Initial Environmental Examination

Project Number: 50050-005
March 2021

Multitranche Financing Facility
People's Republic of China: Guangxi Regional Cooperation and Integration Promotion Investment Program - Tranche 3

Prepared by the Government of Guangxi Zhuang Autonomous Region for the Asian Development Bank (ADB).

CURRENCY EQUIVALENTS

(as of 31 March 2021)

Currency unit	–	yuan (CNY)
CNY1.00	=	$0.152
$1.00	=	CNY6.57

ABBREVIATIONS

ADB	–	Asian Development Bank
AP	–	affected person
AQG	–	air quality guideline
As	–	arsenic
AVG	–	average
BEZ	–	border economic zone
BOD5	–	5-day biochemical oxygen demand
C&D	–	construction and demolition
Cd	–	cadmium
CN	–	cyanide
CNY	–	Chinese yuan
CO	–	carbon monoxide
CO2	–	carbon dioxide
COD	–	chemical oxygen demand
Cr	–	chromium
Cu	–	copper
DDT	–	dichloro-diphenyl-trichloroethane
DO	–	dissolved oxygen
EA	–	executing agency
EARF	–	environmental assessment and review framework
EEM	–	external environmental monitor
EHS	–	environment, health and safety
EIA	–	environmental impact assessment
EIR	–	environmental impact report
EIRF	–	environmental impact registration form
EIT	–	environmental impact table
EMP	–	environmental management plan
EMR	–	environmental monitoring report
EMS	–	Environmental Monitoring Station
EEB	–	Ecology and Environment Bureau
EPD	–	Environmental Protection Department
EPL	–	Environmental Protection Law
ESE	–	environmental supervision engineer
ESMS	–	environmental and social management system
F-	–	fluoride
FAM	–	facility administration manual
FI	–	financial intermediary
FSR	–	feasibility study report
FYP	–	five-year plan

GDP	–	gross domestic product
GPMO	–	Guangxi Foreign Loans Project Management Office
GHG	–	greenhouse gas
GMS	–	Greater Mekong Subregion
GRM	–	grievance redress mechanism
GZAR	–	Guangxi Zhuang Autonomous Region
Hg	–	mercury
IMn	–	permanganate index
IA	–	implementation agency
IEE	–	initial environmental examination
IUCN	–	International Union for Conservation of Nature
LAeq	–	equivalent continuous A-weighted sound pressure level
LAS	–	linear alkylbenzene sulfonate
LDI	–	local design institute
LEED	–	leadership in energy and environmental design
MEP	–	Ministry of Environmental Protection
MSW	–	municipal solid waste
N	–	nitrogen
NH3-N	–	ammonia nitrogen
Ni	–	nickel
NO2	–	nitrogen dioxide
NOX	–	nitrogen oxides
P	–	phosphorus
PAM	–	polyacryl amide
Pb	–	lead
PCR	–	project completion report
pH	–	a measure of acidity and alkalinity
PIU	–	project implementation unit
PM	–	particulate matter
PM2.5	–	particulate matter with diameter ≤ 2.5 μm
PM10	–	particulate matter with diameter ≤ 10 μm
PMC	–	project management consultant
PME	–	powered mechanical equipment
PMO	–	project management office
PO42-	–	phosphate
PPE	–	personal protective equipment
PPP	–	public-private partnership
PPTA	–	project preparation technical assistance
PRC	–	People's Republic of China
Se	–	selenium
SEA	–	strategic environmental assessment
ME	–	small and medium enterprise
SO2	–	sulphur dioxide
SPS	–	safeguard policy statement
SS	–	suspended solid
TN	–	total nitrogen
TP	–	total phosphorus
TPH	–	total petroleum hydrocarbon
TSP	–	total suspended particulate
VOC	–	volatile organic carbon

WBG	–	World Bank Group
WHO	–	World Health Organization
WTP	–	water treatment plant
Zn	–	zinc

WEIGHTS AND MEASURES

^{o}C	–	degree centigrade
dB(A)	–	A-weighted sound pressure level (decibel)
ha	–	hectare
kg/s	–	kilogram per second
km	–	kilometer
km2	–	square kilometer
L	–	liter
m	–	meter
m2	–	square meter
m3	–	cubic meter
m3/d	–	cubic meter per day
m3/s	–	cubic meter per second
mg	–	milligram
mg/L	–	Milligram per liter
mg/m3	–	milligram per cubic meter
min	–	minute
mm	–	millimeter
no./L	–	number of individuals per liter
t	–	metric ton
t/d	–	metric ton per day
µ or µm	–	micron or micrometer
µg	–	microgram
µg/m3	–	microgram per cubic meter

NOTES

In the report, “$” refers to US dollars.

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I. EXECUTIVE SUMMARY

1. This initial environmental examination (IEE) report including an environmental management plan (EMP) has been prepared for the tranche 3 subprojects of the Asian Development Bank (ADB) multitranche financing facility (MFF) for the Guangxi Regional Cooperation and Integration Promotion Investment Program (hereafter referred to as the project) in the People's Republic of China (PRC). The IEE for tranche 3 is prepared in accordance with the requirements of the ADB's Safeguard Policy Statement (SPS 2009) as outlined in the Environmental Assessment and Review Framework (EARF) prepared for the investment program. The IEE is prepared on the basis of feasibility study reports (FSR), the transaction technical assistance's (TRTA) technical, environmental due diligence, and investment program policy dialogue discussions.

2. The government is preparing periodic financing request for tranche 3 of the program for $140 million. This tranche will cover investments in (i) small and medium enterprise (SME) development, including development of SMEs' business development service information center; (ii) developing cross-border e-commerce platforms; (iii) improving key infrastructure and services for border economic zones, such as cold-chain logistics; (iv) increasing physical and people's connectivity for regional cooperation and integration, covering key roads of crossing-border points; and (v) institutional strengthening and capacity building.

3. The project has four outputs: (i) support for SMEs in border areas expanded; (ii) integrated and interoperable cross border e-commerce platforms for the PRC and Viet Nam developed; (iii) key infrastructure and trade related services in Border Economic Zone provided, and technical and institutional support. The impacts of the project are that (i) economic growth potential of border areas in the PRC and Viet Nam realized; (ii) efficient transport and trade operations along GMS North–South Economic Corridor achieved; and (iii) economic integration between GZAR and rest of the GMS further strengthened. The outcome of the project will be benefits of regional cooperation and integration in border areas of Guangxi and northern Viet Nam captured.

4. Tranche 3 will be implemented from January 2022 to December 2024. The government of GZAR through Guangxi Foreign Loans Project Management Office (GPMO) will be the executing agency. Respective municipal governments will be the implementing agencies and state-owned enterprises at the local level will be the project implementing entities (PIEs).

5. The project will support construction of physical infrastructure facilities such as buildings, roads, water supply plant, warehouse and logistics infrastructure, and auxiliary facilities. Subproject 1 involves construction of education and culture entities over a construction area of 31,311.3 sqm and its associated auxiliary facilities. Subproject 2 involves construction of border trade infrastructure for agriculture industry over a total building area of 89,052 sqm. Subproject 3 will construct logistics facilities comprising a bonded warehouse adjacent to the newly constructed river port serving the economic zone, and a cold storage facility located close to rail and expressway junctions. Subproject 4 will involve construction of six new roads with a total length of around 12.4 km and construction of a water treatment plant with capacity of 15,000 tons/day. Subproject 5 will construct tourism facilities (buildings and centers and tourism road upgrade). Subproject 6 will involve construction of cross-border trade facilities (buildings and auxiliary facilities) with a total construction area of 84,000 sqm. All these facilities will be in

(i) Fangchenggang Municipality; (ii) Chongzuo Municipality; and (iii) Baise Municipality and Baise City in GZAR of PRC.

6. The project underwent appraisal during project preparation and was classified as category B based on comprehensive site visits and ADB's Rapid Environmental Assessment Checklist. All buildings will be constructed with access to necessary public utilities such as wastewater sewers, electricity, solid waste collection system, and water supply. Impacts that will arise from civil works will be minimal and localized (dust, noise, construction site safety). Domestically the project is classified as PRC category C on environment according to the Directory of Environmental Impact Assessment Categorization for Construction Project (2018). The implementing agencies will submit EIRs and environmental impact assessment registration forms online through the portal managed by Ministry of Ecology and Environment.

7. In the framework of the environmental due diligence, stakeholder consultations / meetings were carried out. Public consultations for the tranche 3 subprojects were conducted as part of domestic EIA preparation. Public consultations were also conducted by the TRTA environmental team as part of due diligence. Due considerations were given to coronavirus disease (COVID 19) safety aspects during the consultation process. Tools such as public participation questionnaire surveys were conducted as part of consultation process. The consulted persons and organizations expressed support to the project. Further consultations will take place before the start of construction works with due considerations to national and World Health Organization (WHO) guidelines on COVID-19 risks and meaningful consultation will continue throughout project implementation.

8. During construction, major anticipated impacts from tranche 3 subproject activities include (i) dust, noise, and soil runoff during construction; (ii) temporary traffic disturbances because of transportation of construction materials; (iii) risks to community and workers' health and safety during construction; and (iv) wastewater and solid waste generated during construction. Overall, construction-related impacts are localized, short term, and can be effectively mitigated through the application of good construction and housekeeping practices and implementation of construction phase community and occupational health and safety plans as defined in the EMP.

9. During operation, no major environmental impacts are anticipated. All buildings financed by the project will be constructed within designed areas with access to necessary public utilities such as wastewater sewers, electricity, solid waste collection system and water supply. All buildings will be designed in compliance with relevant design standards and codes for energy-efficient, safe and green public buildings, including but not limited to: GB 50011-2010 (Building Seismic Design Code); GB 50016-2006 (Code of Design on Building Fire Protection and Prevention); GB 50189- 2005 (Energy Conservation Design for Public Buildings) and other applicable national design codes. The use of volatile organic compound-emitting materials (including paints, coatings, adhesives, carpet, and furniture's) will be avoided to ensure high indoor air quality. The project will use refrigerant with zero or low global warming potential (GWP) to minimize GHG emission from the project. Cross-border impacts including wildlife and human trafficking have been assessed and covered in the IEE and EMP. The project's potential impacts on community and occupational health and safety during operation were analyzed and corresponding mitigation measures have been defined in the IEE and EMP.

10. An EMP has been developed for the design and pre-construction, construction, and operation phases of the project. The EMP sets out (i) actions to implement mitigation measures; (ii) a monitoring and reporting program; (iii) institutional/organizational arrangements; (iv)

capacity development and training; (v) an implementation schedule; and (vi) cost estimates. The total estimated cost of the EMP implementation is about $1.492 million (Appendix Table A7). Under the supervision of PMO, the implementing agencies will ensure that such funds are made available in a timely manner. The final EMP forms part of the project administration manual (PAM) and will be included as a separate annex in all bidding documents. The contractors will be made aware of their obligations to implement the EMP, to budget EMP implementation costs in their bids, and to develop site specific Construction EMP (CEMP) fully responsive to the project EMP.

11. Environmental risks and the assurances required to address these risks have been identified in this IEE. The majority of environmental risks are related to design features and operational plans which will avoid or mitigate impacts, but which rely on the implementers' commitment and capacity to implement and consistently follow-up.

12. Commitments by the executing agency and the implementing agency will be incorporated into the loan documentation as loan covenants to ensure that the mitigation measures are implemented in a timely and complete fashion, including a commitment to adhere to relevant design standards and codes for energy-efficient, safe, and green public buildings, and use of low GWP refrigerant.

13. The overriding assurance required is that the executing agency and the local government bodies as appropriate will ensure that the full range of effective measures set out in the IEE and EMP are undertaken, and guarantees that the environmental management provisions and the environmental monitoring plan will be implemented effectively during project implementation, and that the implementation reports of the environmental management and monitoring plan in accordance with ADB requirements will be submitted in a timely fashion. Part of this monitoring and management commitment will be a commitment to implement and maintain an appropriate grievance redress mechanism (GRM).

14. The IEE concludes that provided the environmental mitigation and management measures as defined in the EMP are properly implemented, all adverse environmental impacts associated with the project can be prevented, eliminated, or minimized to an acceptable level. Thus the project is feasible from an environment safeguards point of view.

15. This IEE including EMP is considered sufficient to meet the environmental assessment requirements of ADB and PRC. Therefore, a full environmental impact assessment study is not required. However, in case of any change in the project component or change in locations during detailed design, this IEE and EMP will be updated.

I. INTRODUCTION

1. This initial environmental examination (IEE) has been carried out to identify and assess the potential environmental risks and impacts of the subprojects proposed under tranche 3 of the Guangxi Regional Cooperation and Integration Promotion Investment Program (hereafter referred to as the project) in the People's Republic of China (PRC). This IEE has been conducted to meet the Asian Development Bank's (ADB) Safeguard Policy Statement (SPS 2009) requirements for financing the project.

A. BACKGROUND AND RATIONALE

2. **Background.** On 1 December 2016, ADB approved $450 million under the multitranche financing facility (MFF) Program to PRC - Guangxi Regional Cooperation and Integration Promotion Investment Program. Comprising three tranches, the investment program helps the Guangxi Zhuang Autonomous Region (Guangxi) implement its strategies and action plans for regional cooperation and integration with countries of the Association of Southeast Asian Nations, with a focus on developing the North-South Economic Corridor under the Greater Mekong Subregion (GMS) Cooperation Program. The program aims to (i) realize the economic growth potential for the border areas of Guangxi of the PRC and Viet Nam; (ii) improve efficiency of transport and trade operations along the GMS Cooperation Program; and (iii) strengthen economic integration between Guangxi and the rest of the GMS. Project implementation of the first two tranches is ongoing following its approval in December 2016 and April 2018, respectively.

3. The government is currently preparing periodic financing request for tranche 3 of the program. This tranche will cover investments in (i) small and medium enterprise (SME) development, including development of SMEs' business development service information center; (ii) developing cross-border e-commerce platforms; (iii) improving key infrastructure and services for border economic zones, such as cold-chain logistics; (iv) increasing physical and people's connectivity for regional cooperation and integration, covering key roads of crossing-border points; and (v) institutional strengthening and capacity building.

4. **Rationale**. *Unrealized Potential in Regional Cooperation and Investment.* The border areas of both the PRC and Viet Nam have been identified as key areas of accelerated development, taking advantage of opportunities offered by regional cooperation and investment, particularly in terms of improving cross-border connectivity and promoting cross-border economic activities. However, opportunities for regional cooperation and investment in the border areas of Guangxi and its neighboring provinces in Viet Nam have not been fully tapped. This has resulted in inefficient transport and trade operations along the GMS North-South Economic Corridor and unrealized economic growth potential in the border areas and beyond in both Guangxi and northern Viet Nam. This project will improve connectivity in these border areas thus achieving better regional cooperation and investment.

5. *Difficulties in Attracting Investment for Small and Medium Enterprises (SMEs) in Border Areas.* SMEs are generally less developed in border areas with weaker capacities and competitiveness, especially in their start-up phases. The project provides facilities for small and medium-sized enterprises through infrastructure construction.

6. With the continuous economic development of the two countries, the economic level of the people has been gradually improved, and the number of outbound tourists has also started to increase. Especially, border tourism is favored by the public because of the advantages of enjoying the exotic scenery within a short distance. In the context of national strategies, regional tourism and cross-border tourism, cooperation has been developing in an innovative way. This project will comprehensively improve the smart tourism, tourist gathering and distribution capacity and travel capacity of the tourism network of the whole Chongzuo City. The tourism resources of Chongzuo and surrounding counties and cities will be integrated and promoted as a whole. By using the locational advantage of Detian - Banyue transnational waterfall and combined with the tourism resources of Viet Nam, the mutual benefits of transnational tourism between China and Viet Nam can be realized.

7. Regional cooperation and integration (RCI) is an important means for the PRC to achieve greater integration with the global economic system. This has been highlighted as a priority in the 13th Five Year Plan (FYP) for 2016-2020, which committed the PRC to further development and strengthening international and regional economic cooperation, with a special focus on its neighboring countries. The proposed project aims to support participation of Guangxi in regional cooperation and integration, especially GMS program, with a focus on North-South economic corridor development. The project will enhance cooperation between the PRC and Viet Nam under the GMS framework, and is expected to have high regional cooperation and integration spillovers, benefitting also Viet Nam's northern border provinces including Quang Ninh, Lang Son and Cao Bang. RCI is also an integral part of ADB operations in the PRC. It is one of the five strategic priorities of the Country Partnership Strategy 2016-2020 for the PRC.

B. PROJECT IMPACTS AND OUTPUTS

8. The impacts of the project are that (i) economic growth potential of border areas in the PRC and Viet Nam realized; (ii) efficient transport and trade operations along GMS North–South Economic Corridor achieved; and (iii) economic integration between Guangxi Zhuang Autonomous Region (GZAR) and rest of the GMS further strengthened. The outcome of the project will be benefits of regional cooperation and integration in border areas of Guangxi and northern Viet Nam captured. The tranche 3 will deliver four outputs.

1) **Output 1: Support for SMEs in border areas expanded**. The two subprojects are the (i) Baise University Sino-Viet Nam Cross-border Training Center and (ii) Baise Agriculture Product Industry Chain Updating Project. The first involves expansion of Baise University to increase its training capacity in skills sought by local employers such as international trade, e-commerce, tourism, food security, agriculture, and language and translation, and includes an Art and Culture Exhibition Hall, Culture Exchange Performance Center, Sino-Viet Nam Training Center, E-commerce Laboratory, Data Center, and surrounding landscaping. The second subproject includes the construction of a facility with fruit sorting and packaging lines, fruit processing lines, a fruit and vegetable trading area, and refrigerated trucks and containers, having the initial aim of value addition for key agricultural products produced by local SMEs and their onward distribution by rail transport, but also having potential for handling agricultural imports from ASEAN countries.

2) **Output 2: Integrated and interoperable cross border e-commerce platforms for the PRC and Viet Nam developed.** The Chongzuo Cold Chain Logistics Demonstration subproject will construct logistics facilities comprising a bonded warehouse adjacent to the

newly constructed river port serving the economic zone, and a cold storage facility located close to rail and expressway junctions on the principal Pinxiang – Chongzuo – Nanning transport corridor. These facilities will serve companies located in the economic zone. The cold storage facility will also serve logistics providers transporting imported products brought overland from ASEAN countries, as well as products imported from the nearby seaports.

3) **Output 3: Key infrastructure and trade related services in Border Economic Zone provided.** The two subprojects are: (i) Phase II of subproject 1 of Tranche 2 (Chongzuo Sino-Viet Nam Border Economic Zone Demonstration Project) which involves the construction of 12.49 km (6 new roads) and a water treatment plant; and (ii) Fangchenggang Sino-ASEAN Trade and Culture Exchange Center involving the construction of experience stores, an exhibition center, a cross-border e-commerce logistics operation center and a cross-border financial settlement center. These subprojects support and strengthen the capacity of the BEZs, better promote Sino-Vietnamese regional cooperation, and deepen Sino-Vietnamese economic, trade and social relations.

4) **Output 4: Physical and informational connectivity and policy coordination improved**. Chongzuo Daxin Sino–Viet Nam Cross-border Tourism subproject will enhance GMS tourism sector cooperation through upgrading of two roads totaling 16.28 km in length, and construction of a visitor center to accommodate steadily rising visitor numbers to the Detian waterfall which lies on the China–Viet Nam border and is the site of a planned bilateral cross-border tourism cooperation zone.

9. Tranche 3 will be implemented from January 2022 to December 2024. The government of GZAR through GPMO will be the executing agency. Respective municipal governments will be the implementing agencies and state-owned enterprises at the local level will be the project implementing entities (PIEs).

C. TRANCHE 3 SUBPROJECTS

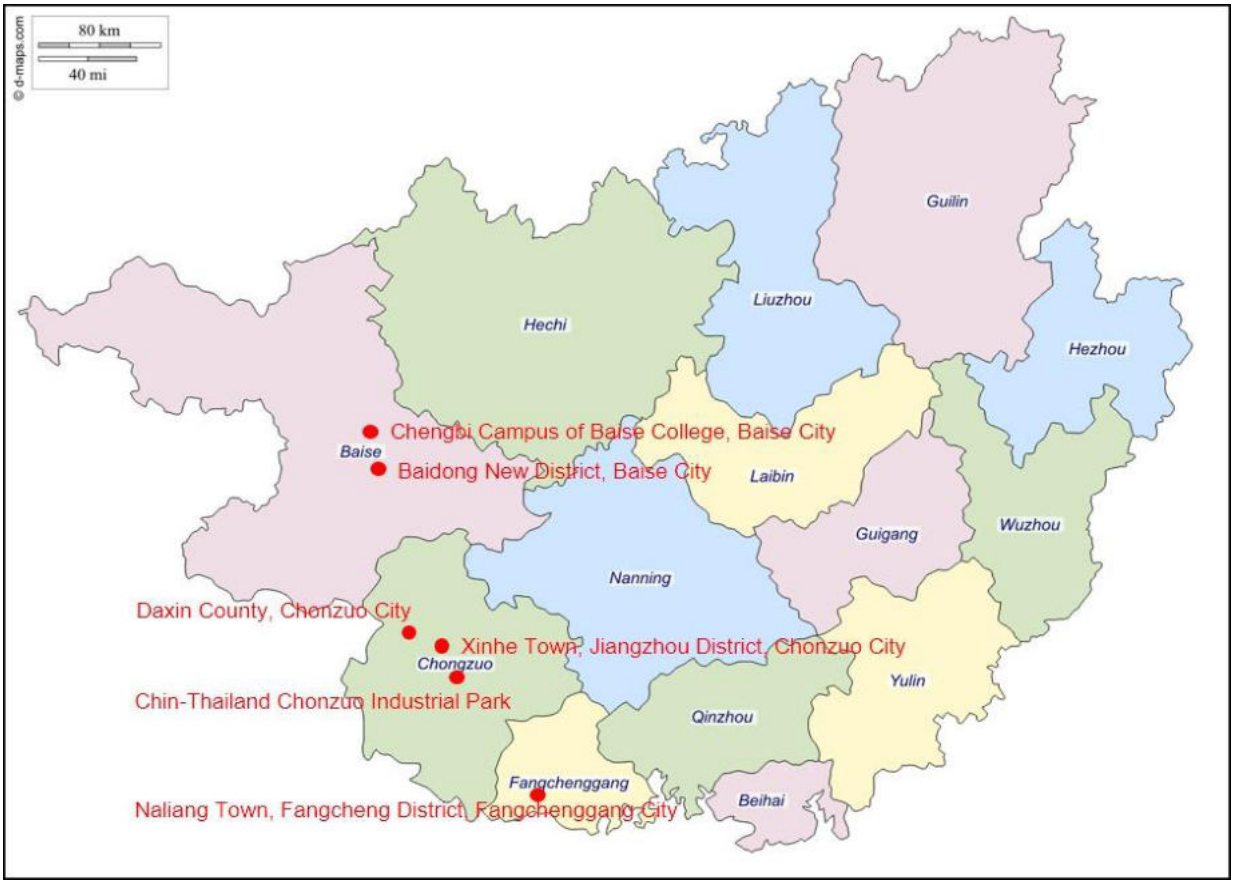
10. Tranche 3 consists of 6 subprojects. The geographical areas covered by tranche 3 of the Investment Program include four prefecture-level cities of: (i) Fangchenggang Municipality; (ii) Chongzuo Municipality and Daxin County; and (iii) Baise Municipality and Baise City in GZAR (Figure 1).

Table 1: Tranche 3 Subprojects

No.	Subproject Title	Summary of Subproject Content	Implementing Agency
1	Baise University Sino-Viet Nam Cross-border Training Center	Based on Baise University, a Sino-Vietnamese economy, culture and education exchange and training center functioned with teaching and training, conference reception, Sino-Vietnamese cultural exhibition, food and commodity trade exhibition will be built.	Baise College
2	Baise Cross-Border Agricultural Products Industry Chain Upgrading project	This project is the construction content of the first phase of the China-ASEAN (Baise) Agricultural Products Trade Center which includes two major construction works -- the cross-border agricultural product supply chain integrated service center, and the small and medium-sized enterprise green fruit and vegetable deep processing demonstration base.	Guangxi Baise Yihao Agricultural Development Co., Ltd.

No.	Subproject Title	Summary of Subproject Content	Implementing Agency
3	Chongzuo Cold Chain Logistics Demonstration Project	Build cold storage and bonded warehouse, build an integrated logistics hub information system	Guangxi Chongzuo City Industrial Investment Development Group Co., Ltd.
4	Chongzuo Sino- Viet Nam Border Economic Cooperation Zone Demonstration Project (Phase II)	Through the construction of the road network and the expansion of the water supply project of the sugar circular economy industrial park in Jiangzhou District, the income and living convenience of overseas Chinese residents, relocated poverty households and Vietnamese workers in the cooperation zone will be improved, and the laborers' competitiveness and enthusiasm of planting and breeding will be promoted to promote industrial transfer	Chongzuo Xinghe Investment Development Co., Ltd.
5	Chongzuo Daxin Sino-Viet Nam Cross-border Tourism Project	Improve the road network and connections, facilitate the construction of smart tourism.	Guangxi Daxin Anping Investment Group Co., Ltd.
6	Fangchenggang Sino-ASEAN Trade and Culture Exchange Center project	Build comprehensive service centers, exhibition centers, friendship building, cross-border financial settlement centers, cross-border e-commerce logistics operation centers, cross-border experience stores for ASEAN specialty commodities, quarantine inspection stations and infrastructure, to promote the functions of cross-border economic cooperation zones	Fangcheng District Agricultural Tourism Investment Co., Ltd., Fangchenggang City

Figure 1: Map of GZAR and Subproject Locations



D. PROJECT BENEFITS

11. This project will have the following benefits:

    (i) Improve connectivity in the border areas of Fangchenggang, Chongzuo and Baise thus achieving better regional cooperation and investment between the PRC and Viet Nam.
    (ii) Strengthen infrastructure construction for supporting SME development in border areas.
    (iii) Facilitate construction of cross-border tourism and build a Sino-Viet Nam cross-border smart tourism center.
    (iv) Through construction of warehousing and logistics infrastructure, a solid foundation for further expansion of foreign exchange and trade will be laid.

E. OBJECTIVE, SCOPE AND METHODOLOGY OF THE INITIAL ENVIRONMENTAL EXAMINATION

12. **Objective and scope of the initial environmental examination**. This IEE report documents the environmental assessment of the physical infrastructure to be developed under tranche 3, and identifies the environmental risks and issues to be considered in the project planning and design stages. The IEE addresses, as far as required, the environmental, health and safety management requirements of the ADB's SPS 2009 as well as those of the country safeguard system of PRC.

13. The objectives of the IEE are to:

    (i) assess the existing environmental conditions in the project areas including the identification of environmentally sensitive areas;
    (ii) provide guidance as to the assessment of suitability for construction locations;
    (iii) review any legislative and approval requirements under which construction activities can occur; and
    (iv) prepare an environmental management plan (EMP) incorporating mitigation and monitoring measures that will guide environmental management during project construction and operation.

14. The environmental studies have been confined to the subproject sites and its direct influence area. The IEE was based on proposed key construction activities. The corridor of impact is taken as a 200 m radius around the proposed facilities. However, the study area impact zone is considered up to 5 kilometer (km) radius to allow for coverage of indirect and induced impacts and a larger analysis of land use and other environmental features including the haulage of materials and equipment. Assessment is carried out on the environment elements of terrestrial and aquatic ecology, soil, water, air, noise, and socioeconomic aspects.

15. **Methodology and structure of the initial environmental examination**. The IEE has been conducted following the process established in the SPS 2009 and complies with the country safeguard system. The study was carried out based on reconnaissance survey to subproject sites, field visits, consultation with stakeholders, review of secondary data, identification of adverse impacts, and preparation of environmental management and monitoring plans. The stepwise activities carried out include:

    (i) review of legal requirements;

(ii) review of technical feasibility study reports;
(iii) reconnaissance survey for identification of key issues data requirement and preliminary consultations;
(iv) primary and secondary data collection;
(v) consultation with stakeholders; and
(vi) identification of impacts and mitigation measures.

16. **Structure of the initial environmental examination.** In compliance with ADB SPS 2009 requirements, this IEE consists of ten structured sections: (i) Introduction; (ii) Policy, Legal and Administrative Framework; (iii) Description of the Project; (iv) Description of the Environment; (v) Anticipated Environmental Impacts and Mitigation Measures; (vi) Analysis of Alternatives; (vii) Consultations, Participation, and Information Disclosure; (viii) Grievance Redress Mechanism; (ix) Environmental Management Plan; and (x) Conclusion and Recommendations. The executive summary is provided in the beginning of the report.

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

17. The IEE study for the project has been prepared in compliance with the ADB's and PRC's environmental statutes, policies, regulations and procedures. PRC is also a signatory to various international treaties, conventions, and protocols. The project will also be guided by the Environmental, Health, and Safety (EHS) Guidelines of the World Bank Group (WBG). The relevant policies and regulatory frameworks are discussed in following sections.

A. POLICY FRAMEWORK

18. **Regional Perspective**. The GMS Cooperation Program envisions a subregion that is more integrated, prosperous and equitable. This vision is pursued through a "3C" strategy of enhancing connectivity, improving competitiveness, and promoting a greater sense of community. To implement this strategy, the GMS countries have adopted an economic corridor approach whereby transport corridors will be expanded, trade and investment promoted, and economic growth stimulated. The PRC and Viet Nam are active participants in developing the GMS North-South Economic Corridor.

(i) As one of the two PRC provinces directly involved in the GMS cooperation, Guangxi has formulated a strategy and action plan for participation in the GMS program[1]. The medium-term plan aims to (a) further enhance connectivity with the rest of the GMS; (b) accelerate development of economic corridors with a special focus on developing border economic zones in partnership with Viet Nam; and (c) further improve trade and investment facilitation to promote cross-border economic activities.
(ii) The proposed project aims to support participation of Guangxi in regional cooperation and integration, especially the GMS program, with a focus on economic corridor development. The proposed project will enhance cooperation between the PRC and Viet Nam under the GMS framework, and is expected to have high regional cooperation and integration spillovers, also benefitting Viet Nam's northern border provinces including Quang Ninh, Lang Son and Cao Bang.

[1] Government of the Guangxi Zhuang Autonomous Region. 2014. Strategy and action plan for participation in the Greater Mekong Subregion Economic Cooperation Program, 2014-2022. Nanning.

19. **PRC Perspective**. (i) Regional cooperation and integration is an important means for the PRC to achieve greater integration with the global economic system. This has been highlighted as a priority in the 13th Five Year Plan (FYP) for 2016-2020[2], which committed the PRC to further opening up and strengthening international and regional economic cooperation, with a special focus on its neighboring countries. (ii) In 2015, the PRC announced plans to develop the so-called Silk Road Economic Belt and 21st Century Maritime Silk Road (the Belt and Road Initiative)[3]. This strategic initiative aims to promote connectivity and strengthen economic partnerships between and among Asian, European and African continents in the spirit of open regionalism. It cites five priorities for cooperation: (i) fostering economic and development policy coordination; (ii) strengthening connectivity by developing energy, transport and telecommunication infrastructure and harmonizing standards; (iii) promoting trade and investment through customs, sanitary and phyto-sanitary cooperation, implementation of World Trade Organization's *Trade Facilitation Agreement*, and development of economic zones and industry clusters; (iv) deepening financial cooperation and integration; and (v) promoting people-to-people exchanges. To implement the Belt and Road Initiative, Guangxi has developed its own action plan with special emphasis on strengthening cooperation with the members of the ASEAN, particularly the GMS countries[4].

20. **ADB Perspective**. Regional cooperation and integration is an integral part of ADB operations in the PRC. It is one of the five strategic priorities of the Country Partnership Strategy 2016-2020 for the PRC[5].

B. LEGAL AND ADMINISTRATIVE FRAMEWORK

21. The administrative framework for environmental impact assessment (EIA) in the PRC consists of national, provincial, and local (city and county) environmental protection authorities. The national authority is the Ministry of Environmental Protection (MEP), which promulgates laws, regulations, administrative decrees, technical guidelines, and environmental quality and emission standards on EIA and pollution prevention and control. At the provincial level are the Environmental Protection Departments (EPD), acting as the gatekeeper for EIA and pollution prevention and control in the province. They are often delegated the authority by MEP to approve EIA reports for development planning and construction projects in the provinces, except those with national interest and those that cross provincial boundaries that would need MEP approval. The local (city or county) Ecology and Environment Bureau (EEB) enforce environmental laws and conduct environmental monitoring within city or county limits. Local EEBs could be delegated the authority to approve EIA reports by the provincial EPDs.

