigation measures and other relevant actions will be formulated as contractual conditions and signed by the qualified investee in a Safeguards Commitment Letter. As far as possible, the same HTIC finance officer (to maintain consistency) will check if the measures have been fully and properly undertaken as part of HTIC's internal monitoring of individual equity investments that are being implemented.

31. Where a subproject needs to be redesigned, the HTIC finance officer will discuss with the qualified investee and consult with the HTIC environment and social officers, and other technical personnel as needed (e.g. agricultural extension staff of the local Agriculture Bureau) and PMO to guide the re-design. After re-design, the application will progress step by step through the ESMS procedures as before.

32. During the project implementation period (six years), HTIC will receive technical support from the LIEC and LISC to implement the ESMS and overall monitoring from the PMO and ADB. The maximum potential life of the Green Investment Fund is estimated to be about 15 years (assuming no future replenishments; and pending capital expenditures and success during implementation of the ADB-funded project). Therefore it is possible the Green Investment Fund might continue to be implemented for another 10-11 years after completion of the ADB-funded project. This future phase of the Green Investment Fund might not be subject to ADB guidance or technical or financial support. At this early stage, there is no viable mechanism to ensure the HTIC will continue to implement the ESMS after the project. The success of the ESMS will be assessed by the government, HTIC, and ADB during project implementation and the ADB project completion report (one year after project completion) and recommendations for future management will be identified as relevant.

V. GRIEVANCE REDRESS MECHANISM

33. The project includes a Grievance Redress Mechanism (GRM) to identify, address and resolve any public concerns for environmental and/or social issues of the project activities. The GRM comprises a series of steps to receive, document, and address the concerns of any affected persons. The GRM is accessible to all members of the community. Multiple entry points are available, as well as multiple ways to convey issues/ grievances including face-to-face meetings, written complaints, telephone conversations, e-mail, and social media. The GRM will be implemented for the 6-year life of the project.

34. The PMO Environmental and Social Officers and HTIC Environmental and Social Officers will be the lead coordinators for GRM implementation. All project related staff will be trained in the GRM and will take an active role in supporting these officers as and when necessary.

35. At the PMO level, the PMO Environmental Officer and Social Officer will establish a GRM tracking and documentation system, conduct daily coordination with the FI's officers, arrange meetings and conduct site visits as necessary, maintain the overall project GRM database, and prepare the reporting inputs for progress reports to ADB. Within HTIC, the environment and social officers will instruct qualified investees, contractors and construction supervision companies (CSCs) on the GRM procedures, and coordinate with the local EEBs and other government divisions as necessary. PMO and HTIC staff will be trained and supported by the LIEC and LISC.

36. The contact persons for different GRM entry points, such as the PMO and HTIC

Environmental and Social Officers, contractors, operators of project facilities, and local EEBs, will be identified prior to construction. The contact details for the entry points (phone numbers, addresses, e-mail addresses) will be publicly disclosed on information boards at construction sites and on the websites of the local EEBs.

37. Once a complaint is received and filed, the PMO and HTIC officers will identify if complaints are eligible for management under the GRM. Eligible complaints include those where (i) the complaint pertains to the subproject; and (ii) the issues arising in the complaint fall within the scope of ESMS issues that the GRM is authorized to address. Ineligible complaints include those where: (i) the complaint is clearly not project-related; (ii) the nature of the issue is outside the mandate of the ESMS GRM (such as issues related to allegations of fraud or corruption); and (iii) other procedures are more appropriate to address the issue. Ineligible complaints will be recorded and passed to the relevant authorities, and the complainant will be informed of the decision and reasons for rejection.

38. HTIC will support the PMO to implement the GRM, including immediate reporting to the PMO of any grievance issues identified. Other key agencies that will support the PMO to implement the GRM are the county EEBs, township governments, and village committees.

39. The PMO will provide progress of the GRM in the semi-annual environmental and social progress reports to ADB.

40. The PMO Environmental and Social Officers coordinate the GRM and work directly with the HTIC Environmental and Social Officers responsible for the ESMS, to handle complaints and implement corrective actions.

41. The following scheme outlines the main elements of the GRM. It will be reviewed during project implementation by the LIEC and LISC and revised if necessary.

42. The procedure for the GRM involves two pathways: environmental issues (three stages) and social (ethnic minority and LURT) issues (four stages) (Figure V.1 and Figure V.2). Upon receiving a complaint, a project agency will report it immediately to HTIC and PMO. The PMO Environment and Social Officers will assess which GRM (environment or social) is to be applied.

43. **Environmental Issues (three stages).** Note that the design of the environmental GRM is similar to the overall project GRM (described in the IEE Appendix 1: EMP), but places more responsibility in stages 2 and 3 on HTIC rather than PMO. This is to help build accountability and self-sufficiency within HTIC and to further embed the ESMS procedures into HTIC operations.

- **Stage 1 (5 calendar days):** If a concern arises during construction or operation, the affected person may submit a written or oral complaint to the contractor or equity investment owner, family (if onsite) or representative. The person receiving the complaint will: (i) respectfully acknowledge the issue and immediately stop the causal activity (e.g. on-site construction causing high noise levels to a nearby household); (ii) not resume the activity until the complaint has been resolved; (iii) inform the PMO and HTIC finance officer of the incident on the same day of the incident occurring and how the contractor has responded or will respond; (iv) give a clear reply to the affected person within two calendar days; and (v) as far as possible, resolve the problem within five calendar days from receiving the complaint. In stage 1, the contractor (or other persons receiving the complaint) will as far as possible resolve the issue directly with the affected person. The contractor will keep the HTIC finance officer fully informed at all stages. The HTIC will: inform the PMO, local village committee, and local EEB of the incident within one working

day of being informed by the contractor; and, subsequently keep the PMO informed at all stages.

- **Stage 2 (5 calendar days):** If the issue cannot be resolved in Stage 1, after five calendar days, the HTIC finance officer and environmental and social officers, with support and facilitation by the PMO, will take over responsibility. Eligibility of the complaint will be assessed and a recommended solution given to the complainant and contractors within two calendar days. If the solution is agreed by the complainant, the contractors and/or facility operators (in operation) will implement the solution within five calendar days from HTIC taking over responsibility of the complaint. Written records will be made of all stages and outcomes. At the expiration of Stage 2, PMO will inform ADB of the outcome.
- **Stage 3 (15 calendar days):** If no solution can be identified by HTIC, and/or the complainant is not satisfied with the proposed solution, HTIC will organize, within seven (7) calendar days, a stakeholder meeting. This will include the complainant, contractor and/or operator of the facility, EEB, and PMO. A solution acceptable to all shall be identified including clear steps. The contractors (during construction) and facility operators (during operation) will immediately implement the agreed solution. All attempts will be made to fully resolve the issue within 15 calendar days. Written records will be made of all stages and outcomes. At the expiration of Stage 3, PMO will inform ADB of the outcome.

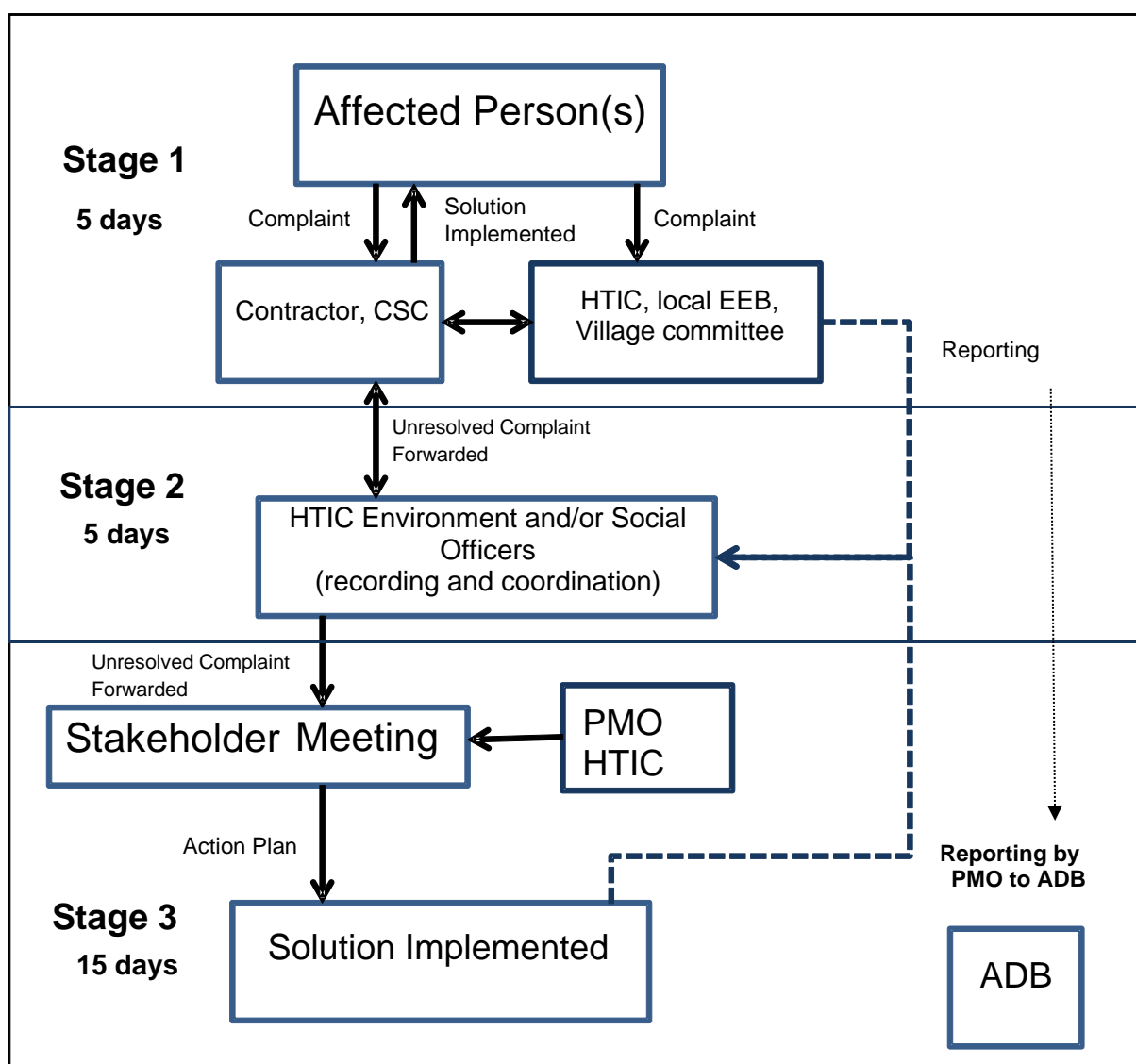


Figure V.1: The Grievance Redress Mechanism for Environment Safeguards

ADB = Asian Development Bank, CSC = construction supervision company, EEB = ecology and environmental bureau, GRM = grievance redress mechanism, HTIC = Huangshan Trust Investment Company, PMO = Huangshan Municipal project management office.

44. The GRM does not affect the right of an affected person to submit their complaints to any agency they wish to, for example the local village committee, community leaders, courts, PMO, HMG, district/county government, and/or ADB. At any time in the GRM, affected persons may also contact the local courts and/or ADB East Asia Department. The GRM does not affect public rights under the PRC *Regulations on Letters and Visits* (ESMS-Appendix 1), which requires a complaint acceptance mechanism at all levels of government and protects complainants from retaliation. If the complaint is still unresolved after all stages, the affected person and/or PMO may refer to the ADB Accountability Mechanism.³⁹

45. All stages of the GRM are time-bound with maximum periods set for advising, finding and implementing corrective actions. All complaints and processes are documented and reported to the ADB in the semi-annual PMO safeguard progress reports.

46. HTIC shall bear any and all costs of implementing the ESMS GRM, including meeting, travel, and/or accommodation costs of the project staff or affected person. The HTIC finance officer and environmental and social officers shall pay close attention to subproject design and implementation to ensure that complaints are minimized.

47. Land use rights transfer issues (four stages).

Stage 1: Complaints are submitted to the village committee. In case of an oral appeal, the village committee shall make a written record. The village committee shall make a decision to resolve the problem within 15 days.

Stage 2: If the affected person is dissatisfied with Stage 1, they may file an appeal to the township government. The township government shall make a decision to resolve the problem within 15 days.

Stage 3: If the affected person is dissatisfied with Stage 2, they may file an appeal to the county/district government and HTIC, who shall resolve the issue within 20 days.

Stage 4: If the affected person is dissatisfied with Stage 3, they may file for arbitration in the Rural Land Use Rights Transfer Disputes Tribunal for final resolution.

At each stage, the receiving agency will report the complaint, and progress resolving it, to the PMO. HTIC will send consolidated reports on GRM activity to the PMO for semi-annual reporting.

Based on the PRC *Law on Mediation and Arbitration of Rural Land Contract Disputes*, charges for disputes arbitration of rural land contracts are not allowed. Reasonable expenses will be paid by the local government.

48. Ethnic minority safeguard issues (four stages).⁴⁰

Stage 1: If the affected people are dissatisfied with the project, they can make either oral or written complaint to the village committee or cultural leaders; if they use verbal

³⁹ See: www.adb.org/accountability-mechanism

⁴⁰ <http://www.adb.org/Accountability-Mechanism/default.asp>.

complaints, the community committee or cultural leader should handle and record it. Complaints will be addressed within 15 days.

Stage 2: If the complainant is not satisfied with the result of the first phase, he/she can appeal to the township government after receiving the result; the township government should make decision within 15 days.

Stage 3: If the complaint is not satisfied with the result of the second phase, he/she can appeal to HTIC after receiving the result; HTIC should make decision within 30 days.

Stage 4: If the complainant is not satisfied with the results of any above phases, he/she can appeal to the government departments applying for administrative reconsideration after receiving the result.

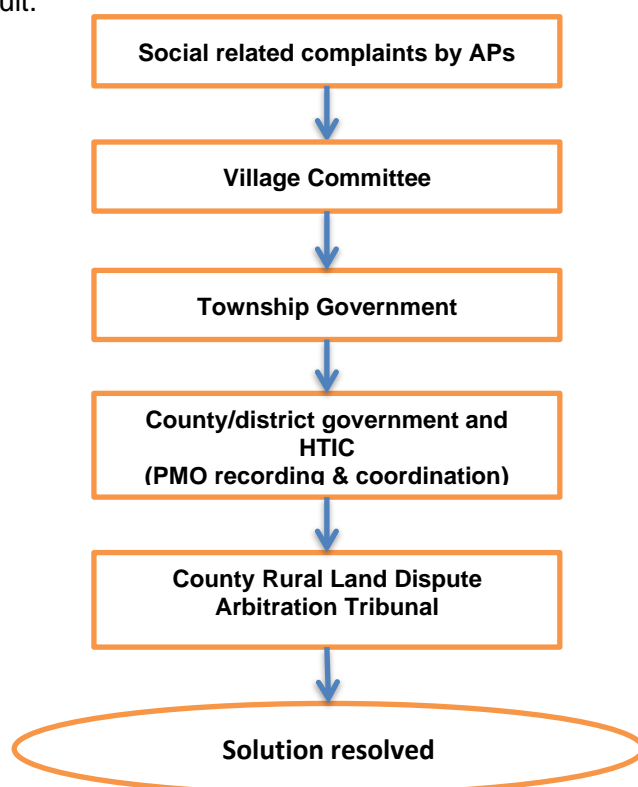


Figure V.2: The Grievance Redress Mechanism for Social Safeguards

AP = affected person, HTIC = Huangshan Trust Investment Company, PMO = Huangshan Municipal project management office.

VI. CAPACITY BUILDING AND TRAINING

49. The capacity of HTIC to implement the ESMS is currently low. Prior to the project, HTIC had no staff qualified in environmental or social management or safeguards. The PMO will work with HTIC to implement the ESMS over the 6 years of the project life. The project includes a training program (Table VI.1) to build capacity of HTIC, with the aim that HTIC can independently conduct the following without PMO or ADB support after the first five years of the project: (i) implement the ESMS; (ii) understand the principles and practice of environmental and social impact assessment in the agriculture and ecotourism sectors; and (iii) incorporate green agriculture and ecotourism best practices into project design to minimize potential environmental and social adverse impacts. Most training will occur within the first two years of the project. Training will be conducted by the loan implementation environment consultant (LIEC) and loan implementation social consultant (LISC) (see terms of reference in EMP Appendix 1-1 and the PAM), supported by other technical loan

implementation consultants.

Table VI.1: Five-year training program for the ESMS.

Includes a mid-term review of the ESMS and grievance redress mechanism in Year 3.

Trainees	Training	Trainer	Year 1	Year 2	Year 3	Year 4	Year 5	Cost (CNY x10,000)
HTIC staff	Maintain and implement ESMS	LIEC, LISC	Full-time	tbc	tbc	tbc	tbc	tbc
PMO, HTIC staff	Maintain and implement GRM	LIEC, LISC	Full-time	tbc	tbc	tbc	tbc	tbc
PMO, HTIC staff	Implement ESMS Steps A–F (screening, design, categorization, impact assessment); and inclusion of safeguards into equity investment contracts (mitigation, monitoring, reporting, SDAP, GAP, land transfer)	LIEC, LISC	Full-time	Full-time	tbc	tbc	tbc	tbc
PMO, HTIC staff	ESMS monitoring and reporting– spreadsheet data, HTIC reporting to PMO; reporting by PMO to ADB	LIEC, LISC	Full-time	Semi-annually	tbc	tbc	tbc	tbc
PMO and HTIC environmental and social officers	Introduction to environmental and social impact assessment in the agriculture and tourism sectors	LIEC, LISC	Full-time	Quarterly	Semi-annual	tbc	tbc	tbc
HTIC staff, qualified investees	Introduction to best practices for green agriculture and ecotourism design	LIC	Full-time	Full-time	tbc	tbc	tbc	tbc
PMO, HTIC staff	Mid-term review of ESMS – progress, challenges, lessons learned	LIEC, LISC	0	0	tbc	0	0	In-kind support

ESMS = environmental and social management system, GRM = grievance redress mechanism, HTIC = Huangshan Trust Investment Company, LIC = loan implementation consultant, LIEC = loan implementation environmental consultant, LISC = loan implementation social consultant, PMO = Huangshan Municipal project management office, SDAP = social development action plan, GAP = gender action plan; tbc = to be confirmed.

VII. PROJECT ASSURANCES

50. HTIC and implementation of the ESMS will be subject to loan- and project-specific assurances to support efficient and timely project management. The loan assurances are described in Section X of the IEE. Refer to the loan and project agreements for the final wording of the assurances.

ESMS-APPENDIX 1. LEGISLATION AND POLICIES

Table 1: PRC Laws and Regulations on Agriculture, Environment and Social Issues Relevant to the ESMS

Laws, Regulations and Standards	Relevance to Project
ENVIRONMENT PROTECTION AND PLANNING and LAND USE MANAGEMENT	
Environmental Protection Law (2015, amended)	Subprojects avoid any significant environmental impact.
Land Administration Law (2004, amended)	Subprojects comply with provincial, county and local land use plans, which are made to protect and develop land resources.
Noise Pollution Prevention and Control Law (2018, amended)	Noise during construction and operation of the proposed subprojects to be mitigated or avoided.
Water Pollution Prevention and Control Law (2018, amended)	Water pollution during construction and operation of the proposed subprojects to be mitigated or avoided.
Air Pollution Prevention and Control Law (2018, amended)	Air pollution during construction and operation of the proposed subprojects to be mitigated or avoided.
Solid Waste Pollution Prevention and Control Law (2016, amended)	Solid waste pollution during construction and operation of the proposed subprojects to be mitigated or avoided.
ENVIRONMENTAL IMPACT ASSESSMENT	
Environmental Impact Assessment Law (2018, amended)	Overarching law for EIA, setting out procedures for EIA and approvals needed before construction.
Management Regulation on EIA Categories of Construction Projects (2018)	Defines assessment and reporting requirements for three EIA classes, based on scale, investment level, and environmental sensitivity: comprehensive environmental impact assessment report (EIAR); environmental impact table (EIT); and, environmental impact registration form (EIRF). See Table 2. All subprojects are expected to require EIT or lower.
Regulation on Public Participation of Environmental Impact Assessment (2017)	Guideline and requirement for conducting public participation and consultation during the environmental impact assessment of a project
Provisional Methods of Management of Projects Financed by International Financial Institutions and Foreign Governments (2005)	Project funds are sourced from an international organization (ADB), the provisions of this method apply for aspects of the environmental impact assessment.
Technical Guideline for EIA: General principle (HJ 2.1-2016)	Guideline for conducting EIA preparation. Provides information on the scope and content of environmental impact assessment.
Technical Guideline for EIA: Surface Water (HJ/T 2.3-2018)	Guideline for surface water pollution prediction and analysis for projects where wastewater discharge is a potential impact.
Technical Guideline for EIA: Atmospheric Environment (HJ2.2-2018)	Guideline for air pollution prediction and analysis for projects where gaseous emissions are a potential impact.
Technical Guideline for EIA: Acoustic Environment (HJ2.4-2009)	Guideline for noise level prediction and analysis for impact assessments.
Technical Guideline for EIA: Ecological Impact Assessment (HJ19-2011)	Guideline for ecological impact prediction and analysis for impact assessments.
Technical Guideline for EIA: Groundwater Environment (HJ 610-2016)	Guideline for groundwater pollution prediction and analysis for impact assessments.
WATER	
Water Law (2016)	Regulation and management of water resources.
Environmental Quality Standard for Surface Water (GB 3838-2002)	Assigns a water quality class to waterbodies according to their use. There are 5 classes, ranging from I (drinking water) to V (industrial use only). Waterbodies in subprojects will be classed to assess the permitted use of the water and discharge of wastewater.
Environmental Quality Standard for Groundwater (GB/T14848-2017)	Standards for groundwater quality which must be maintained.
Water Pollution Prevention and Control Law (2018, amended)	Enabling legislation for rules and regulations preventing water pollution.
Regulation on Pollution Prevention of Drinking Water Source (2010)	Sets aside areas adjoining drinking water sources to protect water quality. Subprojects should not be within or bordering these zones.
Measures on Monitoring of Pollutant Discharge Outlets Entering Rivers (2015, amended)	Environmental monitoring in the wastewater discharge outlet may be required for the subproject if necessary.
Integrated Wastewater Discharge Standard (GB 8978-2002)	Requirements for wastewater discharge.
Water Quality Standard for Sewage Discharged	Wastewater should not be discharged to municipal wastewater

into Municipal Sewers (CJ343-2010)	treatment plant if indicators exceed the limits in this standard.
Regulations for Water Extraction Permitting and Collection of Water Resource Fees (2017, amended)	Subprojects need to obtain water resource extraction permission from local BWR before accessing water resource.
SOIL	
Water and Soil Conservation Law (2010, amended 2011)	Provisions to combat soil erosion and land degradation in construction and agriculture.
AIR	
Air Pollution Prevention and Control Law (2018, amended)	Enabling legislation for rules and regulations preventing air pollution.
Emission Standards for Odor Pollutants (GB 14554-1993)	Limits for odors from enterprises and activities.
Integrated Emission Standard for Air Pollutants (GB 16297-1996)	Limits for air pollutants emission from enterprises and activities.
Technical Guidelines for Fugitive Emission Monitoring of Air Pollutants (HJ/T 55-2000)	Guidance on how to predict and measure air pollutants for environmental impact assessments.
Ambient Air Quality Standard (GB3095-2012)	Standards for ambient air quality of an area (urban, rural, industrial etc.)
SOLID WASTE	
Solid Waste Pollution Prevention and Control Law (2016, amended)	Requirements for solid waste handling and disposal. To be used for management measures in subprojects.
Classification and Assessment Standards for Municipal Solid Waste (CJJ/T 102-2004)	Solid waste quality and contamination limits for a range of permissible disposal options.
FLORA, FAUNA, AND CULTURAL RESOURCES	
Wild Animal Protection Law (2018, amended)	Protection of listed fauna and flora. Subprojects must ensure they do not threaten any animals on the lists.
Cultural Relics Protection Law, 2011	Procedures to record, protect any relics found during construction.
SOCIAL DEVELOPMENT / SAFEGUARDS	
Law on Protection of the Rights and Interests of Women (2018, amended)	Protection of employment, welfare, occupational health and workplace equality of women; equal rights for allocation of farmland and approval of housing sites in rural areas. These rights endure after marriage or divorce.
Decree 431– Regulation on Letters and Visits (2005); Decree 34 – Measures on Environmental Letters and Visits (2006)	Codifies a complaint acceptance mechanism at all levels of government and protects the complainants from retaliation.
LAND	
Land Contract Law for Rural Areas (2019, amended)	Legislative requirements covering all land contract signing.
Law on Arbitration and Dispute over Management of Contracted Rural Land (2009)	Enabling law setting up an arbitration system for disputes in land transfers.
Administration Methods on Rural Land Use Rights Transfer, Ministry of Agriculture, 2005	Land use right transfers to follow this guideline.
Arbitration Rules of Disputes over Management of Contracted Rural Land, Ministry of Agriculture and State Forestry Administration, 2010	Provides rules and procedures for resolving disputes in cases of land use right transfer.
Provincial, county and local land use plans	Plans to be consulted to ensure that proposed subprojects are not prohibited or constrained in the site locality and do not cause land use conflicts with adjoining uses.

Table 2a. Environmental Impact Assessment Requirements in the People's Republic of China for Agricultural and Ecotourism Activities.

Type of subproject	Environmental Impact Assessment Report	Environmental Impact Table	Environmental Impact Registration Form
Agricultural reclamation	N/A	Affecting an environmentally sensitive area	Others
Agricultural base project (including medicinal herb base)	N/A	Affecting an environmentally sensitive area	Others
Economic forest base project	N/A	Involving raw material forest	Others
Park development	Very large-scale and large-scale theme park	Others	City park and botanic garden
Tourism development	Construction of cable car or cableway in environmentally sensitive area; maritime entertainment, sports and landscape exploitation.	Others	N/A

Source: Directory for the Management of Different Categories of Construction Project Environmental Impact Assessment (2018). N/A = not applicable.

Table 2b. Risk Thresholds for the Different Categories of Environmental Impact Assessment in the People's Republic of China.

Project type	Environmental Impact Assessment Report (approximately equivalent to ADB's Environment Category A)	EIA form (approximately equivalent to ADB's Environment Category B)	No EIA (approximately equivalent to ADB's Environment Category C)	Sensitive area*
	Pharmaceutical			
Biochemicals / chemicals	All activities	N/A	N/A	
Only formulate	N/A	All	N/A	
Herb processing	Has extraction process	Others	N/A	
Medi material	N/A	All	N/A	
	Textile and garment			
Fabric manufacture	Has dyeing, finishing, scouring, un-gluing, or silk reeling processes	Others	Knitting, weaving	
Garment manufacture	Has wet printing or dyeing, or washing processes	Others	New factory >1 million piece/yr	
	Husbandry			
Number of farm livestock**	>3,000 pigs; or >600 beef cattle, >500 cows; or >5,000 sheep; or >100,000 poultry; or in sensitive areas	Others	N/A	(1), (3) or eutrophicated waters under (2)
Livestock farms	>5,000 pigs or equivalent, or in sensitive areas	NA	<5,000 pigs	As above
	Agro-processing			
Slaughtering	>100,000 pigs/yr, >10000 cattle, >150,000 sheep, or >10 million poultry	Others	N/A	
Hide processing	Tanning, curing etc	Others	N/A	
Dairy	Processing >200,000t/yr (about 700 t/d)	Others	N/A	

Vegetable oil production	>300,000 t/yr press or >100,000 t/yr refinery	Others	Mix and bottling	
Other agro-production	MSG, lemon acids, starch, lysine etc	others	Mix and bottling	
Juice etc production	Extract raw juice from fruits and vegetable	Others	N/A	
Garment	dyeing, wet printing, rinsing	>1 million pieces/yr	N/A	
Grain, folder processing	>250,000 t/yr or has fermentation	Others	N/A	
Water and sanitation				
Industrial WWTP	All new or expansion of centralized industrial wastewater treatment	Others	N/A	
Sewage WWTP	All new or expansion to and above 100,000 m ³ /day	Others	N/A	
Energy sector				
Thermal power	All including CHP except gas-fired	gas-fired	N/A	
Biomass CHP	From garbage and sludge	others	N/A	
Hydro power	Installed capacity >1 Mw, pumped-storage, involve sensitive areas	others	N/A	(1),(2)
Heat only	Coal/oil-fired >65 steam t/h	others	N/A	

CHP = combined heat and power, EIA = environmental impact assessment, Mw = megawatt, N/A = not applicable, t/h = tons per hour, t/yr = tons per year, WWTP = wastewater treatment plant, yr = year.

*Sensitive areas include:

(1) natural reserve, scenic area, world natural and cultural heritage sites, drinking water protection zone;
(2) basic farmland, basic grassland, forest park, geo-park, key wetland, natural forest, natural habitats for rare and endangered wild species, natural spawning, feeding, wintering and migrating ground for key aquatic species, natural fishing ground, water scarcity area, key area to control water and soil erosion, closure area to combat desertification, closed or semi-closed sea area, eutrophication waters.
(3) area dominated by residential, office, educational, academic and health facilities or functions, designated cultural relics or protected area with special historical, cultural, scientific and ethnic significance.

** Thresholds: If the current thresholds are considered by the executing agency and ADB to be inadequate for the project categorization purposes, this will be discussed and the ESMS procedures will be modified as needed.

ESMS-APPENDIX 2. ADB LIST OF PROHIBITED INVESTMENT ACTIVITIES

The use of ADB funds is strictly prohibited for the following activities (ADB Safeguard Policy Statement, 2009).

1. Production or activities involving harmful or exploitative forms of forced labor⁴¹ or child labor.⁴²
2. Production of or trade in any product or activity deemed illegal under host country laws or regulations or international conventions and agreements or subject to international phase-outs or bans, such as (a) pharmaceuticals,⁴³ pesticides, and herbicides,⁴⁴ (b) ozone-depleting substances,⁴⁵ (c) polychlorinated biphenyls⁴⁶ and other hazardous chemicals,⁴⁷ (d) wildlife or wildlife products regulated under the Convention on International Trade in Endangered Species of Wild Fauna and Flora,⁴⁸ and (e) transboundary trade in waste or waste products.⁴⁹
3. Production of or trade in weapons and munitions, including paramilitary materials.
4. Production of or trade in alcoholic beverages, excluding beer and wine.⁵⁰
5. Production of or trade in tobacco.
6. Gambling, casinos, and equivalent enterprises.
7. Production of or trade in radioactive materials,⁵¹ including nuclear reactors and components thereof.
8. Production of, trade in, or use of unbonded asbestos fibers.⁵² NOTE: see project-specific assurance (ESMS Section VII) for use of asbestos.
9. Commercial logging operations or the purchase of logging equipment for use in primary tropical moist forests or old-growth forests.
10. Marine and coastal fishing practices, such as large-scale pelagic drift net fishing and fine mesh net fishing, harmful to vulnerable and protected species in large numbers and damaging to marine biodiversity and habitats.

⁴¹ All work or services not voluntarily performed i.e. extracted from individuals under threat of force or penalty.

⁴² Employment of children whose age is below the host country's statutory minimum age of employment, or, in contravention of International Labor Organization Convention No. 138 "Minimum Age Convention" (www.ilo.org).

⁴³ A list of pharmaceutical products subject to phaseouts or bans is available at <http://www.who.int>.

⁴⁴ A list of pesticides and herbicides subject to phaseouts or bans is available at <http://www.pic.int>.

⁴⁵ A list of the chemical compounds that react with and deplete stratospheric ozone resulting in the widely publicized ozone holes is listed in the Montreal Protocol, together with target reduction and phaseout dates. Information is available at <http://www.unep.org/ozone/montreal.shtml>.

⁴⁶ A group of highly toxic chemicals. Likely to be found in oil-filled electrical transformers, capacitors, and switchgear dating from 1950 to 1985.

⁴⁷ A list of hazardous chemicals is available at <http://www.pic.int>.

⁴⁸ A list is available at <http://www.cites.org>.

⁴⁹ As defined by the Basel Convention; see <http://www.basel.int>.

⁵⁰ Does not apply to project sponsors who are not "substantially involved" in these activities i.e. the activity concerned is ancillary to a project sponsor's primary operations.

⁵¹ Does not apply to the purchase of medical equipment, quality control (measurement) equipment, and any equipment for which ADB considers the radioactive source to be trivial and adequately shielded.

⁵² Does not apply to purchase and use of bonded asbestos cement sheeting where the asbestos content is <20%.

ESMS-APPENDIX 3. WORKBOOK FOR SCREENING AND CATEGORIZING SUBPROJECTS

This workbook comprises one summary information sheet and five technical worksheets for environmental and social screening. The summary worksheet is to be filled out by the qualified investee (the applicant). The technical worksheets are to be filled out by HTIC staff in consultation with the qualified investee.

The workbook can be printed out and carried into the field by HTIC staff, for site assessments and discussions with applicants. The workbook is retained by HTIC in their records for each equity investment application.

Each subproject is recorded in a separate workbook. Complete the details below.

SUMMARY INFORMATION SHEET

PART 1 – To be filled in by sub-borrower applying for financial support

BASIC INFORMATION		
Name of registered business or company:		
Year started / registered:		
Location / full address:		
Nature and scope of business: (Sector. Mainly sales, production, research and development, other?)		
Designed production capacity: (Per year and/or per day. If not applicable, explain here)		
Actual production capacity or scale: (Per year and/or per day. If any difference with the designed capacity, explain here)		
Main production process(es): (Provide simple flowchart to show main input of materials, water, energy (heat, steam or fuels etc), output of intermediate and final products, and wastes (gaseous, liquid or solid) etc.		
Main product(s): Briefly describe name, main usage, chemical or biochemical composition etc.		
Profile of employees	Male	
	Female	
	Total	
Other information (Provide any other information as relevant)		
PROPOSED APPLICATION		
Location of proposed activity: (Include: site name and full address; village; county; geographic coordinates of site)		
Amount of loan requested (CNY):		

Intended use of the loan: Briefly describe if it is for: new line of business or production? expansion or upgrade of existing business? Other?		
Area of production base (mu): (Write "not applicable" if the application does not involve a specific area of land)		
Designed (production) capacity: (Per year and/or per day. If not applicable, explain here)		
Technical process(es): (If applicable, provide simple flowchart to show main input of materials, water, energy (heat, steam or fuels etc), output of intermediate and final products.)		
Main product(s) of sale or research and development: (Briefly describe name, main usage, chemical or biochemical composition etc.)		
List the types of wastes the subproject will generate, as relevant: (Estimate the amounts per year or per day if possible).	Gaseous emissions	
	Wastewater	
	Solid waste	
	Hazardous waste	
	Noise	
Planned method of waste management and disposal	Gaseous emissions	
	Wastewater	
	Solid waste	
	Hazardous waste	
Number of beneficiaries:		
# farmer households involved		
#farmers involved		
# poverty households involved		
# poverty people involved		
# ethnic minority households involved		
# ethnic minority people involved		
Name of ethnic minority group		
# women involved		
Other relevant information (Provide any other information as relevant)		
Name and Signature of Loan Applicant		
Date		

PART 2 – To be filled in by the Huangshan Trust Investment Company

Existing Business and Facilities (if applicable) of the Qualified Investee (Applicant)	
Is the existing business and facilities of the applicant involved in activities / sectors which are prohibited, phased out, or discouraged by national, provincial or local policy?	
Is the existing business and facilities of the applicant involved in activities / sectors which are prohibited, phased out, or discouraged according to HTIC internal criteria?	
What environmental clearances or permits does the applicant have for the existing business and facilities (e.g. environmental impact assessments)? When were they obtained?	
Validity period and the issuing authority of Environment related clearance, approval and permits	Validity Period..... Authority.....
Activity for which a Loan is Requested	
What environmental clearance and permits are required domestically?	
Status of such clearance /permit:	<div style="display: flex; justify-content: space-around; align-items: center;"> <input type="checkbox"/> Not started yet <input type="checkbox"/> In process <input type="checkbox"/> Received </div>
If received, provide validity and issuing authority	Validity period..... Authority
What environmental documents were prepared for domestic clearance? Has HTIC received a copy?	
Other relevant information	
Name and Signature of HTIC staff	
Date	

WORKSHEET 1: Rapid Environmental Assessment Checklist

1. Answer the first question (“Will it happen?”) assuming that no mitigation measures will be conducted. The purpose is to identify potential impacts.
2. If the answer is “Yes” then fill out the next two columns, “is it irreversible?” and “can it be minimized?”
3. If the answer is “No” then place a “C” in the final column.
4. The first three columns (“will it happen?”, “is it irreversible?”, “can it be minimized?”) should be filled out by discussions with the applicant and a site inspection.
5. The final column refers to the ADB categories “A”, “B” and “C” for environmental impacts. They are defined below. Use these definitions to decide on the category.

Category A. Subproject likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. Impacts may extend beyond the subproject sites. Environmental impact assessment (EIA) including environmental management plan (EMP) is required. Examples: conversion of wetlands; subprojects in or next to protected areas; large scale pollution of water resources.

Category B. Potential adverse environmental impacts are site-specific, few if any are irreversible. In most cases mitigation measures can be designed more readily than for Category A subprojects. Initial environmental examination (IEE) including EMP is required. Examples: crop farming on land already used for the same crop type; farming which does not result in increased pressure on water resources.

Category C. Subproject likely to have minimal or no adverse environmental impacts. EIA or IEE not required. Environmental implications need to be reviewed. Examples: construction of small offices, financing, training, or planning activities.

Screening and Impact Questions	Will it happen? Y/N	If YES		ADB Category
		Is it irreversible? Y/N	Can it be minimized?	
Project Siting				
Is project in or next to (i) a cultural heritage site, (ii) a protected area, (iii) wetland or (iv) special area for protecting biodiversity? If “nearby” any of these sites, state the distance (km) to the site boundary				
Is siting of the project likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?				
Potential Environmental Impacts				
Will the project cause...				
• damage to historical/cultural areas or physical cultural resources?				
• disturbance to precious ecology (e.g. sensitive or protected areas)?				
• alteration of surface water hydrology of waterways resulting in increased sediment in streams affected by increased soil erosion at construction site?				
• deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?				
• increased air pollution due to project construction and operation?				

Screening and Impact Questions	Will it happen? Y/N	If YES		ADB Category
		Is it irreversible? Y/N	Can it be minimized?	
• noise and vibration due to project construction or operation?				
• generation of solid waste and/or hazardous waste?				
• use of chemicals?				
• generation of wastewater during construction or operation?				
In land leveling and other earthworks as necessary will there be:				
• construction dust and erosion				
• loss of micro-habitat for local biodiversity				
• changes to local drainage				
In the upgrade or establish irrigation system, including wells, canals, pipes. Installation of quota irrigation systems will there be:				
• Unsustainable use of local water resources				
• Water use conflicts				
• Cumulative impacts on limited water resource				
For construction of livestock pens and other livestock structures will there be problems with:				
• location (too close to residences / waterways)				
• construction impacts - dust, noise				
• operational impacts – noise, odor				
In electricity use for machinery, greenhouses, pumps, ventilation will there be:				
• GHG emissions from electricity use				
• GHG emissions and flue gas emissions from on-site electricity generator				
In the establishment of on-site wells for process water and drinking water will there be:				
• unsustainable use of local water resources				
• water use conflicts				
• cumulative impacts on limited water resource				
For handling, transport, and storage of materials and inputs of seeds, seedlings, fertilizers and chemicals will there be:				
• application of chemicals and fertilizer not carefully managed - increased volumes enter soil and water				
• noise, dust, pollution from haulage, handling and storage of materials				
• extensive residue of plastic mulch material in soil and water				
• loss of crop diversity and self-sustaining household plots				
In the collection, treatment, disposal / reuse processes built as part of the facilities will there be:				
• pollution of land and rivers from wastewater disposal or via land application as liquid fertilizer				

Overall conclusion on Environment Category (circle one):

A B C

Reason for conclusion:

Notes

WORKSHEETS 2 – 4: Land Acquisition, Involuntary Resettlement, Land Use Rights, Ethnic Minorities

Does the subproject involve physical changes to the land or changes to land user rights (land adjustment within the group or formal land use rights transfer to a third party?) If no, skip to Worksheets 4 and 5. If yes, proceed to Worksheets 2, 3, and 4.

Yes ☐ No ☒

What is the current status of land ownership and land use rights of the land to be used?

- 1) **Ownership:** state-owned farm ☐; collective land ☐
 2) **User rights:** enterprise ☐; cooperative ☐; village/group ☐; or household ☐

WORKSHEET 2: Land Acquisition and Involuntary Resettlement Checklist

INVOLUNTARY RESETTLEMENT ISSUES FROM PAST ACQUISITION OR EXISTING FACILITIES

Involuntary Issues	Yes*	If Yes, give information	No
Are there any involuntary resettlement issues from past land acquisition?			
Are there any involuntary resettlement issues from existing facilities?			

*If “yes”, the subproject should be excluded e.g. in case there are outstanding land acquisition and/or resettlement issues that would present legacy issues or risks to the project.

NEW LAND ACQUISITION UNDER EQUITY INVESTMENT

Probable Involuntary Resettlement Effects	Yes	If Yes, give number of affected persons and households	No
Will there be land acquisition for this subproject?*			
Will there be loss of land use rights due to change in land use resulting from the subproject (e.g., expanded village road)?			
Will there be residential house demolition causing loss of shelter to people due to land acquisition or construction activities?			
Will there be any temporary occupation of land that affects the land, housing, assets or livelihoods/business of people?			
Will there be losses of crops, trees, graves and fixed assets?			
Will people lose access to natural resources, communal facilities and services?			
If land use is changed, will it have an adverse impact on social and economic activities?			
Will access to land and resources owned communally or by the state be restricted?			

* Check if there will be land acquisition per local development planning (especially urban development planning).

Overall conclusion on Involuntary Resettlement Category (circle one):

A B C

Note: for a subproject to be approved for HTIC equity investment, it should be category C and any due diligence for prior land acquisition should confirm there are no remaining issues.

Reason for conclusion:

Notes:

WORKSHEET 3: Land Use Rights Transfer Impact Checklist

Will subproject require land use rights transfer or is there a pre-existing land use rights transfer agreement? (Y/N) If yes, complete form. If no, leave form blank.

Types of activity*	Cooperatives involved	Enterprises involved	Production bases involved	HHs involved	Farmland area (mu)
Total					

*Cropping, animal processing etc. HH=household.

Land use rights transfer (LURT) agreement

New LURT agreement	Yes	No	If no, explain
Has the agreement been prepared in accordance with the LURT Framework in ESMS-Appendix 5?			
Has third party due diligence been conducted? If yes, give results in the "Notes" section.			
Has the agreement been endorsed by the Township Agriculture Station or higher authority?			
Has the agreement been signed by all affected households?			
Has the agreement been signed by at least 70% of spouses?			

Pre-existing LURT agreement	Yes	No	If no, explain
Was the agreement prepared in accordance with the LURT Framework in ESMS-Appendix 5?			
Has third party due diligence been conducted? If yes, give results in the "Notes" section.			
Was the agreement endorsed by the Township Agriculture Station or higher authority?			
Has the agreement been signed by all affected households?			
Has the agreement been signed by at least 70% of spouses?			
Are there any outstanding issues? If yes, give details in the "Notes" section.			

Overall conclusion on LURT Agreement

- Agreement is in place and acceptable (in accordance with LURT Framework) ☐
- Agreement requires further due diligence ☐
- Agreement requires resolution of outstanding issues ☐
- Agreement is not acceptable (not in accordance with LURT Framework) ☐

Reason for conclusion:

Notes:

WORKSHEET 4: Ethnic Minorities Impact Checklist

Will subproject involve any ethnic minority communities? (Y/N) If yes, complete form. If no, leave blank.

Name of ethnic minority:

Include consideration of: (i) magnitude of impact (including customary rights for use and access to land and/or resources, socioeconomic status, cultural and communal integrity, health, education, livelihoods, social security, indigenous knowledge); (ii) the vulnerability of the affected community.

ETHNIC MINORITY ISSUES FROM PAST ACTIVITY OR EXISTING FACILITIES

Involuntary Issues	Yes*	If Yes, give information	No
Are there any ethnic minority issues from past activity?			
Are there any ethnic minority issues from existing facilities?			

*If "yes", the subproject should be excluded e.g. in case there are outstanding ethnic minority community-related issues that would present legacy issues or risks to the project.

NEW IMPACTS TO ETHNIC MINORITY COMMUNITY UNDER EQUITY INVESTMENT

Potential Impacts to Ethnic Minorities (EM)	Yes/No	If Yes, give information about affected EM community
Will the subproject directly or indirectly benefit or target EM community?		
Will the subproject affect the livelihood systems of EM community? (e.g., food production, natural resource management, crafts, trade, employment)		
Is there commercial development of the cultural resources and knowledge of the EM?		
Is there commercial development of natural resources (e.g. forests, river, lake) in customary lands under use, that would impact the livelihoods or cultural, ceremonial, and/or spiritual uses by the EMs?		
Will the subproject involve a pre-existing or new land use rights transfer agreement that are owned by EM communities?		

Proposed activities	No. of villages	No. of EM communities	EM population	Beneficial and/or Adverse Impacts
1.				
2.				
3.				
4.				
5.				

Overall conclusion on Indigenous Peoples Category (circle one):

A B C

Note: The overall project has been categorized C based on due diligence during the project preparation. Category A and B subprojects are not expected. Only Category C subprojects are expected.

Reason for conclusion:

Notes:

WORKSHEET 5: Green Agriculture and Ecotourism Design and Best Practice

This worksheet is to improve the technical design and operation of the subprojects. HTIC will encourage and favor loans which contribute to non-point source pollution control and reduction, organic farming shifting, green economy development and climate change adaption uplift, including reduced use and proper disposal of agricultural chemicals, improved efficiency of water and/or energy use, soil conservation practices and principles, accurate pest control and fertilizing methods, recycling natural resources, creation of economic opportunities through low-impact tourism, conservation of biological diversity and cultural diversity, promotion of sustainable use and preservation of ecosystem.

Use the worksheet to identify which features below are most suitable for the subprojects. Instruct the applicant to work with the HTIC Environmental Officer to include these as relevant in the project design.

Type and content	Sustainable key features
Ecological agriculture: organic farming, e.g. tea, rice.	
Land preparation and leveling	Soil conservation principles including: (1) shallow ploughing and ripping; (2) fallow or green manure inter-cropping; (3) terrace-forming on slopes; (4) check dams on drainage swales; (5) gully head protection
Irrigation facilities: wells, canals, irrigation pipes, water use quota system and monitoring	Water saving technologies including: (1) pipe irrigation system rather than open canal; (2) drip or sprinkler irrigation systems; (3) irrigation system maintenance Irrigation schedule based on crop need; (4) irrigation sustainability demonstrated by seasonal water balances
Production materials	Including: (1) certified seed and seedlings sourced; (2) certified inorganic fertilizer; (3) organic fertilizer; (4) certified pesticides; (5) low-toxicity herbicides
Production practices: soil preparation, sowing, crop nutrition, pest management, harvesting	Including: (1) organic manures; (2) organic mulches; (3) minimum tillage; (4) chemical waste disposal plan
Technical support	The following technical support must be accessible: (1) crop-specific land preparation; (2) cultivation standard; (3) fertilization; (4) irrigation; (5) pest and disease control; (6) management techniques.
Ecological tourism: tourism infrastructure; natural resource conservation; biological and cultural diversity conservation	
Construction: embankments, building, pavements, etc.	Including: (1) ecological embankment, e.g. stone gabion; (2) low impact development practices, e.g. porous pavement, green roof, rain garden, bio-swale, vegetated filter strip
Energy supply	Including: (1) clean energy preferred, e.g. solar and hydro energy; (2) low energy consumption practices; (3) energy recycling plan
Materials	Including: (1) environment friendly construction materials; (2) environment friendly decoration materials; (3) degradable disposable materials
Guideline and education	Including: (1) mitigation of negative environmental impacts; (2) improving awareness of tourists to protect the environment; (3) promotion of small scale, slow growth and local control in tourism
Nature conservation	Including: (1) water and other natural resource management; (2) biodiversity conservation; (3) environmental impact mitigation; (4) ecosystem restoration after construction
Technical support	The following technical support must be accessible: (1) engineering best practice; (2) energy recycling; (3) natural resource management; (4) ecosystem preservation; (5) low-impact development strategy; (6) environmental risk mitigation plan.

ESMS-APPENDIX 4. OUTLINE OF AN INITIAL ENVIRONMENTAL EXAMINATION REPORT

Under the ADB Safeguard Policy (SPS, 2009), an initial environmental examination report is required for all Projects classified as “Environment Category B”. This appendix provides the outline for an initial environmental examination report. No “Category A” Projects will be supported by the loan.

A. Executive Summary

This section describes concisely the critical facts, significant findings, and recommended actions.

B. Policy, Legal, and Administrative Arrangement

This section discusses the national and local legal and institutional arrangement within which the environmental assessment is carried out. It also identifies Project-relevant international environmental agreements to which the country is a party.

C. Description of the project

This section describes the proposed Project; its major components; and its geographic, ecological, social, and temporal context, including any associated facility required by and for the project (for example, access roads, power plants, water supply, quarries and borrow pits, and spoil disposal). It normally includes drawings and maps showing the project's layout and components, the project site, and the project's area of influence.