[2] Government of the People's Republic of China. 2016. The 13th Five Year Plan for National Economic and Social Development.
[3] National Development Reform Commission, Ministry of Foreign Affairs, and Ministry of Commerce. 2015. Vision and actions on jointly building the Silk Road Economic Belt and the 21st Century Maritime Silk Road. Issued on 28 March 2015 with authorization from the State Council of the PRC.
[4] Government of the Guangxi Zhuang Autonomous Region. 2016. Recommendations on implementing the initiative of building Silk Road Economic Belt and 21st Century Maritime Silk Road. Nanning.
[5] Asian Development Bank. 2016. Transforming partnership: People's Republic of China and Asian Development.

22. EPDs and EEBs are supported by Environmental Monitoring Stations (EMS), which are subsidiaries of EPDs or EEBs and are qualified entities to carry out environmental monitoring. The PRC has a qualification and registration system for EIA and only qualified and registered institutes and individuals are allowed to undertake EIA.

23. China has a complete set of supervision and management measures for the preparation of environmental impact assessment report (Table 2). According to the "Supervision and Management Measures for Preparation of Construction Project's Environmental Impact Report (Form)" which is issued on September 2019, "the construction unit may entrust technical units to conduct environmental impact assessments and prepare environmental impact reports (tables); if the construction unit has the technical capability, the environmental impact assessment can be organized by itself, so does the EIA report. Technical units shall not have any inter relationship with environmental and other regular authorities who will review the environmental impact report (form). No unit or individual may designate a technical unit for the construction unit to prepare the environmental impact report (form). The technical unit refers to the unit that has the technical capability of preparation of environmental impact assessment and can be entrusted to prepare the environmental impact report (form) for the construction unit."

C. LAWS, REGULATIONS, GUIDELINES AND STANDARDS

24. **PRC Requirements.** Table 2 lists the PRC's environmental laws, regulations, decrees, guidelines, and standards relevant to this project. These comprehensive requirements cover environmental protection and impact assessment; pollution prevention and control of air, noise, water, ecology and solid waste; and are supported by technical guidelines and standards for assessing atmospheric, noise, water, and ecological impacts.

Table 2: Relevant PRC Laws, Regulations, Decrees, Guidelines, and Standards

Laws	
1	*Water Pollution Prevention and Control Law*, 1984 (amended in 2017)
2	*Wild Animal Protection Law*, 1988 (amended in 2018)
3	*Environmental Protection Law*, 1989 (amended in 2014)
4	*Soil and Water Conservation Law*, 1991 (amended in 2010)
5	*Solid Waste Pollution Prevention and Control Law*, 1995 (amended in 2020)
6	*Environmental Noise Pollution Prevention and Control Law*, 1996 (amended in 2018)
7	*Atmospheric Pollution Prevention and Control Law*, 2000 (amended in 2018)
8	*Occupational Disease Prevention and Control Law*, 2001(amended in 2018)
9	*Water Law*, 2002(amended in 2016)
10	*Environmental Impact Assessment Law*, 2002(amended in 2018)
11	*Cultural Relics Protection Law*, 2002 (amended in 2017)
Regulations	
12	*Natural Reserve Ordinance*, 1994(amended in 2017)
13	*Wild Plant Protection Ordinance* 1996(amended in 2017)

14	*Construction Project Environmental Protection Management Ordinance*, 1998(amended in 2017)
15	*Cultural Relics Protection Law Implementation Ordinance*, 2003(amended in 2016)
16	*Plan Environmental Impact Assessment Ordinance*, 2009
Decrees and Announcements	
17	*Circular on Strengthening the Management of Environmental Impact Assessment for Construction Projects Financed by International Financial Organizations*, (MEP Announcement [1993] No.324)
18	*The Interim Measures for The Acceptance of Environmental Protection for the Completion of Construction Projects, National Environmental Planning and Environmental Assessment [2017] No. 4*
19	*Specifications on the Management of Urban Construction and Demolition Waste* (Ministry of Construction Decree [2005] No. 139)
20	*Management Procedures for the Supervision, Inspection and Environmental Acceptance of Construction Projects under the "Three Simultaneities"* (on trial) (MEP Announcement [2009] No. 150)
21	*Management Measures for Operation of the Environmental Complaint Hotline* (MEP Decree [2010] No. 15)
22	*Opinion from the State Council on Important Tasks for Strengthening Environmental Protection* (State Council Announcement [2011] No. 35)
23	*Measures for Environmental Supervision* (MEP Decree [2012] No. 21)
24	*Requirement for Preparation of Environmental Impact Report Summary* (MEP Announcement [2012] No. 51)
25	*Announcement on Stepping Up the Strengthening of Environmental Impact Assessment Management for Prevention of Environmental Risk* (MEP Announcement [2012] No. 77
26	*Atmospheric Pollution Prevention and Control Action Plan* (State Council Announcement [2013] No. 37)
27	*Policy on Integrated Techniques for Air Pollution Prevention and Control of Small Particulates* (MEP Announcement [2013] No. 59)
28	*Guideline on Government Information Disclosure of Construction Project Environmental Impact Assessment (on trial)* (MEP Announcement [2013] No. 103)
29	*Directory for the Management of Construction Project Environmental Impact Assessment Categorization* (MEP Decree [2015] No. 33) (amended in 2018)
30	*Measures for Public Participation in Environmental Protection* (MEP Decree [2015] No. 35)
31	*Management Measures for Environmental Impact Post Assessment of Construction Projects* (on trial) (MEP decree [2015] No. 37)
Guidelines	
32	HJ 2.1-2016 *Technical Guidelines for Environmental Impact Assessment – General Program*
33	HJ 2.2-2018 *Guidelines for Environmental Impact Assessment – Atmospheric Environment*
34	HJ/T 2.3-2018 *Technical Guidelines for Environmental Impact Assessment – Surface Water Environment*
35	HJ 2.4-2009 *Technical Guidelines for Noise Impact Assessment*
36	HJ 19-2011 *Technical Guidelines for Environmental Impact Assessment – Ecological Impact*

37	HJ 130-2014 *Technical Guidelines for Plan Environmental Impact Assessment - General Principles*
38	HJ 192-2015 *Technical Criterion for Ecosystem Status Evaluation*
39	HJ/T 393-2007 *Technical Specifications for Urban Fugitive Dust Pollution Prevention and Control*
40	HJ 610-2016 *Technical Guidelines for Environmental Impact Assessment – Groundwater Environment*
41	HJ 616-2011 *Guidelines for Technical Review of Environmental Impact Assessment on Construction Projects*
42	HJ 623-2011 *Standard for the Assessment of Regional Biodiversity*
43	HJ 630-2011 *Technical Guideline on Environmental Monitoring Quality Management*
44	HJ 663-2013 *Technical Regulation for Ambient Air Quality Assessment* (on trial)
54	JG/J 146-2004 *Environmental and Hygiene Standards for Construction Sites*
55	*Technical Guidelines for Environmental Impact Assessment - Public Participation (public comment version), (January 2011)*
Standards	
56	GB 3095-2012 *Ambient Air Quality Standards* (amended in 2018)
57	GB 3096-2008 *Environmental Quality Standard for Noise*
58	GB 3838-2002 *Environmental Quality Standards for Surface Water*
59	GB 8978-1996 *Integrated Wastewater Discharge Standard*
60	GB 10070-88 *Standard of Environmental Vibration in Urban Area*
61	GB 12523-2011 *Emission Standard of Environmental Noise for Boundary of Construction Site*
62	GB/T 14529-93 *Principle for Categories and Grades of Nature Reserves*
63	GB 14554-93 *Emission Standards for Odor Pollutants*
64	GB/T 14848-93 *Quality Standard for Ground Water*
65	GB/T 15190-2014 *Technical Specifications for Regionalizing Environmental Noise Function*
66	GB 15618-1995 *Environmental Quality Standard for Soils*
67	GB 16297-1996 *Air Pollutant Integrated Emission Standards*
68	GB 22337-2008 *Emission Standard for Community Noise*
69	GB 50118-2010 *Design Specifications for Noise Insulation of Buildings for Civil Use*

25. **Environmental Protection.** The most far-reaching law on pollution prevention and control is the *Environmental Protection Law* (EPL) (1989, amended in 2014) (item #3 in Table 2). When promulgated in 1989, it set out key principles for the nation's pollution control system, including the policy known as the "Three Simultaneities", the application of pollution levy, and requirements for EIA. The EPL was amended in 2014 and the amended EPL took effect on 1 January 2015. The implementation of "Three Simultaneities" was further strengthened by the decree on its management procedures (items #19 and #21) and the *Construction Project Environmental Protection Management Ordinance* (item #18).

26. Public Participation and Environmental Information Disclosure provisions are among the most significant changes introduced in the amended EPL, further supported by the decrees on the preparation of EIA summaries for the purpose of public disclosure (item #24), information disclosure on construction project EIAs by government (item #28), method for

public participation in environmental protection (item #30), and technical guidelines (for comment) for public participation in EIAs (item #55).

27. The amended EPL further defines enforcement and supervision responsibilities at all levels of environmental protection authorities, imposes stricter obligations and more severe penalties on enterprises and construction units regarding pollution prevention and control, and allows for environmental public interest litigation including through nongovernment organizations. The procedures and requirements for the technical review of EIA reports by authorities have been specified (item #41). Environmental inspection and enforcement on design, installation, and operation of project-specific environmental protection and control measures are regulated under the "Three Simultaneities" (items #3, #18, #20,).

28. For grievance redress, a hotline number 12369 has been established at each level of environmental protection authority throughout the nation since March 2011 for receiving and resolving environmental complaints in accordance with the *Management Measures for Operation of the Environmental Complaint Hotline* (MEP Decree [2010] No. 15] (item #21).

29. The EPL also provides protection for community health, with protection of occupational health and safety provided by the *Occupational Disease Prevention and Control Law* (2001) (item #8), and environmental and hygiene standards for construction sites (item #54).

30. **Environmental Impact Assessment.** EIA is governed by the *Environmental Impact* Assessment *Law* (2018) (item #10), covering EIAs for (i) plans (such as new development areas and new industrial parks) and strategic studies which could also be deemed as strategic environmental assessments (SEA), and (ii) construction projects. This was followed by the promulgation of two regulations: *The Construction Project Environmental Protection Management Ordinance* (2017) (item #14) and the *Plan Environmental Impact Assessment Ordinance* (2009) (item #16). Both require early screening and environmental categorization.

31. A recent MEP decree, the *Directory for the Management of Construction Project Environmental Impact Assessment Categorization* (MEP Decree [2015] No. 33) (item #29), classifies EIAs for construction projects into three categories with different reporting requirements, based on the "significance" of potential environmental impact due to the project and the environmental sensitivity of the project site as described in this directory. An EIR is required for construction projects with potential significant environmental impacts. An EIT is required for construction projects with less significant environmental impacts. An EIRF is required for construction projects with the least significant environmental impacts. Environmentally sensitive areas, as defined in the Decree, involve three categories: (i) nature reserves and protected areas, scenic areas, world cultural and natural heritage sites, drinking water source protection zones; (ii) basic farmland and grassland, forest parks, geological parks, important wetland, natural woodland, critical habitats for endangered plant and animal species, important aquatic spawning/nursery/ wintering/migration grounds, regions suffering from water resource shortage, serious soil erosion areas, desertification protection areas, eutrophic water bodies; and (iii) inhabited areas with major residential, health care, scientific research, and administration functions, cultural heritage protection sites, and protection areas with historical, cultural, scientific, and ethnic values.

32. **Follow-Up Actions on Environmental Impact Assessment.** In 2015, MEP issued a decree, *Management Measures for Environmental Impact Post Assessment of Construction Projects* (MEP decree [2015] No. 37) (item #31) to have, on a trial basis and

effective 1 January 2016, follow-up actions between 3 to 5 years after commencement of project operation for large infrastructure and industrial projects or projects located in environmentally sensitive areas. Such actions would include environmental monitoring and impact assessment to verify the effectiveness of environmental protection measures and to undertake any corrective actions that might be needed. The decree also specifies that the institute that does the original impact assessment for the project cannot undertake environmental impact post assessment for the same project.

33. **Guidelines and Standards.** MEP has issued a series of technical guidelines for preparing EIAs. These include impact assessment guidelines on general EIA program and principles (items #32 and #37), atmospheric environment (item #33) and ambient air quality (item #44), noise (item #35), surface water (item #34), ground water (item #40), ecology (items #36 and #38) and regional biodiversity (item #42), biodiversity monitoring of various biota (items #45 to #53), quality management on environmental monitoring (item #43), and public participation (item #55). Standards issued by MEP generally consist of environmental quality (ambient) standards (applicable to the receiving end) and emission standards (applicable to the pollution source). The former includes standards for ambient air quality (item #56), noise (item #57) and vibration (item #60), surface water (item #58), groundwater (item #64), soil (item #66), etc. The latter includes standards for integrated wastewater discharge (item #59), construction noise (item #61) and community noise (item #68), odor (#63) and air pollutants (#67), etc.

34. **Use and Management of Refrigerants:** The PRC adopted the Kigali Amendment to the Montreal Protocol in 2016. The Kigali Amendment builds on the timetable for elimination of production and use of chlorofluorocarbons (CFCs) and control of ozone depleting substances (ODS), phaseout of the use of hydrochlorofluorocarbons (HCFCs), and sets timetables for deep reductions in production and consumption of HFCs. The Ministry of Environment has developed national policies for implementing those reductions across various sectors with their replacement by use of low global warming potential (GWP) alternatives. These include natural refrigerants such as hydrocarbons (HCs), ammonia (NH3) and carbon dioxide (CO2) and lower GWP hydrofluorocarbons (HFCs). The PRC has international safety standards for refrigeration systems such as ISO 5149 (GB9237).

D. ASIAN DEVELOPMENT BANK SAFEGUARDS POLICY AND REQUIREMENTS

35. The implementation of the proposed tranche subprojects under investment program must also comply with the environmental safeguards' requirements of ADB. The SPS 2009 sets out the policies and principles for the protection of the environment and communities.

36. The SPS 2009 requires that through a process of screening, categorization and assessment any ADB-financed investment will: (i) reflect fully the policy objectives and relevant policy principles and safeguard requirements during preparation and implementation of projects and/or components; (ii) explain the general anticipated impacts of the investment and/or components; (iii) specify the requirements that will be followed for information disclosure, meaningful consultation, and grievance redress mechanism; (iv) describe implementation procedures and responsibilities, including budgets, institutional arrangements, and capacity development requirements; and (v) specify monitoring and reporting requirements.

37. This will be achieved through the identification of the impacts associated with construction of physical infrastructure facilities under the project and the establishment of appropriate mitigating measures to avoid and/or minimize/manage adverse impacts and risks (and/or provide compensation for impacts that cannot be avoided) as established by the process and procedures included in the SPS 2009.

38. ADB uses a classification system to reflect the significance of a project's potential environmental impacts. A project's category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. Each proposed project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. Projects are assigned to one of the following four categories:

    (i) **Category A.** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.
    (ii) **Category B.** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required.
    (iii) **Category C.** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.
    (iv) **Category FI.** A proposed project is classified as category FI if it involves investment of ADB funds to or through a Financial Intermediary (FI).

39. The ADB will review, evaluate and assess the capacity of the borrower/client to properly manage the environmental and social impacts and risks of the project and to implement the relevant national laws and regulations and the ADB requirements. If gaps are identified relative to the existing national laws for safeguards and ADB requirements or if there are apparent gaps in the borrower/client capacity, details of the specific requirements to fill gaps will need to be incorporated in the EMP to ensure compliance with the policy and principles of the ADB's SPS.

40. This IEE has been carried out to ensure that potential adverse environmental impacts associated with development physical infrastructure facilities under tranche 3 are addressed according to the Asian Development Bank Safeguard Policy Statement (SPS) 2009.

E. CATEGORIZATION OF THE PROJECT

41. **ADB Category**. The proposed project is classified as category B for environment for tranche 3 subprojects based on comprehensive site visits and ADB's Rapid Environmental Assessment Checklist. It is found that all the physical infrastructure to be constructed under tranche 3 subprojects are unlikely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. Impacts that will arise from civil works will be minimal and localized (dust, noise, waste, construction site safety). In compliance with ADB's SPS 2009, an initial environmental examination (IEE) including an EMP was

developed, covering the design and pre-construction, construction, and operation of the project.

42. **Domestic (People's Republic of China) category.** According to the Directory of Environmental Impact Assessment Categorization for Construction Project (2018), EITs should be prepared for subprojects 1, 2, 4, 5 and 6, which have less significant environmental impacts, while an EIRF should be prepared for subproject 3 which has the least significant environmental impacts. The implementing agency will submit an environmental impact assessment registration form online through the portal managed by Ministry of Ecology and Environment.

F. INTERNATIONAL AGREEMENTS

43. The PRC is a signatory to several international agreements relevant to environment protection. Those with direct relevance to the project are listed below.

Table 3: International Agreements with the PRC as a Signatory

No.	Name of Agreement	PRC Signing Date	Agreement Objective
1	*Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat*	1975.12.21	To stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the wetlands' ecological functions and their economic, cultural, scientific, and recreational values
2	*Montreal Protocol on Substances That Deplete the Ozone Layer*	1989.01.01	To protect the ozone layer by controlling emissions of substances that deplete it
3	*Convention on Biological Diversity*	1993.12.29	To develop national strategies for the conservation and sustainable use of biological diversity
4	*United Nations Framework Convention on Climate Change*	1994.03.21	To achieve stabilization of greenhouse gas concentrations in the atmosphere at a low enough level to prevent dangerous anthropogenic interference with the climate system
5	*United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification*	1996.12.26	To combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements
6	*Kyoto Protocol to the United Nations Framework Convention on Climate Change*	2005.02.23	To further reduce greenhouse gas emissions by enhancing the national programs of developed countries aimed at this goal and by establishing percentage reduction targets for the developed countries

G. EVALUATION STANDARDS

44. In the PRC, ambient conditions of air, noise, and water quality in the project area determine the appropriate category of emissions and effluent standards for the construction and operational phases of built infrastructure. The World Bank Group (WBG) Environmental Health and Safety (EHS) guidelines (see below) are based on international best practice construction and operational procedures. Both the PRC standards and World Bank Group (WBG) EHS guidelines are used in the assessments.

45. **Air Quality.** The PRC ranks air quality into two classes according to its *Ambient Air Quality Standard* (GB 3095-2012) (amended in 2018). Class I standard applies to nature reserves, scenic areas, and regions requiring special protection. Class II standard applies to residential areas, mixed residential/commercial areas, cultural areas, industrial zones, and rural areas. Only in subproject 5 Chongzuo (Daxin County) Sino-Viet Nam cross-border tourism integrated promotion project, some road sections are classified in category I of "Ambient Air Quality Standards", while all other assessed subproject areas are classified in category II of "Ambient Air Quality Standards". The WBG takes the World Health Organization standards as its environmental, health and safety standards for air quality.

46. According to the requirements in the Regulations on Air Pollution Prevention and Control in Guangxi Zhuang Autonomous Region (2018.11), the provisions related to this project are:

    (i) County level government or above shall take measures to encourage and support the preferential use of natural gas, liquefied petroleum gas, electricity, or other clean energy in new industrial projects.
    (ii) Newly built industrial parks should support the construction of centralized heating and gas supply facilities, and implement central heating and gas supply to meet the requirements of circular economy and clean production.
    (iii) The pollutant discharge unit shall strengthen the precise management of air pollutant discharge, adopt measures such as sealing, enclosure, covering, centralized collection, covering, adsorption, cleaning, and spraying to the air pollutants that are not concentratedly discharged through discharge pipes, control the discharge of dust and gaseous pollutants generated during the production process and the storage, transmission, loading and unloading of internal materials.
    (iv) For the activities that will produce waste gas with volatile organic compounds, the raw materials and processes with low volatile organic compounds should be used and operated in confined spaces or equipment in accordance with regulations, and pollution prevention facilities should be also installed and used.

47. The WHO established air quality guideline (AQG) standards for various air quality parameters for the protection of public health. Yet recognizing that progressive actions are needed to achieve these standards and the financial and technological limitations of some countries, cities or localities especially in developing countries, the WHO also established interim targets as intermediate milestones towards achieving the AQG.

48. Table 4 compares PRC's GB 3095–2012 *Ambient Air Quality Standards* and the WBG's EHS standard which has adopted the WHO AQG. The longer averaging period such as 1 year is more applicable to assessing impacts from multiple as well as regional sources; while shorter averaging periods such as 24 hours and 1 hour are more applicable to assessing short-term impacts from project-related activities, such as from peak hour traffic or daily or peak construction activities.

Table 4: Comparison of PRC and WBG Ambient Air Quality Standards

Air Quality Parameter	Averaging Period	PRC GB 3095-2012 (μg/m^3)		WHO/World Bank Group EHS[11] (μg/m^3)	
		Class I	Class II	Interim Targets	AQG
SO_2	1-year	20	60	n/a	n/a
	24-hour	50	150	50 - 125	20
	1-hour	150	500	n/a	n/a
	1-year	80	200	n/a	n/a

Air Quality Parameter	Averaging Period	PRC GB 3095-2012 (μg/m^3)		WHO/World Bank Group EHS[11] (μg/m^3)	
		Class I	Class II	Interim Targets	AQG
TSP	24-hour	120	300	n/a	n/a
PM_{10}	1-year	40	70	30 - 70	20
	24-hour	50	150	75 - 150	50
$PM_{2.5}$	1-year	15	35	15 - 35	10
	24-hr	35	75	37.5 - 75	25
NO_2	1-year	40	40	n/a	40
	24-hour	80	80	n/a	n/a
	1-hour	200	200	n/a	200
CO	24-hour	4,000	4,000	n/a	n/a
	1-hour	10,000	10,000	n/a	n/a
Note: n/a = not available					

49. The following observations are made comparing PRC and WBG ambient air quality standards as shown in Table 4, showing that WBG interim targets are comparable to PRC's GB 3095–2012 Class II standards:

    (i) 24-hr SO_2: upper limit of EHS interim target (125 μg/m^3) is more stringent than GB Class II standard (150 μg/m^3);
    (ii) 24-hour PM_{10}: the upper limit of the EHS interim target (125 μg/m^3) is the same as GB Class II standard;
    (iii) 24-hr $PM_{2.5}$: the upper limit of the EHS interim target (75 μg/m^3) is the same as GB Class II standard; and
    (iv) 24-hour NO_2: the EHS AQG (200 μg/m^3) is the same as GB Class II standard.

50. Emission standards of fugitive particulate matter (such as dust) from construction sites are regulated under the PRC's *Air Pollutant Integrated Emission Standard* (GB 16297–1996). For particulate matter, the maximum allowable emission concentration is 120 mg/m^3 and the concentration limit at the boundary of construction sites is ≤ 1.0 mg/m^3.

51. **Noise.** GB 3096–2008 categorizes five functional areas based on their tolerance to noise pollution: from Category 0 to Category 4. Category 0 is for areas with convalescent facilities that are the least tolerant to noisy environment and therefore has the most stringent day and nighttime noise standards. Category 1 is for areas predominated by residential areas, hospitals and clinics, educational institutions, and research centers. Category 2 is for areas with mixed residential and commercial functions. Category 3 is for areas with industrial production and storage and logistics functions. Category 4 is for regions adjacent to traffic noise sources such as major roads and railways and is subdivided into 4a and 4b with the former applicable to major road (road class II and above) and marine traffic noise, and the latter applicable to rail noise.

52. Standards for various functional area categories are compared with the WBG's EHS guidelines in Table 5, showing that the EHS guidelines have lower noise limits for residential, commercial, and industrial mixed areas but higher noise limits for industrial areas. The EHS guidelines do not have separate noise limits for major roads but apply the same noise limits based on whether the areas are for residential or industrial use.

Table 5: Environmental Quality Standards for Noise

[LAeq: dB(A)]

Noise Functional Area Category	Applicable Area	GB 3096-2008 Standards		WBG EHS[12] Standards	
		Day 06:00-22:00	Night 22:00-06:00	Day 07:00-22:00	Night 22:00-07:00
0	Areas needing extreme quiet, such as convalescence areas	50	40	55	45
1	Areas mainly for residence, hospitals, cultural and educational institutions, administration offices	55	45		
2	Residential, commercial and industrial mixed areas	60	50		
3	Industrial areas, warehouses and logistic parks	65	55	70	70
4a	Area within 35 m on both sides of trunk road (class II and above)	70	55	55	45

53. The PRC's *Emission Standard of Environmental Noise for Boundary of Construction Site* (GB 12523–2011) regulates construction noise, limiting construction noise levels at the boundary of construction site to 70 dB(A) in the daytime (0600–2200 hours) and 55 dB(A) at night (2200–0600 hours). The WBG does not have standards for construction noise *per se* but applies the same noise standards listed in Table 5 above to the receptors during construction activities.

54. **Surface Water Quality.** For water quality assessment, the determining standard is the PRC's *Environmental Quality Standards for Surface Water* (GB 3838–2002) (Table 6). It defines five water quality categories for different environmental functions. Category I is the best, suitable for head waters and national nature reserves. Category II is suitable for drinking water sources in Class I protection areas, habitats for rare aquatic organisms, breeding grounds for fish and crustaceans, and feeding grounds for fish fry. Category III is suitable for drinking water sources in Class II protection areas, wintering grounds for fish and crustaceans, migration routes, water bodies for aquaculture and capture fishery, and swimming activities. Category IV is suitable for general industrial use and non-contact recreational activities. Category V is the worst which is only suitable for agricultural and scenic water uses.

Table 6: Environmental Quality Standards for Surface Water GB 3838–2002

Parameter	Water Quality Category				
	I	II	III	IV	V
pH	6 ~ 9	6 ~ 9	6 ~ 9	6 ~ 9	6 ~ 9
Dissolved oxygen (DO) [mg/L]	90% saturation or ≥7.5	≥6	≥5	≥3	≥2
Permanganate index (I_{Mn}) [mg/L]	≤2	≤4	≤6	≤10	≤15
Chemical oxygen demand (COD) [mg/L]	≤15	≤15	≤20	≤30	≤40
5-day Biochemical oxygen demand (BOD_5) [mg/L]	≤3	≤3	≤4	≤6	≤10
Ammonia nitrogen (NH_3-N) [mg/L]	≤0.15	≤0.5	≤1.0	≤1.5	≤2.0
Total phosphorus (as P) [mg/L]	≤0.02	≤0.1	≤0.2	≤0.3	≤0.4
Lakes & reservoirs	≤0.01	≤0.025	≤0.05	≤0.1	≤0.2

Total nitrogen (lakes, reservoirs, as N) [mg/L]	≤0.2	≤0.5	≤1.0	≤1.5	≤2.0
Copper (Cu) [mg/L]	≤0.01	≤1.0	≤1.0	≤1.0	≤1.0
Zinc (Zn) [mg/L]	≤0.05	≤1.0	≤1.0	≤2.0	≤2.0
Fluoride (as F^-) [mg/L]	≤1.0	≤1.0	≤1.0	≤1.5	≤1.5
Selenium (Se) [mg/L]	≤0.01	≤0.01	≤0.01	≤0.02	≤0.02
Arsenic (As) [mg/L]	≤0.05	≤0.05	≤0.05	≤0.1	≤0.1
Mercury (Hg) [mg/L]	≤0.0005	≤0.0005	≤0.0001	≤0.001	≤0.001
Cadmium (Cd) [mg/L]	≤0.001	≤0.005	≤0.005	≤0.005	≤0.01
Chromium (Cr, hexavalent) [mg/L]	≤0.01	≤0.05	≤0.05	≤0.05	≤0.1
Lead (Pb) [mg/L]	≤0.01	≤0.01	≤0.05	≤0.05	≤0.1
Cyanide (CN) [mg/L]	≤0.005	≤0.05	≤0.2	≤0.2	≤0.2
Volatile phenol [mg/L]	≤0.002	≤0.002	≤0.005	≤0.01	≤0.1
Total petroleum hydrocarbon (TPH) [mg/L]	≤0.05	≤0.05	≤0.05	≤0.5	≤1.0
Anionic surfactant (=LAS) [mg/L]	≤0.2	≤0.2	≤0.2	≤0.3	≤0.3
Sulfide [mg/L]	≤0.05	≤0.1	≤0.2	≤0.5	≤1.0
Fecal coliform bacteria [number/L]	≤200	≤2000	≤10000	≤20000	≤40000

55. Discharge of wastewater from construction sites is regulated under the PRC's *Integrated Wastewater Discharge Standard* (GB 8978–1996) (Table 7). Class 1 standard applies to discharge into Category III water bodies under GB 3838–2002. Class 2 standard applies to discharge into categories IV and V water bodies. Class 3 standard applies to discharge into municipal sewers going to municipal wastewater treatment plants (WWTPs) with secondary treatment. No new discharge of wastewater into Categories I and II water bodies is allowed. The WBG does not have ambient water quality standard and recognizes the use of national and local ambient water quality criteria for EHS purpose.

Table 7: Standards for Discharging Wastewater from Construction Sites GB 8978–1996

Parameter		**Class 1** (for discharging into Category III water body)	**Class 2** (for discharging into Categories IV and V water body)	**Class 3** (for discharging into municipal sewer)
pH	no unit	6 ~ 9	6 ~ 9	6 ~ 9
SS	mg/L	70	150	400
BOD_5	mg/L	20	30	300
COD	mg/L	100	150	500
TPH	mg/L	5	10	20
Volatile phenol	mg/L	0.5	0.5	2.0
NH_3-N	mg/L	15	25	---
PO_4^{2-} (as P)	mg/L	0.5	1.0	---
LAS (= anionic surfactant)	mg/L	5.0	10	20

56. **Soil Quality**. Soil quality in the PRC is divided into three classes according to the *Environmental Quality Standard for Soils* (GB 15618-1995). Class 1 represents the best and Class 3 the worst (Table 8). The WBG does not have EHS standards for soil quality.

Table 8: Soil Quality Standard GB 15618-1995

Parameter / Soil pH	Maximum Allowable Concentration (mg/kg dry weight)				
	Class 1	Class 2			Class 3
	Background	<6.5	6.5~7.5	>7.5	>6.5
Cadmium (Cd)	0.20	0.30	0.30	0.60	1.0
Mercury (Hg)	0.15	0.30	0.50	1.0	1.5
Arsenic (As) Paddy	15	30	25	20	30
Dry land	15	40	30	25	40
Copper (Cu) Farmland	35	50	100	100	400
Orchard	---	150	200	200	400
Lead (Pb)	35	250	300	350	500
Chromium (Cr)Paddy	90	250	300	350	400
Dry land	90	150	200	250	300
Zinc (Zn)	100	200	250	300	500
Nickel (Ni)	40	40	50	60	200
DDT	0.05	0.50			1.0
666 (Lindane)	0.05	0.50			1.0

H. ASSESSMENT AREA (PROJECT AREA OF INFLUENCE), ASSESSMENT PERIOD, AND EVALUATION STANDARDS FOR THE PROJECT

57. The assessment area or the project area of influence, was determined based on potential impact distances of various environmental parameters. The assessment levels assigned by the local environmental authorities for various environmental parameters, and guidance provided in the PRC's series of Technical Guidelines for EIA (see Table 2, items #33-37) were considered. Table 9 shows the assessment areas and the PRC's evaluation standards adopted for this project. A comparison of the PRC standards with internationally accepted standards (as defined in the WBG EHS Guidelines) was conducted for the IEE. The comparison confirmed that the PRC standards are either internationally accepted or have comparable standard limits with most of the international standards.

Table 9: Assessment Area and PRC Evaluation Standards Adopted for this Project

Type of Standard	Environmental Media	Applicable PRC Standard	Project Area of Influence
Environmental quality standard	Ambient air quality	Some road sections of subproject 5 are applicable for standard I in *Ambient Air Quality Standard* (GB 3095-2012),all the other assessed areas are applicable for Standard II.	Up to 5km beyond the "footprint" of the permanent and temporary land take areas
	Noise	Functional Area Category 1、2 、3、4 standard in *Environmental Quality Standard for Noise* (GB 3096-2008) depending on the function of the areas.	Up to 200 m beyond the "footprint" of the permanent and temporary land take areas
	Surface water quality	Categories III, IV and V standards in *Environmental Quality Standards for Surface Water* (GB 3838-2002) depending on the water quality category of the water body.	Up to 300 m beyond the "footprint" of the permanent and temporary land take areas
	Ecology	No numerical standard. Assessment based on *Technical Guidelines for Environmental Impact Assessment – Ecological Impact* (HJ 19-2011)	"Footprint" of the permanent and temporary land take areas

Type of Standard	Environmental Media	Applicable PRC Standard	Project Area of Influence
	Physical cultural resources	No numerical standard but controlled under PRC's *Cultural Relics Protection Law* and *Cultural Relics Protection Law Implementation Ordinance.*	"Footprint" of the permanent and temporary land take areas
	Occupational health and safety	No numerical standard but controlled under PRC's *Labor Law* and *Environmental and Hygiene Standards for Construction Sites* (JG/J 146-2004)	Construction sites within the "footprint" of the permanent and temporary land take areas
	Community health and safety	No numerical standard	Up to 200 m beyond the "footprint" of the permanent and temporary land take areas
Pollutant emission standard	Air pollutant	*Air Pollutant Integrated Emission Standard* (GB 16297-1996), Class II and fugitive emission standards	Construction sites within the "footprint" of the permanent and temporary land take areas
	Noise	*Emission Standard of Environmental Noise for Boundary of Construction Site* (GB 12523-2011)	Construction sites within the "footprint" of the permanent and temporary land take areas
	Wastewater	*Integrated Wastewater Discharge Standard* (GB 8978-1996): (i) Class 1 standard for discharging into Category III water bodies; (ii)Class 2 standard for discharging into Categories IV and V water bodies; (iii) Class 3 standard for discharging into municipal sewers; (iv) No discharge into Categories I and II water bodies.	Construction sites within the "footprint" of the permanent and temporary land take areas during construction. Effluent discharge standards for the facilities during operation.

58. The assessment period covers both construction (18-48 months) and operation (first three years after construction) of the tranche 3 subprojects with civil works. The approximate construction durations (months) are:

    (i) SP1: Economic and Cultural Exchange and Training Center Project - 36;
    (ii) SP2: Cross-border Agricultural Products Industry Chain Upgrading Project - 32;
    (iii) SP3: Chongzuo Cold Chain Logistics Demonstration Project - 36;
    (iv) SP4: Economic Corporation Zone Demonstration Project - 48;
    (v) SP5: Cross-Border Tourism Integrated Promotion Project - 24; and
    (vi) SP6: Economic, Trade and Cultural Exchange Center - 18.

I. JUSTIFICATION FOR THE USE OF PRC STANDARDS

59. ADB's *Safeguard Policy Statement (2009)* requires projects to apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the WBG's *Environmental, Health and Safety Guidelines*. Table 10 compares PRC standards with the WBG's EHS guidelines and concludes that the application of PRC's legislated standards was justified. The justification is based on several observations,

60. The WBG's EHS guidelines endorses the use of internationally recognized standards in case of absence of national legislated standards. In this project, this clause applies to ambient air quality and ambient water quality standards: (i) The General EHS Guidelines on Air Emissions and Ambient Air Quality state that "Projects with significant sources of air emissions, and potential for significant impacts to ambient air quality, should [apply] national legislated standards, or in their absence, the current WHO Air Quality Guidelines or other

internationally recognized sources". The availability of national legislated standards overrides the adoption of other internationally recognized standards; (ii) The General EHS Guidelines on Air Emissions and Ambient Air Quality state that "Projects with significant sources of air emissions, and potential for significant impacts on ambient air quality, should prevent or minimize impacts to ensure that emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards, or in their absence, the current WHO Air Quality Guidelines or other internationally recognized sources". The availability of national legislated standards overrides the adoption of other internationally recognized standards.

61. Some PRC standards are more stringent than internationally accepted standards. PRC standards of relevance to the project include ambient CO and NO_2 concentrations (Table 10).

62. PRC standards are not always comparable to standards suggested in the World Bank Group's EHS Guidelines. Some ambient air quality standards, including NO_2 and H_2S, are defined for different time periods (exposures), and are thus not directly comparable (see Table 9). PRC ambient acoustic quality standards are defined for categories as well as by taking into consideration influencing factors such as road and rail traffic and are different to the classification of the World Health Organization that does not take influencing factors into consideration. As standard limits are not significantly different (e.g. noise levels), a shift to alternate classifications or time periods, which would require an adaptation of the monitoring procedures by nationally accredited monitoring stations, does not seem to be justified.

63. Some PRC standards are not defined in the World Bank Group's EHS Guidelines. Internationally accepted standards for NH_3 and TSP, which are defined in PRC ambient air quality standards, could not be identified. Other parameters which could not be compared to international standards include surface and marine water quality standards.

Table 10. Comparison of PRC Standards with World Bank Group's EHS Guideline

Parameter	PRC standards	International standards	*Remarks*
Ambient Air Quality	**GB-3095-2012**	**WHO Air Quality Guidelines Global Update (2005); USEPA**	
TSP	0.12 mg/m^3 (Class I, 24h) 0.30 mg/m^3 (Class II, 24h)	WHO: No standard USEPA: No standard	*No comparison possible*
CO	4.0 mg/m^3 (Class I, 24h) 4.0 mg/m^3 (Class II, 24h)	WHO: No standard USEPA: 10 mg/m^3	*PRC standard is more stringent than USEPA*
NO_2	0.08 mg/m^3 (Class I, 24h) 0.08 mg/m^3 (Class II, 24h) 0.20 mg/m^3 (Class I, 1h) 0.20 mg/m^3 (Class II, 1h)	WHO: 0.04 mg/m^3 (365d); 0.20 mg/m3 (1h) USEPA: 0.14 mg/m^3 (24h)	*PRC and WHO standards are either not compatible given the different time periods, or the same for same time period.* *PRC standard is more stringent than USEPA standard*
PM_{10}	0.05 mg/m^3 (Class I, 24h) 0.15 mg/m^3 (Class II, 24h)	WHO: 0.05 mg/m^3 (24h) USEPA: 0.15 mg/m^3 (24h)	*PRC standards are comparable to EPA standard.*

Ambient Acoustic Quality Standard	**GB-3096-2008**	**World Health Organization (1999)**	
L_{Aeq} (dBA)	45/55 (night/day, Category 1) 50/60 (night/day, Category 2) 55/65 (night/day, Category 3) 55/70 (night/day, Category 4a) 60/70 (night/day, Category 4b)	Class I: 45/55 (night/day) Class II: 70/70 (night/day)	*WHO Class I: Residential, institutional, educational WHO Class II: Industrial, commercial* *PRC Category 1 :Refers to the residential, medical and health, culture and education, scientific research and design, administrative office as the main functions, need to keep quiet area* *Category 2:Refers to the commercial finance, market trade as the main function, or residential, commercial and industrial mixed, the need to maintain quiet residential areas* *Category 3:Refers to the industrial production, warehousing and logistics as the main function, the need to prevent industrial noise on the surrounding environment has a serious impact on the area* *Category 4:Refers to the area within a certain distance on both sides of a traffic trunk line where traffic noise should be prevented from having a serious impact on the surrounding environment, including Class 4A and Class 4B*
Surface Water Quality Standard	**GB-3838-2002**		*No comparable standard identified/suggested in the EHS guideline*
COD	15 mg/L (Category II) 20 mg/L (Category III) 30 mg/L (Category IV)		
NH_3-N	0.5 mg/L (Category II) 1.0 mg/L (Category III) 1.5 mg/L (Category IV)		
TP	0.1 mg/L (Category II) 0.2 mg/L (Category III) mg/L (Category IV)		
Sea Water Quality Standard	**GB-3097-1997**		*No comparable standard identified/suggested in the EHS guideline*
COD	2 mg/L (Category I) 3 mg/L (Category II) 4 mg/L (Category III) 5 mg/L (Category IV)		
Inorganic. N	0.2 mg/L (Category I) 0.3 mg/L (Category II) 0.4 mg/L Category III) mg/L (Category IV)		
Active P	0.015 mg/L (Category I) 0.030 mg/L (Category II) 0.030 mg/L (Category III) 0.045 mg/L (Category IV)		
Noise Standards for Industrial Enterprise Boundary	**GB 12348-2008**	**World Health Organization (1999)**	*WHO Class I: Residential, institutional, educational WHO Class II: Industrial, commercial*
LAeq (dBA)	55/45 (day/night, Class I) 60/50 (day/night, Class II)	Class I: 45/55 (night/day)	

	65/55 (day/night, Class III) 70/55 (day/night, Class IV)	Class II: 70/70 (night/day)	
Noise Limits for Construction Sites	**GB 12523-1990**	**USEPA**	
LAeq (dBA)	75/55 (Earth works, day/night) 85 (Pile driving, day; banned for night) 70/55 (Structural works, day/night) 65/55 (Exterior and interior finishing works, day/night)	85 (day, 8h exposure)	

J. ADMINISTRATIVE ARRANGEMENTS

64. The government of GZAR through GPMO will be the executing agency. Respective municipal governments will be the implementing agencies and state-owned enterprises at the local level will be the project implementing entities (PIEs). The project management office (PMO) has been set up at the provincial level with designated staff. PMOs have been set up at all municipal and country governments, i.e., Daxin, Chongzuo, Baise and Fangchenggang, which also manage tranche 3 subprojects. In addition, under each PIE, a project management unit (PMU) will be established. The PIEs and PMUs will be responsible for day-to-day work of the implementation for respective subprojects under guidance by the implementing agencies, and close supervision by the executing agency.

65. The Ministry of Ecology and Environment (MEE) of the PRC is the national nodal agency for the government level administration and enforcement of Environment Laws and Policies. At the provincial level, the local Ecology and Environment Bureau (EEB) is responsible to monitor the project implementation.

III. DESCRIPTION OF THE PROJECT

A. GENERAL

66. The proposed tranche 3 project comprises six subprojects involving the construction and operation of physical infrastructure facilities such as buildings, roads and water plant, warehouse and logistics infrastructure. This IEE and attached EMP therefore focus on assessing and mitigating potential environmental impacts during construction and operation of these facilities. Table 11 shows the domestic environmental assessment reporting and approval requirements and status for these subprojects. The environmental impact assessment reports (EIA) and environmental impact tables (EIT) have been prepared for these subprojects. The approval authorities for these EIAs are the respective city or county EEBs. This IEE is prepared based on information provided in these EIAs and EITs, feasibility study reports (FSRs) for these subprojects, as well as site reconnaissance by the TRTA consultants.

Table 11. Domestic Environmental Assessment Reporting for Tranche 3 Subprojects

No.	Tranche 3 Subproject Name	Report Type	Compilation Situation		Approval Status	
			Preparation Unit	Preparation Time	Approval Unit	Processing Time
1	Baise University Sino-Viet Nam Cross-border Training Center	EIT	Beijing Zhonghuanruide Environmental Engineering Ltd.	October 2020	Ecological Environment Bureau of Baise City	The EIT of the project will be approved before the construction and it is not required to be approved before bidding.
2	Baise Cross-Border Agricultural Products Industry Chain Upgrading Project	EIT	Beijing Zhonghuanruide Environmental Engineering Ltd.	October 2020	Ecological Environment Bureau of Baise City	The EIT of the project will be approved before the construction and it is not required to be approved before bidding.
3	Chongzuo Cold Chain Logistics Demonstration Project	EIRF	Guangxi Yuhong Environmental Consulting Co., Ltd.	August 2020	Registration	August 2020
4	Chongzuo Sino-Viet Nam Border Economic Cooperation Zone Demonstration Project (Phase II)	EIT	Guangxi Hongchen Engineering Consulting Co., Ltd.	July 2020	Ecological Environment Bureau of Jiangzhou District, Chongzuo City	August 26, 2020
5	Chongzuo Daxin Sino-Viet Nam Cross-border Tourism Project	EIT	Beijing Zhonghuanruide Environmental Engineering Ltd.	October 2020	Ecological Environment Bureau of Daxin County	The EIT of the project will be approved before the construction and it is not required to be approved before bidding.
6	Fangchenggang Sino-ASEAN	EIT	Beijing Zhonghuanruide	October 2020	Ecological Environment	The EIT of the project will be approved

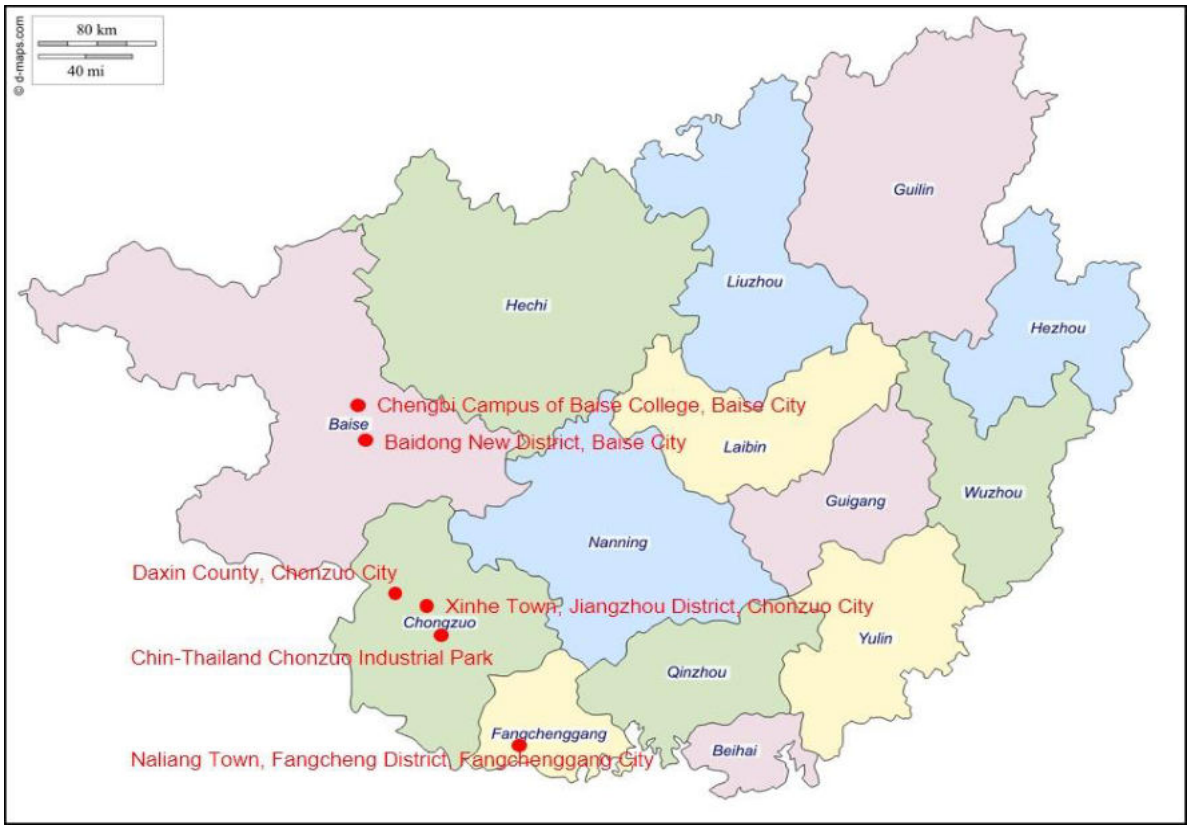
	Trade and Culture Exchange Center Project		Environmental Engineering Ltd.		Bureau of Fangcheng District, Fangchenggang City	before the construction and it is not required to be approved before bidding.

B. NATURE, SIZE, AND LOCATION OF PROJECT FACILITIES

67. The proposed subprojects will support construction of physical infrastructure facilities such as buildings, roads, water supply plant, warehouse and logistics infrastructure, and auxiliary facilities. Subproject 1 involves construction of education and culture entities over a construction area of 31,311.3 m^2 and associated auxiliary facilities. Subproject 2 involves construction of border trade infrastructure for agriculture industry over a total building area of 89,052 m^2 Subproject 3 will construct logistics facilities comprising a bonded warehouse adjacent to the newly constructed river port serving the economic zone, and a cold storage facility located close to rail and expressway junctions. Subproject 4 will involve construction of six new roads sections with a total length of around 12.4 km and construction of a water treatment plant with capacity of 15,000 tons/day. Subproject 5 will construct tourism facilities (buildings and centers and tourism road upgrade). Subproject 6 will involve construction of cross-border trade facilities (buildings and auxiliary facilities) with a total construction area of 84,000 m^2.

68. These facilities are located in Fangchenggang Municipality, Chongzuo Municipality and Daxin County and Baise Municipality and Baise City of PRC (Figure 2).

Figure 2: Indicative Map of GZAR and Subproject Locations



C. OVERVIEW OF INFRASTRUCTURE DEVELOPMENT BY SUBPROJECT

69. This section details the rationale and physical construction work of each subproject.

1. Subproject 1: Baise University Sino-Viet Nam Cross-border Training Center

70. **Rationale.** This subproject will promote the Sino-Viet Nam high college cooperation and offer the needed staff for border SME development. The project will build a Sino-Viet Nam economic, cultural and educational exchange and training center and platform with the main functions of teaching and training, conference reception, Sino-Viet Nam cultural exhibition, catering and commodity exhibition and sales.

71. **Overview**. There are two components in this subproject. **Component 1**: Baise Sino-Viet Nam Economy and Culture Exchange Center Complex (Construction area of 31,311.3 sq m) to host following education and culture entities: (i) Viet Nam Art and Culture Exhibition Hall; (ii) Sino-Viet Nam Culture Exchange Performance Center; (iii) Sino-Viet Nam Training Center; (iv) Sino-Viet Nam E-commerce Laboratory; and (v) Sino-Viet Nam Big Data Center. **Component 2: Auxiliary facilities**. i) A 3m wide pedestrian walking trail (5,262 m) will be built in the east campus. Starting from training center, it will connect with the existing campus road, with a total length of 8,962m. ii) Along the trail, 24 teaching sites with local characteristics are arranged. iii) Southeast Asian cultural corridor is set up at the top of the mountain in the south. It goes down to the comprehensive building of art and education department to display the characteristic traditional culture of Southeast Asian countries. iv) The construction of high-voltage line relocation, terrain leveling, slope support and the connecting channel between the East and the west campus.

72. The building contains energy saving facilities. The water source for this project will be municipal tap water and the campus water supply system. The campus adopts the district water supply system. The 1-6 floors will adopt the municipal water supply system and the 6-12 floors will adopt the non-negative pressure superimposed water supply. The maximum daily water supply demand will be around 255.00m^3 /h. The domestic sewage, after entering the septic tank, will be discharged into the municipal drainage system through the established sewage pipe network on the campus. After the water is collected, it will flow into the campus rainwater network and finally into the municipal rainwater network or the internal water body of the college.

73. The proposed site is in the existing Chengbi Campus of Baise College, around 6 km north of central Baise City. The land on which these facilities will be developed appears to be partly within the existing property, and partly cut into mountainous land outside the property. Following figures present the location map and lay out of the subproject facilities.

Figure 3. Subproject 1 Location

Figure 4. Subproject 1 Existing Conditions

Figure 5. Subproject 1 Location of Proposed Works

74. Physical facilities. Proposed construction for the training center consists of two 12-story buildings with 1 level basement, and one 3-story building with 1 level basement plus external and ancillary works. Proposed construction of the teaching base using counterpart funds which appears to apply exhibits distributed along a road and a walking trail across the mountain.

Table 12. Subproject 1 Details of the Subproject Components

No.	Item	Description
I	**Training center**	
1	International Exchange Center	12 floors above ground. 1 floor underground, floor height 3.6m,floors1-3 are 4.8 m high, building height 46.8m,Total floor area 14,155m^2,Building area 1,089m^2
2	Practice Teaching Center	12 floors above ground. 1 floor underground, floor height 3.6m,building height 46.8m,Total floor area 14,155m^2,Building area 1,089m^2
3	Cultural Exchange Center	3 floors above ground. 1 floor underground, floor height 4.8m, building height 14.4m,Total floor area 3,001m^2,Building area 846m^2
II	**Teaching base**	
1	Site area	493,764m^2
2	Road for vehicles	5m wide, 3,700m long
3	Walking Trail	3 m wide, 5,262 m long
3	Kiosk	568.80m^2
4	Cultural corridor	1530.15m^2

No.	Item	Description
5	Teaching site engineering	3057 m^2
6	Landscaping	Trees, shrub and grass planting,15,000 m^2
7	Site paving	272.13 m^2
8	Site slope	20,000 ㎡
9	Earthwork	85,000m^3
10	Underpass	200m long, 9m wide, 4.5m high
11	Public toilet	2 locations, 30 ㎡ each
12	110KV high voltage line relocation	

2. Subproject 2: Baise Cross-border Agricultural Products Industry Chain Upgrading Project

75. **Rationale.** This subproject will facilitate the Sino-ASEA agriculture products trade and SME development through construction of comprehensive agricultural product distribution platform integrating agricultural product storage, logistics, processing, trade, information, and capital.

76. **Overview**. (i) Cross border agricultural products supply chain integrated service center, (a) Cross border agricultural products trading comprehensive service center: 1 building, 6 floors above the ground, cornice elevation of 23.4 m, and total construction area of 28,594 m^2; (b) High quality vegetable trading logistics center: 1 building, 1 floor above ground, cornice elevation of 9 m, total construction area of 8,648 m^2; (c) Cross border ecological fruit trade logistics center: 1 building, 1 floor above ground, cornice elevation of 10m, total construction area of 12,120 m^2. (ii) (a) Fruit and vegetable sorting and packaging center: 1 building, 1 floor above the ground, with cornice elevation of 9m and total building area of 12,060 m^2; (b)Fruit and vegetable deep processing center: 1 building, 1 floor above ground, cornice elevation of 9 m, total building area of 12,060 m^2;

77. The building will contain energy saving facilities. Urban water supply will be used as all water source in this subproject. The maximum daily water consumption requirements of this project is 643.83 m^3/d. After the project is put into use, domestic sewage will mainly be produced. After the project is constructed, separate rainwater and sewage separation system will be implemented. The sewage will be preliminarily treated by the septic tank and then discharged into the urban sewage system, and finally into the municipal sewage system. Rainwater will be collected and then transferred to the city rainwater system, and finally into the municipal rainwater system.

78. The site is located approximately 12 km south east of Baise city center, adjacent to an interchange of two expressways, and with a freight station on Nanning - Kunming Railway line to the south, and a branch line to a fuel storage facility to the north of the site. The site occupies part of a larger plot which is already partially developed. The following figures present the location map and layout of the subproject facilities.

Figure 6. Subproject 2 Location

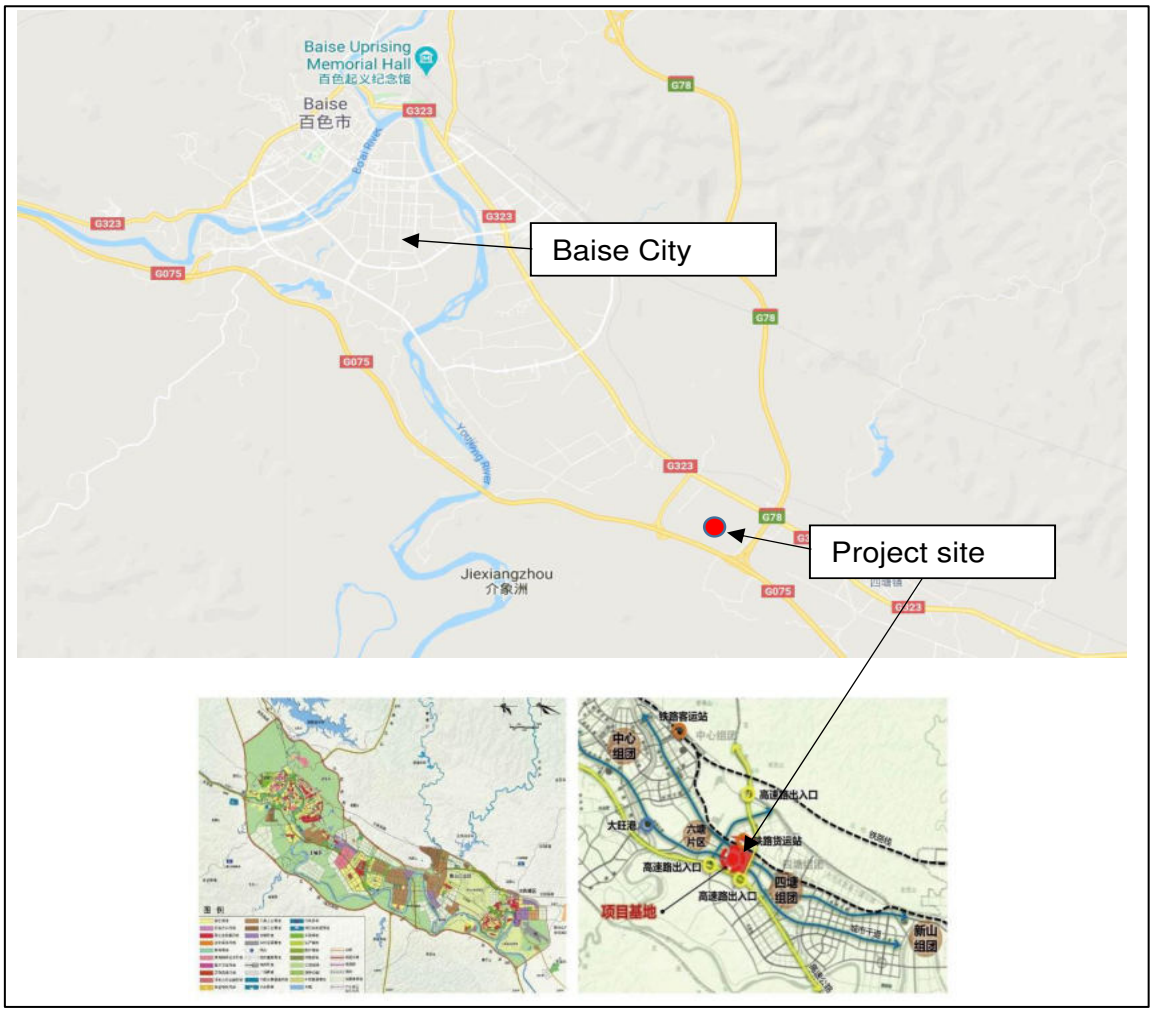


Figure 7. Subproject 2 Existing Conditions

(site boundary-yellow, project buildings- red)

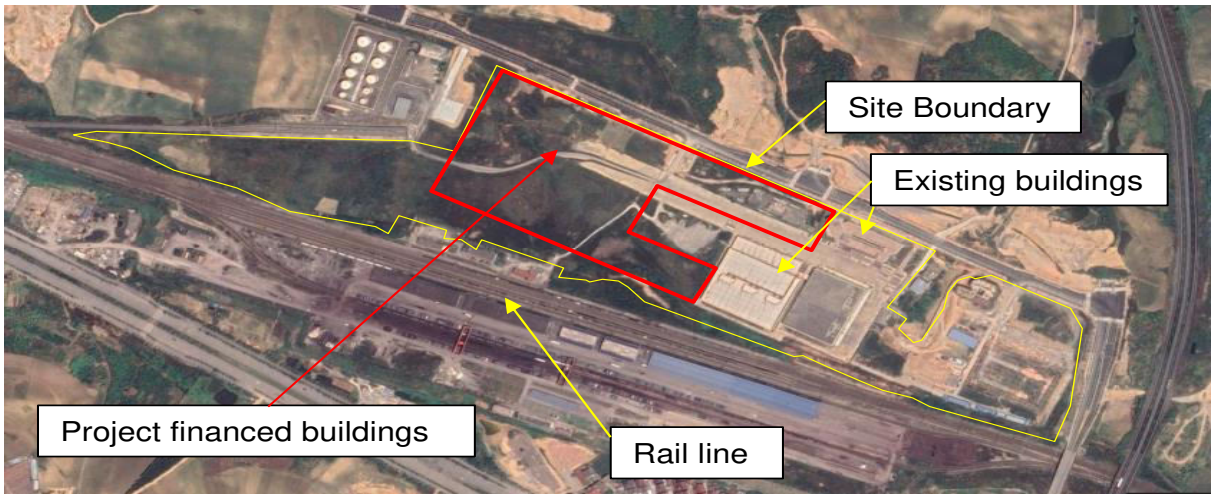
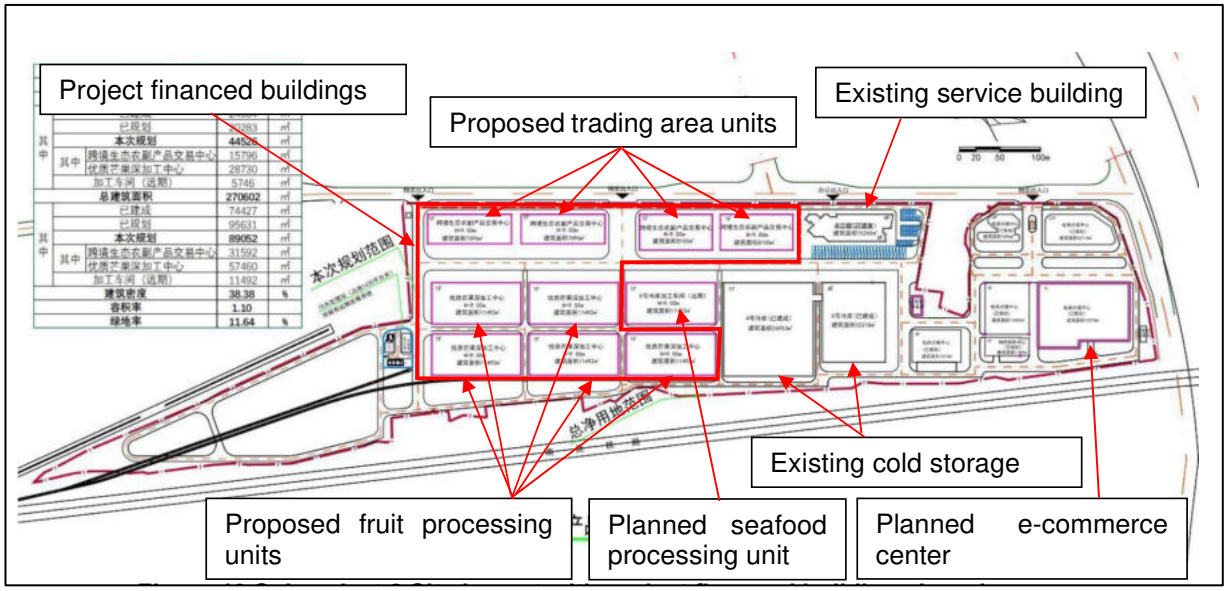


Figure 8. Subproject 2 Site Layout with Project Financed Buildings in Red Zone



79. **Physical facilities**. The project consists of construction of 89,052 m^2 of floor area (Table 13) of 1 story building, presumed to be steel framed pre-engineered industrial units. The food safety testing laboratory would be installed in the existing 6 story service building. There is also 76,667 m^2 of external works (parking, access roads and hard standing).

Table 13. Subproject 2 Details of the Project Elements

No.	Engineering construction	Item	Area (m^2)	Stories
1	Cross border agricultural products supply chain integrated service center	Cross border agricultural products trading comprehensive service center	28594	6
2		High quality vegetable trading logistics center	8648	1
3		Cross border ecological fruit trade logistics center	12120	1
4	Demonstration base for deep processing of green fruits and vegetables agricultural products of small and medium-sized enterprises	Fruit and vegetable sorting and packaging center	12060	1
5		Fruit and vegetable deep processing center	12060	1
	Total building area (new construction)		73482	

3. Subproject 3: Chongzuo Cold Chain Logistics Demonstration Project

80. **Rationale.** This subproject will construct logistics facilities comprising a bonded warehouse adjacent to the newly constructed river port serving the economic zone, and a cold storage facility located close to rail and expressway junctions on the principal Pinxiang – Chongzuo – Nanning transport corridor. These facilities will serve companies located in the economic zone. The cold storage facility will also serve logistics providers transporting imported products brought overland from ASEAN countries, as well as products imported from the nearby seaports.