D. Description of the Environment (Baseline Data)

This section describes relevant physical, biological, and socioeconomic conditions within the study area. It also looks at current and proposed development activities within the project's area of influence, including those not directly connected to the project. It indicates the accuracy, reliability, and sources of the data.

E. Anticipated Environmental Impacts and Mitigation Measures

This section predicts and assesses the project's likely positive and negative direct and indirect impacts to physical, biological, socioeconomic (including occupational health and safety, community health and safety, vulnerable groups and gender issues, and impacts on livelihoods through environmental media, and physical cultural resources in the project's area of influence, in quantitative terms to the extent possible; identifies mitigation measures and any residual negative impacts that cannot be mitigated; explores opportunities for enhancement; identifies and estimates the extent and quality of available data, key data gaps, and uncertainties associated with predictions and specifies topics that do not require further attention; and examines global, transboundary, and cumulative impacts as appropriate.

F. Analysis of Alternatives

This section examines alternatives to the proposed Project site, technology, design, and operation—including the no Project alternative—in terms of their potential environmental impacts; the feasibility of mitigating these impacts; their capital and recurrent costs; their suitability under local conditions; and their institutional, training, and monitoring requirements. It also states the basis for selecting the particular Project design proposed and, justifies recommended emission levels and approaches to pollution prevention and abatement.

G. Environmental Management Plan

This section deals with the set of mitigation and management measures to be taken during Project implementation to avoid, reduce, mitigate, or compensate for adverse environmental impacts (in that order of priority).

H. Conclusion and Recommendation

This section provides the conclusions drawn from the assessment and provides recommendations.

ESMS-APPENDIX 5. ENVIRONMENTAL SITE INSPECTION CHECKLIST

Note: This form is designed for use by the Huangshan Trust Investment Company environmental officer and financial officers during site inspections, and may not be exhaustive. Modifications and additions may be necessary to suit individual subproject activities and to address any specific environmental issues.

Location: _____
 Inspection Date: _____
 Inspection Time: _____
 Inspection by: _____

Inspection Item	Yes	No	N/A	Remarks (i.e. problem observed, possible cause of problem, and/or proposed corrective/ preventative actions)
1. Has contractor appointed a construction supervisor and is the supervisor on-site?				
2. Is information pertaining to construction disclosed at construction site (construction period, contractor information, etc.)?				
3. Are chemicals/hazardous products and waste stored on impermeable surfaces in secure, covered areas?				
4. Is there evidence of oil spillage?				
5. Are chemicals stored and labeled properly?				
6. Is construction equipment well maintained? (any black smoke observed)				
7. Is there evidence of excessive dust generation?				
8. Are there enclosures around the main dust-generating activities?				
9. Does contractor regularly consult with residents to identify concerns?				
10. Is there evidence of excessive noise? If yes, describe location and equipment.				
11. Any noise mitigation measures adopted (e.g. use noise barrier / enclosure)?				
12. Is construction wastewater and domestic wastewater discharged to sewer systems (if possible), or are on-site treatment facilities (e.g. septic tank, portable latrine) provided?				
13. Is there any wastewater discharged to soil or surface water?				
14. Is the site kept clean and tidy? (e.g. litter free, good housekeeping)				
15. Are separated labeled containers/ areas provided for facilitating recycling and waste segregation?				
16. Are construction wastes / recyclable wastes and general refuse removed off site regularly?				
17. Have hazardous wastes been identified (such as asbestos, PCBs)?				

Inspection Item	Yes	No	N/A	Remarks (i.e. problem observed, possible cause of problem, and/or proposed corrective/ preventative actions)
18. Is safe supply of clean water and an adequate number of latrines provided for workers?				
19. Is personal protection equipment (PPE) provided for workers?				
20. Are clear information and warning signs placed at construction sites?				
21. Are construction sites secure, to discourage access?				
22. Are fire extinguishers / fighting facilities properly maintained and not expired? Escape not blocked / obstructed?				
23. Is there any evidence of damage to vegetation, habitats, Khuvsgul Lake, or streams?				
24. Are disturbed areas properly re-vegetated after completion of works?				
25. Any other problems identified or observations made?				

N/A = not applicable.

Date, Name, and Signature

ESMS-APPENDIX 6. TERMS OF REFERENCE FOR ESMS POSITIONS

I. BACKGROUND

The Huangshan Municipal Government will apply a \$100 million loan from the Asian Development Bank (ADB) to implement the Anhui Huangshan Xin'an River Ecological Protection and Green Development Project (the project). Project implementation will be coordinated by the Huangshan Municipal project management office (PMO). Of the loan, \$8 million will be on-lent to the Huangshan Trust Investment Company (HTIC) to help establish a Green Investment Fund. HTIC will on-lend the funds directly to qualified investees (small and medium-sized enterprises in green farming and ecotourism). All subprojects supported under the Green Investment Fund will be used for "green" development, including tea gardens, organic rice, bamboo forestry, orchards, and ecotourism. An Environmental and Social Management System (ESMS) has been developed to regulate safeguards for the Green Investment Fund and will be established by HTIC within its business procedures. The ESMS is the key guiding document to assess and manage the potential environmental and social impacts of subprojects. This is the first ESMS to be conducted by the HTIC. HTIC will recruit one environmental officer and one social officer to guide and oversee ESMS establishment and implementation. These terms of reference describe the requirements for these two positions.

II. SCOPE AND DURATION OF WORK

The HTIC Environment Officer and Social Officer will work with the HTIC finance officers, PMO Environment Office and Social Officer, and other relevant personal, to establish and implement the ESMS. Duration: entire project (6 years).

III. QUALIFICATIONS

The HTIC Environment Office and Social Officer will have: (i) an undergraduate degree or higher in a relevant field (i.e. environmental and social sciences or related topics, respectively); (ii) ability to compile and prepare progress reports, including critical review and checking of reports and data from county branches; (iii) at least some familiarity with environmental, social, agricultural, and/or natural resource management; (iv) preferably, proficiency in spoken and written English. The HTIC finance officers implementing the ESMS will have demonstrated ability to: (i) communicate and work effectively with local communities, contractors, and government agencies; (ii) analyze data and prepare technical reports; at least some familiarity with environmental, social, agricultural, and/or natural resource management (iii) willingness and health to regularly visit the subproject sites.

IV. DETAILED TASKS

HTIC Environmental and Social Officers and HTIC finance officers:

1. Develop a high level of familiarity with the ESMS and range of supporting documents to be produced (environmental and social checklists, categorization forms, the different types of PRC environmental assessment reports, land use rights transfer framework, social and gender action plan, etc).
2. Implement the ESMS, from daily implementation with qualified investees to reporting to HTIC.

HTIC Environment Office and Social Officer:

3. Ensure quality assurance and control for establishment and implementation of the ESMS, for the environmental and social components of the ESMS respectively.
4. Lead the integration of the ESMS in the HTIC business procedures.
5. Report on ESMS progress to HTIC senior management.

6. Represent the HTIC regarding the ESMS, in discussions with the PMO and other relevant agencies.
7. Support the PMO to implement the safeguard-related training for HTIC staff.
8. Incorporate the ESMS progress into the semi-annual reports to be submitted to PMO.

HTIC finance officers:

9. Implement Steps A–F of the ESMS for each equity investment application under the Green Investment Fund, working with applicants, the PMO and other agencies as relevant.
10. For subprojects categorized as environment Category B, ensure that applicant prepares an initial environmental examination (see Appendix 4).
11. Instruct and guide qualified investees on their requirements under the ESMS. Including: (i) coordination with qualified investees and/or other relevant agencies to re-design (or relocate) subprojects to comply with the ESMS; (ii) assist in the training of qualified investees to facilitate implementation of the ESMS.
12. During the implementation phase of subprojects, liaise with qualified investees to ensure all safeguard related conditions of the equity investments (as stated in the Safeguard Commitment Letter attached to the equity investment) are being met.
13. Support the PMO to implement the project grievance redress mechanism (GRM) at the local level, and help ensure that potentially affected communities know about the GRM before the subproject commences.
14. Support the PMO to implement the safeguard-related training for HTIC staff.

V. REPORTING REQUIREMENTS

From HTIC to the PMO: semi-annual ESMS reports, using a template provided by ADB or a domestic format reviewed and approved by ADB.

ESMS-APPENDIX 7. LAND USE RIGHTS TRANSFER FRAMEWORK

1. Main Principles

This Land Use Rights Transfer Framework (LURTF) is to help the Huangshan Trust Investment Company (HTIC; the project financial intermediary responsible for implementation of the Green Investment Fund) and qualified investees mitigate, monitor and report, potential negative impacts caused by land use rights transfer, and to satisfy the requirements of ADB's SPS (2009). The LTF guiding principles are:

- (i) Equality, voluntary, legal procedure, and, fair compensation. Equality means both of parties have equal legal status. Voluntary means the transfer of land contracting management right must be completely voluntary for both parties, and one party shall not force another party to transfer or accept transfer of land. Legal procedure means that land use rights transfer must be concluded per legal procedure with legal agreement. Fair compensation means the transferred land shall be compensated at negotiated market price.
- (ii) Unchanged ownership and agricultural use of transferred land. Land use rights transfer means transferring use right, not ownership, therefore ownership of transferred land shall remain unchanged. Yet future users of transferred land shall not change the agricultural land use nature, i.e., shall not convert transferred land for non-agricultural uses.
- (iii) Priority to fellow-community members. Under the same conditions, priority shall be given to members of the collective economic organization (community) to obtain land use rights through transfer.
- (iv) Government's direction and administration. Department of agriculture of county government shall direct and administrate legal transfer of rural land
- (v) Conflict resolution through GRM. The grievance redress system of Project counties shall be used to resolute complaints and conflicts, if any.

2. Legal Framework

All subprojects must comply with the PRC Rural Land Contract Law and Rural Land Management Right Transfer Management Method, other relevant policies of Anhui Province and local governments, and ADB's SPS. These are listed in Appendix 1. Key laws and policies are as follows:

- (i) Law of the People's Republic of China on Land Contract in Rural Areas – no change of collective ownership; no change of agricultural land use (not allowed to convert farmland into construction land for establishment of permanent structures).
- (ii) Administration Methods on Rural Land Use Rights Transfer, Ministry of Agriculture of PRC, relevant regulations of Anhui Province and Project district/county governments:
 - Land use rights transfer duration without the land contract period;
 - Negotiated settlements between transferor and transferee;
 - Land use rights transfer per legal procedures;
 - Standard contract (with endorsement by a third party if transferor and transferee feel necessary).
 - Official registration and documentation for land use rights transfer.
 - If necessary, the township agricultural station endorses the contract.
- (iii) PRC Law on the Mediation and Arbitration of Rural Land Contract Disputes, and relevant implementation methods of Anhui provincial and Project district/county governments – mediation and arbitration of disputes per a bottom-up Grievance Redress Mechanism (GRM).
- (iv) ADB's SPS – requirements on IR does not apply to LURT. The good practice on voluntary agreements include meaningful consultations; negotiated agreements; establishment and functioning of a GRM; record-keeping; and; independent monitoring.

In addition, the best practices in the project area also have good applications for the land use rights transfer under the project, such practices include:

- Land use rights transfer period of 5-10 years, within the land contraction period (1998-2028);
- Land use rights transfer rate (or land rental rate) calculated in equivalent output value of grain

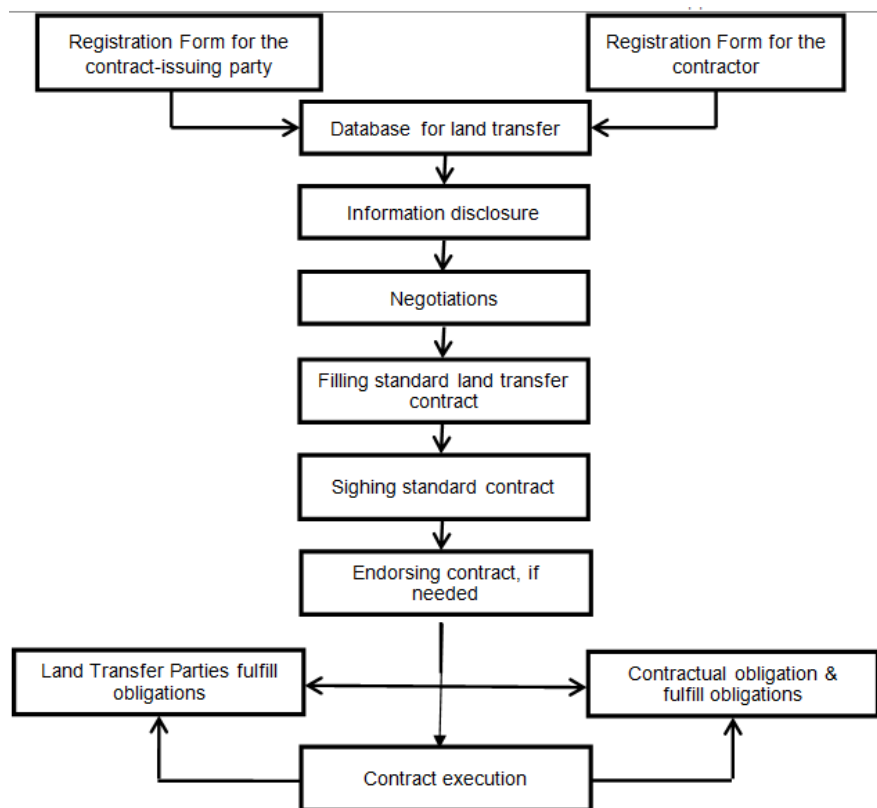
- (wheat, rice); this protects transferees from price fluctuations;
- Endorsement of land use rights transfer contract by the township agriculture station.

3. Legal Procedures of Land use rights transfer

Legal procedures are as follows (also the following chart):

- (i) Information collection. Farmers with intention to transfer land present the details of the land, like location, area, usage, and reference price to village committee, which will then report to the township agricultural station. They can also entrust the contracted or intermediary organizations to transfer their land, and the letter of attorney will be issued by land transferee, illustrating the entrusted matters, authority and deadlines, etc., with the signature of the principal.
- (ii) Information disclosure. Township agricultural station, after collecting data, will sort out information about land use rights transfer of different villages and establish a database. The sorted information will be disclosed timely by means of network, radio, newspapers, board, electronic display, and etc. The township station will also report to the county (district) agricultural bureau for updating land use rights transfer databases.
- (iii) Negotiation between transferor and transferee. With the arrangement of township agricultural station, both sides negotiate about the land use rights transfer conditions and price based on the principle of equality, voluntariness and mutual benefiting.
- (iv) Signing land use rights transfer contract. When both parties agree on conditions and price, township agricultural station provides 4-5 copies of a standard contract (the fifth copy for endorsement, if needed), for both parties to sign. Township agricultural station also endorses the contract.
- (v) Endorsing land use rights transfer contract. The township agricultural station endorses the contract.
- (vi) Registration for land use rights transfer. Township agricultural station registers the land use rights transfer information timely and exactly, and submits the relevant materials to the county agriculture bureau for documentation.
- (vii) Documentation. County agricultural bureau documents all relevant materials for land use rights transferred.

Supervising contract implementation. Both parties should perform the contract positively, and township agricultural station supervises the contract execution. In case of conflicts or disputes, the township station will timely report to the county station, and the latter will inform HTIC synchronously.



Land Use Rights Transfer Procedure Chart

4. Institutional Arrangement and Responsibility

According to relevant laws and regulations, county agricultural bureau and township agricultural stations should manage and guide rural land use rights transfer (LURT) in their administrative areas.

Responsibilities of municipal agricultural bureau:

- (i) publicity rural land use rights transfer policies;
- (ii) direct the land use rights transfer legally and orderly;
- (iii) guide disputes arbitration and resolution;
- (iv) strengthen and standardize rural LURT; and
- (v) propose solutions to problems in LURT, and develop a new mechanism for LURT.

Responsibilities of county agricultural bureau:

- (i) direct rural LURT and contracting;
- (ii) set up a service center for LURT, and establish information network platform, on line trading and/or open trading of land to be transferred;
- (iii) accept, manage and guide the application from rural LURT agencies;
- (iv) settle the disputes; and
- (v) provide consultation services for LURT policies.

Responsibilities of township agricultural station:

- (i) information collection, analysis and disclosure, LURT can be conducted by county or township;
- (ii) providing a standard contract for parties who have reached agreements on contract conditions and terms, and assisting them to sign contract signing;
- (iii) functioning as a third party to endorse the signed contract, if requested by land use rights transferor and transferee;
- (iv) formulating a system for registering the rural LURT, and record the relevant information timely and exactly;
- (v) documenting land use rights transfer materials;
- (vi) investigating and rectify illegal LURT;
- (vii) settling disputes about rural LURT;

- (viii) guide and administrate LURT legally; and
- (ix) provide consultancy services.

Responsibilities of village committee:

- (i) information collection and classification on LURT, to be reported to township agricultural station;
- (ii) assisting township in settling disputes.

Responsibilities of district/county PMO:

- (i) supervising contract execution; and
- (ii) participating in conflict/dispute resolution at county level if not resolved at township level.

5. Land Use Rights Transfer Contract

Land use rights transfer contract shall include the following clauses:

- (i) names and domiciles of two parties;
- (ii) location, borders, area and quality of the land for transferring;
- (iii) term of transfer and dates of beginning and completion;
- (iv) ways of transfer;
- (v) usage of land;
- (vi) rights and obligations of two parties;
- (vii) land use rights transfer expense and method of payment;
- (viii) handling of appurtenance and relevant facilities after expiry of contract;
- (ix) liabilities for breach of the contract;
- (x) method of conflict resolution;
- (xi) other clause that both parties thought necessary;
- (xii) stamping of endorsing agency; and
- (xiii) date of contract conclusion.

Contract used in the Project, as well as in Anhui Province, is normative, which is prepared by the Anhui Department of Agriculture and Animal Husbandry.

6. Measures to Safeguard Interests of Contract Parties

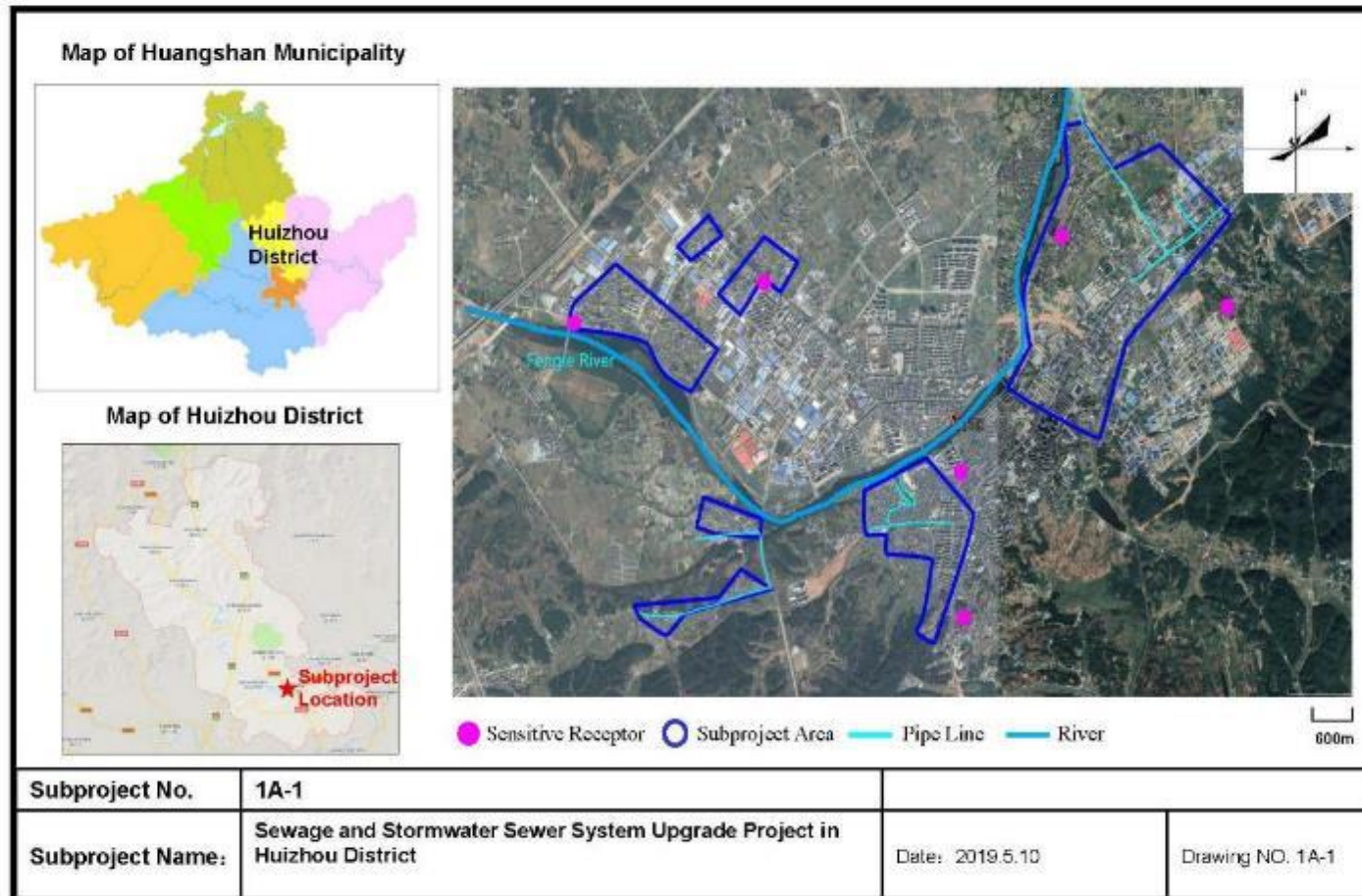
The following measures will be taken to safeguard the interests of contract parties:

- (i) In case of severe damage of transferred land due to natural disasters or force majeure during the contract term, both parties can terminate or change the contract through negotiation, and the land shall be returned to the original users for cultivation. When there are specific contract provisions on severe damage of land, the provisions prevail.
- (ii) Contract agreement regarding policy subsidies to farmers for grain production and production masteries.
- (iii) At least 70% of the land leasing contracts will be signed by both husband and wife in case of involving individual households.
- (iv) Contract endorsement by township per request of contract parties, free of charge.
- (v) According to the PRC's Rural Land Contract Law and Rural Land Management Right Transfer Management Method and other relevant LURT laws and regulations of Anhui Province and districts/counties, the LURT duration shall be negotiated equally by both parties, but within the limit of the rural land contract (duration from 1998-2028 or so).
- (vi) The LURT rate will be ensured according to land type, feasibility, grade, and condition of referential corps, or even the price of LURT in nearby villages. Taking farmer's interest into consideration, both transferor and transferee should set a time to renegotiate land price in case of LURT for over 5 years. It is recommended to adjust the rate after five years.

7. Grievance Redress Mechanism (GRM) for Social Safeguards

Where LURT contract is based on negotiations and mutual agreement, complicated disputes are unlikely to occur. However, there might be some unexpected issues during and after land being transferred. According to *Law of the People's Republic of China on the Mediation and Arbitration of Rural Land Contract Disputes*, the project has set up a transparent and efficient grievance redress procedure to settle such disputes and defaults after land use rights transfer. The GRM for social safeguards is described in Section V of the ESMS.

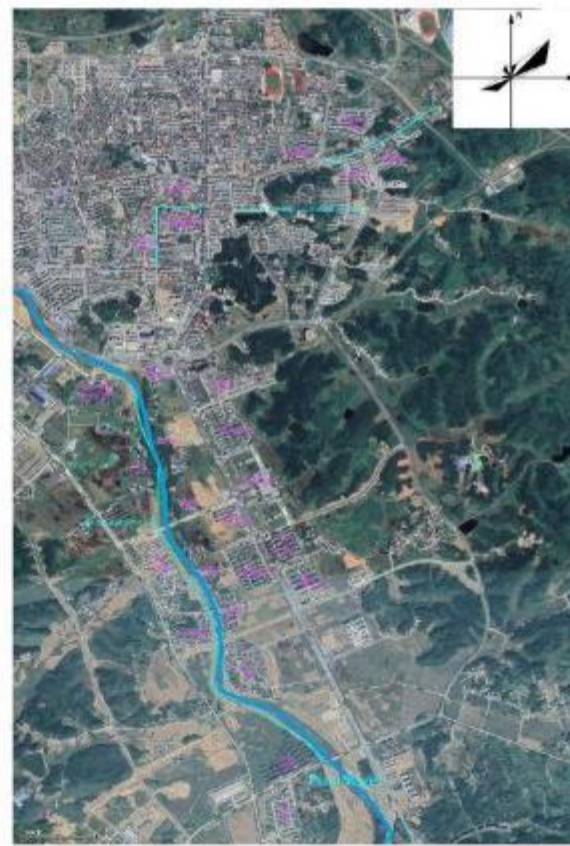
APPENDIX 3: LOCATION MAPS FOR STRUCTURAL COMPONENTS UNDER OUTPUTS 1 AND 2



Map of Huangshan Municipality



Map of Huangshan District



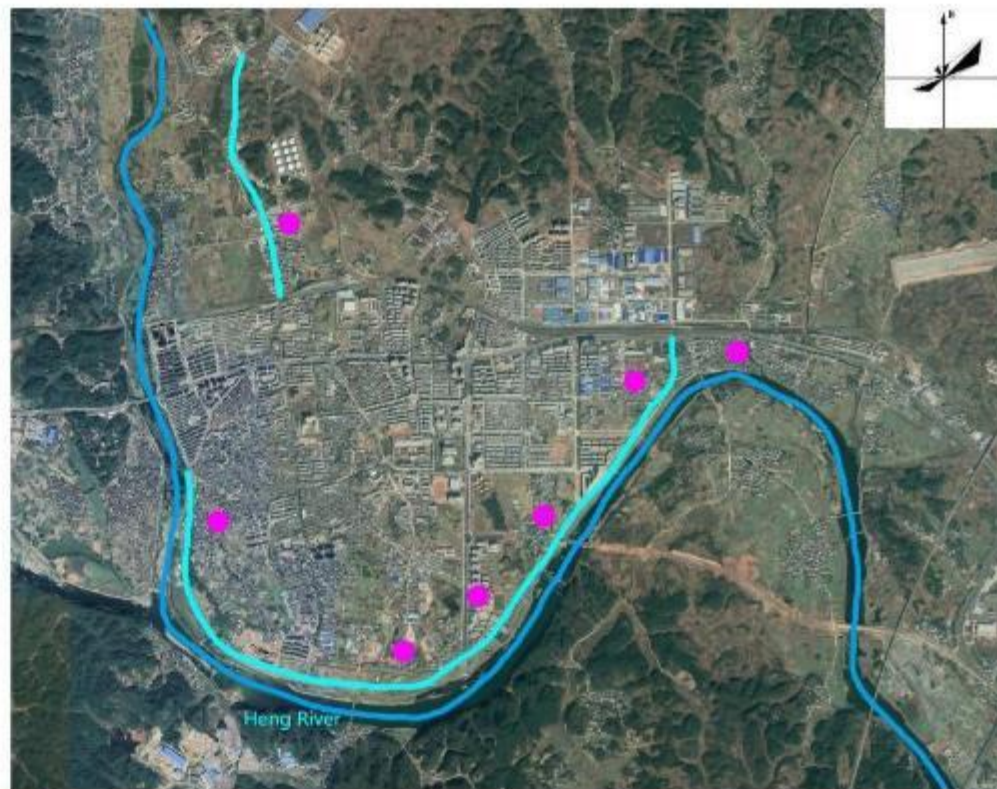
● Sensitive Receptor — Pipe Line — River 500m

Subproject No.	1A-2		
Subproject Name:	Sewage and Stormwater Sewer System Upgrade Project in Huangshan District	Date: 2019.5.10	Drawing NO. 1A-2

Map of Huangshan Municipality



Map of Xiuning County



● Sensitive Receptor — Pipe Line — River

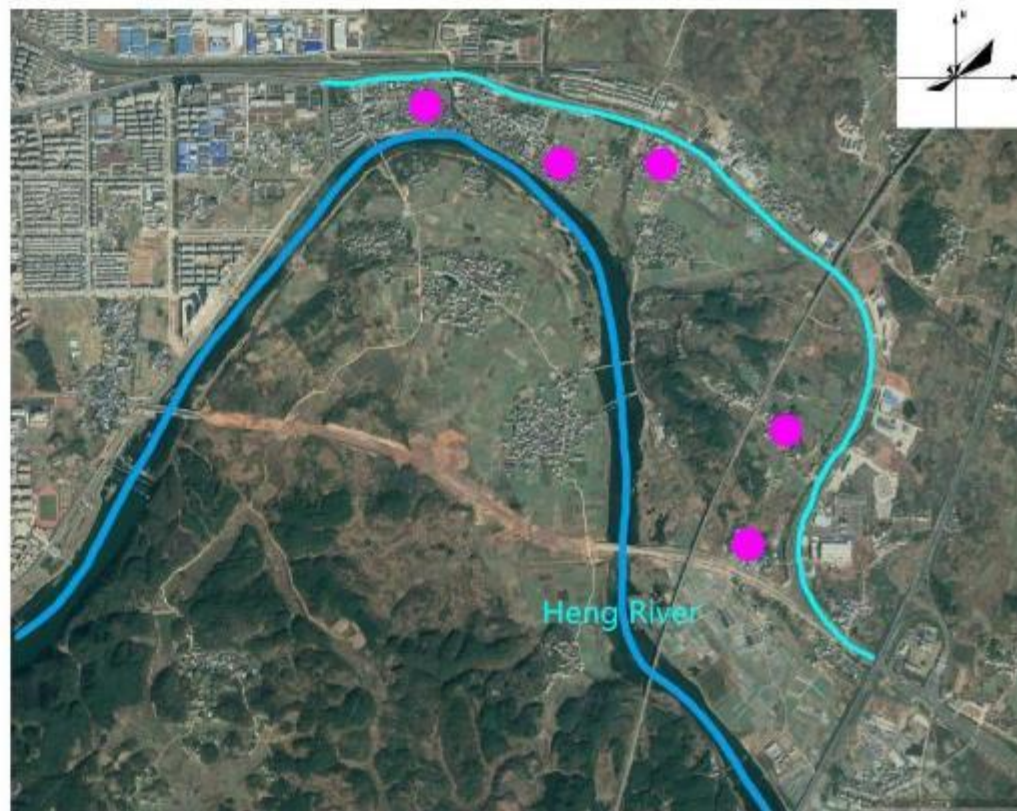
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Subproject No.	1A-3		
Subproject Name:	Sewage and Stormwater Sewer System Upgrade Project in Xiuning County	Date: 2019.5.10	Drawing NO. 1A-3-1

Map of Huangshan Municipality



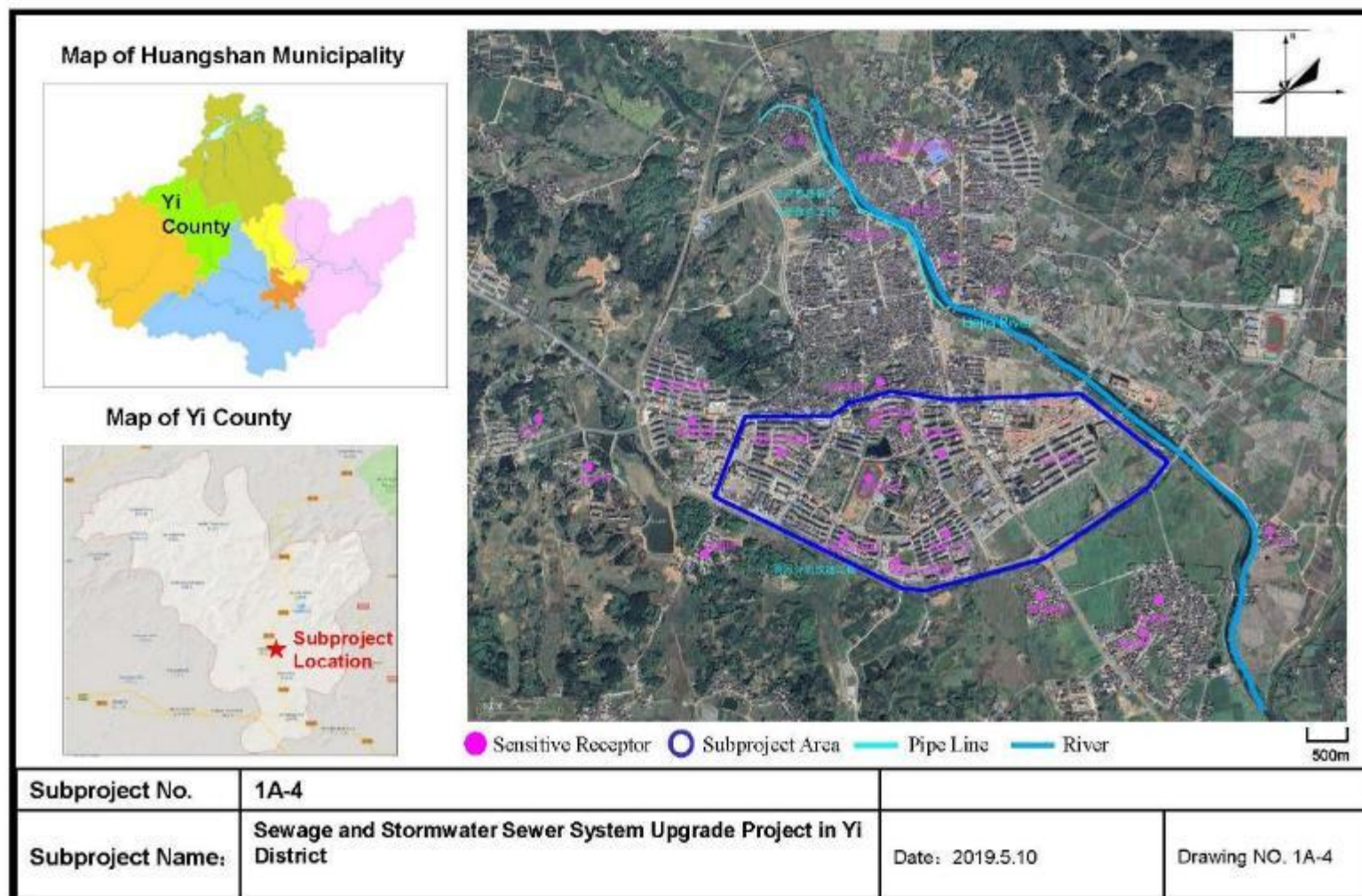
Map of Xiuning County

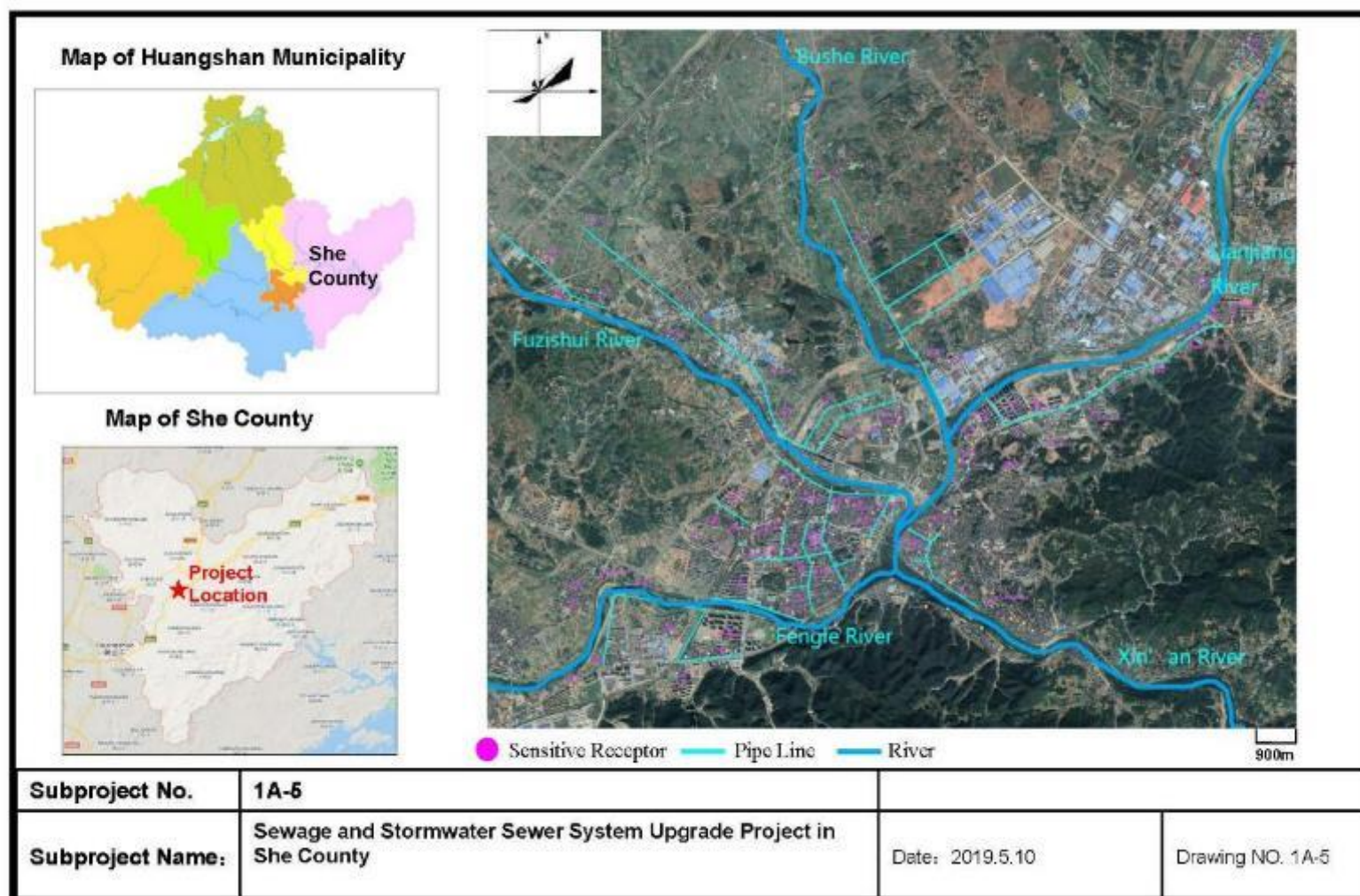


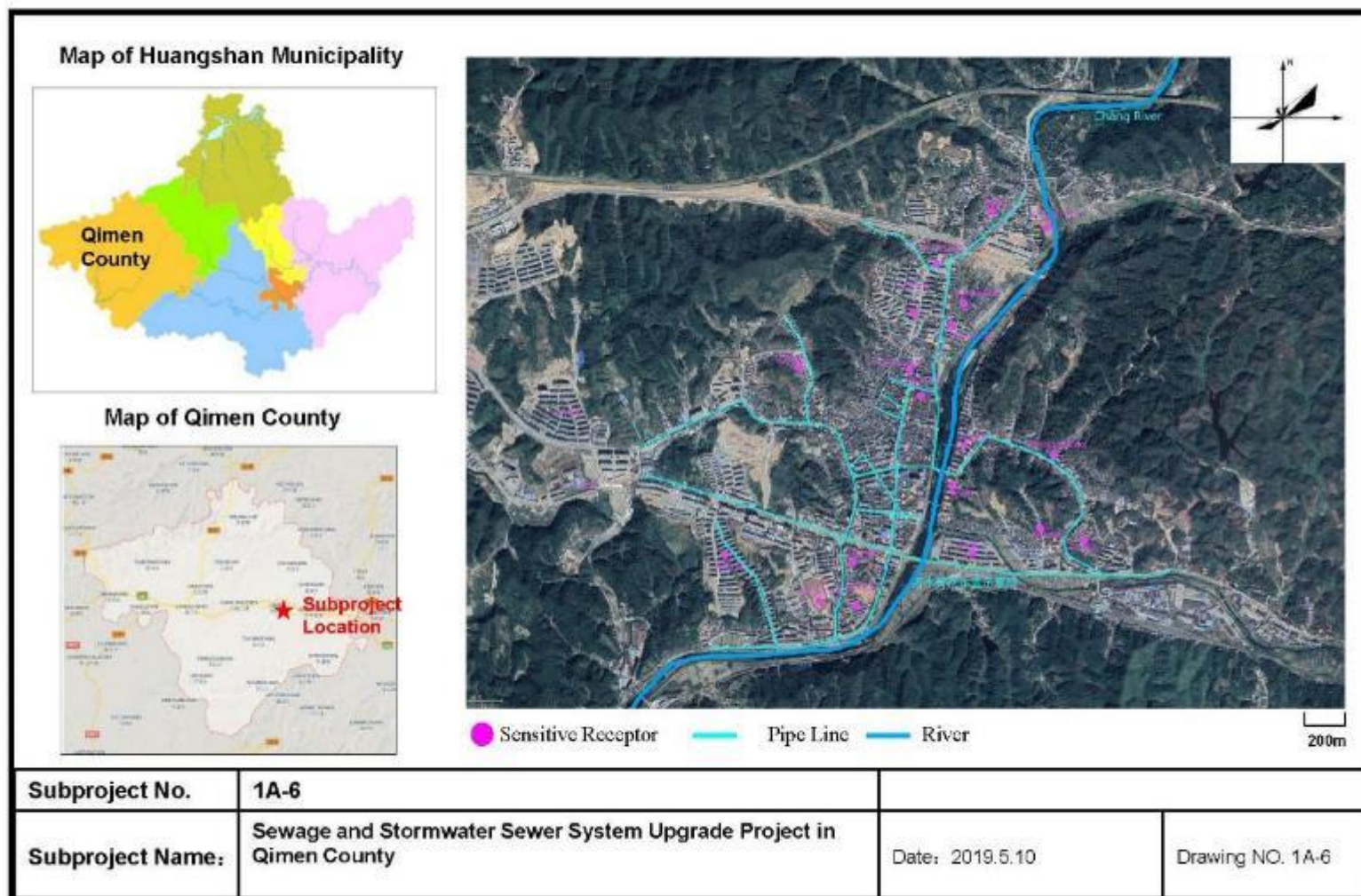
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Subproject No.	1A-3		
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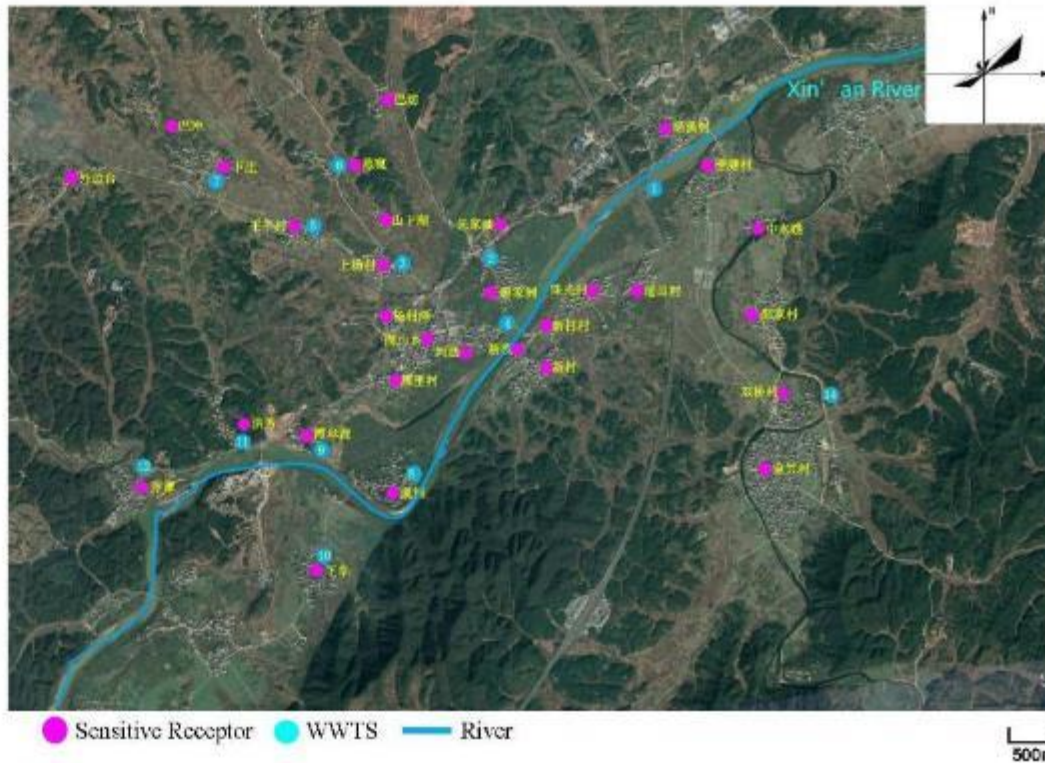




Map of Huangshan Municipality



Map of Xiuning County



Subproject No.	1B-1		
Subproject Name:	Village Environment Improvement Project in Xiuning County	Date: 2019.5.10	Drawing NO. 1B-1-1

Map of Huangshan Municipality



Map of Xiuning County



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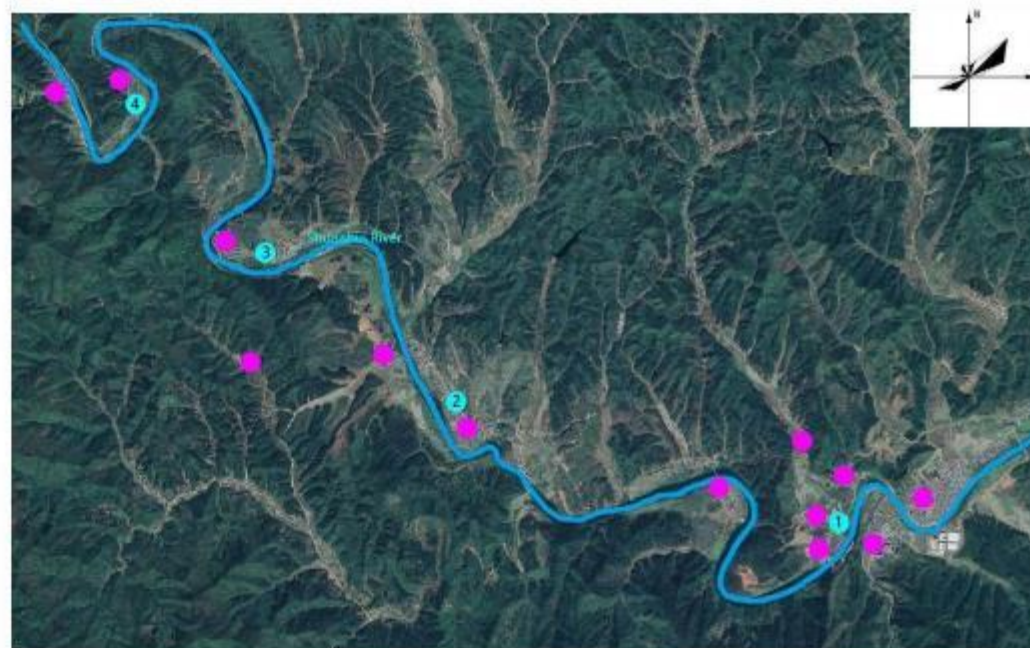
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Subproject No.	1B-1		
Subproject Name:	Village Environment Improvement Project in Xiuning County	Date: 2019.5.10	Drawing NO. 1B-1-2

Map of Huangshan Municipality



Map of Xiuning County



● Sensitive Receptor ● WWTS — River

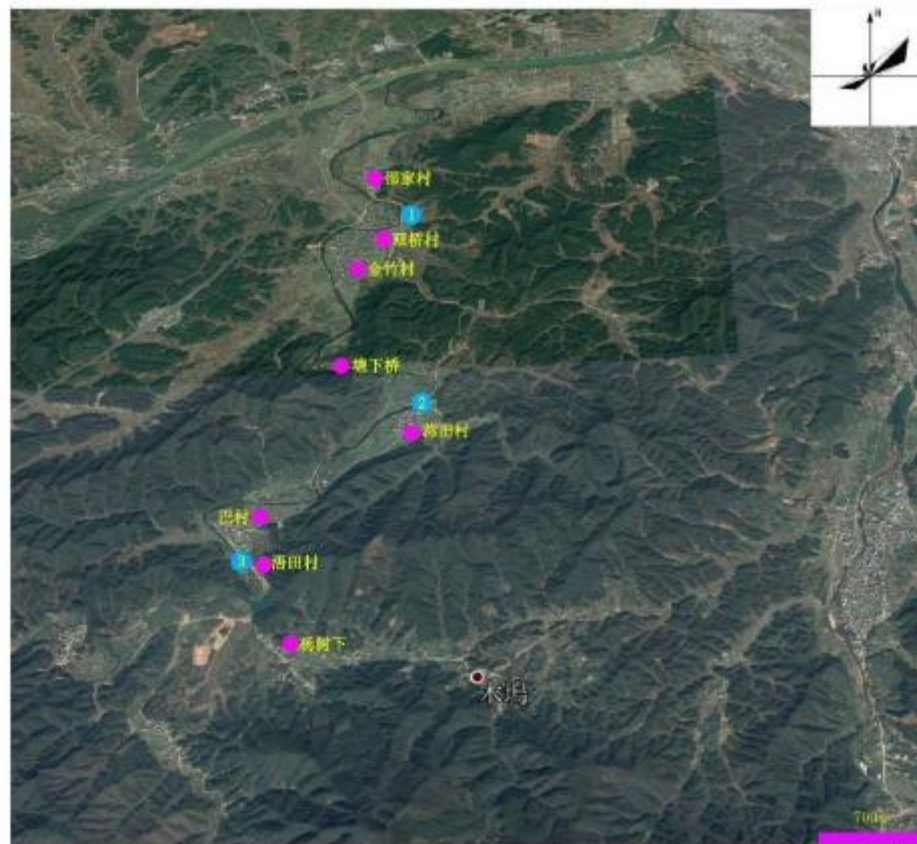
500m

Subproject No.	1B-1		
Subproject Name:	Village Environment Improvement Project in Xiuning County	Date: 2019.5.10	Drawing NO. 1B-1-3