81. **Overview.** There are three components in this subproject. Component 1. Development of multimodal logistics comprehensive/e-commerce supply chain service information platform, procurement of cold chain containers, and refrigerated trucks etc.; Component 2. Construction of cold storage, freezer and ancillary buildings (39,691 sqm), standard workshops for sorting, rough processing and packaging of perishable articles (7,480 sqm), supporting management office buildings (totaling 4,896 sqm), and supporting projects such as roads, power supply and distribution, water supply and drainage, fire control, communication, greening, etc., and corresponding loading and unloading tools are provided; Component 3. Construction of one bonded warehouse with 36,960 sqm of warehouses and 26,605 sqm of storage yards, as well as facilities such as roads, power supply and distribution, water supply and drainage, fire control, communication and greening.

82. The building will contain energy saving facilities. Combined with the requirements of green building, the measures of energy utilization such as water saving and energy saving have been considered. Municipal water will be the source of all water demand of the subproject. A DN200 water supply pipe is adopted to lead from the road in the park to the bonded warehouse water pump house, and it is laid in a ring within each block. The new water pipes follow current road alignments. The thickness of earth-fill over of the pipe will be greater than 0.70m, and the maximum water consumption requirements is 709.60m^3/d. The project adopts separate rainwater and sewage system. The outdoor rainwater will be collected through the rainwater mouth and the roof rainwater will be discharged into the municipal rainwater pipes nearby the road together with the outdoor rainwater pipes. Domestic sewage will be collected by the sewage pipe and discharged into the septic tank for treatment, and then discharged into the municipal sewage drainage system. All sewage pipes will be equipped with PVP-U plastic drainpipes, adhesive interfaces and open installation. A DN1200 reinforced concrete drainpipe shall be constructed to connect with the park drainage pipe network.

83. The facilities are planned to be constructed in the China-Thailand Chongzuo Industrial Park, on two separate plots around 8 km apart. The proposed sites are around 10 km east, and 15 km north east of Chongzuo city respectively. The bonded warehouse is proposed for a plot adjacent to the Zuo River, whilst the cold storage is proposed on a plot located adjacent to the Nanning to Xiangxiang railway which is under construction and expected to open in 2022. The following figures present the location map and lay out of the subproject facilities.

Figure 9. Subproject 3 Location Map of the Development Masterplan

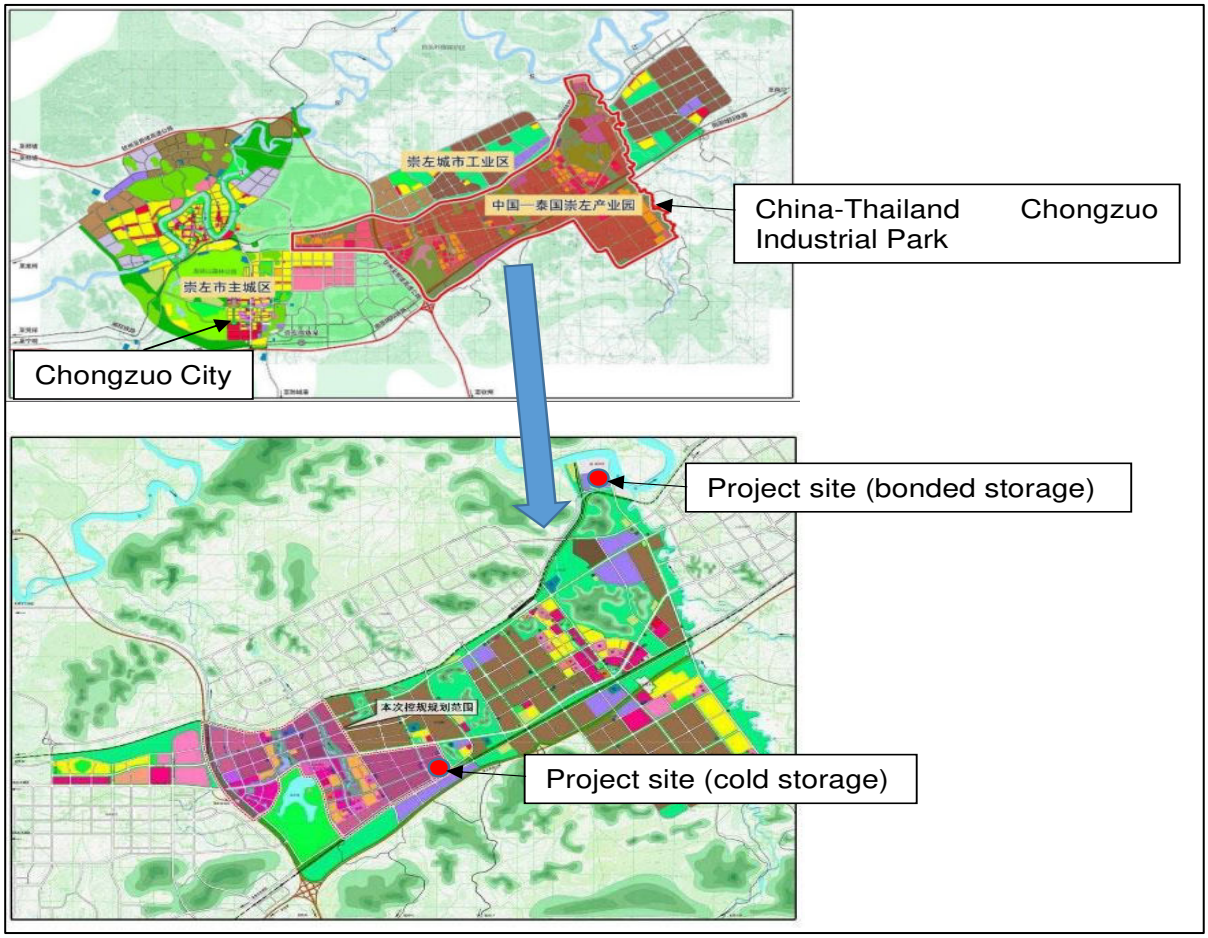


Figure 10. Subproject 3 Existing Conditions

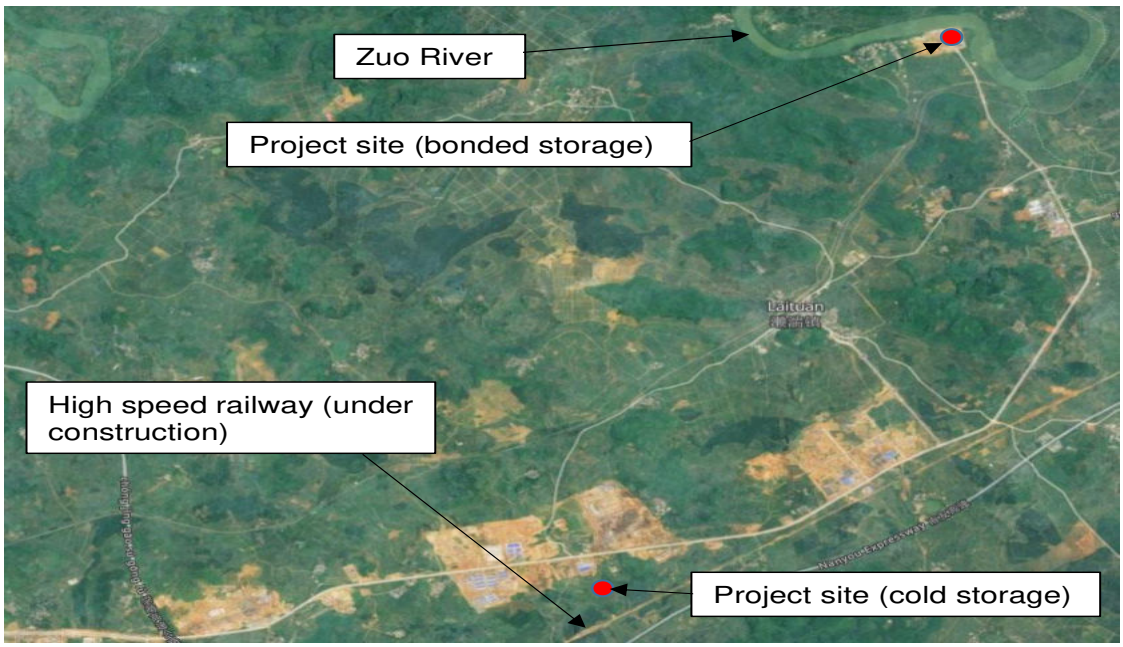
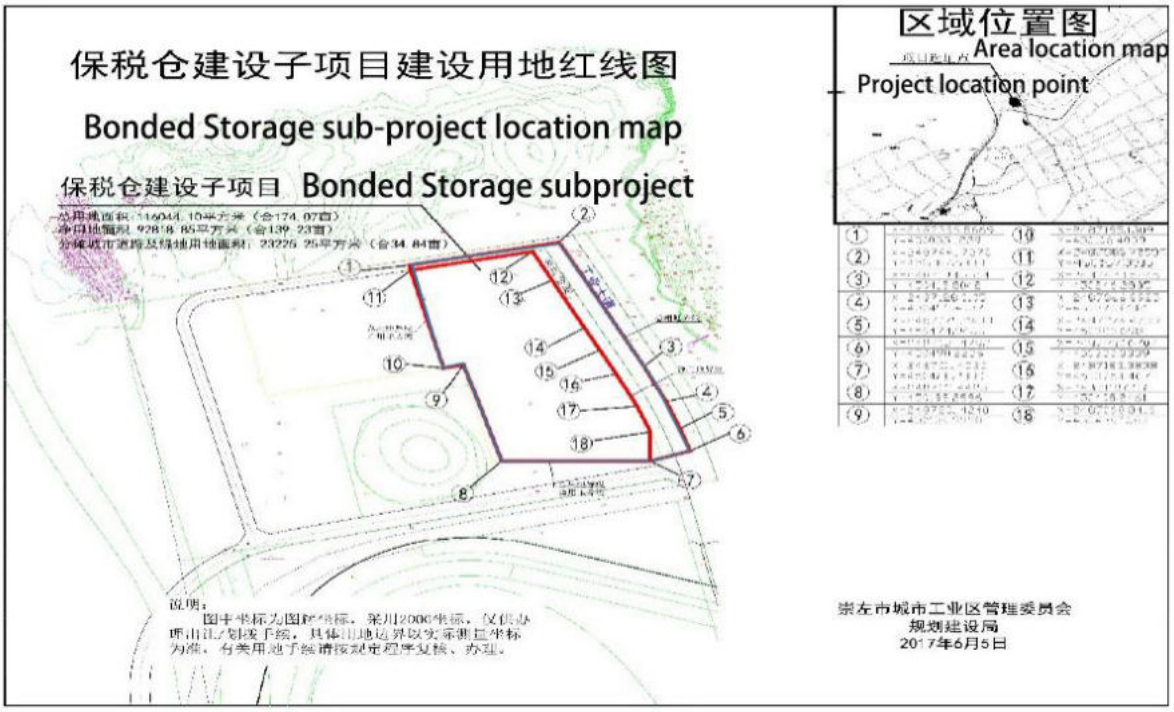


Figure 11. Subproject 3 Cold Storage Plot Layout

Figure 12. Subproject 3 Bonded Storage Plot Layout



84. **Physical facilities**. Proposed facilities include construction of cold storage, freezer and ancillary buildings (39,691 m^2), standard workshops for sorting, rough processing and packaging of perishable articles (7,480 m^2), supporting management office buildings, etc. (4,896 m^2), bonded warehouse (36,960 m^2) and yard (26,605 m^2).

4. Subproject 4: Chongzuo Sino-Viet Nam Border Economic Cooperation Zone Demonstration Project (Phase II)

85. **Rationale.** This subproject is the Phase II project of subproject 1 under GRIP Tranche 2, Chongzuo Sino-Viet Nam Border Economic Zone Demonstration Project (Phase I). The purpose of this subproject is to support this BEZ to strengthen its capacity by constructing 6 road sections and one water treatment plant in the Border Economic Zone.

86. **Overview.** There are two components in this subproject. Component 1. Construction/upgrading of 6 new road sections with a total length of 12.4 km. The design speed of roads 1, 4 and 5 is 50 km/h and 30 km/h for the other three roads. All roads will have asphalt concrete pavement. Component 2. Jiangzhou District sugar circular economy industrial park water supply project expansion (15000 tons / day), and approximately 49 km of supporting water supply network outside the plant.

87. The function of the water supply plant is partly for the economic zone. The function of the roads is partly as internal roads in the economic zone, and partly for linkage with the urban area:

    (i) Road 1 Main northern access road to the town / economic zone
    (ii) Road 2 Access road to the northern part of the economic zone
    (iii) Road 3 Arterial east-west spine within the economic zone
    (iv) Road 4 North south road within the economic zone giving access from the expressway
    (v) Road 5 East west road in the urban area adjacent to the economic zone
    (vi) Road 6 North south road in the urban area adjacent to the economic zone

88. The proposed construction site is located in Xinhe Town, Jiangzhou District, Chongzuo City, in the west of Jiangzhou District. The site is located within the Chongzuo Sino-Viet Nam border economic cooperation zone.

Figure 13. Subproject 4 Existing Conditions

Figure 14. Subproject 4 Project T3 Road Location Map (in pink)

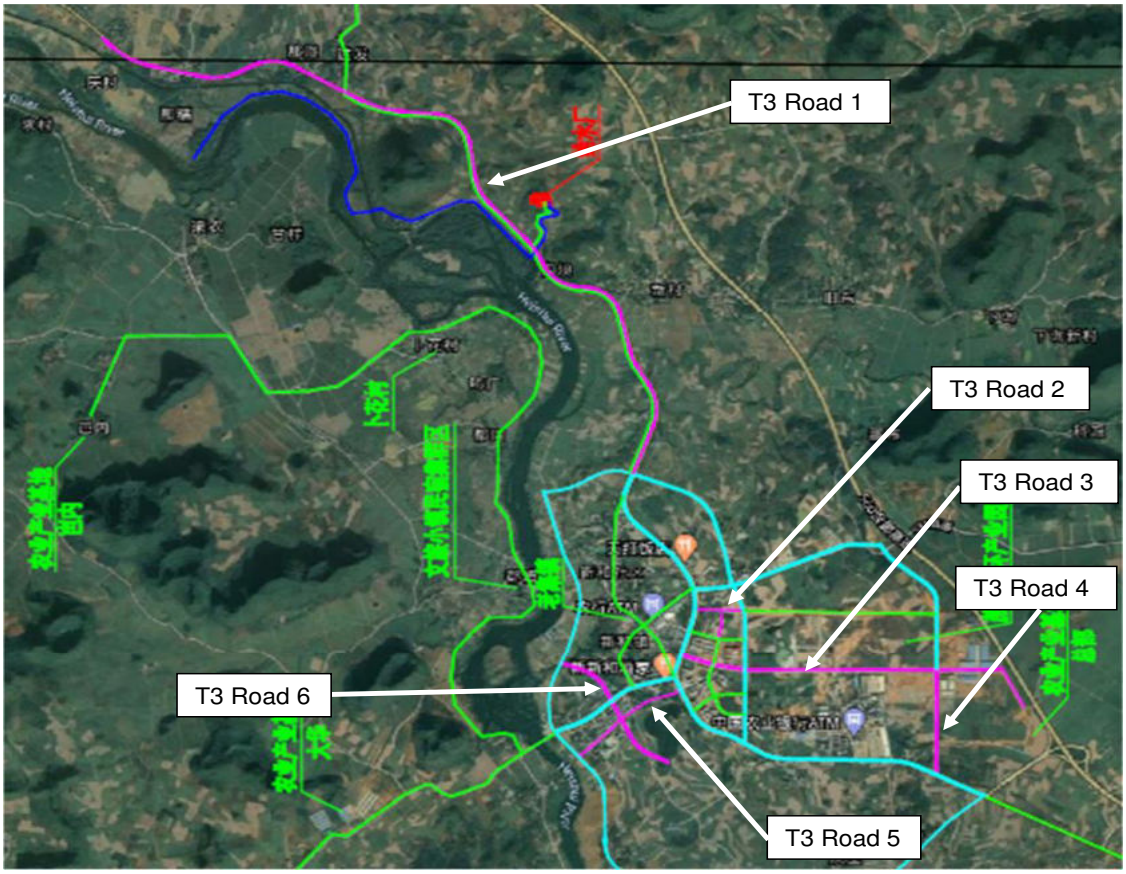
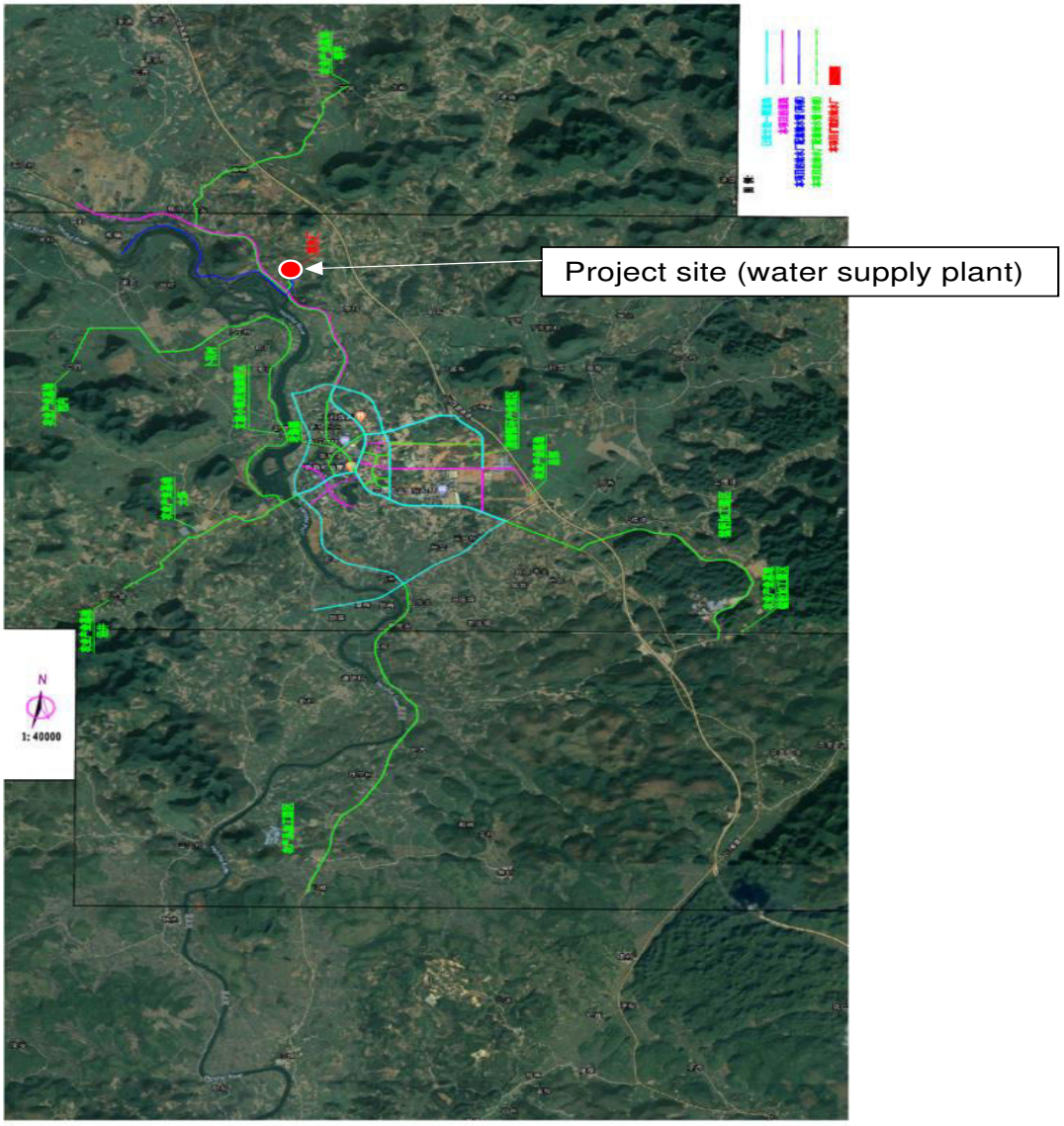


Figure 15. Subproject 4 Project T3 Water supply plant and pipeline location map (in green)



89. **Physical facilities**. There are six road sections (total 12.39 km) to be financed under the tranche.

Table 14. Subproject 4 Details of the Project Elements

No.	Road	Length (m)	Width (m)	Design speed (km/h)	Road type
T3 Road 1	Northern section of Xinghe Road	6,461	21	50	Main city road
T3 Road 2	Xinggui Road	493	18	30,40	City branch
T3 Road 3	Xingui Road	2,596	18,30	30,50	Main city road
T3 Road 4	Xingong Road	752	30	50	Main city road
T3 Road 5	Baiwu Er Road	1,162	30	50	Main city road
T3 Road 6	Xinjuan Road	926	15	30	City branch
	Total	**12,391**			

90. The water supply plant is proposed for financing under tranche 3 will serve the existing and expanded border economic zone as well as the urban area and surrounding villages and will have a capacity of 15,000 m^3/day. It will also include construction of 49 km of water supply pipeline. The proposed location of water supply pipeline is shown in green in Figure 15. The existing water plant in the town has a capacity of 4,000m^3/d. Phase I provides a capacity of 15,000 m^3/d. and Phase II would add 15,000 m^3/d capacity. Water supply covers residents in Xinhe Town, the industrial park, a planned cultural and tourism town and two villages, plus Vietnamese workers.

5. Subproject 5: Chongzuo Daxin Sino-Viet Nam Cross-border Tourism Project

91. **Rationale.** This subproject will promote Sino-Viet Nam Daxin Detian cross-border waterfall tourism and border trade through infrastructure development, smart service system development and road updating.

92. The grade of roads is low and the traffic capacity is insufficient. The connection roads around the base are two-way two Lane County roads and provincial roads with low traffic capacity. The capacity of the highway directly connected to the base is only about 700 PCU / h, and there is a huge gap in the capacity during peak period.

93. There is a lack of diversion channel, and the local pressure is too high. Vehicles mainly arrive through the three routes of x532, x534 and x539. However, due to the prohibition of private cars by x539, all vehicles need to reach the tourist center through x532, and the high pressure on this section .

94. Due to the lack of traffic guidance and unreasonable traffic flow distribution, most of the self-driving tourists take the navigation software and road signs as reference. Most of the tourists in Jingxi choose g359 provincial road from west to East, and most of the tourists in Chongzuo choose 702 rural road from S60 days and other toll stations to get off the expressway and automatically turn west. In peak hours, the actual time cost of passing provincial highway x534-g359 or x532 to Chongzuo via Mingshi pastoral direction is similar, but due to the lack of guidance, fewer tourists choose alternative routes

95. **Overview.** Following components are proposed under this subproject. Component 1: Cross border tourist center, the total construction area is 18565.34 m^2; Component 2: The construction of tourist roads, including tourist distributing roads (11.825 km) and tourist line road (4.457 km); Component 3: China Viet Nam cross border smart tourism center includes one center and seven applications, namely cross-border global tourism distribution cloud service center, mobile app and new energy vehicle and ship mobile terminal service and comprehensive public service, marketing, comprehensive supervision, talent training and e-commerce.

96. There are two road segments: i) the tourist distribution road, the starting point of tourist distributing highway is Shunde Tianbian highway, from south to north, it passes through Detian village and Nongai, and then along x539 County Road, passing liantun, Zhumei, Bubang, Xiatun, Renai village and Baxing, and ends at G359 provincial highway. The road is positioned as a class II Highway with a design speed of 40km/h, a subgrade width of 8.5 m and a total length of 11.825km; and ii) the tourist line road, starts from the existing border road, along the existing forest farm old road, and ends near liantun village, the tourism

distribution highway. The road is positioned as a substandard highway. The design speed is 20 km/h, the subgrade width is 6.5 m, and the total length of the line is about 4.457 km.

97. The buildings will contain energy saving facilities. Combined with the requirements of green building, the measures of energy utilization such as water saving and energy saving have been considered. The water supply source of this subproject is municipal water supply network of Ji town, and the maximum daily water requirement amount to 27.6 m^3/d. In order to ensure the ecological and cultural environment of the scenic spot, it is necessary to set up a buried sewage treatment station on site. After analyzing the human flow of the distribution center, it is predicted that the sewage volume of the center will be 24.84 m^3/d. The sewage treatment process will follow Membrane Bio-Reactor (MBR) treatment process. Rainwater in the project area will be collected through the building drainage ditch or rainwater mouth and then discharged into the rainwater pipe network in the area, and finally discharged into the municipal rainwater drainage system.

98. The subproject site is in Daxin County, Chongzuo City, Guangxi Zhuang Autonomous Region. The subproject site is located near Detian waterfall (Ban Gioc in Vietnamese), which is one of the most beautiful natural attractions, in Guangxi province, located on the river forming the border between China and Viet Nam. The waterfall can be accessed from either of two routes from the national highway, with the shortest by county road X539 around 12 km long, and the longer route by county road X532 and provincial road S325 around 16 km long. These both access roads are two-lane county roads and provincial roads.

Figure 16. Subproject 5 Location Map

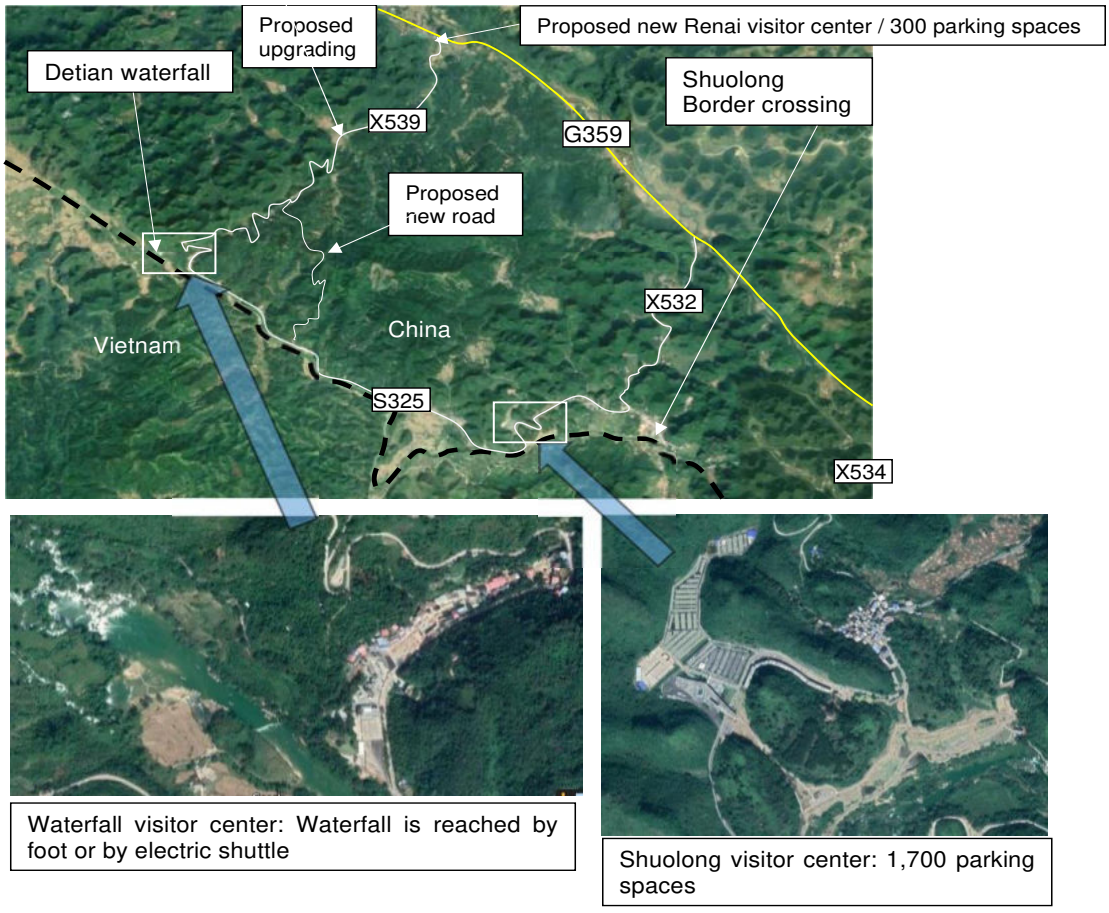


Figure 17. Subproject 5 Shuolong / Ly Van Border crossing location map and access roads

Figure 18. Subproject 5 Proposed new and upgraded road alignments

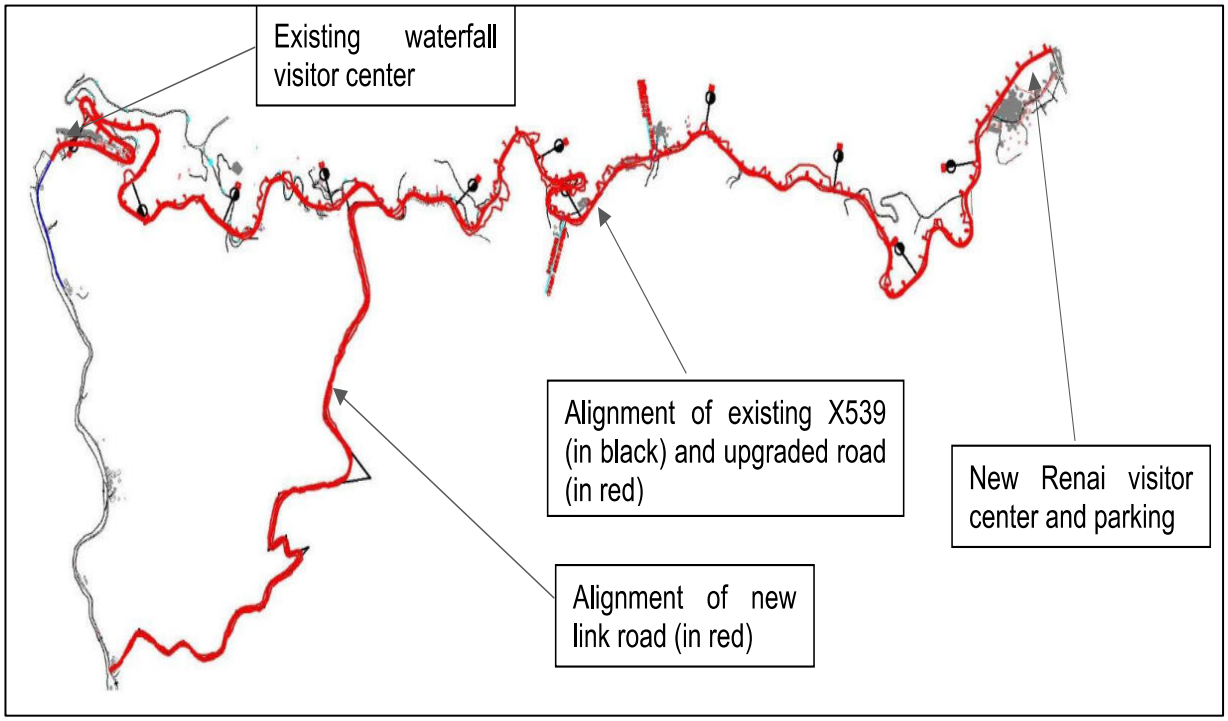
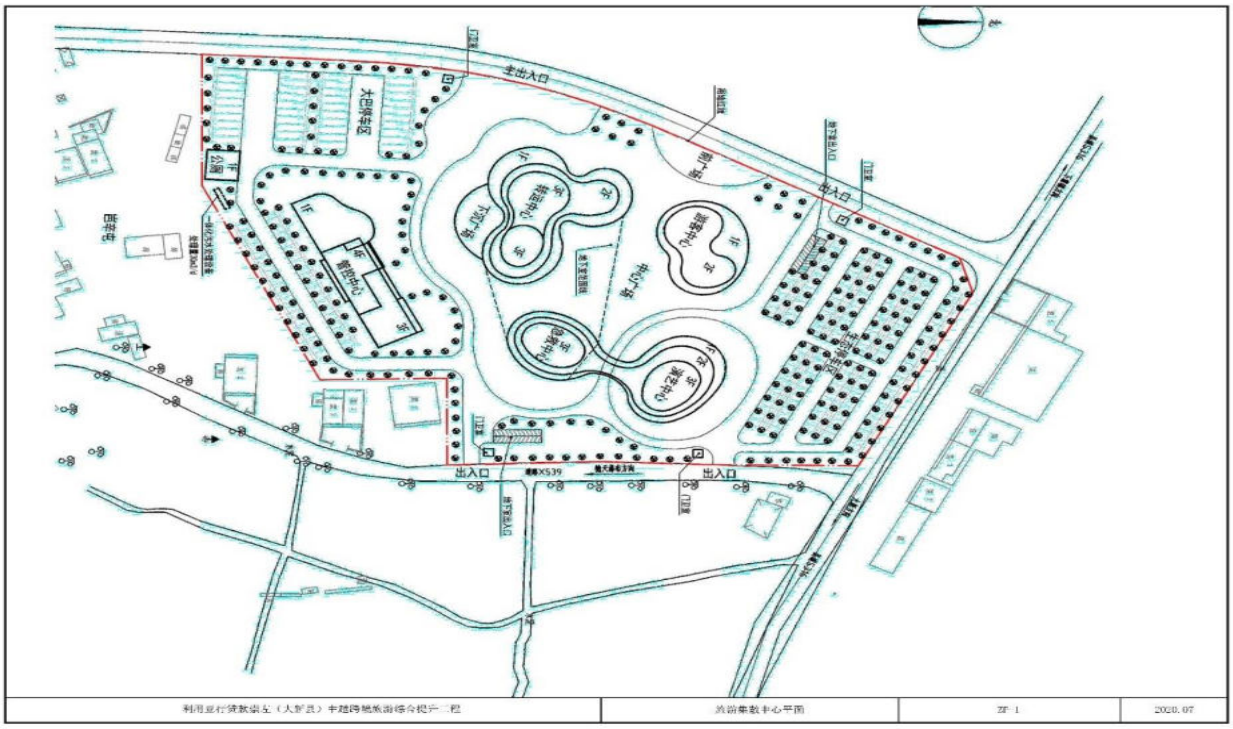


Figure 19. Subproject 5 Proposed Renai visitor center and car park (300 spaces)



99. **Physical facilities**. The proposed facilities under subproject 5 involve the upgrading of X539 and construction of new branch road (total of 16.28 km of 2-lane roads), and construction of new Renai visitor center and parking - 18,565m^2 building area and 314 parking spaces.