Map of Huangshan Municipality

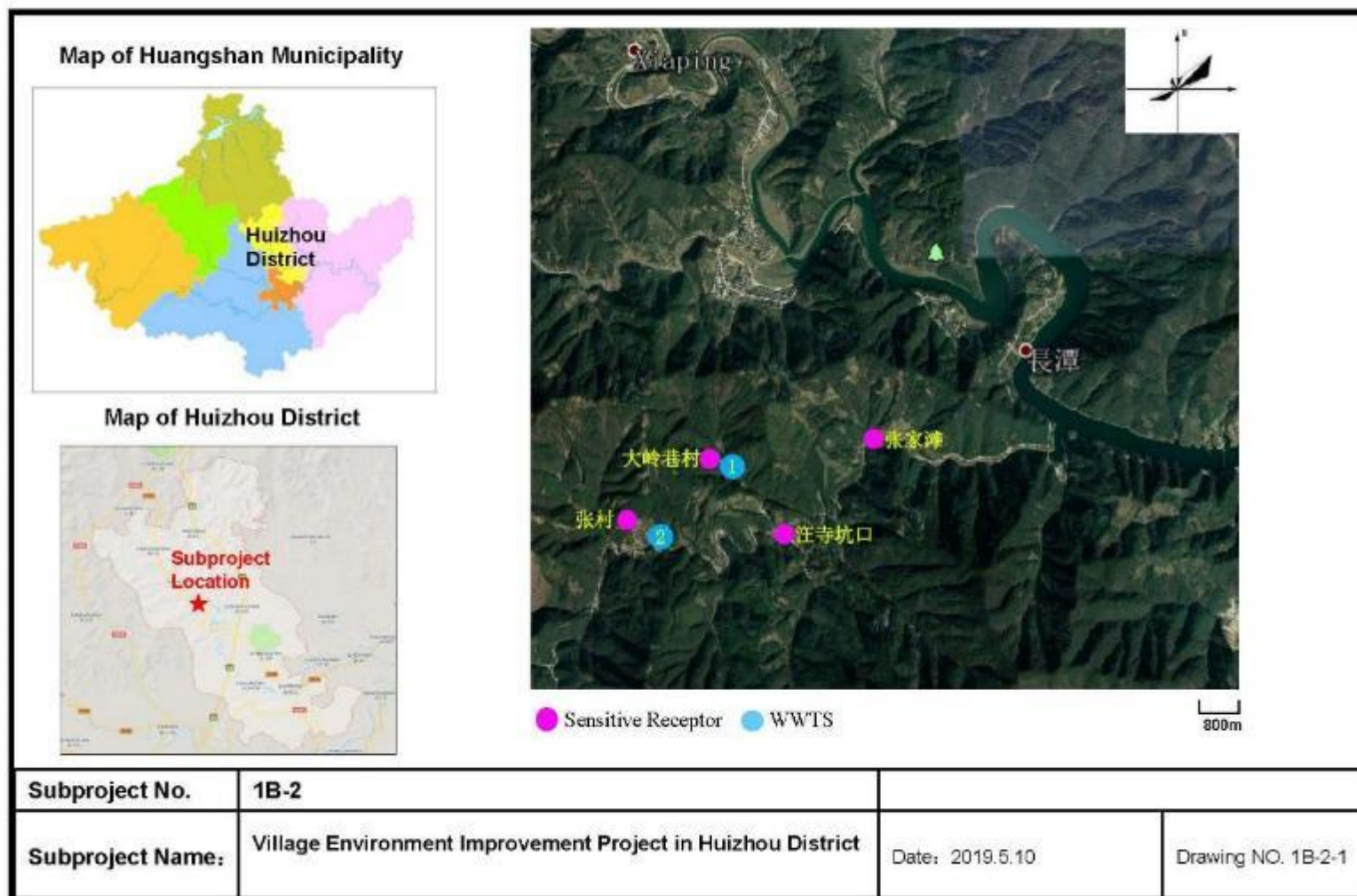


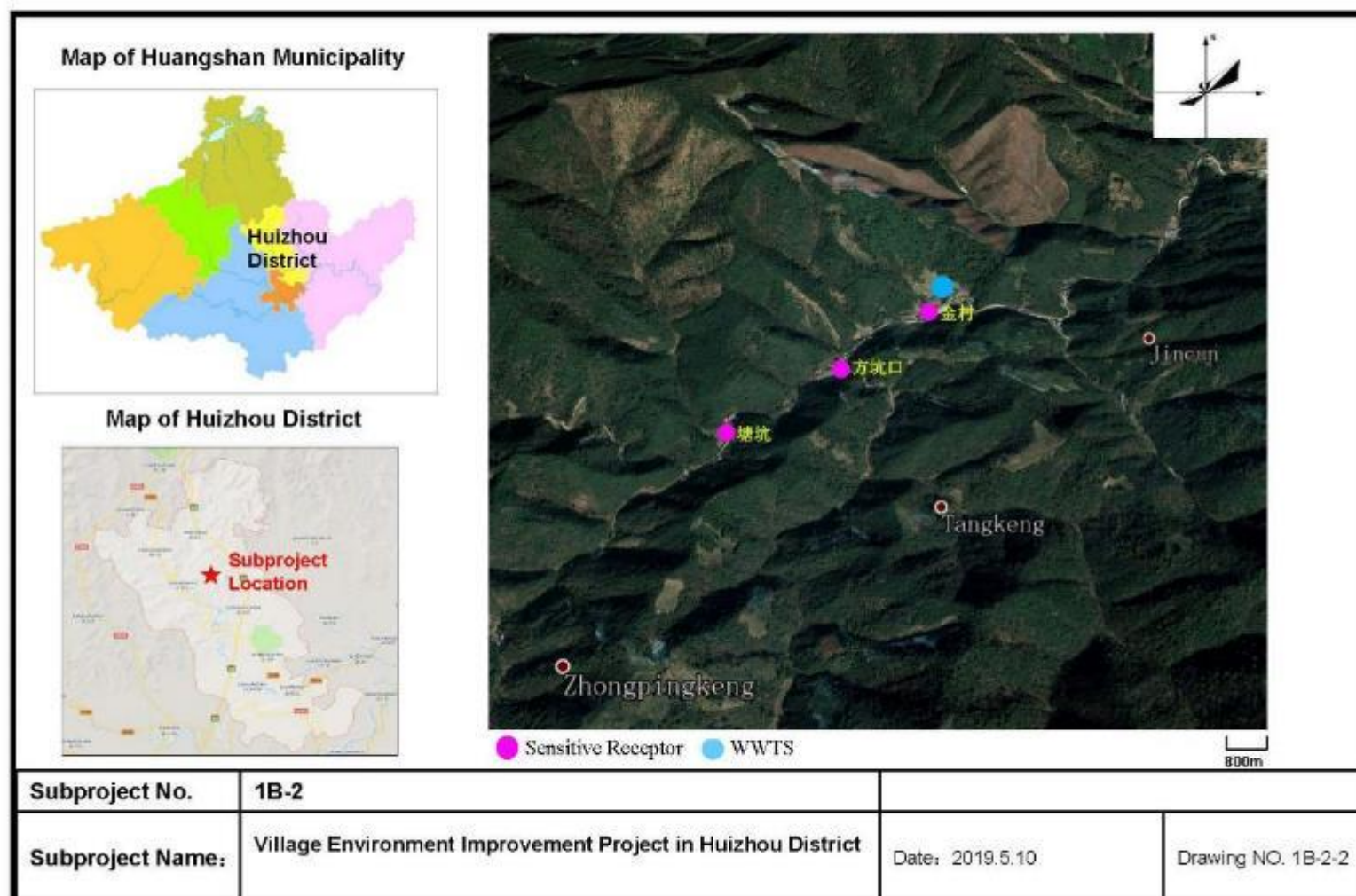
Map of Xiuning County



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Subproject No.	1B-1		
Subproject Name:	Village Environment Improvement Project in Xiuning County	Date: 2019.5.10	Drawing NO. 1B-1-4

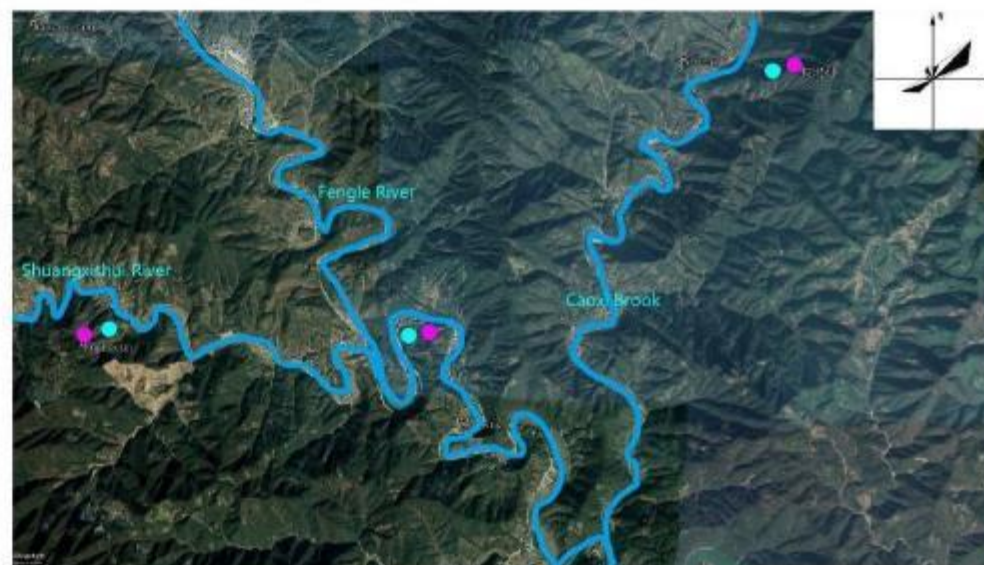




Map of Huangshan Municipality

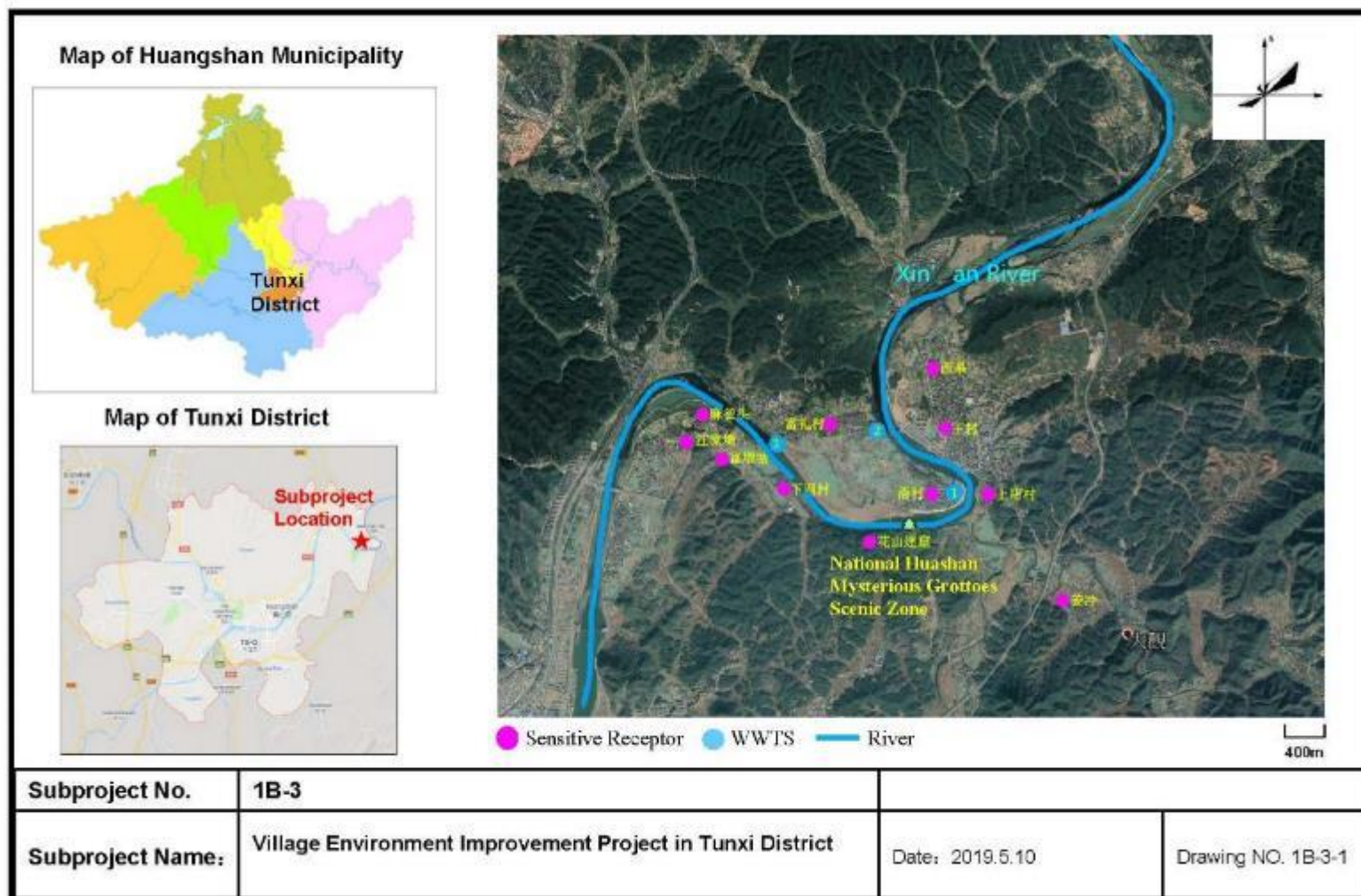


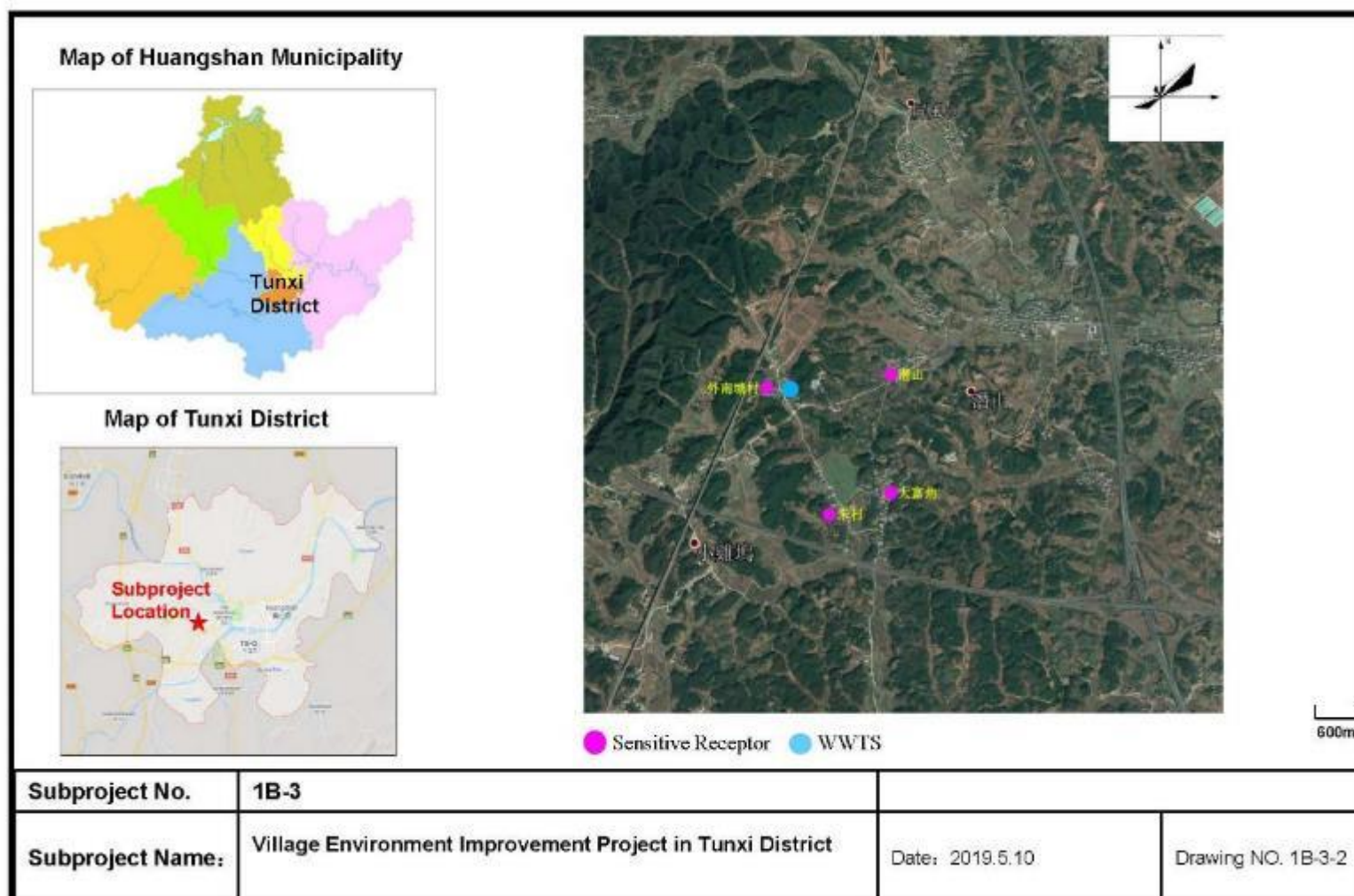
Map of Huizhou District

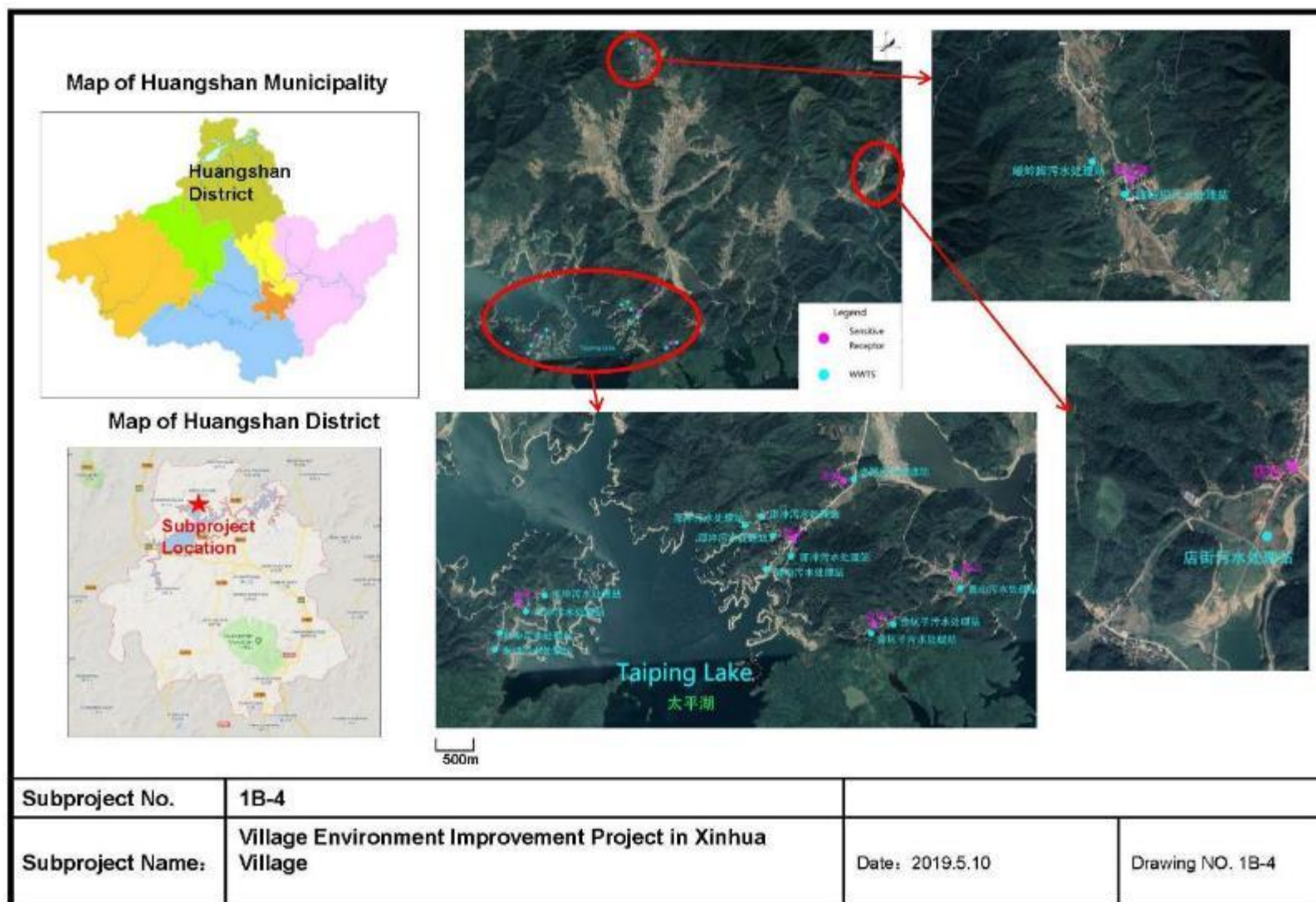


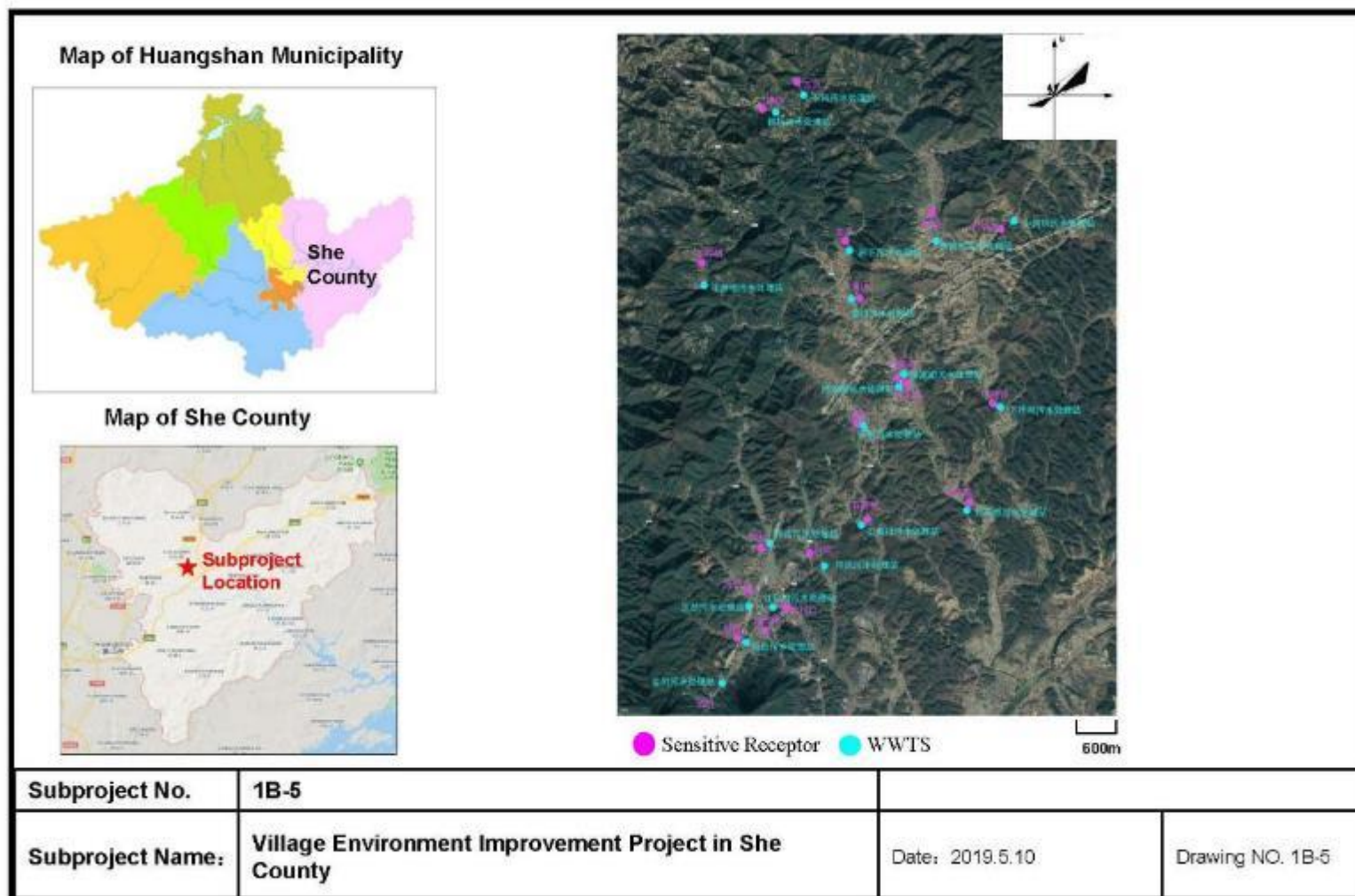
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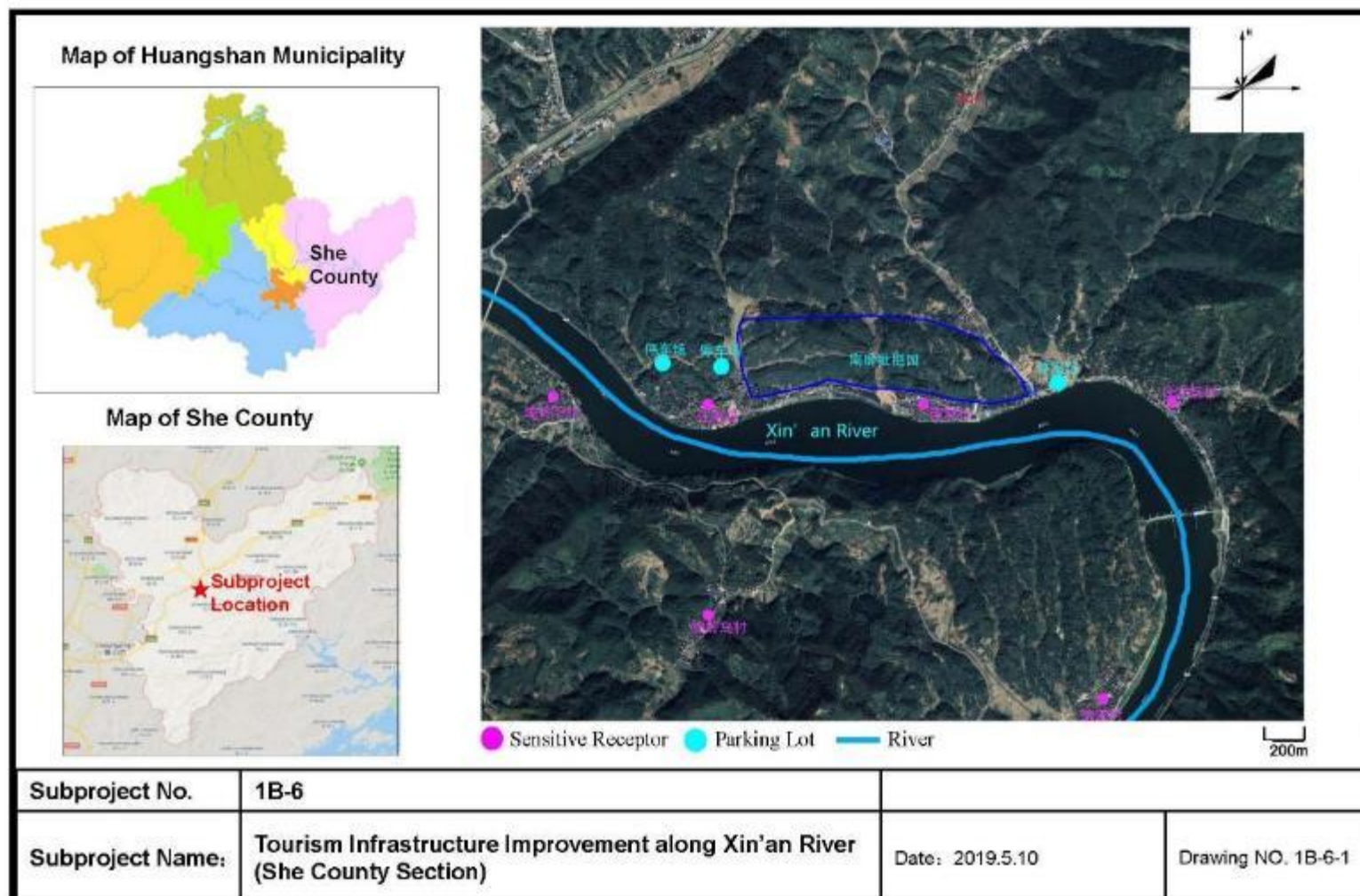
Subproject No.	1B-2		
Subproject Name:	Village Environment Improvement Project in Huizhou District	Date: 2019.5.10	Drawing NO. 1B-2-3

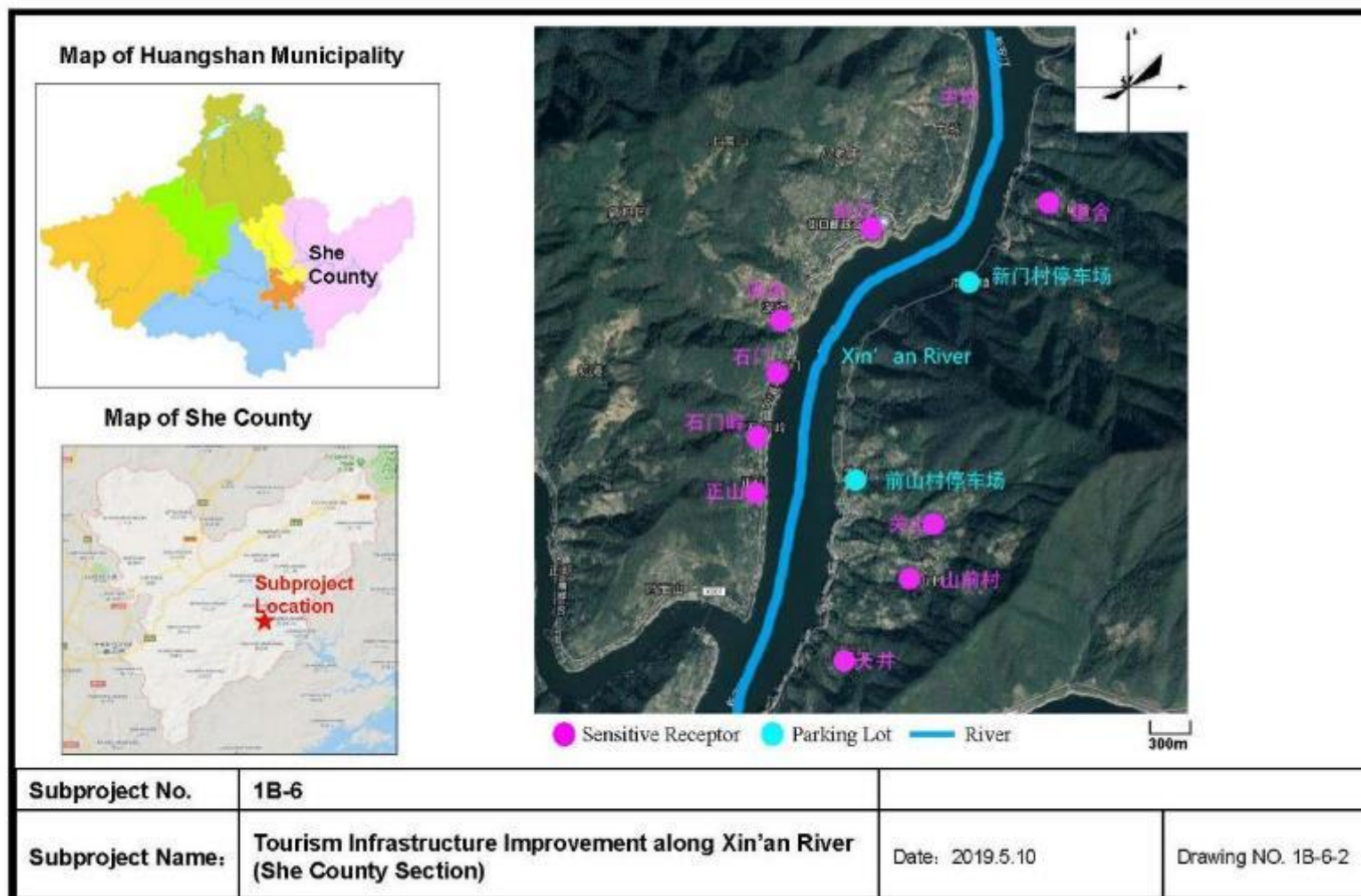


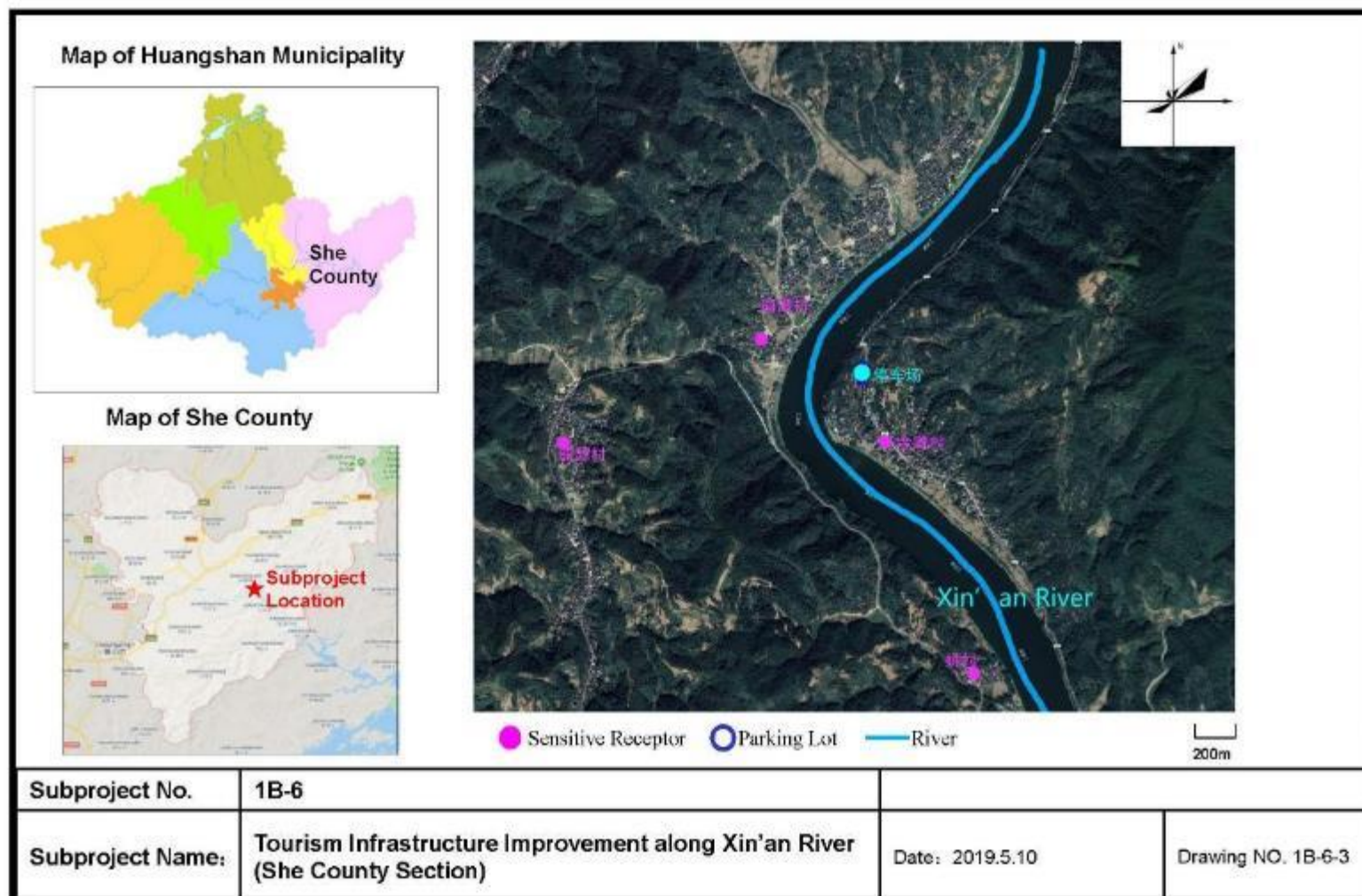












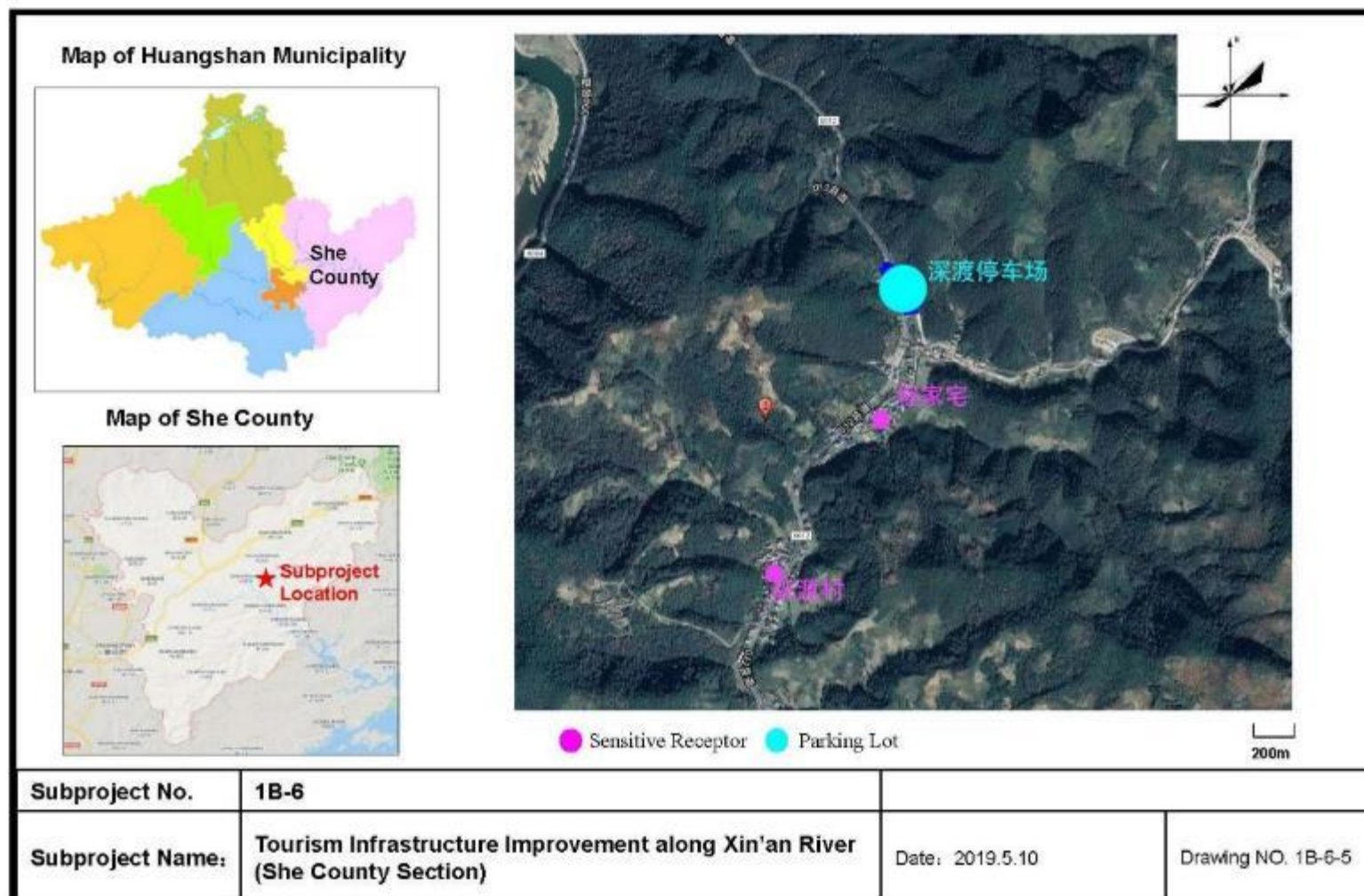
Map of Huangshan Municipality



Map of She County



Subproject No.	1B-6		
Subproject Name:	Tourism Infrastructure Improvement along Xin'an River (She County Section)	Date: 2019.5.10	Drawing NO. 1B-6-4



Map of Huangshan Municipality



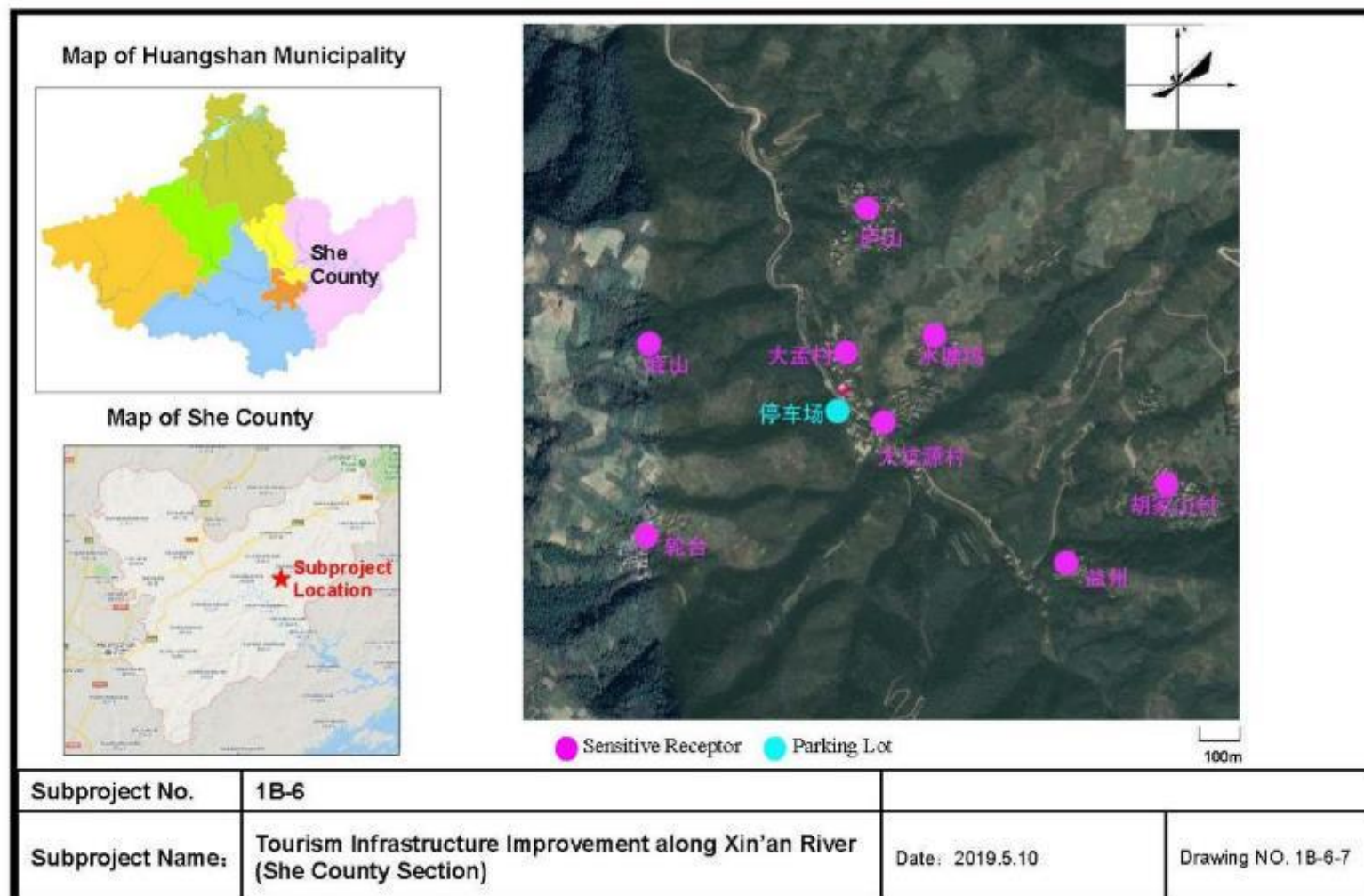
Map of She County

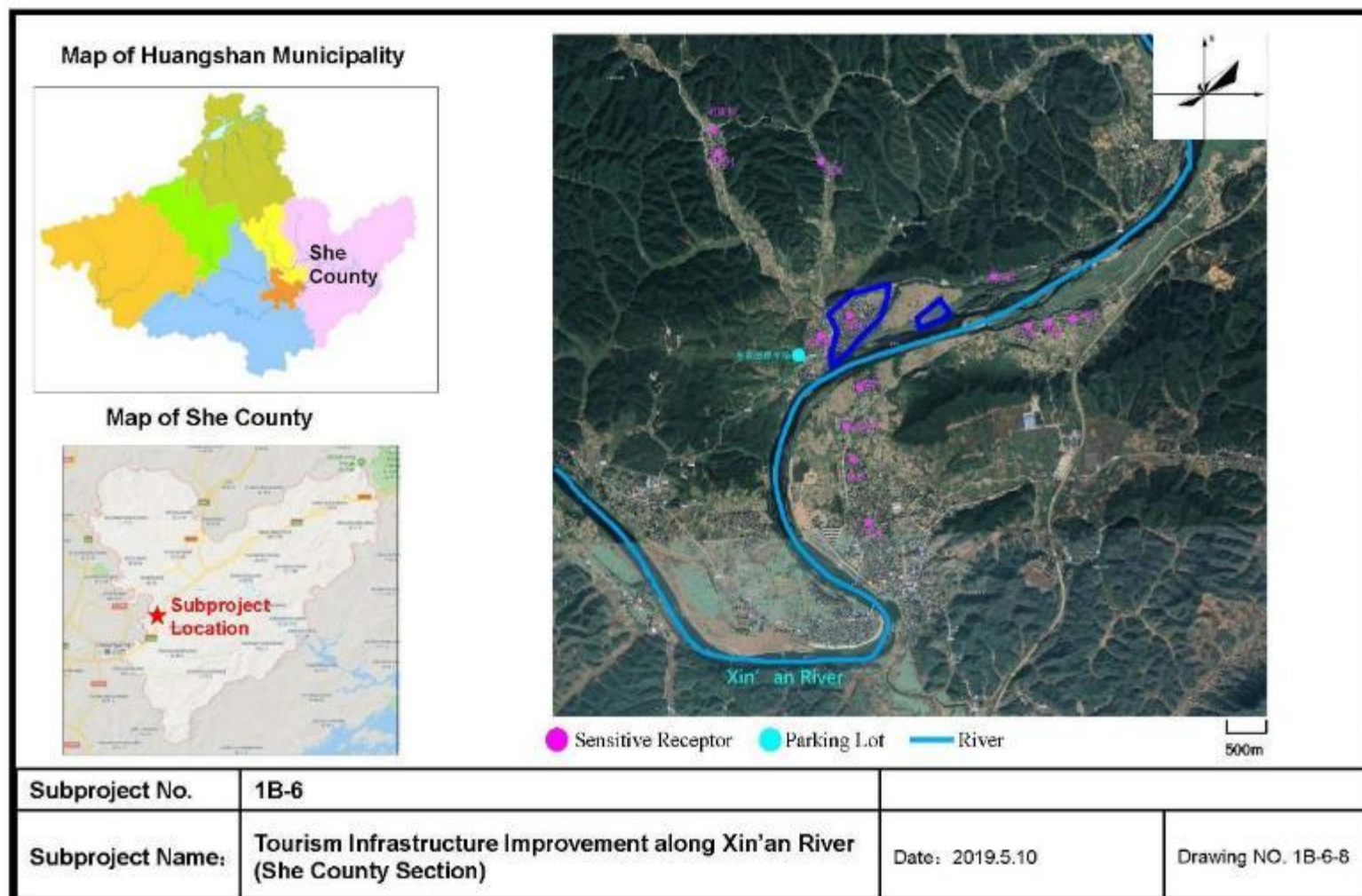


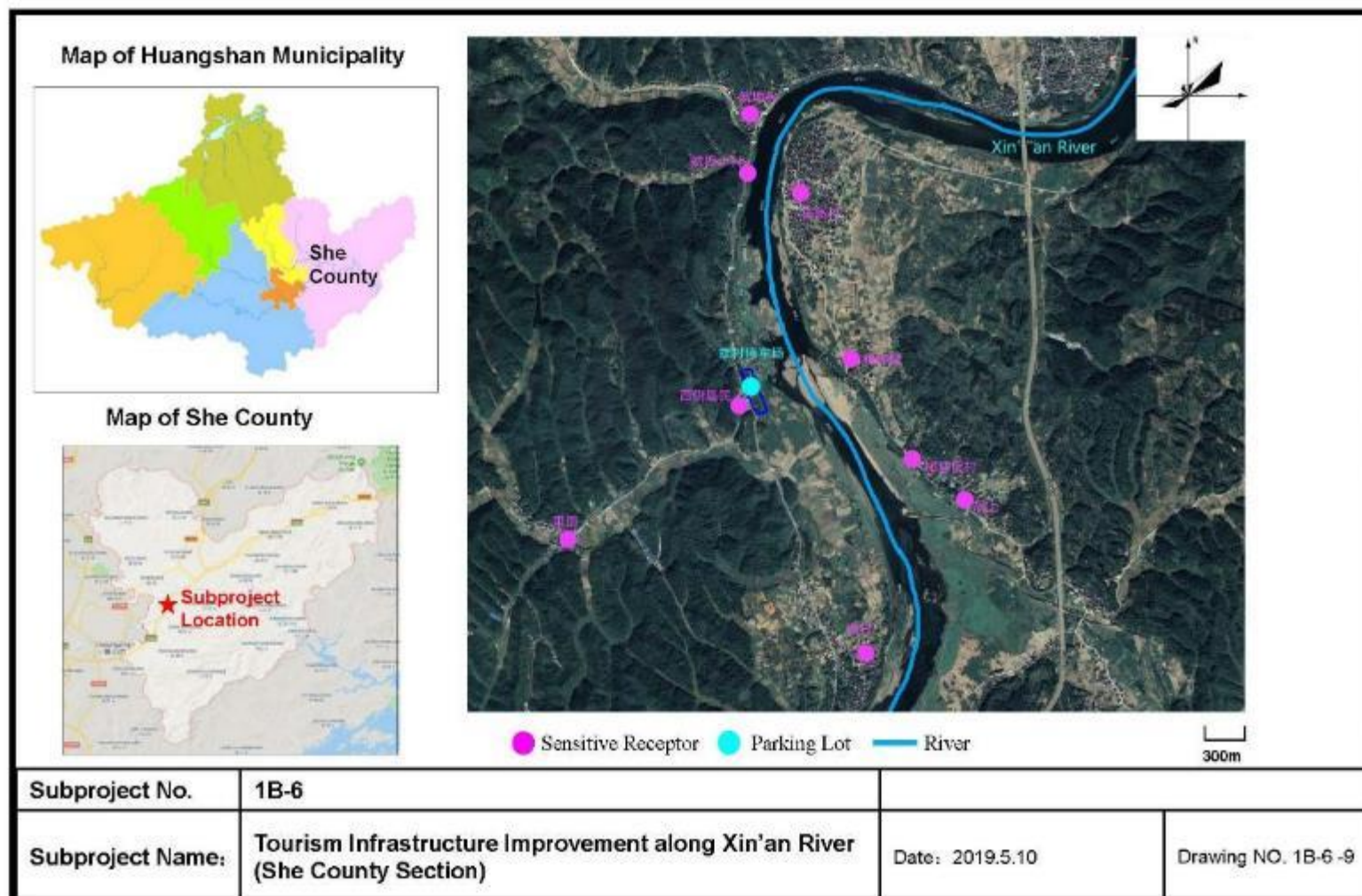
● Sensitive Receptor ● Parking Lot — River