6. Subproject 6: Fangchenggang Sino-ASEAN Trade and Culture Exchange Center Project

100. **Rationale.** This subproject will enhance the Fangchenggang Border Economic Zone competitiveness through creating a comprehensive platform for cross border cooperation, e-commence development, public information service, labor training, culture exhibition and financial settlement service.

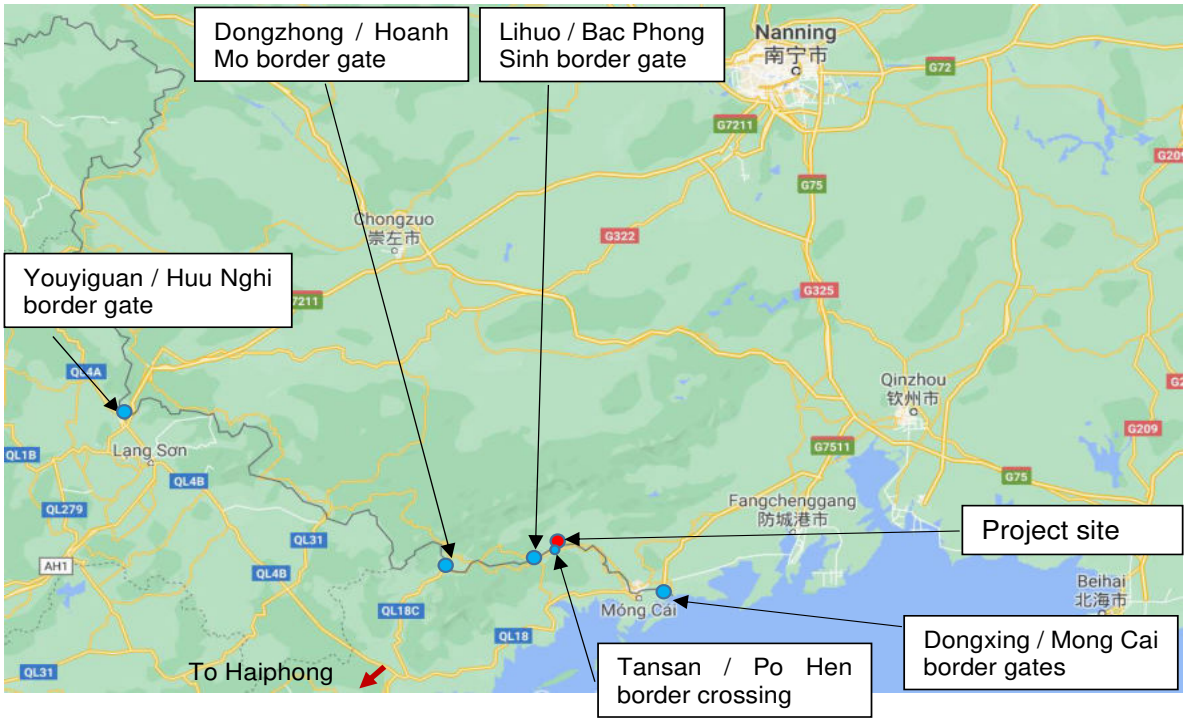
101. **Overview**. The total land area of the project is 104,184 m^2, and the total construction area is about 83,050 m^2. The main construction area is 40,800 m^2 for cross-border product landing processing workshop, 17,600 m^2 for cross-border product trading logistics center, 6,275 m^2 for comprehensive service building, 9,600 m^2 for ASEAN featured commodity exhibition and trading center, 8,775 m^2 for Sino-Vietnamese cultural exchange center, and supporting infrastructure such as open-air parking lot, square road, greening and sewage treatment facilities.

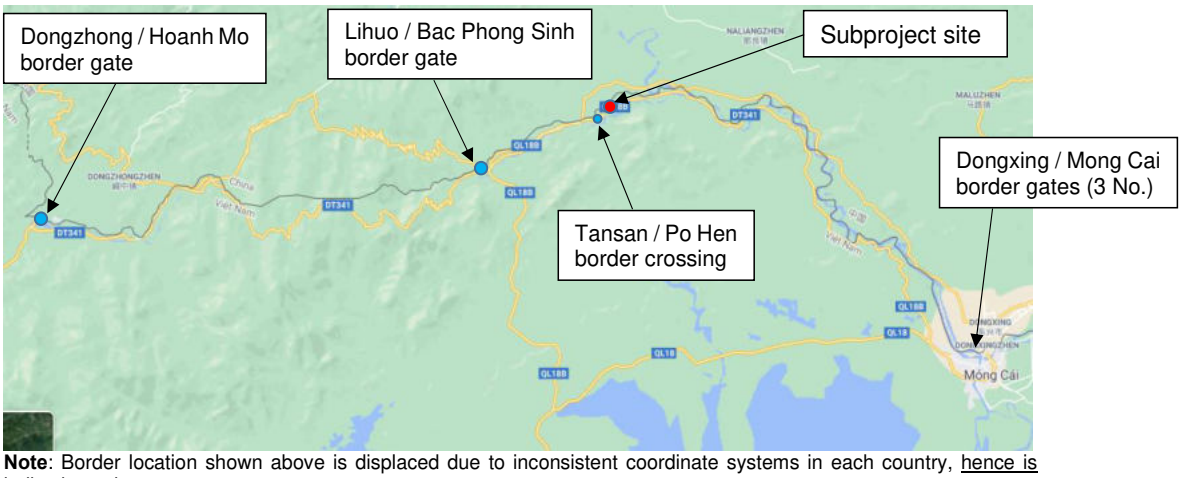
102. The building will contain energy saving facilities. The water requirement for the project will be met through surface as well as groundwater sources. There are two waterworks in Dongzhong town with an annual water supply capacity of 125,000 m^3. The water supply source is Kunguo reservoir in Banba River. According to the situation of water use, it is proposed to introduce two DN300 inlet main pipes (with master water meter) from the nearby industrial avenue and arrange DN300 water supply loop pipe network. The

maximum daily water demand of the project is 160.93m^3/d. After the project completion, the daily wastewater generated is mainly from domestic sources. The design will adopt separate rain and sewage collection system. Domestic sewage will be treated in a septic tank before being discharged centrally into the nearest trunk sewer through the sewer network. The drainage system adopts rain and sewage separation system outside. According to the principle of making full use of the terrain and discharging the rainwater into the water nearby, the rainwater pipe network will be arranged according to the road planning.

103. The subproject 6 is located 15 km by provincial road 325 from the center of Nalian town in Fancheng district of Fanchenggang city in Guangxi province. It is 30 km west of the major border gate at Dongxing / Mong Cai, 6 km east of the border gate point at Lihuo / Bac Phong Sinh, and 40 km by road east of the border gate at Dongzhong / Hoanh Mo. The following figures present the location map and lay out of the subproject facilities.

Figure 20. Subproject 6 Location Map





Note: Border location shown above is displaced due to inconsistent coordinate systems in each country, hence is indicative only

Figure 21. Subproject 6 Existing Conditions

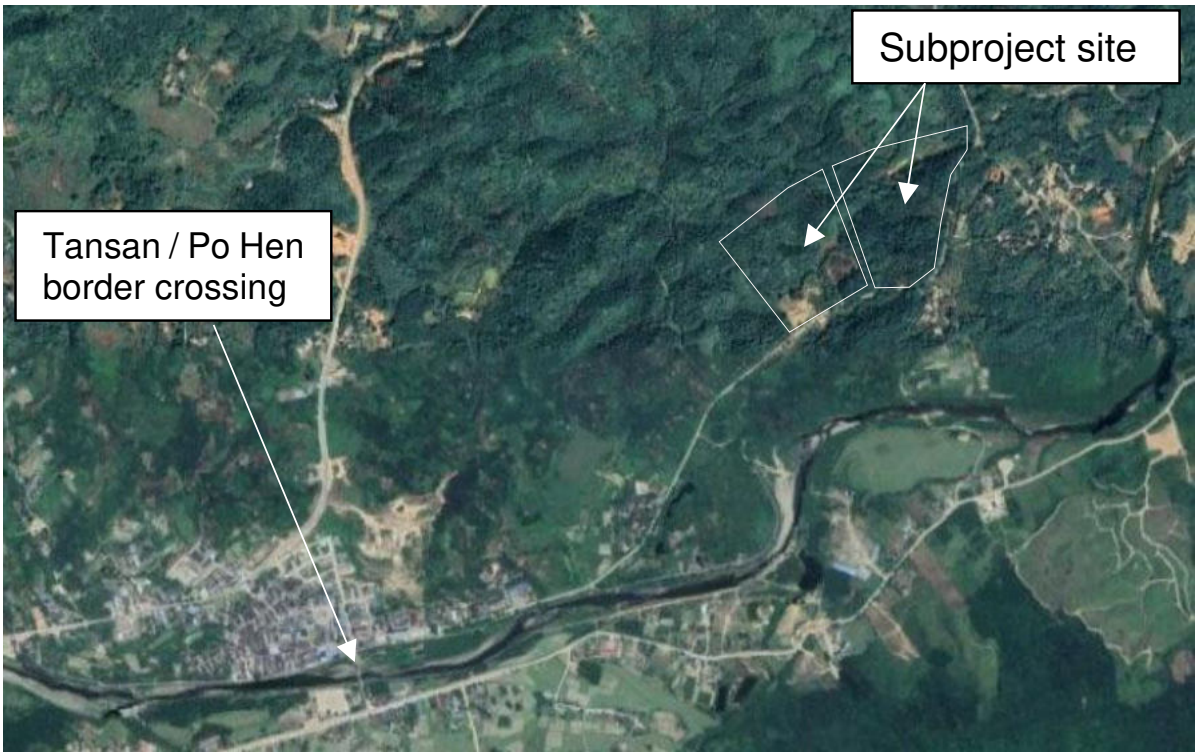


Figure 22. Subproject 6 Fangcheng Border Economic Cooperation Zone Master Plan 2017-2030

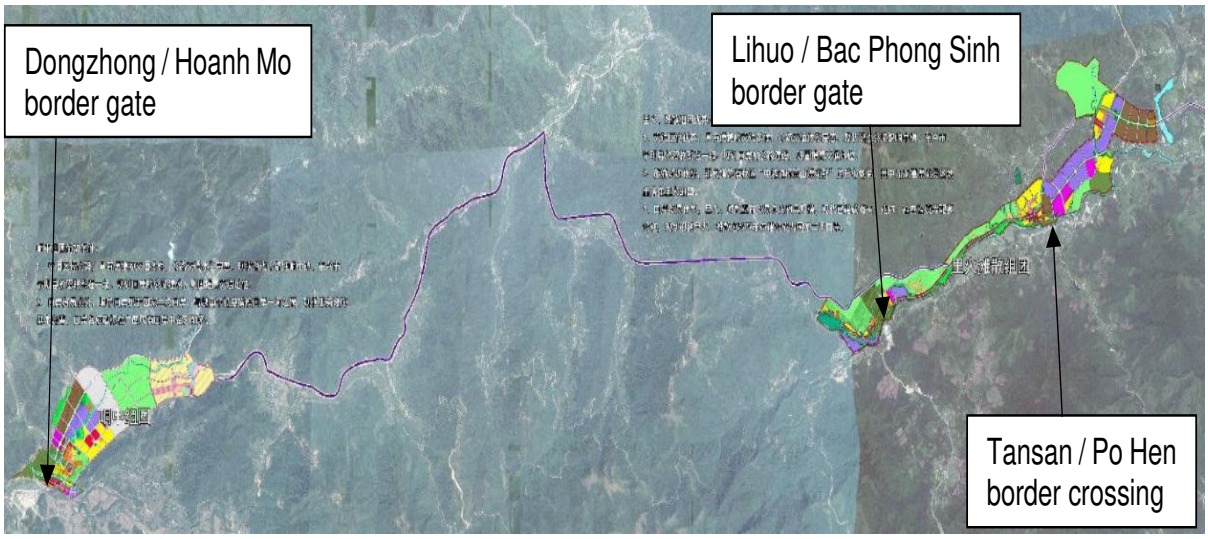


Figure 23. Subproject 6 Border Economic Cooperation Zone Master Plan 2017-2030 – Detail at the Project Site

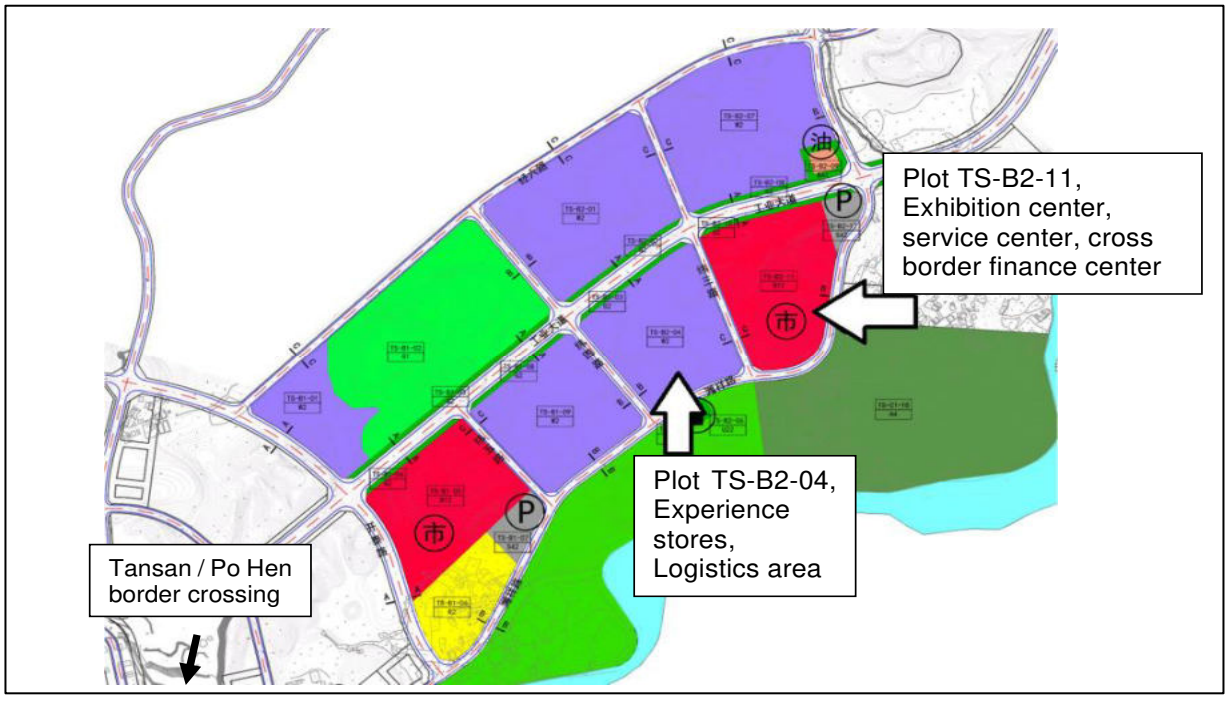
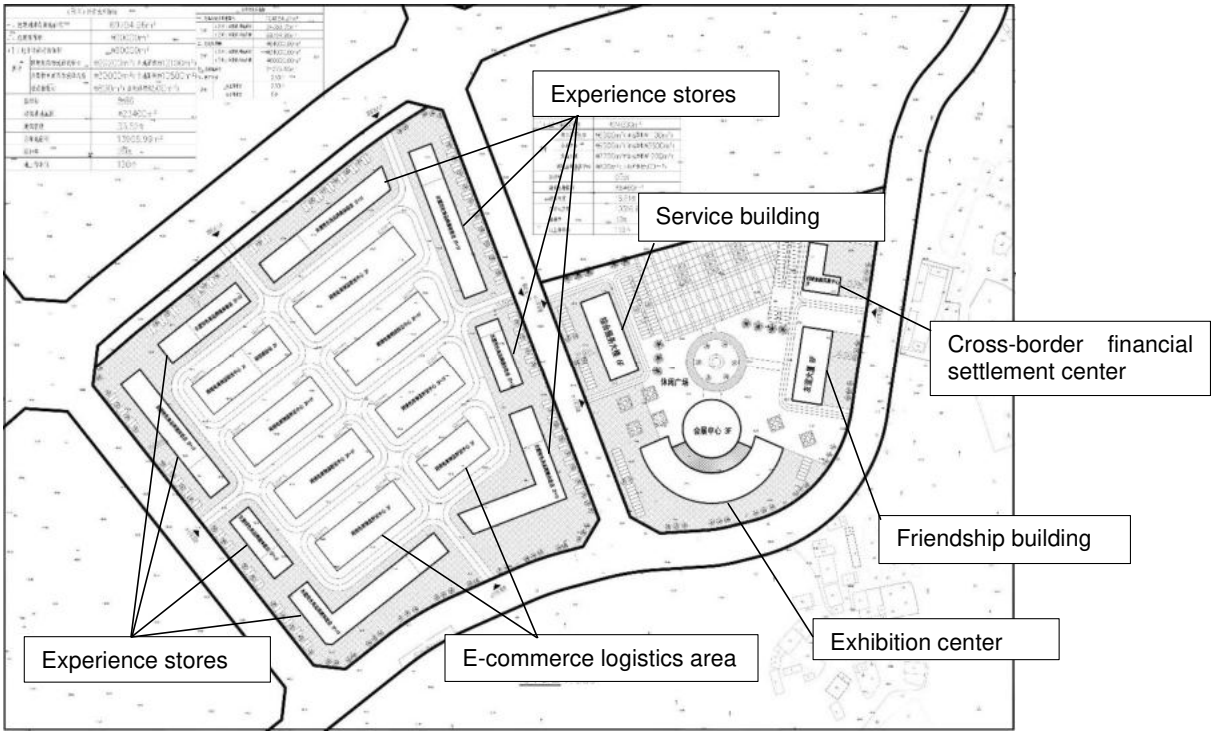


Figure 24. Subproject 6 Proposed Site Lay Out



104. **Physical facilities**. Proposed facilities to be constructed under this subproject are as listed below and shown on the site layout above.

Table 15. Subproject 6 Details of the Project Elements

No.	Item	Quantity	Unit	Remarks
1	Cross-border product landing processing workshop	40800	m^2	2 layers
2	Cross-border product trading logistics center	17600	m^2	2 layers
3	Comprehensive service building	6275	m^2	7 layers
4	ASEAN featured commodity exhibition and trading center			
5	Sino Vietnamese cultural exchange center	9600	m^2	3 layers
6	Roads and squares	46461	m^2	10 layers
7	Sewage treatment facilities	1	number	
8	Green area	24275	m^2	
9	Parking spaces for large trucks	3384	number	
10	Car parking space	2856	number	
11	Non motor vehicle parking spaces	624	number	

D. CLIMATE CHANGE ADAPTATION CONSIDERATIONS

105. The climate risk and vulnerabilities of six subprojects have been analyzed. According to the climate risk and vulnerability assessment report the annual mean temperature in the project area is likely to increase between 1.1°C to 1.3°C by 2050 and 2.2°C to 2.5°C by 2100, according to the median scenario projection. There is a high spatial variation in rainfall over the project area. The median scenario projection indicates the annual rainfall change in the Guangxi Project area will also likely be noticeable, with an average increase

of 2.5% in the northwest to 3.5% in the southeast by 2050 and 4.5% to 7.0% by 2100. The climate change projection indicates that the spatial variation of rainfall may become even larger in the future (2050 and 2100 projection), as the current wettest area likely receives more rainfall than relative drier areas. At a site-specific scale, the projected rainfall increase is clearer for the rainy season than the dry season. The dry period of January to March of Qinzhou even shows a slight decreasing trend. Such a scenario projection implies an increased storm and flood risk for the area.

106. Climate impacts almost all aspects of life including infrastructure development. Flooding and cyclones are likely to have adverse impacts on the building structure to be constructed under tranche 3. Design of physical infrastructure under tranche 3 subprojects facilities have taken into account the likelihood of increased flooding, both in periodicity and extent to ensure that construction occurs beyond areas that may be potentially inundated in the future. Climate change adaption and resilience measures are elaborated in the Climate Risk and Vulnerability Assessment. The project civil engineer will be responsible for including these measures as a specification within the bid and contract documents.

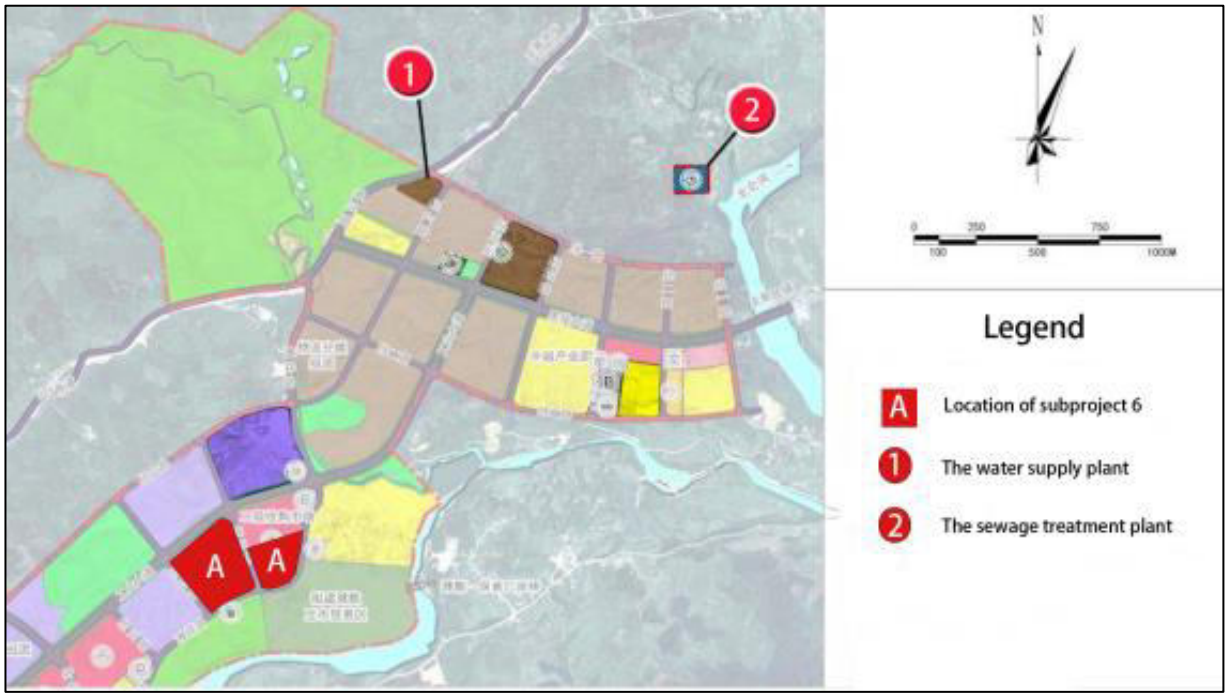
E. ASSOCIATED FACILITIES

107. Based on ADB SPS (2009) definition of associated facilities, subprojects 1, 2, 3, 4 and 5 of Tranche 3 do not have any associated facilities i.e. facilities that are not funded by the project but (i) whose viability and existence depend exclusively on the project and (ii) whose goods and services are essential for successful operation of the project. However, for subproject 6, a water treatment plant and a sewage plant are classified as associated facilities of subproject 6.

108. One water supply plant and one sewage treatment station are planned in the subproject area, among which, the design water supply capacity of the water supply plant is 10000 m^3/d in the short term and 20 000 m^3/d in the long term; whereas the treatment scale of the sewage treatment plant is 5000 m^3/d in the short term and 15 000m^3/d in the long term. At present, the water supply plant and sewage treatment plant have entered the construction bidding process. It is expected to start construction in 2021 and put into operation in 2023. At that time, it can meet the water supply and drainage demand of the project.

109. The location relationship between the two facilities and the project is shown in Figure 25. The two facilities are the only available water and drainage facilities during the operation period of subproject 6, and the operation of this is one of the supporting components of the operation of the two facilities. The domestic EIA report has been prepared but not approved. The environmental impact of these two facilities has been comprehensively evaluated in the domestic EIAs, which concluded that these facilities does not have any significant environmental impacts.

Figure 25: Associate facility location diagram – Subproject 6



110. Apart from the above two facilities, some of the project facilities will be connected or covered by the existing public utilities (such as water supply, sewerage system, wastewater treatment, municipal solid waste, electricity supply) which can also be associated facilities to the project. The availability and reliability of these public utilities are verified in discussion with PIEs and project entities.

111. Based on the review conducted to date, the associated facilities are planned, constructed and being operated in compliance with national policies and regulatory framework for environment, health and safety. Therefore, these facilities do not pose any significant environmental impacts.

F. COST AND IMPLEMENTATION SCHEDULE

112. The total cost of tranche 3 subprojects is estimated to cost $460 million. Government preparing to submit PFR for $140 million from ADB and remaining amount will be funded by government as counterpart funding. Tranche 3 will be implemented from January 2022 to December 2026. The construction will last from 18 to 72 months in total. The overall EMP will be adjusted at detailed design stage, then it will be reviewed and updated on an annual basis during the project implementation period. The proposed implementation plan of physical infrastructure constructions under tranche 3 is set out in Table 18 below.

Table 16: Tranche 3 Investment Program Implementation Plan

	2021		2022				2023				2024				2025				2026			
	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
A. Design and Monitoring Framework																						
Output 1: Small and medium-sized enterprises' base for cross-border businesses expanded																						
SP1 Baise University Sino-Viet Nam Cross-border Training Center																						
Construction of faculty buildings and underpass linking west / east campuses																						
Supply and installation of furniture and teaching equipment																						
Construction of road, a walking trail, and educational exhibits																						
SP2 Baise Cross-Border Agricultural Products Industry Chain Upgrading project																						
Construction of factory buildings																						
Supply and installation of blast freezer, trucks																						
Supply and installation of fruit processing and packaging lines																						
Output 2: Cost-competitive, safe, and expeditious cross-border financial transactions and investments realized																						
No activities in Tranche 3																						
Output 3: Integrated and interoperable cross-border e-commerce platforms for the People's Republic of China and Viet Nam developed																						
SP3 Chongzuo Cold Chain Logistics Demonstration Project																						
Construction of cold warehouse, factory building																						
Construction of bonded warehouse and storage yard																						
Supply / installation / commissioning of integrated logistics / e-commerce system.																						
Supply of forklifts for cold chain and bonded warehouse sites																						
SP6 Fangchenggang Sino-ASEAN Trade and Culture Exchange Center																						
Construction of experience stores, logistics center, exhibition center, service building																						
Output 4: Key infrastructure and trade-related services in border economic zones provided																						
SP4 Chongzuo Sino- Viet Nam Border Economic Cooperation Zone Demonstration Project (Phase II)																						
Construction of freshwater treatment plant and pipelines.																						
Construction of roads 2, 3, 4																						
Construction of roads 1, 5, 6																						
SP5 Chongzuo Daxin Sino-Viet Nam Cross-border Tourism Project																						
Realignment / upgrading of two roads, construction of visitor center																						
Construction of various tourist attractions and outdoor activities																						
Supply / installation / commissioning of surveillance system																						
Data center and network system																						
Application server and applications																						
Output 5: Physical and informational connectivity and policy coordination improved																						

	2021		2022				2023				2024				2025				2026			
	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
No activities in Tranche 3																						
B. Management Activities																						
Annual/Midterm review																						
Loan closing procedures																						

IV. DESCRIPTION OF THE ENVIRONMENT

A. GENERAL SETTING

113. The description of the pre-project environment (biophysical and socio-economic) establishes: (i) the environmental setting of the area within which the project will be implemented, and therefore needs to be designed to suit, and (ii) the environmental values which will be changed (either negatively or positively) by the project. Both are encompassed by the concept of the "baseline" environment. The baseline environmental surveys undertaken for the subprojects were determined by the types of components proposed and the environmental parameters which were relevant to their impact assessment. The existing environmental settings of the subproject sites are described in following sections. Air and noise sensitive receptors within the assessment area of 200 m from the subproject sites are presented in subsequent sections.

114. **Subproject 1**: Baise University Sino-Viet Nam Cross-border Training Center. The construction site is in the Chengbi campus of Baise University on the east side of Panbai Highway, Youjiang District, Baise City (106°38'49" east, 23°55'18" north, see Figure 27). According to the site survey, the west side of the project is adjacent to National Highway 324, the north, east and south sides are surrounded by undulating hills, and the overall environment is beautiful and pleasant (Figure 26).

Figure 26. Surrounding Environment of Subproject 1

Figure 27: Current Environment of the Project Sites

Training Center

Education Base

115. **Subproject 2:** Baise Cross-border Agricultural Products Industry Chain Upgrading Project. The construction site straddles the Nanbai Highway in Youjiang River Valley. Nanbai Expressway is in the eastern end of Baise East Exit and on both sides is the Liutang Railway Freight Station.

Figure 28. Location of Subproject 2

116. **Subproject 3**: Chongzuo Cold Chain Logistics Demonstration Project. The construction site is located within the designated area of China Thailand Chongzuo Industrial Park. This industrial park is located on the east and norther side of Chongzuo city. It is 240 km from Hanoi, Viet Nam, 1700 km from Bangkok, Thailand, 130 km from Beibu Gulf international seaport, 800 km from Hong Kong and 70 km from Nanning. The occupation of basic farmland is not involved.