100m

Subproject No.	1B-6		
Subproject Name:	Tourism Infrastructure Improvement along Xin'an River (She County Section)	Date: 2019.5.10	Drawing NO. 1B-6-6







Map of Huangshan Municipality



Map of Yi County



● Sensitive Receptor — River

100m

Subproject No.	1C-1		
Subproject Name:	Zhang River Rehabilitation Project in Yi County	Date: 2019.5.10	Drawing NO. 1C-1

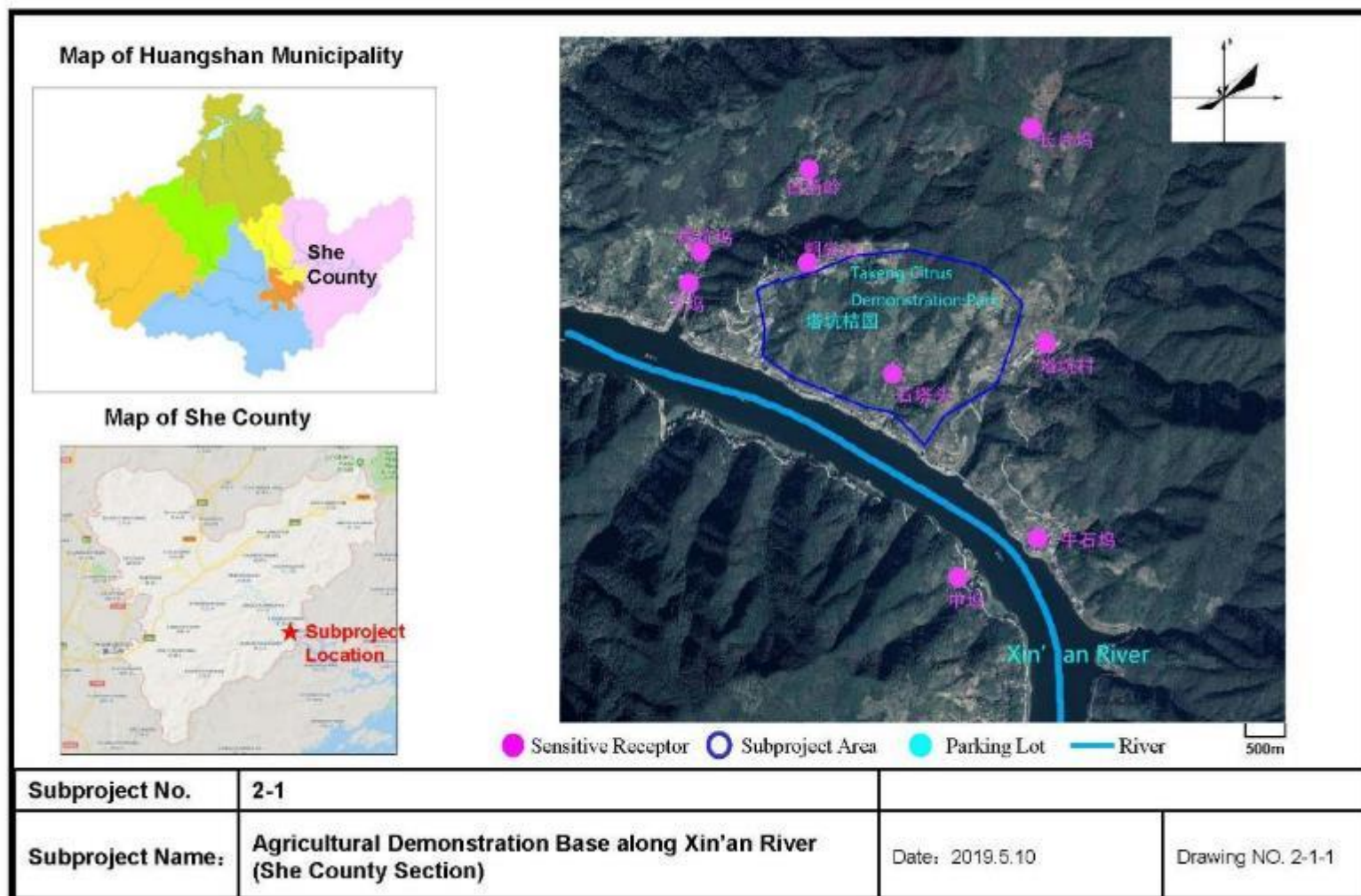
Map of Huangshan Municipality

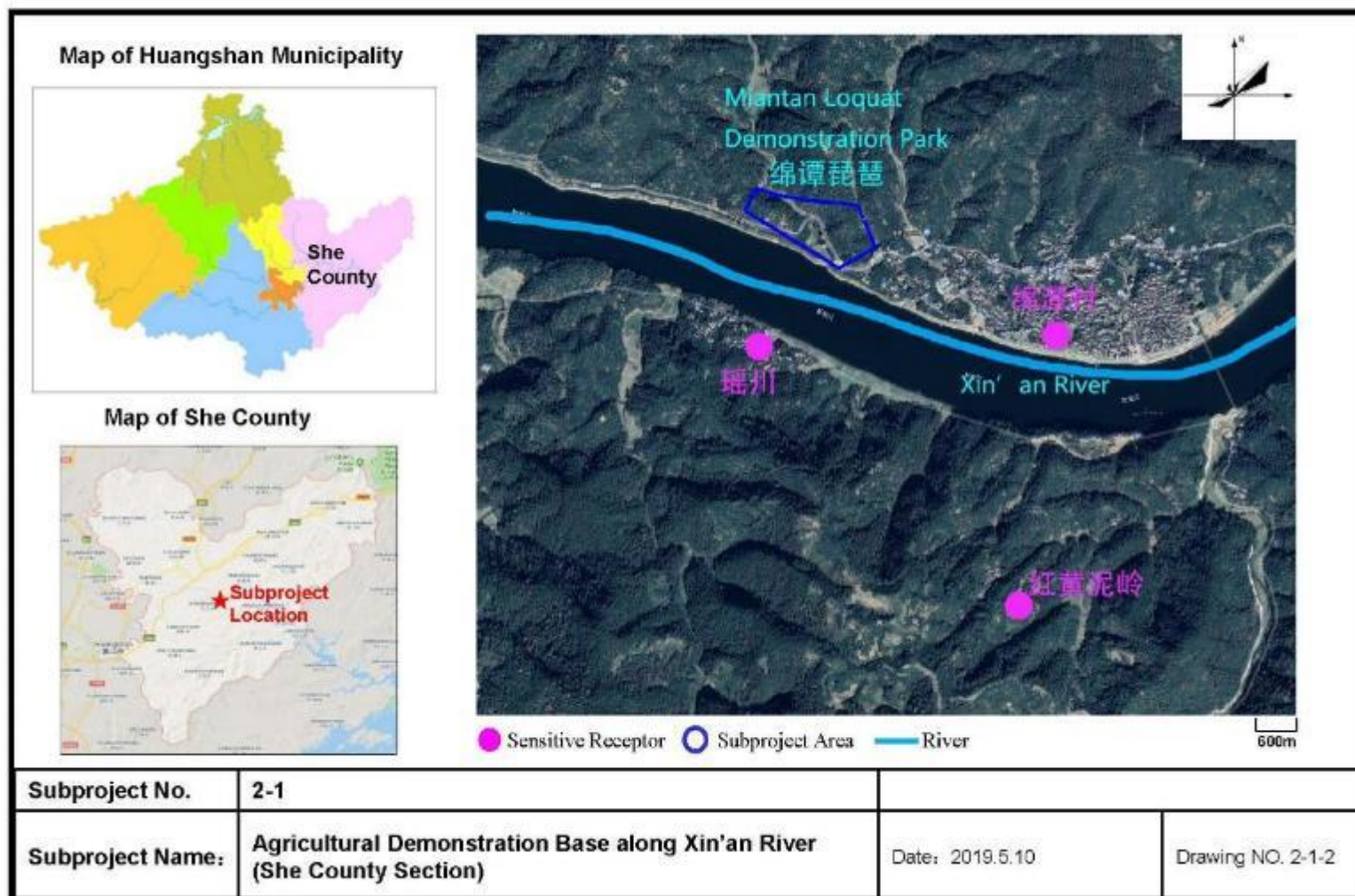


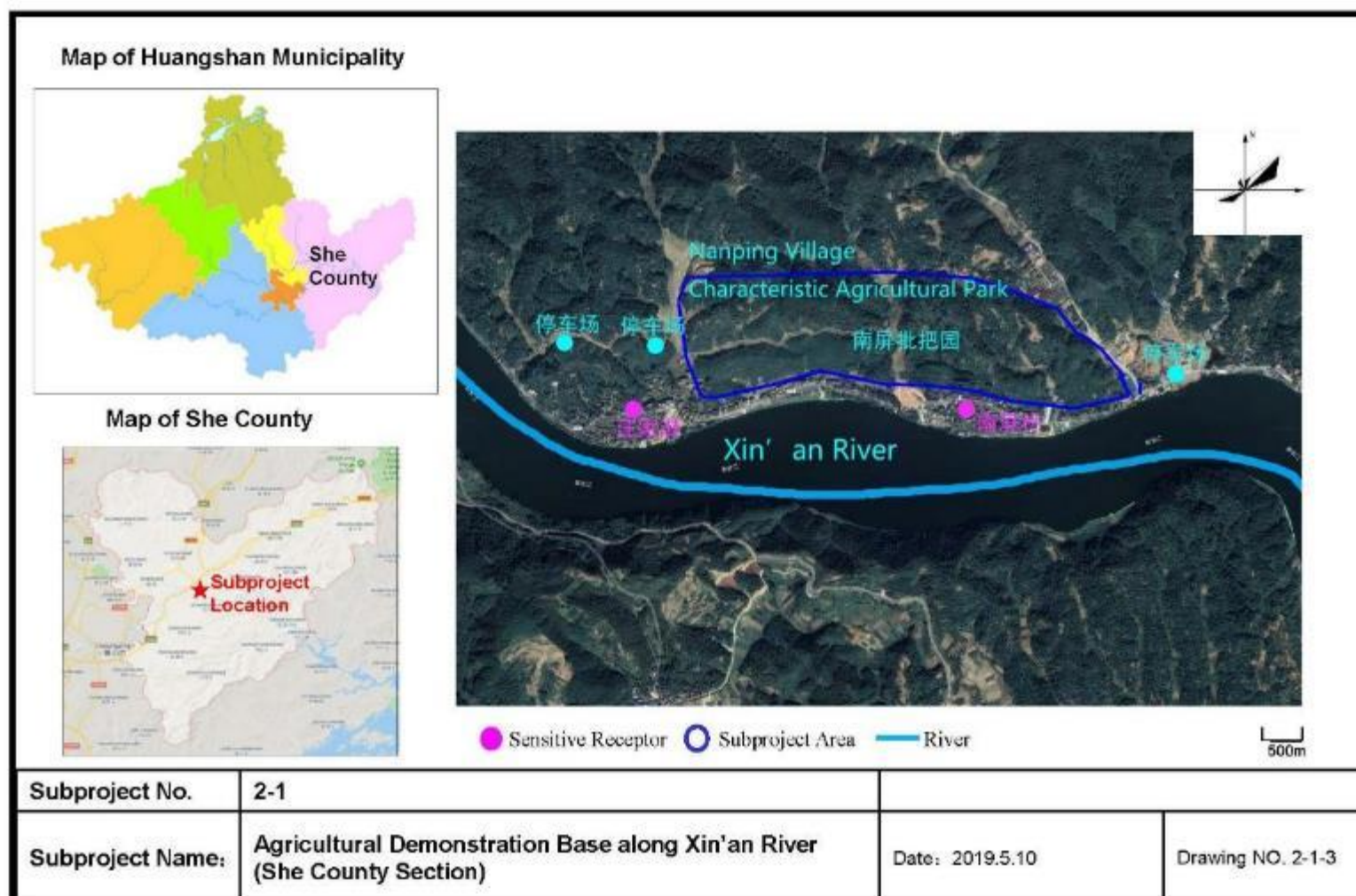
Map of Huangshan District



Subproject No.	1C-2		
Subproject Name:	Caocun River Rehabilitation Project in Xinhua Village	Date: 2019.5.10	Drawing NO. 1C-2







Map of Huangshan Municipality



Map of Huangshan District



● Sensitive Receptor ○ Subproject Area

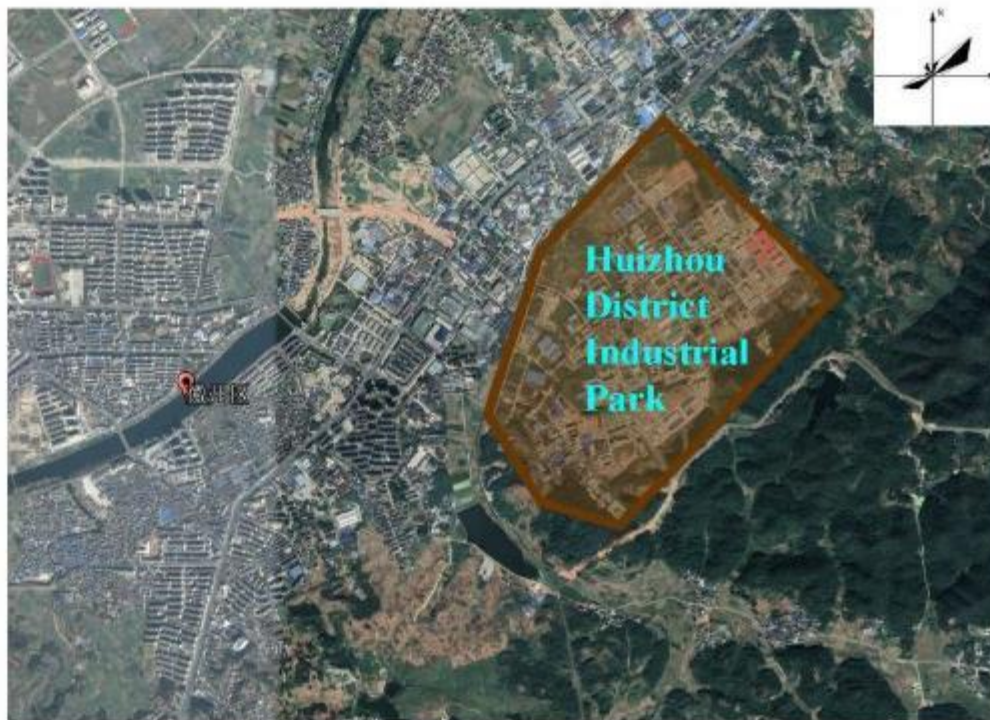
500m

Subproject No.	2-2		
Subproject Name:	Forestry Demonstration Base in Xinhua Village of Huangshan District	Date: 2019.5.10	Drawing NO. 2-2-4

Map of Huangshan Municipality



Map of Huizhou District



600m

Subproject No.	4A-3		
Subproject Name:	Smart Management System in Huizhou District Industrial Park	Date: 2019.5.10	Drawing NO. 4A-3

Map of Huangshan Municipality



Map of She County



Subproject No.	4A-4		
Subproject Name:	Agricultural Demonstration Base along Xin'an River (She County Section)	Date: 2019.5.10	Drawing NO. 4A-4

APPENDIX 4: DESIGN OF URBAN SEWERAGE SYSTEM UPGRADING SUBPROJECTS

Subproject No.	Main Content	Construction Method
1A-1 Huizhou District	<u>Sewage pipes (D400)</u> (1) West Ring Rd: starts at Linhe Village and ends at Yansi Rd, and one wastewater pumping station (0.01m ³ /s); (2) Yansi Rd: starts at Maotian Village and ends at West Ring Rd; (3) Nanshan Rd: starts at Yongjia Rd and ends at Yingxi River; (4) Defeng Rd: starts at Yongjia Rd and ends at Xinhui Rd; (5) Sugong Rd: starts at Yongjia Rd and ends at Xinhui Rd; (6) Yongjia Rd: starts at Hongmenli and ends at Liying Restaurant; (7) Yinxi River – eastern bank: starts at Nanshan Rd and ends at Binhe South Rd; (8) Yinxi River – western bank: starts at Xia Street and ends at Binhe South Rd.	<ul style="list-style-type: none"> • Open cut construction • Material: steel belt reinforced PE spiral corrugated pipe • Concrete manhole
	<u>Stormwater drainage pipes (D600-D800)</u> (1) Linhe Village: starts at Linhe Village and ends at the intersection of Linhe Village By-pass and West Ring Rd; (2) Yansi Rd: one section starts at Maotian and ends at Congmu; the other section starts at West Ring Rd and ends at Congmu; (3) Nanshan Rd: starts at Binhe South Rd and ends at Yinxi River; (4) Defeng Rd: one section starts at Xinhui Rd and ends at downstream canal; the other section starts at existing WWTP and ends at downstream canal.	<ul style="list-style-type: none"> • Open cut construction • Material: steel belt reinforced PE spiral corrugated pipe • Concrete manhole
	<u>Village improvement (12 villages)</u> (1) Sewage pipes: D400 in main Rd and D300 for branches; (2) Stormwater side ditches: width: 400mm; height: 300mm, length: 21.37km; (3) Septic tanks: length: 4800mm; width: 1350mm, effective volume: 4 m ³ . (4) install household sewage outlet pipes that connecting to new constructed sewage pipes	<ul style="list-style-type: none"> • Open cut construction • Material: steel belt reinforced PE spiral corrugated pipe • Septic tanks: prefabricated reinforced concrete ST
1A-2 Huangshan District	<u>Sewage pipes (D800)</u> Puxi Rd: starts at Jincheng Bridge and ends at the old Tourism School.	<ul style="list-style-type: none"> • Open cut construction
	<u>Stormwater drainage pipes: (D800)</u> (1) Pinghu East Rd: starts at Yuhe Rd and ends at Xianyuan Rd; (2) Qingxi Rd: throughout the road; (3) Yupin South Rd: starts at Qingxi Rd and ends at Furong Rd.	<ul style="list-style-type: none"> • Material: steel belt reinforced PE spiral corrugated pipe
1A-3 Xiuning County	<u>Sewage pipes:</u> (1) along Binjiang Rd (D800 – D1200) start point: intersection of Binjiang Rd and Jiayi Bridge end point: intersection of Qiyun Rd and Binjiang Rd (2) along Songluo Rd (D400) a. start point: Hehuang Rd; end point: Railway Overpass. b. start point: Wenxi Bridge; end point: Shangwenxi Cross-river Bridge. (3) along Qiyun East Rd (D400) a. start point: Elevated Railway Bridge; end point: Binjiang East Rd. b. start point: Elevated Railway Bridge; end point: Jing-Tai Highway.	Pipe-jacking along Binjiang Rd: <ul style="list-style-type: none"> • Operation shaft: φ6.5m, reinforced concrete • Reception shaft: φ4.5m, reinforced concrete • Open-caisson method • Material: F type (III) bell end reinforced concrete pipe
	<u>Stormwater drainage pipes: (D600-D1000)</u> (1) Along Songluo Rd a. start point: Houdizhuang By-pass; end point: Hehuang Rd. b. start point: Houdizhuang By-pass; end point: Qiyun Rd (2) Wenxi Village and Xiuyang Village a. start point: Xiuyang Village; end point: Shangwenxi. b. start point: Xiuyang Village; end point: Xiawenxi.	Open cut construction <ul style="list-style-type: none"> • Material: steel belt reinforced PE spiral corrugated pipe • Concrete manhole
	<u>Sewage pipes:</u>	Pipe-jacking along
1A-4	<u>Sewage pipes:</u>	Pipe-jacking along

Yi County	<p>Sewage interceptor: Sewage interceptor main (D800) along Hexi Rd: starts at Jiudong Bridge and ends at Dongmen Bridge;</p> <p>Sewage pipes: (D400) (1) Dongyueshan North Rd; (2) Shuyuan Rd; (3) Bishan Rd; (4) Kecun Rd; (5) Longjiang Rd; (6) Xiwu Rd;</p>	<p>Hexi Rd</p> <ul style="list-style-type: none"> • Operation shaft: $\phi 6.5\text{m}$, reinforced concrete • Reception shaft: $\phi 4.5\text{m}$, reinforced concrete • Open-caisson method • Material: F type (III) bell end reinforced concrete pipe <p>Open cut construction</p> <ul style="list-style-type: none"> • Material: steel belt reinforced PE spiral corrugated pipe • Concrete manhole
1A-5 She County	<p><u>Sewage pipes: (D300-D600)</u> (1) Zixia Rd: a. starts at Ziwei Rd and ends at Huangshan Rd; b. starts at Ziwei Rd and ends at Fuzi Rd; (2) Fufeng Rd: a. starts at Ziyun Rd and ends at Huangshan Rd; b. starts at Ziyun Rd and ends at Xin'an Rd; (3) Qingliang Rd: starts at South Xin'an Rd and ends at Ziyun Rd; (4) Ziyun Rd: starts at West Zixia Rd and ends at Baihua Rd; (5) Ping'an Rd: throughout the road; (6) Fuzi Rd: a. starts at Ziyun North Rd and ends at Zixia North Rd; b. starts at Zixia North Rd and ends at Ping'an Rd; (7) Ziwei Rd: throughout the road; (8) Lianhuatang Rd: throughout the road; (9) Huizhou Rd: a. starts at Huixin Rd and ends at Zhonghe Street; b. starts at Zhonghe Street and ends at Xinnan Street; (10) Ziyang Rd: starts at S215 and ends at Wan-Gan Railway. (11) Gongyeyi Rd: starts at 2nd Rind Rd and ends at Weisi Rd; (12) Weisi Rd: starts at Jingsan Rd and ends at Gongyeyi Rd; (13) Weiwu Rd: starts at Jingsan Rd and ends at Gongyeyi Rd; (14) Weiliu Rd: starts at Jingsan Rd and ends at Gongyeyi Rd; (15) Jing'er Rd: starts at 2nd Rind Rd and ends at Weisi Rd; (16) South section of 2nd Ring Rd; (17) Fenge River Binjiang Rd; (18) Xinzhou 1st Rd and Xinzhou 2nd Rd; (19) Fuxin Rd; (20) Bilongwan Area, Zheng Village Area, Fuhe Town Area, Development Zone Area, East Urban Area.</p> <p><u>Stormwater drainage pipes: (D600-D1000)</u> Pipes are designed to be installed along with the sewage pipes (1-19) as mentioned above.</p>	<ul style="list-style-type: none"> • Open cut construction • Material: steel belt reinforced PE spiral corrugated pipe • Concrete manhole
1A-6 Qimen County	<p><u>Sewage pipes: (D400-D500)</u> (1) Zhongxin North Rd: starts at Xinxing Middle Rd and ends at Qishan Rd; (2) Zhongxin South Rd: one section starts at Xinxing Middle Rd and ends at Jun'an Driving School; the other section starts at Jun'an Driving School and ends at Shunli Car Store; (3) Changjiang North Rd: one section starts at Qimen Environmental Inspection Team Office and ends at Qishan Rd; the other section starts at Qishan Rd and ends at S326; (4) Wenfeng Rd: one section starts at Xinxing Middle Rd and ends at S326; the other section starts at S326 and ends at Zhongxing South Rd; (5) Xinxing Middle Rd: starts at Wenfeng Rd and ends at Changjiang North Rd; (6) Qishan Rd: starts at Qimen Water Resource Bureau office and ends at Changjiang North Rd; (7) Changlin Rd: starts at Wenfeng Rd and ends at Zhongxing South Rd; (8) Xujia Xiang: throughout the road; (9) Zuoheng Street: throughout the road;</p>	<ul style="list-style-type: none"> • Open cut construction • Material: steel belt reinforced PE spiral corrugated pipe