Current status of bonded warehouse project location

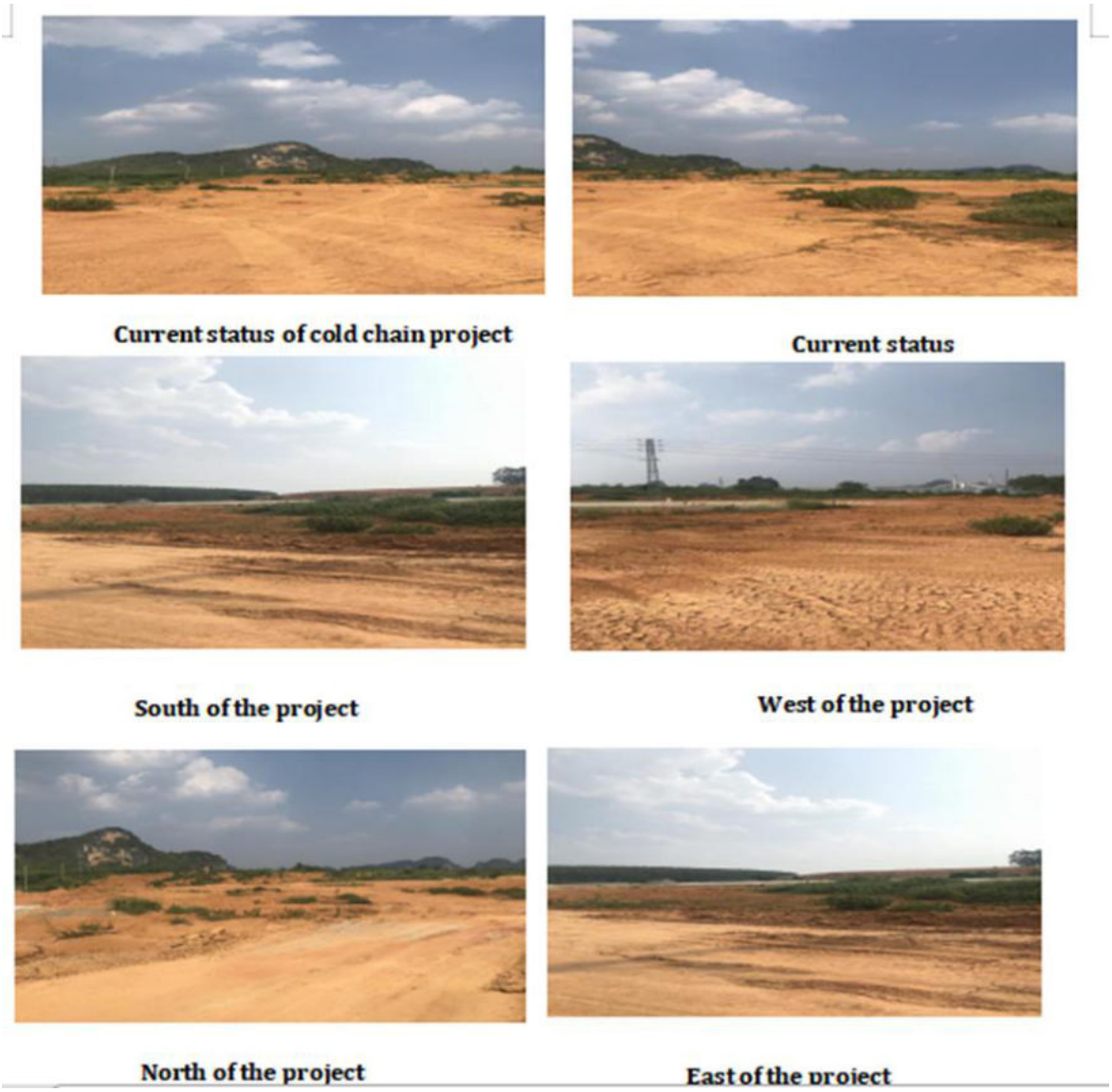
Current status of the project

South of the project

West of the project

North of the project

East of the project



117. **Subproject 4:** Chongzuo Sino-Viet Nam Economic Corporation Zone Demonstration Project. The proposed plant site is located about 4km north of Xinhe Township, Jiangzhou District. The water intake pump station is located on the left bank of the Heishui River about 800 m south of Nanuotun, Xinhe Town. The area surrounding the water intake pump house is shrub land, the south side is Heishui River; the water treatment plant is located about 700 m north of Sibatun, Xinhe Town, by the Provincial Highway S213 and is surrounded by dry land (mainly sugarcane crop). About 180 m to the west of the plant is S213 Provincial Highway, and 350 m to the west is the Heishui River. Geographic location of the northernmost end of the road network: E107.175064, N22.605057; the southernmost end: E107.245402, N22.544586; the center of the expanded water treatment plant: E107.215979, N22.587386; the northernmost end of the water supply pipeline: E107.224224, N22.619933; the southernmost geographical location: E107.219192, N22.476436 (Figure 29 and Figure 30).

Figure 29. The current status of the plant site

Figure 30. Road network, water network sensitive points

Xinjian

Naban, Jinfa

Siba

Nanuo

Xinxing Jiayuan Resettlement Points

Residents in Xinhe Township

No.2 Elementary School in Xinhe Township

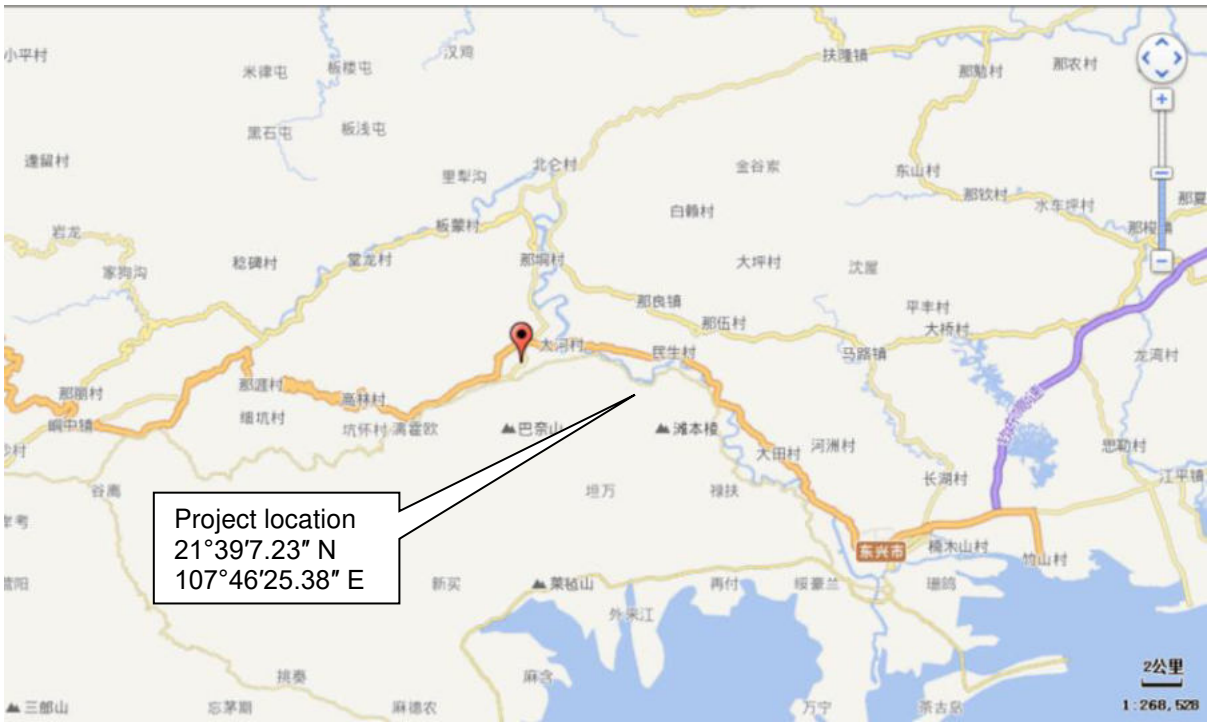
Kindergarten

118. **Subproject 5:** Chongzuo Daxin Sino-Viet Nam Cross-border Tourism Project. The project is in Daxin County, Chongzuo City. The central coordinates of the project are longitude 106.768913, latitude 22.866527.

Figure 31. Subproject 5 Geographical Location Map

119. **Subproject 6**: Fangchenggang Sino-ASEAN Trade and Culture Exchange Center project. The project is in the center of Tansan village, Naliang Town, Fangchenggang City (107°46'21.94"E and 21°39'7.39"N).

Figure 32: Location of Subproject 6



B. EXISTING SENSITIVE RECEPTORS

120. Based on field surveys, the subproject EITs identified various sensitive receptors/ protection targets that currently exist within the influence areas of the subprojects (see Table 17 to Table 22). Locations of these sensitive receptors for these subprojects are illustrated in Figure 33 to Figure 38.

Table 17. Sensitive Receptors for Subproject 1

Protection Category	Sensitive Receptor	Property	Location and distance	Number of People	Protection Level
Atmosphere and Acoustic environment	Nadao	Residential	Northwest 1663m	65	(1) Air quality shall meet Class 2 standard in Ambient Air Quality Standards (GB 3095-2012). (2) Acoustic environment shall meet Category 1 and 4a standard in
	Yannai	Residential	Northwest 1258m	70	
	Lada	Residential	West 335m	25	
	Dihao Jingyuan	Residential	Southwest 1706m	3500	
	Baise Vocational College	School	Southwest 1084m	6000	
	Shangshui Jiayuan	Residential	Southwest 2136m	1500	
	Baise Institute of Mechanical and Electrical Engineering	School	Southwest 2077m	3000	

	Jianxin Community	Residential	Southwest 1955m	3200	Environmental Quality Standard for Noise (GB 3096-2008); (3) Category 2 standard in Environmental Quality Standards for Surface Water (GB 3838-2002)
	No.7 High School, Baise	School	Southwest 2097m	800	
	Guangxi Youjiang College of Business for Nationalities	Residential	Southwest 1812m	4100	
	Youjiang Nationality Museum	Unit	Southwest 1998m	45	
	Baise Uprising Memorial Hall	Unit	South 2025m	56	
	Jiangyuan	Residential	Southeast 1282m	63	
	Gudu	Residential	Southeast 2439m	70	
	Natun	Residential	Northeast 1756m	67	
Surface Water	Chengbi River		Northwest 429m	/	

Figure 33. Sensitive Receptors for Subproject 1

Table 18: Sensitive Receptors for Subproject 2

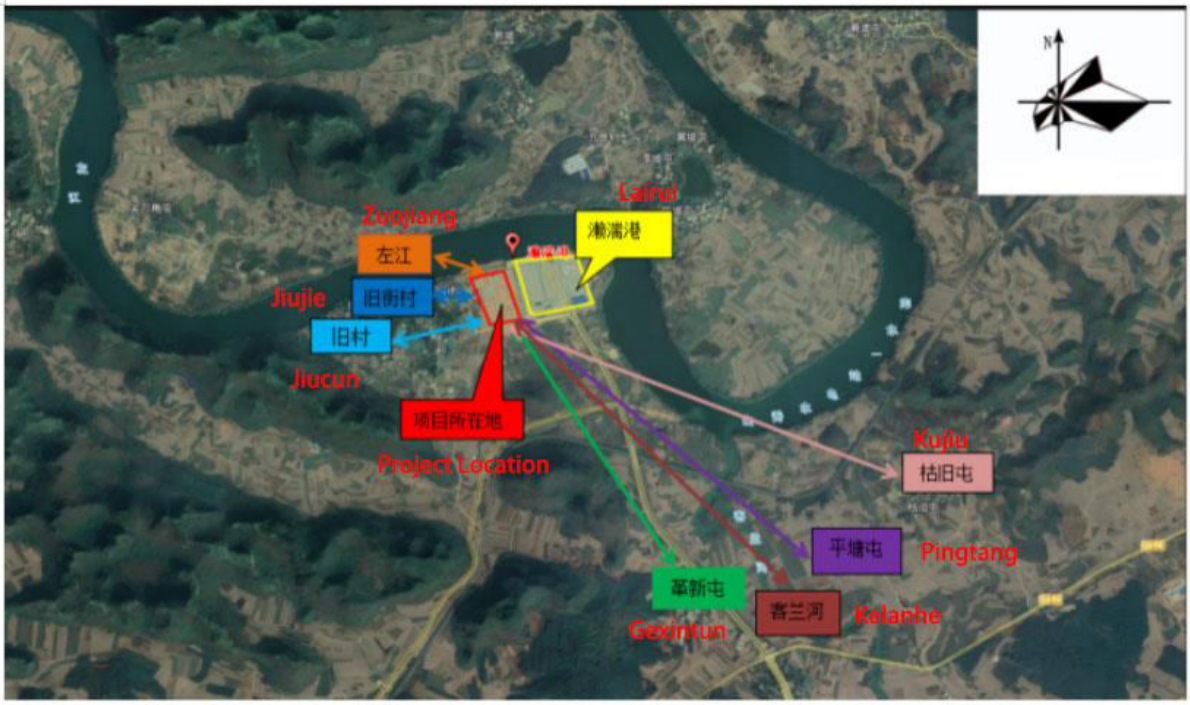
Protection category	Sensitive point name	Relative position and distance from the boundary	Number	Protection level
Atmospheric environment and acoustic environment	Wutangtun	E50m	560	"Ambient Air Quality Standard" (GB3095-2012) secondary standard; "Acoustic Environmental Quality Standard" (GB3096-2008) Class 1 and Class 4a standards
	Najintun	S200m	550	
	Yintun	W500m	130	"Ambient Air Quality Standard" (GB3095-2012) secondary standard;
	Yenatun	WN700m	144	
	Najitun	WN1400m	100	
	Anjutun	WN1600m	1800	
	Liutangzhen	W1130m	2000	
	Gugutun	WN2000m	120	
	Luyangtun	N1900m	372	
	Waiyutun	S1300m	678	
	Shemacun	E2000m	1122	

Figure 34. Sensitive Receptors for Subproject 2

Table 19. Sensitive Receptors for Subproject 3

Environmental elements	Objectives of environmental protection	Relative position with project	coordinate	scale	Environmental protection level
surface water	Second grade protection area of Jiujie water source in laituan town	near		The length is from 7000m upstream to 300m downstream	Secondary water source protection area
	Second grade protection area of Dukou water source in Qujiu town	3.8km		The length is 4000m upstream to 300m downstream of the intake	
ecological environment	Zuojiang Huashan rock painting cultural landscape heritage area	East, 100m	Heritage Area III: 22°32′00″ N and 107°34′00″E	2486.27hm^2	World Cultural Heritage
	Chongzuo white headed langur nature reserve, Guangxi Zhuang Autonomous Region	North, 5200m	Longitude 107°16′53″ ~ 107°59′46″E, 22°10′43″ ~ 22°36′55″N	The reserve is about 75KM long from east to west and 48km wide from south to north	Natural Reserve

Figure 35. Sensitive Receptors for Subproject 3



Sensitive Receptors for Bonded Storage

Sensitive Receptors for Cold storage

Table 20. Sensitive Receptors for Subproject 4

Sensitive Receptors for Road Construction						
Road	Name	Feature	Number of Pile	Distance (m)	Building scale	Applicable Environmental Standard
North Section of Xinghe Road	Xinjiantun	Residential	1K1+380~ 1K1+480, right side	34	170 2-3 story houses 170 households with 550 people	(1) Air quality shall meet Class 2 standard in Ambient Air Quality Standards (GB 3095-2012). The ambient air quality remains unchanged from the current situation. (2) Acoustic environment shall meet Category 1 ,2, 3, 4a standards in Environmental Quality Standard for Noise (GB 3096-2008) (3) Surface water intake, Nanuo Level-I water source area (proposed), Xinhe Township Junzao Level-I water source area shall meet Category II in Environmental Quality Standards for Surface Water (GB 3838-2002), other rivers shall meet Category III in Environmental Quality Standards for Surface Water (GB 3838-2002), the regional water environment will not be changed.
	Sibatun	Residential	1K2+000~ 1K2+080, both sides	32	30 2-3 story houses 30 households with 92 people	
	Jinfatun	Residential	1K4+560~ 1K4+760, left side	94	72 2-3 story houses 72 households with 226 people	
	Nabantun	Residential	1K4+760~ 1K4+960, right side	19	75 2-3 story houses 75 households with 228 people	
	Nanuotun	Residential	1K5+700~ 1K6+100, both sides	18	65 2-3 story houses 65 households with 210 people	
	Qingcun	Residential	1K6+295~ 1K6+515, right side	35	70 2-3 story houses 70 households with 210 people	
Section A Xinggui Road	Xinxing Jiayuan Resettlement Point	Residential	2AK0+000~ 2AK0+340, right side	25	23 6-story building 520 households with 1560 people	
Section A Xingui Street	Xinxing Jiayuan Resettlement Point	Residential	3AK0+000~ 3AK0+500, both sides	25	47 6-story building 1040 households with 3120 people	
South Section Xingong Street	Qinghe Village	Residential	4K0+460~ 4K0+720, right side	25	93 2-3 story houses 93 households with 420 people	
Xinyuan Street	Residents 1 along the street in Xinhe Township	Residential	5K0+460~ 5K0+690, both sides	17	280 3-4 story houses 280 households with 840 people	
Baiwu Second Road	Residents 2 along the street in Xinhe Township	Residential	6K0+100~ 6K0+600, left sides	9.5	290 3-4 story houses 290 households with 870 people	
	Residents 3 along the street in Xinhe Township	Residential	6K0+960~ 6K0+995, right side	15.5	40 3-4 story houses 40 households with 150 people	
	Xinhe No.2 Elementary School	School	6K0+340~ 6K0+440, right side	14.5	3 2-6 story education building with 2000 students and teachers	

	Kindergarten	School	6K0+260~ 6K0+330, right side	14.5	3-story education building with 300 students and teachers	
Xinhe Township Junzao water source area	North section of Xinghe Street 1K0+000~1K0+834、1K0+874~1K3+180 cross the drinking water source protection area level II land area					
	North section of Xinghe Street 1K0+834~1K0+874 cross the level II water source protection area					
Xinhe Township Nanuo water source area (proposed)	North section of Xinghe Street 1K5+700~1K6+500 cross the level II protection land area					
Heishui River	30m West of the Start Point of Baiwu Second Road					

Sensitive Receptors of Water Supply Expansion Project						
	Sensitive Receptors	property	Location	Distance (m)	Sensitive Receptors' Features	(1) Air quality shall meet Class 2 standard in Ambient Air Quality Standards (GB 3095-2012). The ambient air quality remains unchanged from the current situation. (2) Acoustic environment shall meet Category 1 ,2, 3, 4a standards in Environmental Quality Standard for Noise (GB 3096-2008) (3) Surface water intake, Nanuo Level-I water source area (proposed), Xinhe Township Junzao Level-I water source area shall meet Category II in Environmental Quality Standards for Surface Water (GB 3838-2002), other rivers shall meet Category III in Environmental Quality Standards for Surface Water (GB 3838-2002), the regional water environment will not be changed.
Intake pump room	Nanuo	Residential	North Side	478	70 households, 210 people	
	Qvnong	Residential	South Side	317	330 households, 1000 people	
	Ganxiang	Residential	Southeast	790	100 households, 300 people	
Water treatment plant	Siba	Residential	South side	460	40 households, 120 people	
	Xinjian	Residential	Southeast	726	290 households, 870 people	
Water supply pipeline networks	Jinfa	1K0+130~450	Left side	5	100 households, 300 people	
	Zhenwu	1K1+200~670	Both sides	4	70 households, 225 people	
	Tongping	1K3+700~1K4+100	Left side	40	53 households, 160 people	
		1K4+000~200	Right side	6	35 households, 100 people	
	Junzao	2K1+930~2K2+550	Left side	3	200 households, 600 people	
	Dutong	2K3+360~500	Left side	8	100 households, 300 people	
	Buguang	2K3+740~990	Left side	180	80 households, 240 people	
	Buhuacun	2K5+250~600	Left side	5	130 households, 390 people	

	Banei	2K8+260~430	Right side	8	150 households, 450 people	
	Resettlement point in Xinhe Township	3K0+195~580	Left side	90	36 households, 105 people	
	Yanjing	3K2+870~3K3+020	Right side	18	10 households, 30 people	
	Residents along Xinhua North Street	4K0+000~4K1+500	Both sides	3~5	450 households, 3650 people	
	Residents along Xinxing Street	5K0+000~5K1+090	Both sides	3~6	100 households, 500 people	
	Xinxing Jiayuan Resettlement Point	6K0+000~6K0+700	Both sides	11	1040 households, 3120 people	
	Xialengqiu	7K2+150~500	Left side	75	130 households, 390 people	
	Jiupaitou	8K0+320~550	Left side	3	70 households, 210 people	
	Xinpaitou	8K0+840~8K1+000	Left side	4	40 households, 120 people	
	Dongban	8K1+370~580	Left side	12	65 households, 195 people	
	Nawan	8K3+500~870	Left side	190	70 households, 210 people	
	Zuozi	8K4+500~850	Left side	78	75 households, 225 people	
	Jiaocheng	8K6+900~8K7+100	Left side	12	60 households, 180 people	
Xinhe Township Nanuo water source protection area (proposed)	The raw water intake pipe is located in the Level-I protection area					
	The first-phase water pipeline K0+000~0+435m passes through the first and second land areas of the water source protection area					
Xinhe Township Junzao water source protection area	100m south of the water plant Level-II land protection zone					
	The 2K2+030~2K6+259m section of the water supply pipeline passes through the Level II land protection zone					
	The left side of water supply pipeline 7K0+750~7K1+663 is adjacent to the Level II land protection area					
Heishui River	Right side of Water supply pipeline 2K0+000~2K2+030m					
	Water supply pipeline 3K0+000~3K0+275m passes through					
	Water supply pipeline 5					

Figure 36. Sensitive Receptors for Subproject 4

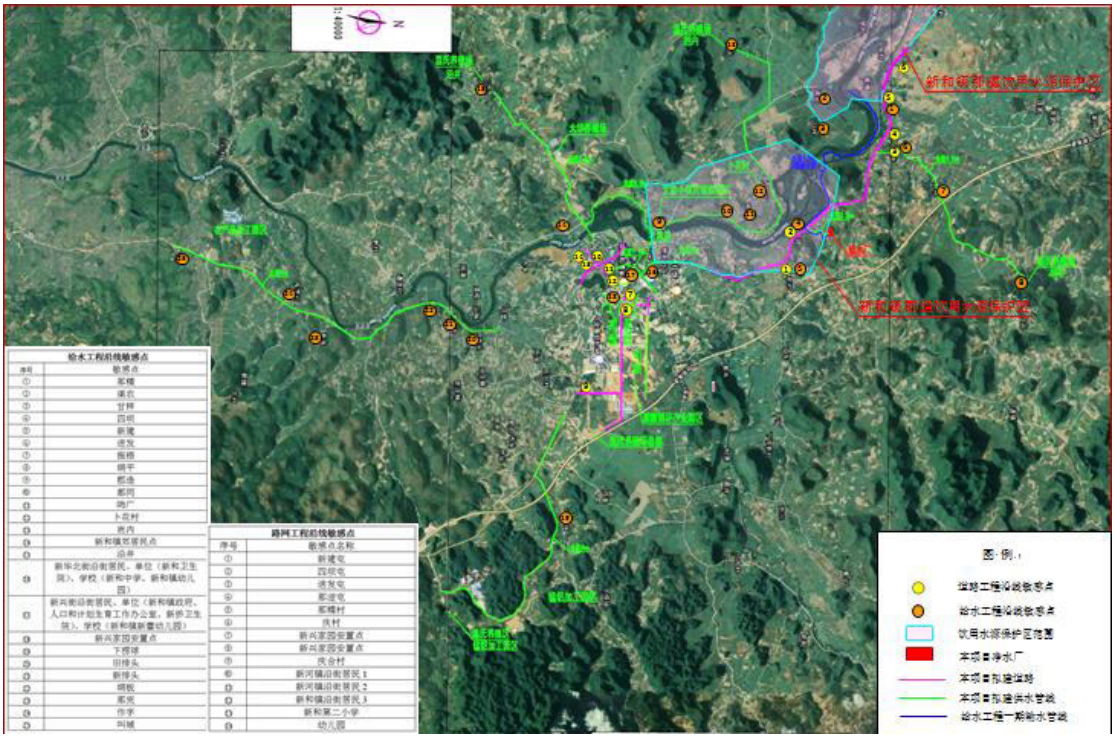
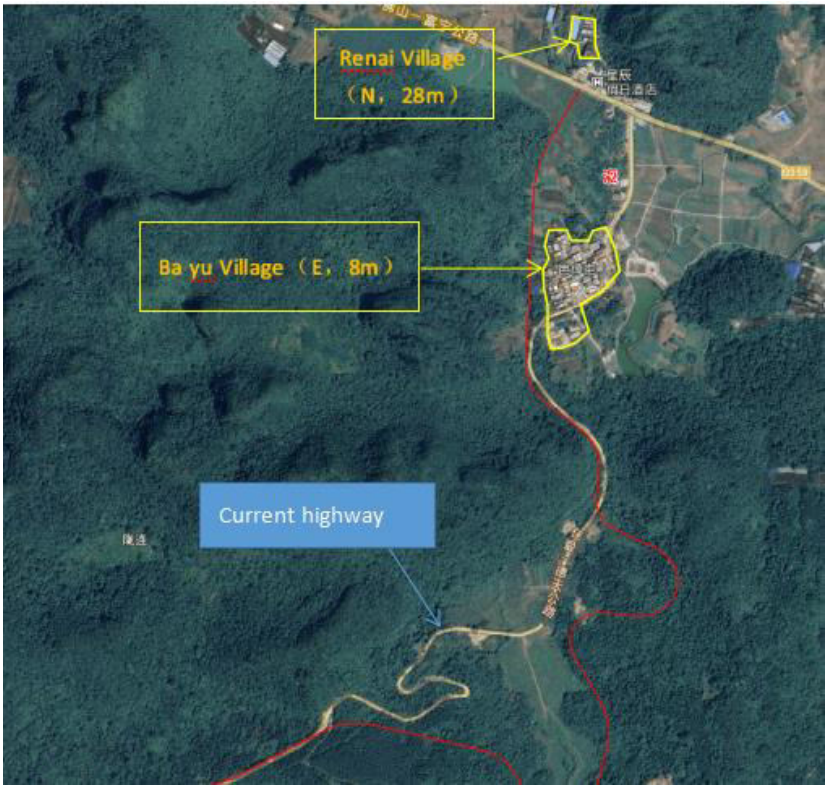


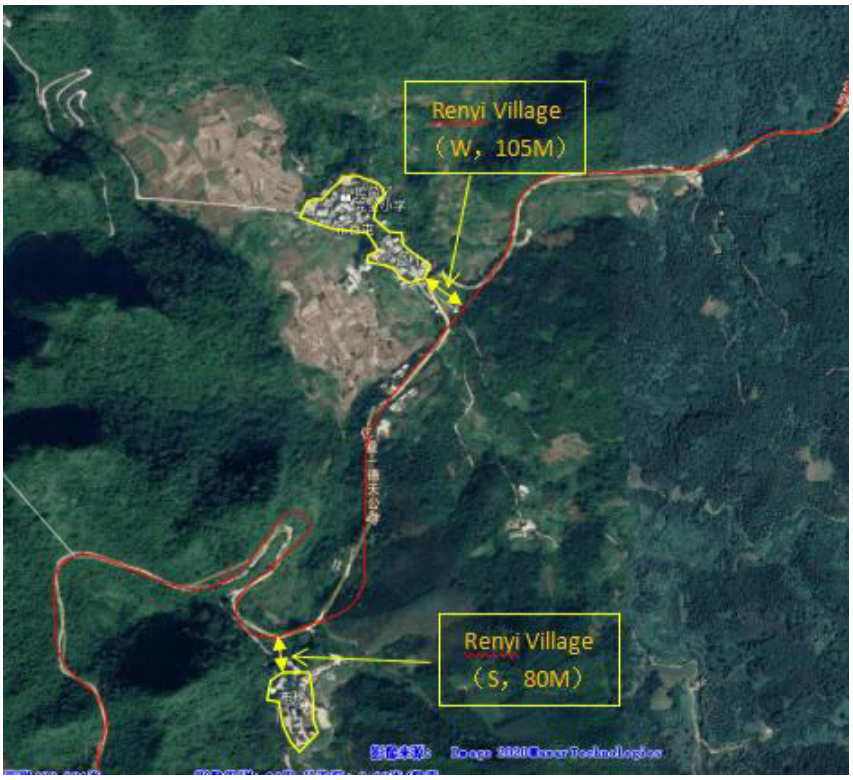
Table 21. Sensitive Receptors for Subproject 5

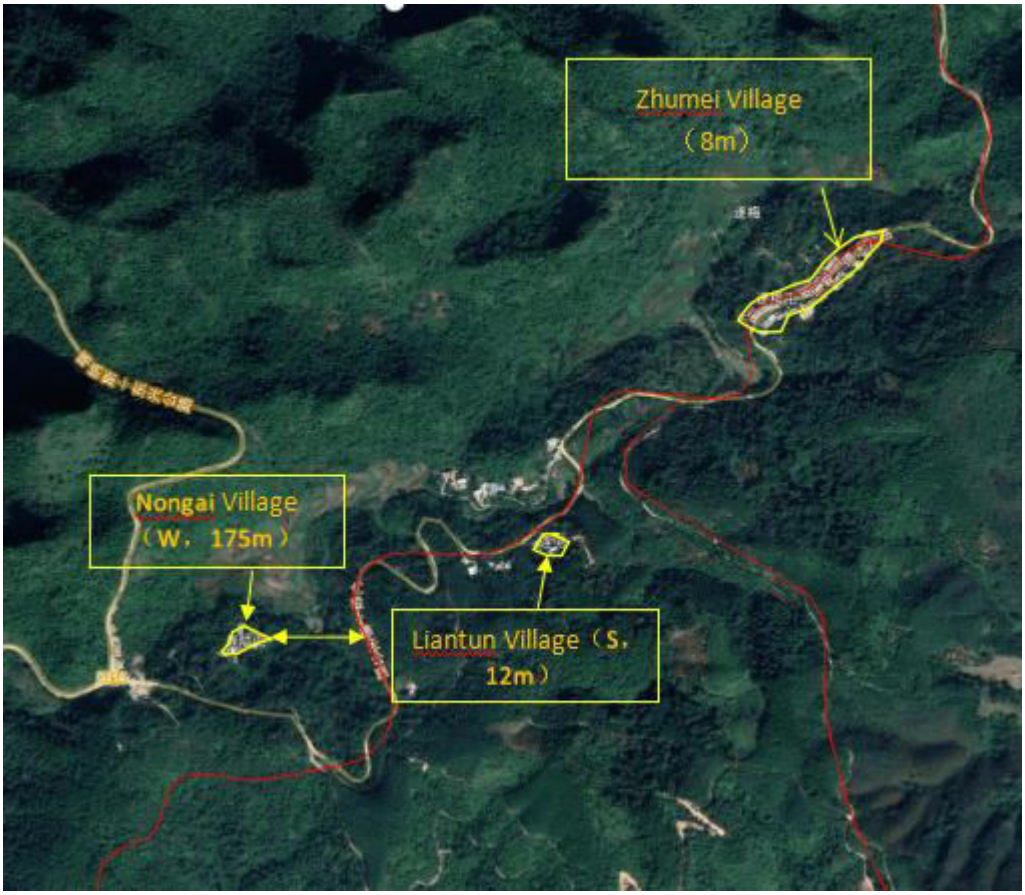
Environmental elements	Objectives of environmental protection	Relative position with project	coordinate	scale	Environmental protection level
ambient air	Ren Ai Village	North, 28m	N 22.895605°, E 106.780517°	About 100 people	Ambient air quality standard (gb3095-2012) and the secondary standard in the revised list in 2018
	Baxing Village	East, 8M	N 22.891373°, E 106.779460°	About 200 people	
	Renyi Village Shangtun	West, 15m	N 22.876482°, E 106.763109°	About 150 people	
	Bulang Village	South, 80m	N 22.868371°, E 106.780593°	About 100 people	The air quality standard of Huashan Scenic Area (GB3095, 2012) is implemented
	Zhumei Village	8 m on both sides of the road	N 22.864229°, E 106.753308°	About 100 people	
	Liantun Village	Both sides of the road, 12m	N 22.859676°, E 106.748357°	About 70 people	
	Nongai Village	West, 175m	N 22.857738°, E 106.745630°	About 70 people	
	Longjiantun	North, 151m	N 22.822133°, E 106.783242°	About 200 people	
	Deng Ya Tun	Within the project area	N 22.822133°, E 106.783242°	About 200 people	

	Aijiangtun	Within the project area	N 22.822865°, E 106.773902°	About 150 people	
	Baqiantun	East, 20m	N 22.816318°, E 106.776273°	About 400 people	
	Longhongtun	West, 20m	N 22.820838°, E 106.799887°	About 350 people	
Acoustic environment	Ren Ai Village	North, 28m	N 22.895605°, E 106.780517°	About 100 people	Class 4a of environmental quality standard for noise (GB 12348-2008) shall be implemented within 35m of both sides of the road, and class II standard shall be implemented beyond 35m
	Baxing Village	East, 8M	N 22.891373°, E 106.779460°	About 200 people	
	Renyi Village Shangtun	West, 15m	N 22.876482°, E 106.763109°	About 150 people	
	Bulang Village	South, 80m	N 22.868371°, E 106.780593°	About 100 people	In Huashan Scenic Area, class 4a of environmental quality standard for noise (GB 12348-2008) shall be implemented within 35m of both sides of the road, and class 1 standard shall be implemented beyond 35m
	Zhumei Village	8 m on both sides of the road	N 22.864229°, E 106.753308°	About 100 people	
	Liantun Village	Both sides of the road, 12m	N 22.859676°, E 106.748357°	About 70 people	
	Nongai Village	West, 175m	N 22.857738°, E 106.745630°	About 70 people	
	Longjiantun	North, 151m	N 22.822133°, E 106.783242°	About 200 people	
	Deng Ya Tun	Within the project area	N 22.822133°, E 106.783242°	About 200 people	
	Aijiangtun	Within the project area	N 22.822865°, E 106.773902°	About 150 people	
	Baqiantun	East, 20m	N 22.816318°, E 106.776273°	About 400 people	
	Longhongtun	West, 20m	N 22.820838°, E 106.799887°	About 350 people	
water environment	Guichun River	South, 20m	/	/	Class III standard of environmental quality standard for surface water (GB3838-2002)
ecological environment	Huashan scenery Scenic spots	Huashan Scenic Area		/	National Scenic Spot

Figure 37. Sensitive Receptors for Subproject 5





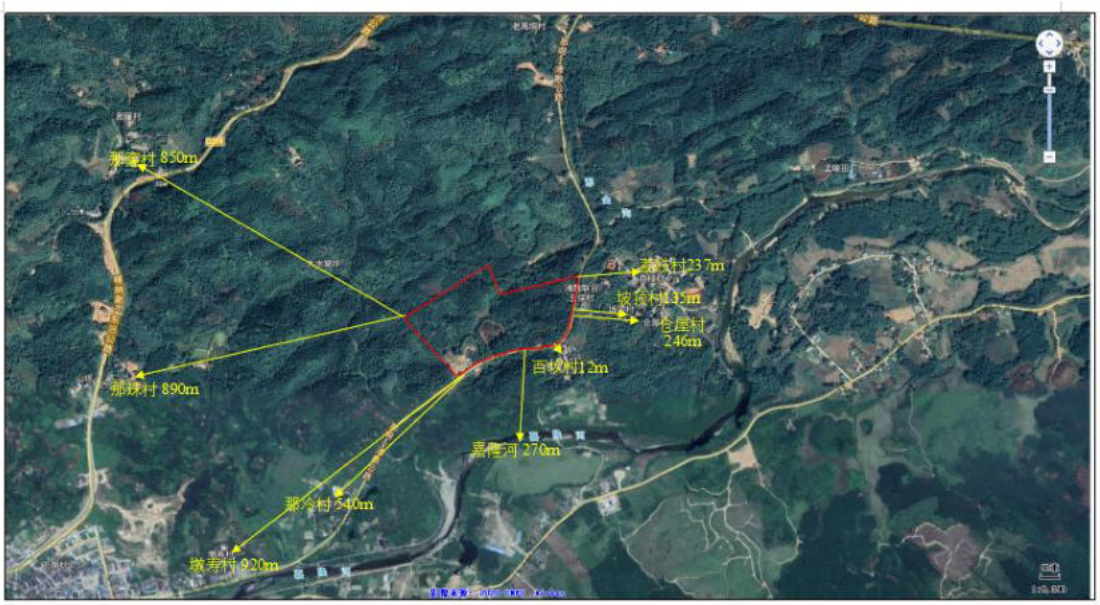

Zhumei Village
（8m）
Nongai Village
（W，175m）
Liantun Village（S，
12m）


Bagantun
（E，20m）
Longjiantu
n（N，40m）
Longhongtun
（W，20m）
Aijiangtun（项
目区内）
Deng Yatun
（项目区内）

Table 22. Sensitive Receptors for Subproject 6

Serial number	Sensitive target	nature	Relative project field boundary orientation	Distance m	influence factor	Protection level
1	Litchi Village	residence community	E	237	atmosphere	Class II standard (gb3095-2012)
2	Cangwu Village	residence community	E	246		
3	Poding Village	residence community	E	135		
4	Baikan Village	residence community	S	12		
5	Naleng Village	residence community	SW	540		
6	Dunshou Village	residence community	SW	920		
7	Nazhu Village	residence community	S	890		
8	Nalong Village	residence community	NW	850		
9	Beilun River	surface water	E	2000	/	Class III standard (GB3838-2002)

Figure 38. Sensitive Receptors for Subproject 6



121. **Air Quality and Noise Sensitive Receptors.** The sensitive receptors for air and noise quality within the boundary of the impact zone (within 1 km radius as per domestic EIA report) for the subprojects have been identified and listed in Table 17 through Table 22. Most of the sensitive receiving points are residential buildings with 2-3 floor height. In Guangxi University of Finance and Economics (Fangchenggang campus), there are some buildings with 6 floor height or more. There are people living in these sensitive reception points. These are basically dormitories for students and teachers of the University campus. Noise sensitive receivers can be classified into 1, 2, 3 and 4A acoustic environment functional areas.

122. **Water Quality Sensitive Receptors**. The water quality sensitive receiving points around the subproject sites include 5 rivers and 4 water source protection areas. Subproject 3 is close to Jiujie water source area secondary protection area of laituan Town, and is 3.8 km away from Qujiu town Dukou water source area. Subproject 4 involves Xinhe Town County water source protection area and Nanuo water source area.

123. **Relationship between Subproject 5 and Guangxi Huashan Scenic Area.** Subproject 5 is in Huashan national scenic area, which belongs to the scenic area and its supporting facilities of the construction project. There is no construction unrelated to the scenic spot. According to the reply to the upgrading and reconstruction project of ShuoLong via Detian to Renai secondary road issued by Chongzuo Guangxi Huashan Scenic Area Management Committee (May 2018), the site selection of the project road basically meets the requirements of the upper level planning. The route of the site selection not only has a small impact on the scenic spot landscape, but also can greatly improve the traffic congestion during holidays and festivals after the completion of the project. In principle, the site selection for the project is agreed.

124. **Protected Area**. According to the field survey and domestic EIA report form, subproject 5 is in Huashan Scenic Spot. Subproject 3 includes Chongzuo White-headed langur Nature Reserve, Zuojiang Huashan Rock Painting cultural landscape Heritage Area and Huashan Scenic Spot.

125. Zuojiang HuashanRock Art Cultural Landscape in Guangxi are mainly distributed on the wide, flat and vertical stone walls of the river bend in Ningming, Longzhou, Chongzuo, Fusui, Daxin and other areas inhabited by Zhuang people in the Zuojiang River Basin of southern Guangxi. They are painted by Luoyue people, the ancestor of Zhuang people, in 79 places. Among them, the frescoes on Huashan cliff of Mingjiang River in Ningming County are the largest and most spectacular, known as "natural exhibition Palace" and "cultural treasure of Zhuang nationality".On July 15, 2016, at the 40th World Heritage conference held in Istanbul Conference Center, Turkey, the rock art and cultural landscape of Huashan Mountain in Zuojiang, Guangxi, China was approved to be included in the world heritage list.The construction of subproject 5 and subproject 3 has no impact on Zuojiang HuashanRock Art Cultural Landscape.

126. Guangxi Chongzuo white headed langur National Nature Reserve is located in Chongzuo City, Southwest China. It is located in 22 ° 10 ′ 43 ″ - 22 ° 36 ′ 55 ″ north latitude and 107 ° 16 ′ 53 ″ - 107 ° 59 ′ 46 ″ east longitude. The Nature Reserve belongs to the nature reserve of wildlife type. The main protected objects are white headed langur, black leaf monkey and other wild animals as well as the karst rocky mountain forest ecosystem. The white headed langur reserve has the largest population of wild white headed langur in the world. It is one of the 17 key areas of terrestrial biodiversity with international significance in China.Guangxi Chongzuo white headed langur National Nature Reserve is located in the 5200 meters to the north of subproject 3.

127. Based on assessment there are no species identified in the IUCN red list reported in the subproject areas.

C. PHYSICAL SETTING OF PROJECT AREAS

1. Overview of Baise

128. **Geographical location.** Baise City is in the west of Guangxi, 104°28'-107°54'E, 22°51'-25°07'N. It borders Guizhou in the north, Yunnan in the west, Nanning in the east and Viet Nam in the south. The total area of the city is 36,200 km^2. There are 183 towns including Youjiang District, Tianyang, Tiandong, Pingguo, Debao, Jingxi, Napo, Lingyun, Leye, Tianlin, Longlin, Xilin and other 12 counties (districts). The total population as of 2007 was 3.859 million. It is located at the edge of the Yunnan-Guizhou Plateau, high in northwest and southwest, low in southeast, tilted from northwest to southeast. The Pochangsha in the southwest is 1570 m above sea level, which is the highest peak in the whole area. The southeast is hilly with Youjiang Valley (plain) and is to the west edge of Baise Basin, which are agricultural farming areas and economic crops growing areas.

129. **Topographic, geomorphic and geological conditions.** Baise City is a small city located in the southeast edge of Yunnan-Guizhou Plateau, with mountains and hills in the north and south, covering a large area, and valley plains in the middle. The terrain condition is high in north and south, low in the middle, tilt from northwest to southeast. Mountains and hills account for about 90%, platform and plains about 6%, the other 4% of the total area. The karst outcrops in the Shishan area represent about 30%. It is mountainous terrain with a variety of shapes. Upstream of the Youjiang River: Baise Junction reservoir area is located at the eastern foot of the Yunnan-Guizhou Plateau. The terrain is high in the west and low in the east, high in the south and north and low in the middle, in the shape of a pot. Youjiang River Valley area: Baise Basin is mainly composed of alluvial plains, hills and mountains, with high areas in the north and low in the south. There are grade I and II terraces on both sides of the Youjiang River to varying degrees. The terrain is relatively flat and the terraces on both sides of the riverbed are asymmetrical, wide in the north and narrow in the south. The terrace slopes towards the Youjiang River at an inclination Angle of 2 ~ 5°. Generally, the elevation of class I terrace is 100 ~ 110 m, which is close to the riverbank and partly covered by modern river alluvium. Class Ⅱ terrace elevation generally is 135 ~ 145 m, mainly in pedestal terrace. The back edge of the terrace on both sides is hilly and mountainous terrain, with a general elevation of 150 ~ 250 m. In the reservoir area, the river channel is curved, and the valley is a wide "U" shape. During the dry season, the water surface of the right river is 150 ~ 200 m wide and the water depth is generally 1 ~ 4 m. Upstream of the Nanpanjiang River basin, the terrain is high in northwest and low in southeast, along the river for the mountains and hills with little plane area. The bedrock in most places along the river is shallowly buried, or directly exposed on the surface. The bedrock is limestone, and the main soil layer of the bank slope has a certain bearing capacity. The riverbed is relatively stable. The terrain of the Pingban-Shuangjiangkou section of Nanpanjiang river is high in the northwest and low in the northeast. The river flows from the northwest to the northeast to the Shuangjiangkou and the Beipanjiang river and merge into the Hongshui River. The terrain of Longtan dam site in Shuangjiang Estuary of Hongshui River is low from north to east, and the river valley is from north to east. Its elevation is 700 ~ 1300 m, and the relative elevation differs with the riverbed surface is 300 ~ 700 m. Controlled by lithology and structure, the two sides of the valley are mostly piedmont landforms, and the valley is an open V-shaped valley. It is a relatively open river section, with gentle slopes and canyons. There are many platforms on both sides of the river, and the platforms are all first-grade platforms, forming small mountain stream basins. In addition to small bend areas, the river is generally straight with rapid current and often forms shoal.

130. **Climatic conditions.** Baise City has a subtropical monsoon climate, with the tropic of cancer across the south. The summer is long, and the winter is short, the sunshine is sufficient, the light is strong, the precipitation is moderate and the climate vertical change is obvious. Baise City is located in the southeast of Yunnan-Guizhou Plateau, surrounded by mountains and lying in the Youjiang Basin. Due to the barrier effect of mountains, cold air is not easy to invade in winter. Except for Leye, Longlin, Xilin part of the county, the other counties and cities rarely frost and snow. Youjiang Basin has no winter and summer lasts from180 to 220 days. The annual average temperature of Baise is 16℃-22℃, and the geographical distribution is low in the south and north, high in the middle. The mountainous area terrain is complex, the terrain elevation difference is large. The horizontal distance from Baise to Leye is just less than one latitude, but the annual average temperature difference is 5.8℃. The Nanpanjiang River basin has a subtropical climate. Affected by the southwest and southeast ocean monsoon, it is wet and rainy in summer and warm and dry in winter. The upper reaches of Nanpanjiang Tiansheng Bridge are in high altitude and low latitude areas, forming the unique climate of the reservoir area. There are no severe cold days in winter and no severe hot days in summer. The climate is mild with an average annual temperature of 19.3℃ and a frost-free period of over 330 days. Hongshui River basin is a subtropical climate zone, mild and humid, with relatively high temperature. The annual average temperature is 13 ~ 20.5℃, the extreme maximum temperature is 42.5℃, and the extreme minimum temperature is -14.9℃. The annual average maximum temperature generally occurs in July, while the average minimum temperature occurs in January. The annual average rainfall of Baise area is about 1300 mm, which is higher than the national average of 648 mm and the global land surface rainfall of 800 mm. However, the rainfall is unevenly distributed, more in the north and south region, less in the central region, more in the east and less in the west. The annual average precipitation of Nanpanjiang River basin is 1060 mm, and the annual total rainfall from June to August can reach 55% to 60% of the whole year, and the total rainfall from December to February of the next year is less than 10% of the whole year. The duration of rainstorms in the basin is shorter but the frequency is higher, most of which are one-day rainstorms. The perennial average wind speed of Youjiang, Tianyang, Tiandong and Pingguo in the lower reaches of Baisushu District is 2.5 m/s.

131. **Hydrological conditions.** There are three water systems in Baise: Youjiang river is the main water system in Baise. It flows into Nanning from northwest to southeast, running through the middle of the region and reaching Pingguo, with a catchment area of 30243 km^2 within the territory. The basin area controlled by The Zuo River in Baise city is 1567 km^2. In Baise City, there are 102 rivers with a rainwater catchment area of over 50 km^2, with a total length of 5040 km and a river density of 0.14 km per km^2. The main rivers include Youjiang, Hongshui and Chengbi. Hydrological characteristics of Baise river: many tributaries and abundant water; Flood season long, boom and bust; Less sediment content, Baise city vegetation is lush, and limestone is widely distributed, so the river sediment content is less. The main length of the Youjiang River is 727 km with a basin area of 40204 km^2. The annual average runoff is 17.221 billion m^3. The length of the watershed reaches 409 km to the mouth of Baise Chengbi River, with a drop of 1565 m and an average slope of 4.01%. The length of the section from Baicheng Bi Estuary to Songcun Sanjiang Estuary is 318 km, with a drop of 47 m and an average slope of 0.15%. The section from Sanjiangkou, Songcun, Yujiang to Sanjiangkou, Guiping, is 425 km long with a drop of 42 m and an average slope of 0.10%. The mainstream of Yujiang river is 1152 km from Yangmeishan Watershed to Guiping Sanjiangkou, with a drop of 1654 m and an average slope of 1.44%. Above Baise is the plateau slope landform, belonging to the middle and low mountain canyon landform. The mountain elevation on both sides of the valley is mostly 600 ~ 1200 m, and the slope

is 30° ~ 45°. Due to the strong flow erosion, cutting and denuviation, the valley is 200 ~ 400 m deep, v-shaped, and the river is 50 ~ 100 m wide. Most of the lower Baise basins are interlaced with low hills and hemispheric long and narrow basins, and the main basins are Baise ~ Tiandong basin. The first and second class terrace on both sides of the river are developed, and the terrain is flat and broad. The mesa is a large area of farmland with dense residential areas distributed. The river surface is 200 ~ 450 m wide. Bihe river, originating in Lingyun County, is the largest river in Lingyun County, with a basin area of 1,326 km^2 and a length of 56.8 km. It flows into Youjiang River in Baisi urban area, with an average annual total flow of 1,158.1 million m^3. The average annual flow of Chengbi River is 40.5 m^3/s, the normal water level of the urban area is 111.40 m, and the maximum flood level is 123.86 m. The upstream of Chengbi River is The Chengbi Lake, also known as the Chengbi River Reservoir, with an average annual runoff of 38.7 m^3/s, at a normal water level of 175.69 m, a total storage capacity of 1.25 billion m^3, an effective storage capacity of 580 million m^3, and a maximum reservoir area of 39.1 km^2.

132. **Overall environmental quality.** The project regional ecological and environmental authorities did not release the status of urban environmental air standards.

2. Overview of Guangxi

133. Guangxi is a mountainous region. The Nanling Mountain range is located near the northeast border, with the Yuecheng Mountain and Haiyang Mountain being its shorter branching ridges. Nearer to the center of the region are the Dayao Mountain and the Daming Mountain. The Duyao Mountain and the Fenghuang Mountain are in the north. The Yunkai Mountain is near the southeast border. The highest point is Mount Mao'er located at the Yuecheng Mountain, at 2,141 m. Many river-cut valleys run through the mountains. Most of these rivers are branches of the West River. Guangxi has a short coastline on the Gulf of Tonkin and important seaports include Beihai, Qinzhou and Fangchenggang. Guangxi has a subtropical climate. Summers are generally long and hot. Average annual temperature is 17ºC to 23ºC, while average annual precipitation is 1,250 to 1,750 mm. Guangxi has a rich and diverse ecosystem partly due to the subtropical climatic conditions and topography. Over 6,000 plant species and a variety of wild animals have been recorded.

3. Overview of Chongzuo

134. **Geographical position**. Chongzuo city spans from 21°36'north to 23°22'north, from 106°33'east to 108°8'east (geographical coordinates 22°23'north to 107°24'east). It is adjacent to Nanning city in the northeast, Baise City in the north, Fangchenggang City in the southeast, and the Democratic Republic of Viet Nam in the west and south. The geological structure of Chongzuo city is ancient, most of which are devonian, Permian and Triassic, dominated by limestone, followed by shale and sandstone, and quaternary acid red loam layer as the surface cap layer. The territory is mountainous, hilly with few plain, with complex and diverse landform, mainly karst landform. In the west side is the Daqing Mountain. In the south side are the Gongmu mountain and Shiwan mountain. The terrain is roughly northwest and slightly higher in southwest, tilted to the east. It is cut by the Left River and its tributaries in the middle, forming a comprehensive hilly plain. The highest peak in the territory is Pulong Mountain (1358 m above sea level) next to the southern Ningming County and Shiwan mountain at the border of Fangchenggang city, followed by the Gongmu mountain (1357.6 m above sea level) near Aidian at the China-Viet Nam border. Ningming County has eight peaks above the sea level. Other peaks above 1000m include Sicheng Ling (1073.7 m above sea level) at the border between Daxin County and Tiandeng County in the north, West Daming Mountain (1071.2 m) at the border between

Jiangzhou District and Longan County in the northeast, and Daqing Mountain (1045 m) in Longzhou County in the south, etc. River within territory belongs to the Zuo River system. The mainstream of the Zuo River is 539 km long. It originates in The Klong Mountain at the border between Ningming County and Viet Nam. The upper source is called Qiqiong River, and the inflow is called Pinghe River. The average annual runoff of the Zuo River is 20.9 billion m^3 (Fuzuixinning Station), and the basin has a huge drop, covering an area of 31,595 km^2.

135. **Topographic, geomorphic and geological conditions.** The geological structure of Chongzuo city is ancient, most of which are Devonian, Permian and Triassic, dominated by limestone, followed by shale and sandstone, and quaternary acid red loam layer as the surface cap layer. The geomorphology is hilly and mountainous with very few plain. The landform is complex and diverse, karst in main. In the west side is the Daqing Mountain. In the south side are the Gongmu mountain and Shiwan mountain. The terrain is roughly northwest and slightly higher in southwest, tilted to the east. It is cut by the Left River and its tributaries in the middle, forming a comprehensive hilly plain. The highest peak in the territory is Pulong Mountain (1358 m above sea level) next to the southern Ningming County and Shiwan mountain at the border of Fangchenggang city, followed by the Gongmu mountain (1357.6 m above sea level) near Aidian at the China-Viet Nam border. Ningming County has eight peaks above the sea level. Other peaks above 1000 m include Sicheng Ling (1073.7 m above sea level) at the border between Daxin County and Tiandeng County in the north, West Daming Mountain (1071.2 m) at the border between Jiangzhou District and Longan County in the northeast, and Daqing Mountain (1045 m) in Longzhou County in the south, etc.

136. **Climatic conditions.** Chongzuo city is located to the south of the Tropic of Capricorn. It has a subtropical monsoon climate with abundant rainfall. The annual sunshine hours are more than 1600 hrs, the average temperature in January is 13.8℃, the average temperature in July is 28.1℃, the average annual temperature is 20.8℃-22.4℃, the annual frost-free period is more than 340 days, the annual rainfall is more than 1200 mm. The most rainfall usually happens in Xialei town, Daxin County. Downtown city, Fu Sui, and two counties in Ningming have an annual average rainfall of 1250 mm. Drought in spring is frequent. Affected by tropical storm, it is prone to flooding in August and September. Chongzuo has adequate sunshine with annual sunshine more than 1800 hours. It is very conducive to the development of subtropical crops.

137. **Hydrological conditions.** Rivers within the territory belongs to the Zuo River system. The mainstream of the Zuo River is 539 km long. It originates in the Kulong Mountain at the border between Ningming County and Viet Nam. The upstream is called Qiqiong River, and the part within border is called Pinghe River. The average annual runoff of Zuo River is 20.9 billion m^3. It has a huge drop in elevation, covering an area of 31,595 km^2.

138. **Overall environmental status.** The city's environmental quality was generally good in 2019, according to the Chongzuo City Environmental Quality Status Report in 2019. The proportion of days with good air quality was 94.8%. The rate of surface water and urban centralized drinking water quality meeting standard is 100%. Sound environment quality of urban area, road traffic and function area are good.

4. Overview of Fangchenggang

139. **Geographical position**. Fangchenggang City is located at 107°28′E~108°36′E and 20°36′N~22°22′N, to the south of Tropic of cancer. It is adjacent to Qinzhou City in the East

and Beibu Gulf in the south. Dongxing City (county-level city) under its jurisdiction borders on Guangning province of Viet Nam. It is bounded by Ningming County in the west, Fusui County in the north, Yongning District of Nanning City in the northeast, with a continental coastline of 584 km and a border line of more than 200 km.

140. The landscape is interwoven with mountains, plateaus and hills (78%), water surface (8%) and alluvial plains (14%). The north and south are primarily low-mountains and hills. The central part is dominated by mountains. The southeast is lined with coastal hills and mudflats. The Shiwanda Mountain runs east to west through the territory.

141. The Fangchenggang Gulf is surrounded by hills on three sides with Fangcheng River, Shatan River and Nalan River converging inside the gulf and then into Beibu gulf. The terrain of the city contains hills, residual hill, terrace and plain, which were formed by the erosion of rivers and typhoon. The main geomorphic unit is coastal hills.

142. **Seismicity.** According to the China Seismic Ground Motion Parameters Zoning Map (GB 18306-2001) Amendment 1, the seismic intensity in Fangchenggang is Grade 6. The PRC classifies seismic intensity into 12 grades under the China Seismic Intensity Table (GB/T 17742-2008), from Class 1 to Class 12 based on the severity of "shaking" of the earth surface and the extent of potential impact. Class 6 is intermediate in severity with most people unable to stand still and furniture falling.

143. **Climate.** The subproject area is in subtropical zone at lower latitude, belonging to subtropical monsoon climate. As it is on the coast of Beibu Gulf, it is influenced by warm air mass from the sea all year round, which provides the place with sufficient sunlight and rainfall and pleasant climate.

144. **Temperature.** The multi-year annual average temperature is 22.3^0C with the highest temperature being 37.8^0C and the extreme lowest temperature being 0.9^0C. The temperature reaches the highest in July averaging 31.2^0C. January has the lowest temperature averaging 12.0^0C.

145. **Rainfall.** The multi-year annual average rainfall is 2,314.5 mm with the highest annual average rainfall being 3,111.9 mm and the highest daily rainfall being 244.1 mm (Fangchenggang meteorological station on May 16, 1972). The lowest annual average rainfall is 1,745.6 mm. The city is regarded as lying in high rainfall region in GZAR. Rainy season runs from May to September, accounting for 83% of the annual rainfall. Rainfall from October to March makes up only 6.4% of the annual rainfall. August usually has the highest monthly rainfall, reaching 528.7 mm. December usually has the lowest monthly rainfall averaging only 23.9 mm.

146. **Evaporation.** The multi-year annual average evaporation is 1,512.1 mm. The highest evaporation usually occurs in September averaging 159.9 mm. February has the lowest evaporation averaging 65.8 mm. Annual variation basically corresponds to temperature changes.

147. **Wind.** Located at the northwestern part of the Beibu gulf, Fangchenggang has vast sea area, which gives the place obvious monsoon climate. Southerly wind is dominant in the summer and northeasterly wind in the winter. The dominant wind direction is NNE with a frequency of 30.5%, and the sub-normal wind direction is SSW with a frequency of 8.4%. Strong wind usually comes from the east with maximum speed reaching 36 m/s; the sub-

strong wind direction is NNE with a maximum speed of 27 m/s. The annual average wind speed is 3.1 m/s. Typhoon occurs one to three times a year, mostly in June to September with average wind force of 8 to 9 degrees (clockwise from north). The force of gust wind could reach 11 to 12 degrees (clockwise from north).

148. **Frost and Fog**. Fog mostly occurs in winter and spring with an average of 10.9 foggy days. The maximum foggy period is 23 days and the minimum are 8 days. Normally fog appears from the night to early morning which lasts for 2 to 3 hours and disperses when the sun rises. The annual frost-free period is more than 350 days.

149. **Relative Humidity**. The annual average relative humidity is 82%. Monthly variation of relative humidity is between 74-87%, with the highest at 87% in July to August, and the lowest at 74% in November. The annual average number of sunlight hours is 1,561.

150. **Hydrology and Surface Water Quality**. There are more than ten rivers flowing through Fangchenggang, with a total length of more than 400 km and an average annual runoff of more than 8 billion m^3. Five major rivers drain into the Xiwan bay: Lizitan, Liyujiang, Dawangjiang, Chongsha (small stream) and Shitan (small stream) which are used primarily for irrigation purposes. The largest river is Lizitan, with a length of 13 km, average width of 40 m and average depth of 2 m. The Liyujiang River has a length of 3 km, average width of 2.5 m and average depth of 1.5 m. The Dawangjiang River has a length of 5.2 km, average width of 3 m and average depth of 2 m. The water quality for most of the marine areas meets Category I of the PRC Sea Water Quality Standard (GB 3097-1997).

151. Fangchenggang has a mixed tidal regime with 6/8-day small tides every month, which is irregular semi-diurnal tide and the rest is regular semi-diurnal tide including spring tide and neap tide. When the diurnal tide is dominant, the average tide level is 3.82 m with the highest tidal level reaching unto 5.54 m. The maximum tidal range is 5.39 m with the average tidal range larger than 4.5 m. Flood tide lasts for 15 hours, and ebb tide lasts 9 hours, which is favorable for the erosion and deposition of channels. When the semi-diurnal tide is dominant, the tidal range is less than 1 m with the smallest range at 0.79 m.

152. **Overall Environmental Quality**. According to the environmental quality annual report of Fangchenggang City in 2019, the excellent and good rate of air quality is 94.2%, with a year-on-year decrease of 1.1%; the water quality standard rate of municipal centralized drinking water sources is 100%, and the sound environment quality of urban areas, road traffic and functional areas is good.

D. ENVIRONMENTAL BASELINE FOR EACH SUBPROJECT

(i) Subproject 1: Baise University Sino-Viet Nam Cross-border Training Center and

(ii) Subproject 2: Baise Cross-border Agricultural Products Industry Chain Upgrading Project in Baise City

153. **Air quality**. Subprojects 1 and 2 are in Baise City. The project area's air quality data was taken from Baise City center blood station air quality monitoring station for the year 2018, according to the "environmental air quality assessment specification" (HJ663-2013) on the scale of the project to identify years evaluation index.

154. The annual evaluation index of monitoring location indicates that SO2, NOx and PM10 levels are within evaluation standard limits for both 24 hour and annual evaluation period. Concentration of PM2.5 and CO exceeds the evaluation standard for both 24 hour and annual evaluation period. The monitoring results are shown in Table 23 below.

Table 23. Regional basic pollutant environmental quality status assessment

Contaminants	Annual evaluation index	Evaluation period	Evaluation standard (μg/m^3)	Current status (μg/m^3)	Status of compliance
SO_2	98% of 24-hour average	24-hour average	150	36	compliance
	Annual average	Annual average	60	17	compliance
NOx	98% of 24-hour average	24-hour average	80	42	compliance
	Annual average	Annual average	40	21	compliance
PM_{10}	95% of 24-hour average	24-hour average	150	116	compliance
	Annual average	Annual average	70	63	compliance
$PM_{2.5}$	95% of 24-hour average	24-hour average	75	80	compliance
	Annual average	Annual average	35	39	compliance
CO	95% of 24-hour average	24-hour average	(mg/m^3)	1.7	compliance
O_3	90% of Daily maximum 8 hours average	Daily maximum 8 hours average	160	120	compliance

155. Water environmental quality. According to the on-site investigation, the nearest surface water of the project is the Chengbi River which is 429 m to the northwest of the project site, which belongs to the tributary of the Qiangjiang River of the Pearl River System. The river surface water monitoring results show that the pH, suspended solids, dissolved oxygen, chemical oxygen demand (COD), biochemical oxygen demand (BOD), petroleum, ammonia nitrogen are within permissible limits of GB3838-2002 "standard of surface water environment quality" class II water quality standard and class IV water quality standards.

156. **Subproject 2**. The waterbody in the project area is the Youjiang River at about 4.3 km to the west. According to the Baise City Water Environment Monthly Report (February 2020) published by the Baise City Ecological Environment Bureau in February 2020, the water quality of Baaiheluo Village, Youjiang Gongluo Section, Chengbihe Reservoir Section and Nantan River Aitun Section of Baise City reached Class I water quality. The section of Tianshengqiao reaches Grade III water quality. The water quality of the monitoring sections of major rivers is good (reaching or better than Grade III) and the proportion of them is 100%.

Acoustic environmental quality. Guangxi Hengqin Detection Technology Co., Ltd. was entrusted to conduct noise monitoring from September 2 to September 3, 2020 (

157. Table 24). One monitoring point for environmental noise monitoring was set up in the east, south, west and north side of the project land respectively for the measurement of environmental noise surrounding the project area.

Table 24. Noise Monitoring Results

Monitoring location		Monitoring date	Monitoring time	Results L_{eq} [dB(A)]
N1	East boundary of the site	Sep 2	Day	45.8
			Night	43.0
		Sep 3	Day	46.4
			Night	43.8
N2	North boundary of the site	Sep 2	Day	47.4
			Night	44.5
		Sep 3	Day	48.2
			Night	44.8
N3	West boundary of the site	Sep 2	Day	57.9
			Night	47.7
		Sep 3	Day	59.2
			Night	48.6
N4	South boundary of the site	Sep 2	Day	46.6
			Night	42.1
		Sep 3	Day	44.9
			Night	43.7

158. It can be concluded that the boundary of the project sewage treatment plant meets the requirements of Class 1 and Class 4A in the Acoustic Environment Quality Standard (GB3096-2008) for both day and night.