	<p>(10) Xueqian Street: starts at Xinxing West Rd and ends at Zhongxing North Rd; (11) S326: a. starts at Yelin Villa and ends at Zhongxing South Rd; b. starts at Shanshui Mingmen Residential Area (phase III) and ends at Changjiang West Bank; c. starts at Changhua Logistic Co., Ltd office and ends at Jindong River East Bank; (12) Xinxing West Rd: starts at Jiazilin and ends at Xinxing Middle Rd; (13) Xinxing East Rd: a. starts at Rongrong Supermarket and ends at Binhe Rd; b. starts at Rongrong Supermarket and ends at S326; (14) Fenghuang Xincun Rd: starts at S326 and ends at Zhongxing South Rd; (15) Xiaobei Rd: starts at Zhawu Rd and ends at Changjiang North Rd.</p>	
	<p><u>Stormwater drainage pipes: (D600-D1200)</u> (1) Zhongxing North Rd: starts at Xinxing Middle Rd and ends at Qishan Rd; (2) Zhongxing South Rd: starts at Xinxing Middle Rd and ends at Shunli Car Store; (3) Changjiang North Rd: starts at Qimen Environmental Inspection Team Office and ends at S326; (4) Wenfeng Rd: one section starts at Xinxing Middle Rd and ends at Zhongxing South Rd; (5) Xinxing Middle Rd: starts at Wenfeng Rd and ends at Changjiang North Rd; (6) Qishan Rd: starts at Qimen Water Resource Bureau office and ends at Changjiang North Rd; (7) Changlin Rd: starts at Wenfeng Rd and ends at Zhongxing South Rd; (8) Xujia Xiang: through the road (9) Zuoheng Street: through the road (10) Xueqian Street: starts at Xinxing West Rd and ends at Zhongxing North Rd; (11) S326: starts at Yelin Villa and ends at Changhua Logistic Co., Ltd office; (12) Xinxing West Rd: starts at Jiazilin and ends at Xinxing Middle Rd; (13) Xinxing East Rd: starts at S326 and ends at Binhe Rd; (14) Fenghuang Xincun Rd: starts at S326 and ends at Zhongxing South Rd; (15) Xiaobei Rd: starts at Zhawu Rd and ends at Changjiang North Rd.</p>	<ul style="list-style-type: none"> • Open cut construction • Material: steel belt reinforced PE spiral corrugated pipe
	<p><u>Stormwater pipe culverts cleaning</u> Three sections will be cleaned by removing the sediment in the stormwater pipe culverts.</p>	<p>Manually clean method.</p>

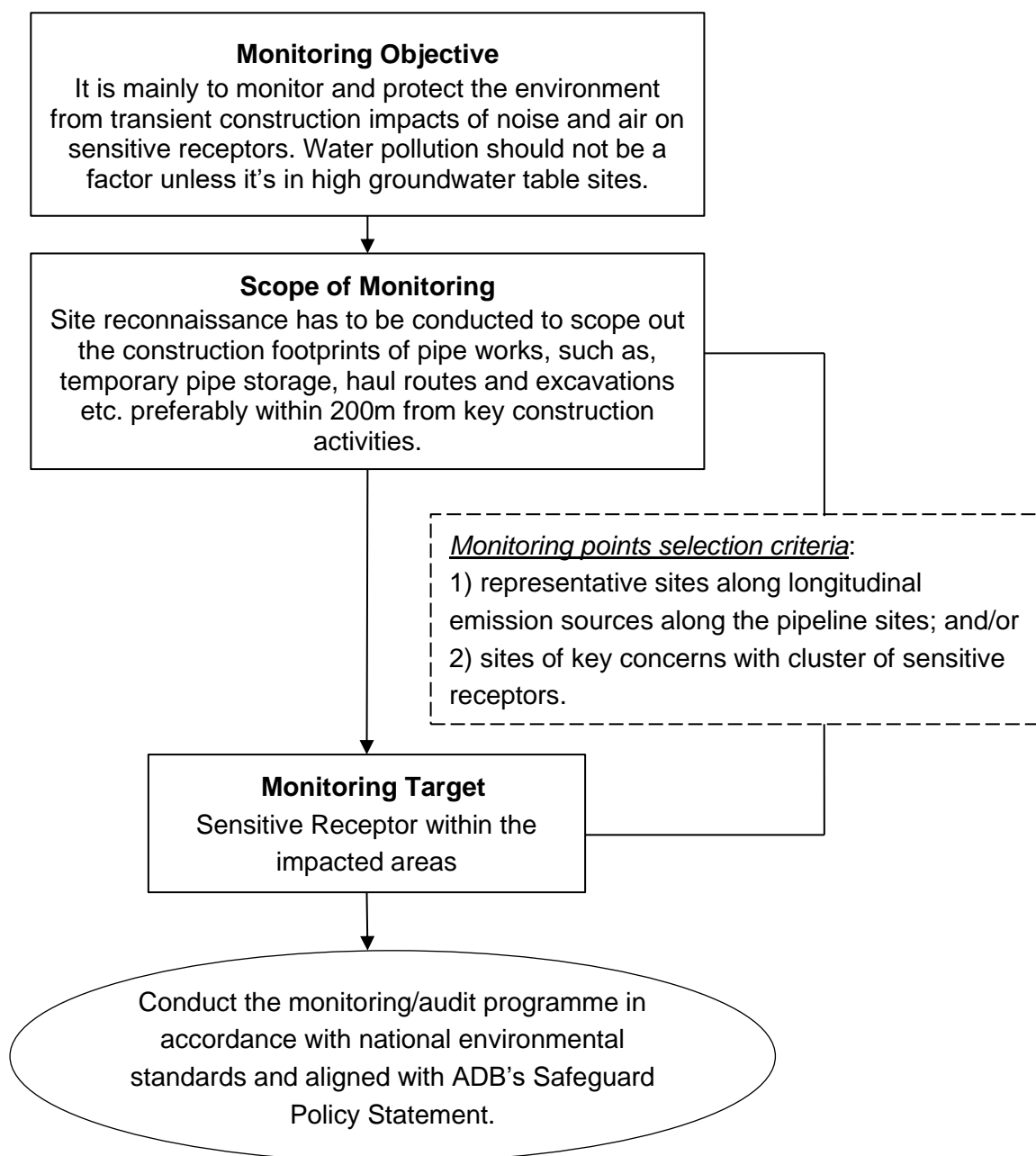
Source: FSR (28 June 2019).

APPENDIX 5. ENVIRONMENTAL BASELINE MONITORING STRATEGY

The project components will be located in six counties and districts of Huangshan Municipality. The following environmental baseline monitoring strategy was developed based on the proposed construction contents and potential environmental impacts.

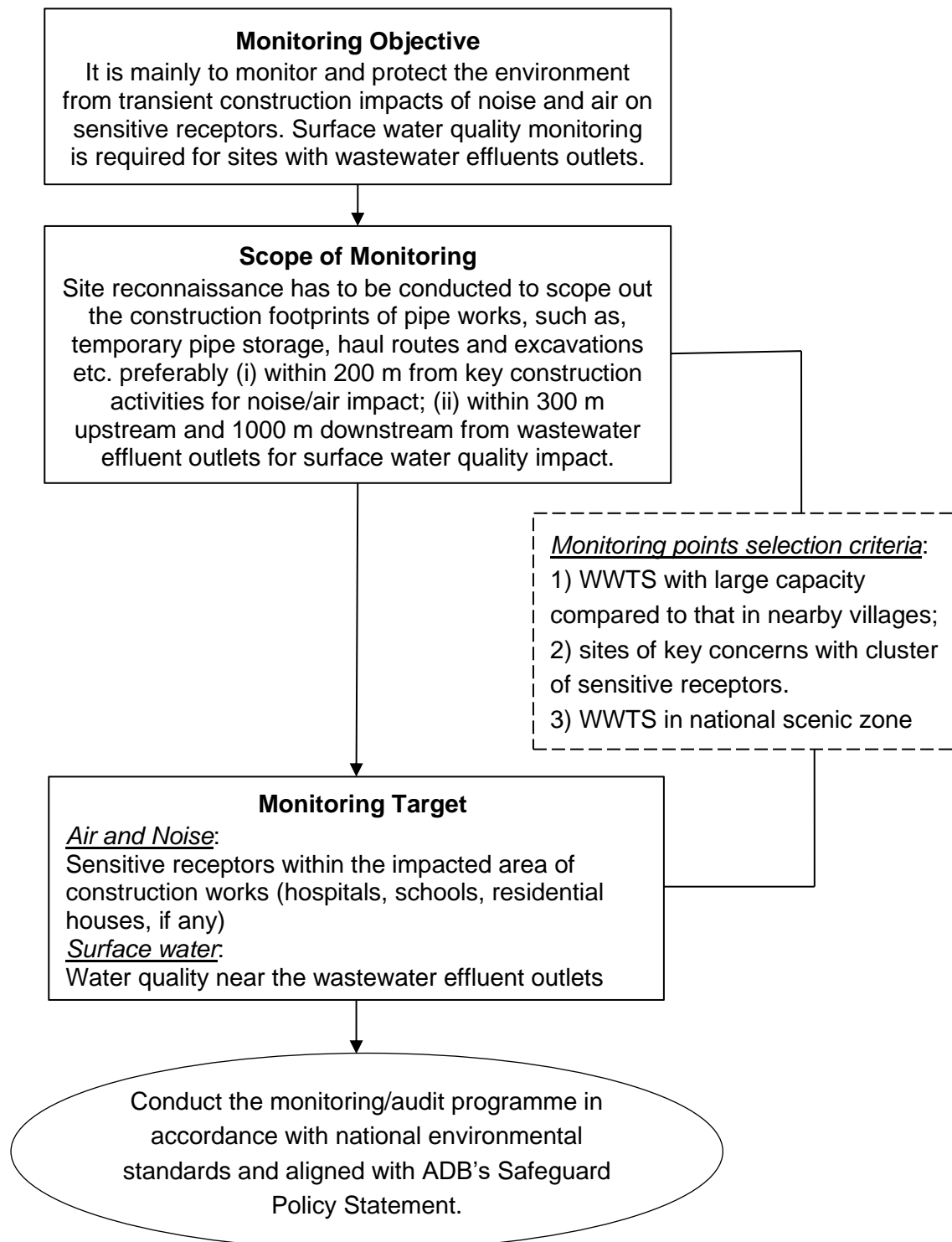
A. Urban sewerage system upgrading

Two construction methods will be employed, which are open cut and pipe-jacking. For open cut works, pipelaying underneath existing roads will be implemented with traditional and basic construction equipment. Pipe-jacking works are proposed in some locations with very minimal impacts.



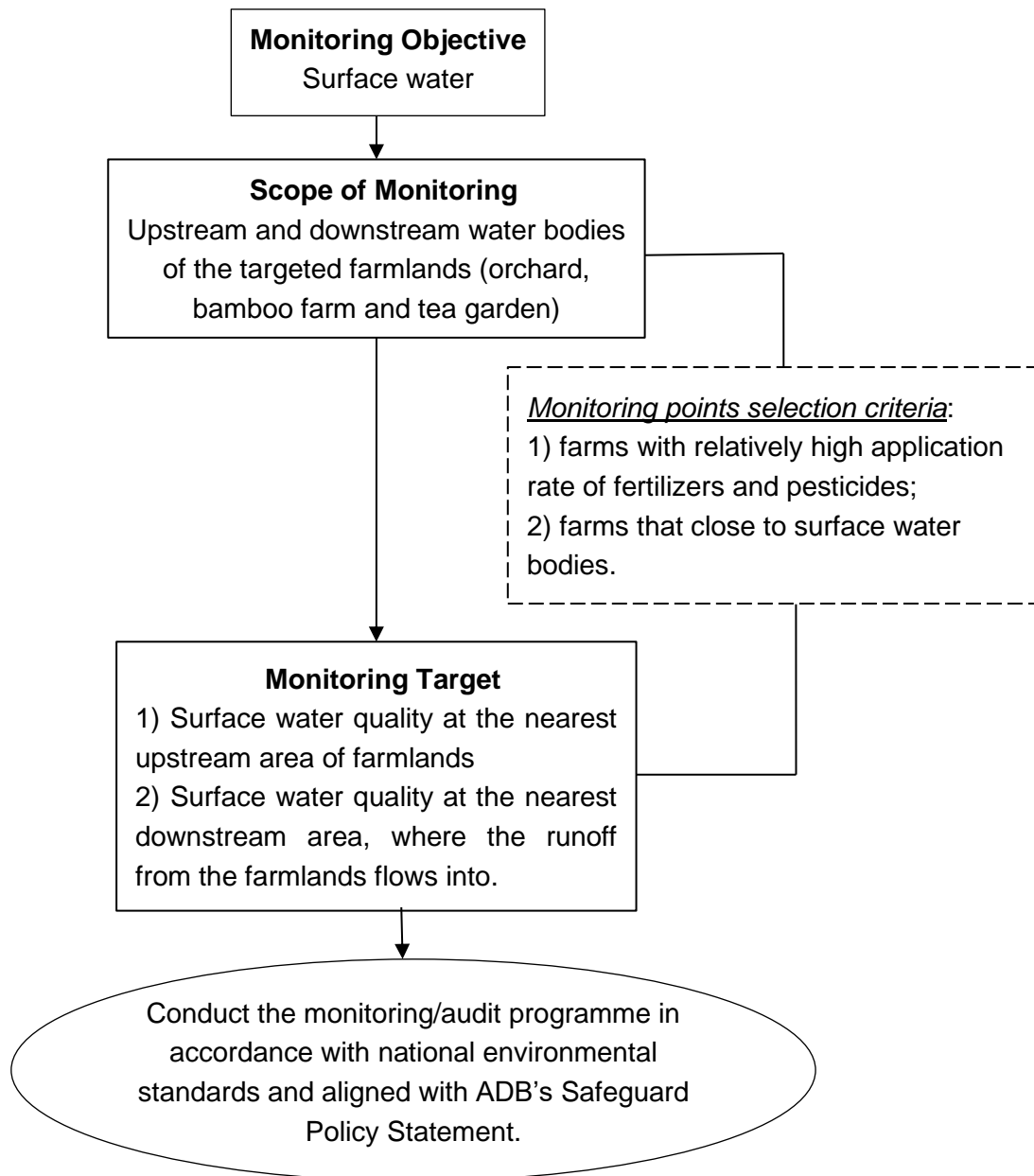
B. Rural wastewater and water management

Detailed monitoring program is designed for selected sites for representative samplings. These rural works are mainly pipe works for water/wastewater drainage for over hundred small remote and hilly villages. Some involve small wastewater treatment stations (WWTS) and/or pumping stations to enable the processes.



C. Non-point source pollution control of agricultural activities

With reference to site specific monitoring programmes on eco-organic greening for existing orchard farm, bamboo farm as well as tea garden, the key purpose is to examine and limit the use of agrochemicals and further protect the relevant surface water.



APPENDIX 6. SAMPLING LOCATIONS FOR ENVIRONMENTAL BASELINE PARAMETERS

Sampling No.	Sampling point (location)	Geographical coordinates
	Surface Water	
W1	300m upstream of Dianjie WWTS outlet (an unnamed channel)	118.077353°E, 30.431316°N
W2	1000m downstream of Dianjie WWTS outlet (an unnamed channel)	118.086977°E, 30.425289°N
W3	300m upstream of Fudun WWTS outlet (Xin'an River)	118.382235°E, 29.757821°N
W4	1000m downstream of Litangxia WWTS outlet (Xin'an River)	118.405323°E, 29.772871°N
W5	300m upstream of Yaoxi WWTS outlet (Xin'an River)	118.246794°E, 29.674257°N
W6	1000m downstream of Yaoxi WWTS outlet (Xin'an River)	118.259025°E, 29.677539°N
W7	300m upstream of Xizhou WWTS outlet (Xin'an River)	118.212461°E, 29.652293°N
W8	1000m downstream of Hexi WWTS outlet (Xin'an River)	118.235035°E, 29.666334°N
W9	300m upstream of Changwu WWTS outlet (Caoxi River)	118.227696°E, 29.977874°N
W10	1000m downstream of Changwu WWTS outlet (Caoxi River)	118.220186°E, 29.970810°N
W11	300m upstream of Huangcun WWTS outlet (Fengle River)	118.157701°E, 29.957091°N
W12	1000m downstream of Shankou WWTS outlet (Fengle River)	118.198214°E, 29.955901°N
W13	300m upstream of Shuangzhu WWTS outlet (an unnamed channel)	118.253253°E, 29.652330°N
W14	1000m downstream of Shuangzhu WWTS outlet (an unnamed channel)	118.247910°E, 29.657514°N
W15	300m upstream of Xinhua Oil Tea Ecological Demonstration Park (an unnamed channel)	118.050027°E, 30.442218°N
W16	1000m downstream of Xinhua Oil Tea Ecological Demonstration Park (an unnamed channel)	118.049104°E, 30.439665°N
W17	300m upstream of Nanping Village Characteristic Agricultural Park (Xin'an River)	118.507032°E, 29.843585°N
W18	1000m downstream of Nanping Village Characteristic Agricultural Park (Xin'an River)	118.519049°E, 29.843994°N
W19	300m upstream of Takeng Citrus Demonstration Park (Xin'an River)	118.725986°E, 29.763483°N
W20	1000m downstream of Takeng Citrus Demonstration Park (Xin'an River)	118.732510°E, 29.759273°N
W21	300m upstream of Miantan Loquat Demonstration Park (Xin'an River)	118.571792°E, 29.821825°N
W22	1000m downstream of Miantan Loquat Demonstration Park (Xin'an River)	118.573658°E, 29.820968°N
	Air Quality	
A1	Shuangzhu WWTS	118.252673°E, 29.649813°N
A2	Xinyan WWTS	118.240271°E, 29.663667°N
A3	Wucun WWTS	118.404518°E, 29.750164°N
A4	Yaoxi WWTS	118.241301°E, 29.670678°N
A5	Changwu WWTS	118.226500°E, 29.977021°N
A6	Yeja WWTS	118.474749°E, 30.005323°N
A7	Xizhou-Xiafudu WWTS	118.216474°E, 29.649235°N
A8	Hexi WWTS	118.228683°E, 29.660013°N
A9	Suntian WWTS	118.257222°E, 29.630435°N
A10	Yuetan-Luntang WWTS	118.163238°E, 29.633494°N
A11	Fudun WWTS	118.383093°E, 29.757224°N
A12	Taiping Villa in Huangshan District	118.131373°E, 30.280954°N
A13	Yuhe Village in Huangshan District	118.133347°E, 30.277766°N
A14	Hebian Village in Huangshan District	118.137875°E, 30.265257°N
A15	Fuchun International Garden Residential Area in Huizhou District	118.336015°E, 29.820875°N
A16	Sunshine Residential Area in Huizhou District	118.355927°E, 29.832380°N
A17	Congmu Village in Huizhou District	118.322926°E, 29.817897°N
A18	Piyun Shanzhuang Residential Area in She County	118.434827°E, 29.867145°N
A19	Sanqingyan Villa Residential Area in She County	118.421245°E, 29.867033°N
A20	Daming Villa Residential Area in She County	118.416181°E, 29.865824°N
A21	Gaoqi Residential Area in Yi County	117.940110°E, 29.928336°N

Sampling No.	Sampling point (location)	Geographical coordinates
A22	Kaiyuan Shijia Residential Area in Yi County	117.942041°E, 29.926635°N
A23	Qimen No.1 Middle School in Qimen County	117.726000°E, 29.866107°N
A24	Qishan Primary School in Qimen County	117.718774°E, 29.858510°N
A25	Wenjiang Primary School in Qimen County	117.716532°E, 29.848475°N
A26	Qimen No.2 Middle School in Qimen County	117.713785°E, 29.846209°N
A27	Huangshan Donghua Technician School in Xiuning County	118.196926°E, 29.774249°N
A28	Haiyang Middle School in Xiuning County	118.176498°E, 29.786280°N
A29	Gucheng Village in Xiuning County	118.231366°E, 29.777210°N
Noise		
N1	Tangjiazhou Village in Xiuning County	118.228195°E, 29.664147°N
N2	Wu Village in Tunxi District	118.404518°E, 29.750164°N
N3	Changwu Village in Huizhou District	118.226717°E, 29.977227°N
N4	Yejiazu Village in She County	118.474749°E, 30.005323°N
N5	Hexi Village in Xiuning County	118.228523°E, 29.660269°N
N6	Taiping Villa in Huangshan District	118.131373°E, 30.280954°N
N7	Yuhe Village in Huangshan District	118.133347°E, 30.277766°N
N8	Hebian Village in Huangshan District	118.137875°E, 30.265257°N
N9	Fuchun International Garden Residential Area in Huizhou District	118.336015°E, 29.820875°N
N10	Sunshine Residential Area in Huizhou District	118.355927°E, 29.832380°N
N11	Congmu Village in Huizhou District	118.322926°E, 29.817897°N
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N13	Sanqingyan Villa Residential Area in She County	118.421245°E, 29.867033°N
N14	Daming Villa Residential Area in She County	118.416181°E, 29.865824°N
N15	Gaoqi Residential Area in Yi County	117.940110°E, 29.928336°N
N16	Kaiyuan Shijia Residential Area in Yi County	117.942041°E, 29.926635°N
N17	Qimen No.1 Middle School in Qimen County	117.726000°E, 29.866107°N
N18	Qishan Primary School in Qimen County	117.718774°E, 29.858510°N
N19	Wenjiang Primary School in Qimen County	117.716532°E, 29.848475°N
N20	Qimen No.2 Middle School in Qimen County	117.713785°E, 29.846209°N
N21	Huangshan Donghua Technician School in Xiuning County	118.196926°E, 29.774249°N
N22	Haiyang Middle School in Xiuning County	118.176498°E, 29.786280°N
N23	Gucheng Village in Xiuning County	118.231366°E, 29.777210°N
Groundwater		
GW1	Changwu WWTS	118.226500°E, 29.977021°N
GW2	Yejiazu WWTS	118.474749°E, 30.005323°N
GW3	Xizhou-Xiafudu WWTS	118.216474°E, 29.649235°N
GW4	Hexi WWTS	118.228683°E, 29.660013°N
GW5	Suntian WWTS	118.257222°E, 29.630435°N
GW6	Yuetan-Luntang WWTS	118.163238°E, 29.633494°N
GW7	Fudun WWTS	118.383093°E, 29.757224°N
GW8	Wucun WWTS	118.404518°E, 29.750164°N
GW9	Shuangzhu WWTS	118.252673°E, 29.649813°N
GW10	Xinyan WWTS	118.240271°E, 29.663667°N
GW11	Yaoxi WWTS	118.241301°E, 29.670678°N
GW12	Xinhua Oil Tea Ecological Demonstration Park	118.050027°E, 30.442218°N
GW13	Nanping Village Characteristic Agricultural Park	118.519049°E, 29.843994°N
GW14	Takeng Citrus Demonstration Park	118.732510°E, 29.759273°N
GW15	Miantan Loquat Demonstration Park	118.573658°E, 29.820968°N

Source: the DEIA Institute