(iii) Subproject 3: Chongzuo Cold Chain Logistics Demonstration Project

(iv) Subproject 4: Chongzuo Sino-Viet Nam Border Economic Cooperation Zone Demonstration Project

159. **Air quality.** According to the "Chongzuo City Environmental Status Bulletin 2019", the average annual concentration of SO2, NO2, PM10 and PM2.5 in Chongzuo in 2019 is 7μg/m^3, 19μg/m^3, 58μg/m^3 and 32μg/m^3 respectively. The average 95th percentile of CO for 24 hours is 1.2μg/m^3, and the average 90th percentile for O3 for 8 hours at most is 131μg/m^3. The average concentration of all pollutants is superior to the second-level

standard limit in Environmental Air Quality Standard (GB3095-2012). Therefore, the annual evaluation indexes of SO2, NO2, PM10, CO, O3 and PM2.5 in the basic pollutants in the region where the project is located meet the "Environmental Air Quality Standard" (GB3095-2012) and the secondary and middle standards in its revision list. Therefore, the region where the project is located belongs to the standard area and the current environmental air quality is good.

160. **Water environmental quality.** According to the Monthly Report of the Chongzuo City Water Environment Quality (No. 155, No. 6, 2020), Chongzuo monitored nine surface water sections in the city in June 2020. According to those environmental quality monthly report, project intake upstream black river new section water quality will meet the surface water environment quality standard (GB3838-2002) class Ⅱ standard. The main surface water in the area where the project is located is Heishui River. To improve the regional surface water environmental quality, the monitoring data from six sections of Heishui River in the General Plan of China Sugar Industry Industrial Park (2018-2030) near the project are cited. As shown in Table 25, the monitoring results of all sections shows that the water quality is within permissible limits at all the locations for all the monitored parameters.

Table 25. Water Quality Monitoring Results

Monitoring Parameters		Monitoring Section						Standard
		1#	2#	3#	4#	5#	6#	
Water Temperature	Range of monitoring	22.6~23.0	22.8~23.3	23.0~23.2	23.0~24.0	23.0~23.1	22.0~23.0	/
	Status of compliance	/	/	/	/	/	/	
pH	Range of monitoring	7.23~7.30	7.08~7.15	6.98~7.05	6.96~7.03	7.33~7.40	7.10~7.20	6~9
	Rate of exceeding	0	0	0	0	0	0	
	Maximum exceeding multiple	0	0	0	0	0	0	
	Si，j range	0.115~0.15	0.04~0.075	0.02~0.025	0.015~0.04	0.165~0.2	0.05~0.1	
	Status of Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	
Dissolved oxygen	Range of monitoring	6.9~7.0	6.8~6.9	6.7~6.8	6.6~6.7	7.0~7.2	6.9~7.0	≥5
	Rate of exceeding	0	0	0	0	0	0	
	Maximum exceeding multiple	0	0	0	0	0	0	
	Si，j range	0.44~0.477	0.461~0.500	0.492~0.524	0.503~0.552	0.381~0.44	0.44~0.491	
	Status of Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	
Suspended solids	Range of monitoring	4~6	6~8	8~11	6~8	6~7	8~11	≤30
	Rate of exceeding	0	0	0	0	0	0	
	Maximum exceeding multiple	0	0	0	0	0	0	
	Si，j range	0.133~0.2	0.2~0.267	0.267~0.367	0.2~0.267	0.2~0.233	0.267~0.367	

Monitoring Parameters		Monitoring Section						Standard
		1#	2#	3#	4#	5#	6#	
	Status of Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	
COD_{cr}	Range of monitoring	13~15	10~12	19~20	11~12	11~13	15~16	≤20
	Rate of exceeding	0	0	0	0	0	0	
	Maximum exceeding multiple	0	0	0	0	0	0	
	Si，j range	0.65~0.75	0.5~0.6	0.95~1	0.55~0.6	0.55~0.65	0.75~0.8	
	Status of Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	
BOD_5	Range of monitoring	0.8~1.2	0.6~1.1	1.1~1.5	0.8~1.0	0.8~0.9	1.5~1.8	≤4
	Rate of exceeding	0	0	0	0	0	0	
	Maximum exceeding multiple	0	0	0	0	0	0	
	Si，j range	0.2~0.3	0.15~0.275	0.275~0.375	0.2~0.25	0.2~0.225	0.375~0.45	
	Status of Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	
Ammonia	Range of monitoring	0.027~0.041	0.027~0.037	0.041~0.051	0.246~0.264	0.030~0.035	0.040~0.054	≤1.0
	Rate of exceeding	0	0	0	0	0	0	
	Maximum exceeding multiple	0	0	0	0	0	0	
	Si，j range	0.027~0.041	0.027~0.037	0.041~0.051	0.246~0.264	0.030~0.035	0.040~0.054	
	Status of Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	
Volatile Phenol	Range of monitoring	0.0003L	0.0003L	0.0003L	0.0003L	0.0003L	0.0003L	≤0.005
	Rate of exceeding	0	0	0	0	0	0	
	Maximum exceeding multiple	0	0	0	0	0	0	
	Si，j range	0.03	0.03	0.03	0.03	0.03	0.03	
	Status of Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	
Total phosphorus	Range of monitoring	0.02	0.01L	0.02	0.02	0.02	0.02	≤0.2
	Rate of exceeding	0	0	0	0	0	0	
	Maximum exceeding multiple	0	0	0	0	0	0	
	Si，j range	0.1	0.025	0.1	0.1	0.1	0.1	
	Status of Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	
Anionic surfactant	Range of monitoring	0.05L	0.05L	0.05L	0.05L	0.05L	0.05L	0.2
	Rate of exceeding	0	0	0	0	0	0	

Monitoring Parameters		Monitoring Section						Standard
		1#	2#	3#	4#	5#	6#	
	Maximum exceeding multiple	0	0	0	0	0	0	
	Si，j range	0.125	0.125	0.125	0.125	0.125	0.125	
	Status of Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	
Petroleum	Range of monitoring	0.02	0.02	0.01~0.02	0.01L~0.01	0.02	0.01~0.02	≤0.05
	Rate of exceeding	0	0	0	0	0	0	
	Maximum exceeding multiple	0	0	0	0	0	0	
	Si，j range	0.4	0.4	0.2~0.4	0.1~0.2	0.4	0.2	
	Status of Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	
Sulfide	Range of monitoring	0.005L	0.005L	0.005L	0.005L	0.005L	0.005L	≤0.2
	Rate of exceeding	0	0	0	0	0	0	
	Maximum exceeding multiple	0	0	0	0	0	0	
	Si，j range	0.013	0.013	0.013	0.013	0.013	0.013	
	Status of Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	
Fluoride	Range of monitoring	0.06~0.07	0.07	0.07~0.08	0.06~0.07	0.06~0.07	0.16~0.19	≤1.0
	Rate of exceeding	0	0	0	0	0	0	
	Maximum exceeding multiple	0	0	0	0	0	0	
	Si，j range	0.06~0.07	0.07	0.07~0.08	0.06~0.07	0.06~0.07	0.16~0.19	
	Status of Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	
Fecal coliforms (1 /L)	Range of monitoring	80~90	30~50	80~90	200~220	60~70	190~210	≤10000 个/L
	Rate of exceeding	0	0	0	0	0	0	
	Maximum exceeding multiple	0	0	0	0	0	0	
	Si，j range	0.008~0.009	0.003~0.005	0.008~0.009	0.02~0.022	0.006~0.007	0.019~0.021	
	Status of Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	Compliance	

161. **Acoustic environment quality.** Subproject 3 is in Chongzuo Industrial Park of China-Thailand. According to the review opinion of the environmental impact report of Guangxi China Thailand Industrial Park Master Plan (2013-2030), commercial finance, market trade, residential, commercial and industrial mixed areas and other areas that need to maintain quite for residential areas shall be subject to class II standard of acoustic environmental quality standard (GB3096-2008).Therefore, the acoustic environment in the east, south,

west and north of the site boundary of the project shall comply with the class II standard in the environmental quality standard for noise (GB3096-2008).

162. The environmental impact assessment unit of subproject 4 assigned Guangxi Hengqin Testing Technology Co., Ltd. to monitor the acoustic environment status along the project and surrounding areas from March 9 to 10, 2020. The monitoring results of sensitive points along the road are shown in Table 26, and the monitoring results of acoustic environment around the water treatment plant are given in Table 27. The current monitoring results of acoustic environment background noise at sensitive points along the line include the day-night exceeding standard (day-day exceeding standard is 0.7 to 4.6dB(A) in Xinghe Residential area (type 2 area) and the day-night exceeding standard (day-day exceeding standard is 0.1dB(A) in Xinhe Town and 2.6 to 3.7dB(A) in night exceeding standard) in Xinhe Town residential area 3 (type 2 area). Besides, other sensitive points in Xinhe Town Second Primary School (Class 1 district) and kindergarten (Class 1 district) meets the requirements of corresponding standards in Sound Environment Quality Standard (GB3096-2008) and the limit value of the corresponding standards exceeded at night (exceeding quantity is 0.2 to 9.6dB (A)). The buildings in the first row of Xinghuan housing estate and schools located in Category 1 are the ones where the results exceeded the standard. The obvious reason for the exceeding standard of Xinghuan housing estate is the influence of the traffic noise of Xingui Avenue. The daytime and nighttime noise near the boundary of the water treatment plan meet the requirements of category 2 standards for Sound Environment Quality Standard (GB3096-2008).

Table 26. Monitoring and Testing results of sensitive point acoustic environment quality along the road

Nr.	Monitoring Point			Period	Result [dB(A)]		Standard [dB(A)]	Exceed Amount [dB(A)]	
					2020.4.17	2020.4.18		2020.4.17	2020.4.18
N1	Xinjian Chariot	Front row at street		Day	66.1	65.3	70	0	0
				Night	52.3	52.5	55	0	0
		Behind the front row		Day	58.7	58.2	60	0	0
				Night	47.6	46.8	50	0	0
N2	Siba Chariot	Front row at street		Day	62.3	60.6	70	0	0
				Night	48.7	48.2	55	0	0
		Behind the front row		Day	55.9	56.2	60	0	0
				Night	49.6	50.3	50	0	0
N3	Jinfa Chariot			Day	Day	55.3	60	0	0
				Night	Night	48.3	50	0	0
N4	Naban Chariot	Front row at street	1st Floor	Day	62.4	62	0	0	0
				Night	54.6	53.5	0	0	0
			2nd Floor	Day	60.6	61.4	0	0	0
				Night	53.1	54.2	0	0	0
				Day	59.7	60.1	0	0	0

Nr.	Monitoring Point			Period	Result [dB(A)]		Standard [dB(A)]	Exceed Amount [dB(A)]	
					2020.4.17	2020.4.18		2020.4.17	2020.4.18
			3rd Floor	Night	52.4	52.7	0	0	0
		Behind the front row		Day	58.3	59.4	60	0	0
				Night	48.7	47.9	50	0	0
N5	Nanuo village	Front row at street		Day	65.8	64.2	70	0	0
				Night	53.7	52.6	55	0	0
		Behind the front row		Day	55.1	54.6	60	0	0
				Night	49.3	50.1	50	0	0.1
N6	Xinxing Home settlements	Front row at street	1st Floor	Day	64.6	63.5	60	4.6	3.5
				Night	54.6	52.7	50	4.6	2.7
			3rd Floor	Day	62.7	63	60	2.7	3
				Night	53.7	52.9	50	3.7	2.9
			5th Floor	Day	60.7	59.3	60	0.7	0
				Night	52.1	52.6	50	2.1	2.6
		Behind the front row		Day	54.6	53.5	60	0	0
				Night	49.5	50.3	50	0	0.3
N7	Qinghe village	Front row at street	1st Floor	Day	65.3	64.5	70	0	0
				Night	53.6	52.8	55	0	0
			2nd Floor	Day	63.9	62.5	70	0	0
				Night	52.1	51.7	55	0	0
			3rd Floor	Day	61.8	60.9	70	0	0
				Night	50.3	50.8	55	0	0
		Behind the front row		Day	58.4	59.7	60	0	0
				Night	48.5	49.3	50	0	0
N8	Xinhe Town street dweller 1	Front row at street	1st Floor	Day	53.2	54	60	0	0
				Night	46.1	47.2	50	0	0
			2nd Floor	Day	51.7	52.1	60	0	0
				Night	46.3	45.7	50	0	0
			3rd Floor	Day	49.7	50.7	60	0	0
				Night	45.2	46.7	50	0	0
N9	Xinhe Town street dweller 2	Front row at street		Day	55.5	54.3	60	0	0
				Night	45.6	44.9	50	0	0

Nr.	Monitoring Point			Period	Result [dB(A)]		Standard [dB(A)]	Exceed Amount [dB(A)]	
					2020.4.17	2020.4.18		2020.4.17	2020.4.18
N10	Xinhe No. 2 Primary School	The first row of teaching building faces the road	1st Floor	Day	52.5	52.7	60	0	0
				Night	46.5	45.4	50	1.5	0.4
			3rd Floor	Day	50.4	51.4	60	0	0
				Night	46.1	45.6	50	1.1	0.6
			5th Floor	Day	48.7	49.3	60	0	0
				Night	46	46.7	50	1.0	1.7
N11	Kindergarten			Day	53.2	Day	60	0	0
				Night	45.6	Night	50	0	0
N12	Baiwu Second road and Xinghe Avenue intersection of residential			Day	60.1	59.8	60	0.1	0
				Night	53.7	52.6	50	3.7	2.6

Table 27. Monitoring and Testing results of the acoustic environment around the water treatment plant

Monitoring Point	Monitoring Date	Monitoring Period	Monitoring value L_{Aeq}[dB(A)]	Standard limit [dB(A)]	Status of Compliance
N1# East boundary of the water treatment plant	2020.4.17	Day	42.1	60	Compliance
		Night	40.6	50	Compliance
	2020.4.18	Day	41.4	60	Compliance
		Night	41.2	50	Compliance
N2# South boundary of the water treatment plant	2020.4.17	Day	41.3	60	Compliance
		Night	41	50	Compliance
	2020.4.18	Day	42.5	60	Compliance
		Night	42.4	50	Compliance
N3# West boundary of the water treatment plant	2020.4.17	Day	45.1	60	Compliance
		Night	44.7	50	Compliance
	2020.4.18	Day	44.6	60	Compliance
		Night	45.3	50	Compliance
N4# North boundary of the water treatment plant	2020.4.17	Day	43.9	60	Compliance
		Night	42.6	50	Compliance
	2020.4.18	Day	42.7	60	Compliance
		Night	42.9	50	Compliance

(v) Subproject 5: Chongzuo Daxin Sino-Viet Nam Cross-border Tourism Project

163. **Air quality.** The effective monitoring days of ambient air quality in Daxin County in 2019 are 358 days. Our of these on 203 days the air quality was excellent, on 139 days it was good, on 15 days it was mild pollution, and on 1 day the pollution load was severe. The compliance rate (excellent rate) of ambient air quality is 95.5%. In 2019, the annual average concentration of inhalable particles, fine particles, sulfur dioxide, nitrogen dioxide, carbon monoxide and ozone in Daxin County will be 50 μg/m^3, 33 μg/m^3, 4 μg/m^3, 14 μg/m^3, 1.4 mg/m^3 and 110 μg/m^3, respectively.

164. **Water environment quality.** The nearest river to the subproject is Guichun river. According to Chongzuo water system map (first level division) (2017), Guichun river water is classified as "Heishui river China and Viet Nam reserved area", and the water quality target is class III. According to the water environment quality status of Chongzuo City in April 2020, as reported in the "Chongzuo water environment quality monthly report" (No. 4, No. 153 in 2020) issued by Chongzuo ecological environment monitoring center, the water environment quality of the section (state control) of the Guitun River can meet the class II water quality requirements, indicating that the surface water environment quality in this area is good.

165. **Acoustic environment quality.** The project proponent entrusted Guangxi Hengqin Testing Technology Co., Ltd. to monitor the regional acoustic environment on September 4 and 5, 2020. Eleven environmental noise monitoring points were set up for continuous monitoring for 2 days, twice a day and two times during night. The specific monitoring points are detailed in table 30. At the same time, 24-hour continuous monitoring points were set up at K8+700 of x539 county road for 1 day. The monitoring results are presented in Table 28.

Table 28. Noise Monitoring Results of Sensitive Points

(Unit: dB(A))

S.No.	Position	Distance from road	Monitoring date		Monitoring results		evaluate standard	evaluate result
1#	Ren Ai Village The first row on the south side of the village 1 m outside the house	28m from provincial highway s316 28m away from Guihua Road	2020 9.4	daytime	first time	63.4	70	Up to standard
					second time	62.4		Up to standard
				at night	first time	54.6	55	Up to standard
					second time	54.3		Up to standard
			2020 9.5	daytime	first time	63.7	70	Up to standard
					second time	62.8		Up to standard
				at night	first time	53.9	55	Up to standard
					second time	53.9		Up to standard
2#	Baxing Village The first row on the west	140m away from the existing road	2020 9.4	daytime	first time	46.3	60	Up to standard
					second time	45.9		Up to standard

	side of the village 1 m outside the first floor of residential building	8m away from planning road		at night	first time	42.7	50	Up to standard
					second time	42.5		Up to standard
			2020 9.5	daytime	first time	46.4	60	Up to standard
					second time	45.7		Up to standard
				at night	first time	42.6	50	Up to standard
					second time	42.6		Up to standard
3#	Baxing Village The first row on the west side of the village 1 m outside the third floor of residential building	140m away from the existing road 8m away from planning road	2020 9.4	daytime	first time	45.6	60	Up to standard
					second time	44.9		Up to standard
				at night	first time	42.4	50	Up to standard
					second time	42.3		Up to standard
			2020 9.5	daytime	first time	46.1	60	Up to standard
					second time	44.5		Up to standard

(vi) Subproject 6: Fangchenggang Sino-ASEAN Trade and Culture Exchange Center project

166. **Air quality**. The subproject is in Tansan village, Naliang Town, Fangcheng District, Fangchenggang City. The ambient air quality of the project area is assessed in accordance with the secondary standard of ambient air quality standard (GB3095-2012). According to the environmental quality annual report of Fangchenggang City 2019, the effective days of air quality monitoring in Fangcheng district were 344 days. Of these days severe pollution level was reported on 20 days and moderate on 1 day. The proportion of excellent pollution level days is 94.2% and the comprehensive index is 3.37. The annual average concentration of sulfur dioxide is 8 μg/m^3; the average annual concentration of nitrogen dioxide is 17 μg/m^3; the average annual concentration of PM10 is 55 μg/m^3. The average annual concentration of carbon monoxide was 1.4 mg/m^3, that of ozone is 132 μg/m^3 and that of PM2.5 is 30 μg/m^3. According to the field survey, the surrounding areas of the subproject are mainly mountainous and woodland. The vegetation coverage rate of the surrounding area of the project site is high, which has a certain purification effect on the ambient air. Overall, the ambient air quality meets the class II standard of ambient air quality standard (GB3095-2012), and the ambient air quality in the project area is good.

167. Water environment quality. (i) Surface water. According to the water environment quality status of Guangxi in the months of January and June 2020, from the months of January to June, 94 of the 97 monitoring sections in Guangxi Zhuang Autonomous Region achieves or are better than Class III water quality, and the proportion of excellent and good water quality sections is 96.9%, which is 6.2 percentage points higher than that of the previous year. Among these, there are 8 class I water quality sections, accounting for 8.2%; 74 class II water quality sections, accounting for 76.3%; 12 class III water quality sections,

accounting for 12.4%; 2 class IV water quality sections, accounting for 2.1%; and 1 class V water quality section, accounting for 1.0%. There are no inferior class V water quality sections reported.

168. Among the three sections that fail to meet the class III water quality standard, two sections belong to the single flow river into the sea, which are liusiqiao section of Nanliu River and West Bridge section of expressway of Qinjiang River; one section belongs to the tributary of Yujiang River, which is the Nongxin section of Xialei river. The main pollution indexes are for total phosphorus and ammonia nitrogen.

169. The project is in Fangcheng District, Fangchenggang City, Guangxi. The surface water quality of Beilong River and its tributaries (GB3838-2002) meets the environmental quality standard for surface water of Jialun river.

170. **(ii) Current situation of groundwater environmental quality.** According to the water environment quality status of Guangxi in in the months of January to June 2020, 36 of the 37 centralized drinking water sources in GZAR are up to or better than Class III water quality. The water quality standard rate is 97.3%, with a year-on-year decrease of 0.1 percentage point and the water quality standard rate is 97.7%, with an increase of 0.5 percentage points. The water source exceeding the standard is Longtan groundwater source. In Beihai it is exceeding the pH value.

171. Centralized drinking water sources at county-level cities were monitored in the whole region, Of the monitored sources 103 achieved or were better than Class III water quality. The water source standard rate was 93.6%, with a year-on-year decrease of 3.6 percentage points. The water quality standard rate was 99.6%, which was the same as that of last year. Some indexes from the 7 water sources exceeded the limits of class III water quality standard.

172. **Sound environment quality.** The environmental impact assessment unit of the subproject entrusted Guangxi Hengqin Testing Technology Co., Ltd. to monitor the acoustic environment along the project facilities and surrounding areas on September 2 to 3, 2020 (Table 29).

Table 29. Results of Noise Level Monitoring Around the Subproject Area

Testing date	Detection point location (from project site boundary)	Measured value L_{eq}[dB (a)]		Main sound source	
		daytime	at night	daytime	at night
2020. 09.02	1 m from the northwest boundary	46.5	43.9	Natural noise	Natural noise
	1m from the Northeast boundary	46.3	43.9	Natural noise	Natural noise
	1m from the east boundary	46.8	43.1	Natural noise	Natural noise
	1m from the south boundary	45.8	42.9	Natural noise	Natural noise
	1m from the west boundary	47.2	42.9	Natural noise	Natural noise
2020. 09.03	1 m from the northwest boundary	46.8	43.5	Natural noise	Natural noise
	1m from the Northeast boundary	46.9	42.3	Natural noise	Natural noise

Testing date	Detection point location (from project site boundary)	Measured value L_{eq}[dB (a)]		Main sound source	
		daytime	at night	daytime	at night
	1m from the east boundary	47.2	44.1	Natural noise	Natural noise
	1m from the south boundary	46.1	43.6	Natural noise	Natural noise
	1m from the west boundary	47.6	44.2	Natural noise	Natural noise

173. It can be seen from the above table that the noise around the project site meets the class 2 standard on the environmental quality standard for noise (GB3096-2008), and the acoustic environment quality in the area is in good condition.

E. BIOLOGICAL RESOURCES, ECOLOGY AND BIODIVERSITY

1. Subproject 1: Baise Sino-Viet Nam Economic and Cultural Exchange Training Center

174. The subproject is located at the south entrance of the main gate of Baise University and is now green land. The project is in the subtropical region of southwest China, belonging to the tropical monsoon climate region of South Asia, and the native vegetation is evergreen broad-leaved forest with monsoon climate. However, due to its location on the edge of Baise City and due to frequent human activities, the original ecological environment has been seriously damaged, and there is no native vegetation in the subproject area. In addition to industrial and building land, it is mainly agricultural development zone, and the vegetation is mainly cultivated land and fruit forest. According to the site investigation, the vegetation within the land scope of the project site mainly includes: masson pine, Chinese fir, eucalyptus, neem, brachyelia, pupeach, false apple tree, grapefruit tree, mango tree, almond tree, etc. Common shrub myrtle, pine, green hills, wild peony, puberulous glochidion herb, jade leaf golden flower and vine, vitex negundo, peach blossom, white back tong, sesame, Viet Nam raspberries, lobed leaf raspberries, guangxi flower, lespedeza, lobular privet, herbaceous vegetation mainly Ma Ying Dan, yellow thatch, iron dicranopteris dichotoma, plantain, cordate houttuynia, Shi Zhen mans, miscanthus floridulus, imperata cylindrica, partridge grass, wild citronella, aircraft, the centipede grass and neyraudia reynaudiana, common have tendrils cane vines, clematis, Boston ivy, morning glory, such as range contains a small amount of bamboo forest. The artificial vegetation mainly includes eucalyptus, Taiwan Acacia, almond, etc. The common economic trees in the surrounding mountains include mango, longan, litchi, citrus, jackfruit, guava, banana, oil tea, etc. The main crops in the study area are rice, corn, peanut, cassava and so on. Due to the frequent interference of traffic and human activities, no large wild animals have been seen. The faunal species mainly includes snakes, rodents, birds, insects and other common small animals. Wild animals are mainly rodents with close human activities, such as house mice, and common birds and reptiles, such as sparrows, geckos, snakes and so on.

175. During site reconnaissance, no wildlife under national or local protection have been reported, and also there are no rare wild animals and plants and no nature reserves and national reserves present within the area. There are no IUCN Red List species reported in the subproject area.

Figure 39. The status of the ecological environment around the project

2. Subproject 2: Baise Cross-border Agricultural Products Industry Chain Upgrade Project

176. Both subproject 1 and subproject 2 are in Baise City. The current status of ecological environment quality is basically the same as subproject 1. During the site survey, no wild animals under national and local protection were found. There are no nature reserves and rare wild animals and plants belonging to national reserves in the project area. There are no IUCN Red List species reported in the subproject area.

3. Subproject 3: Chongzuo Cold Chain Logistics Demonstration Project

177. The subproject is in China Thailand Chongzuo Industrial Park. There are no special ecological sensitive areas, rare and endangered animals and plants in the project area. The biodiversity is relatively simple. The plants are mainly common low shrubs; the animals are common birds, frogs and insects. According to the field survey, there are no key cultural relics protection units, nature reserves, scenic spots and drinking water source protection areas in the project area. Also there are no animals and plants listed in the list of national key protected wild plants and the list of national key protected wild animals within the impact zone around the project area. There are no IUCN Red List species reported in the subproject area.

4. Subproject 4: Chongzuo Sino-Viet Nam Border Economic Cooperation Zone Demonstration Project

178. The project is in Xinhe Town, Jiangzhou District, Chongzuo City, with strong human activities and high land utilization rate. The original vegetation no longer exists, and most vegetation is artificial or natural vegetation under human interference. Due to the strong and frequent artificial interference with natural vegetation, the present situation is dominated by brushwood and shrub, mainly including shrub, small shrub, dog root meadow, dog tail grass, humulus scandens and so on. Artificial vegetation is mainly agricultural and forestry vegetation, mainly paddy fields, vegetable garden and so on. No national protected plants have been found within the project area. According to the investigation, the comparison of amphibian and reptile habitat, the visit of surrounding residents and the reference of relevant materials, the amphibians in the area mainly include: toad, frog, and the main reptiles are water snakes. The population of these species is very small. The main animal resources are rodents, and there are two species of muridae, namely, rattus norvegicus and rattus sensulato. These two species have a wide distribution range in the project study area, and they are all distributed on the study area. The rat family is the companion of human and animal, and there are traces of these two kinds of animals in the places with habitation. No protected animals or plants included in the State animal or plant Protection list or the State endangered animal or plant protection list have been found in the project area. The project is located in a region with low biodiversity and a simple ecological environment. Special protection targets such as wildlife under key protection, scenic spots, nature reserves and cultural heritage, etc. are not found within 500 meters of the surrounding area, and the ecological environment sensitivity is low, which is not an ecological sensitive area. There are no IUCN Red List species reported in the subproject area.

5. Subproject 5: Chongzuo Daxin Sino-Viet Nam Cross-border Tourism Project

179. Daxin County has a forest area of 171,600 hectares (including shrubbery), and the forest coverage rate is 64.93%. There are Encheng nature reserve and Xialei nature reserve. The rare plants under national protection include Corbicula, camellia, Prunus canadensis, etc., and more than 30 species of rare animals reported including white ape, black leaf monkey, hornbill, white monkey, golden monkey, etc. There are rich resources of agricultural and forestry specialties, including rice, corn, sugarcane, soybean, sweet potato, cassava, peanut, sisal, etc.; local products mainly include longan, Kuding tea, star anise, fruit cane, sanhua plum, sour plum, wintersweet orange and shanhuangpi, among which longan and kudingcha are particularly famous, known as the "hometown of longan", and are one of the six longan production bases in China. It is the origin of Kudingcha and the

hometown of Kudingcha in China. According to the investigation, no animals and plants listed in the list of national key protected wild plants and the list of national key protected wild animals were found within the project area. There are no IUCN Red List species reported in the subproject area.

6. Subproject 6: Fangchenggang Sino-ASEAN Trade and Culture Exchange Center Project

180. Fangchenggang City has a forest coverage rate of 59%. It has the world's only national Camellia National Nature Reserve and China's largest and most typical Gulf mangrove. It has been approved by the United Nations Environment Agency to be listed as China's first and one of three global GEF mangrove international demonstration areas. It is an important corridor for International migratory birds. In particular, Qisha peninsula is surrounded by the sea on three sides, with vast hinterland, low development cost and large environmental capacity. It is recognized by authoritative experts as "the last section of China's mainland coastline has not been effectively opened". There are many kinds of forest resources in the territory, including more than 1500 kinds of forest resources and more than 300 kinds of forest by-products. The most famous timber forests are Pinus and Cunninghamia lanceolata, Yugui, Illicium verum and Camellia chrysantha. The second is Bauhinia, wannianmu, litchi and Platycladus orientalis, and the third is Phoebe bambusicola, Aquilaria chensinensis and xianghuamu. There are also wild ginseng, fungus, mushrooms, Amomum villosum, Ganoderma lucidum, Morinda officinalis, Fructus aurantii Immaturus, Eucommia ulmoides, seven leaves and a branch of flowers, honey and other precious medicinal materials and local products. It has a great potential in forestry development. Among them, Osmanthus fragrans and Illicium verum are the fastest growing, with a total of 900000 mu of economic forest. With an annual output of 40000 Dan of Yugui and 25000 DTA of star anise, Fangchenggang, with the advantages of cinnamon and star anise, is providing the largest spice base in China. There are 269 species, 80 families and 28 orders of mammals, birds, amphibians and reptiles in Fangchenggang region. There are 21 species of mammals listed in the first and second level of national protection, such as bee monkey, black leaf monkey, Little Otter, golden cat, clouded leopard, roe deer, pangolin, Sumen antelope, etc.; 8 species of birds are listed as the second level of protection, including pheasant, pheasant, cuckoo, great tit, etc.; 6 amphibian reptiles under second level protection include Rana tigrina, ground turtle, giant lizard, python, etc. No rare wild animals and plants under state protection were found in the assessment area. There are no IUCN Red List species reported in the subproject area.

F. SOCIO-ECONOMIC CONDITIONS

1. Overview of Baise

181. **Administrative division and population profile**. Subproject 1 and Subproject 2 are in Baise City, located in west Guangxi. It borders Guizhou in the north, Yunnan in the west, Nanning in the East and Viet Nam in the south. With a total area of 36200 km^2, the city has jurisdiction over 12 counties (districts) including Youjiang District, Tianyang, Tiandong, Pingguo, Debao, Jingxi, Napo, Lingyun, Leye, Tianlin, Longlin, Xilin and 183 towns. By the end of 2019, the total population is 4.2268 million.

182. **Economic development**. In 2019, the GDP of the whole city was CNY125.778 billion, which is 9.0% higher than that of the previous year. Among them, the added value of the primary industry was CNY24.518 billion, an increase of 7.1%; the added value of the secondary industry was CNY50.846 billion, an increase of 10.6%; the added value of the

tertiary industry was CNY50.415 billion, an increase of 8.3%.The added value of the primary, secondary and tertiary industries accounted for 19.5%, 40.4% and 40.1% of GDP respectively, and their contribution rates to economic growth were 14.9%, 48.3% and 36.8% respectively. The GDP per capita increased by 344.4% compared with the previous year.

183. **Communication and transportation.** The surrounding areas of the subproject sites has existing or under-construction urban trunk roads. At the same time, Baise City has high-speed rail, railway, expressway, aviation, water transportation and other conditions, and the traffic conditions are superior.

184. **Natural resources.** The total amount of Fengshui resources in the city is about 21.6 billion m^3, and the hydropower resources that can be developed and utilized are more than 6 million kilowatts. As of 2013, more than 4.6 million kilowatts of hydropower resources have been developed, which is based on the national "west to east power transmission". The city has more than 35 million mu of earth mountain area, forest coverage rate of 63.9%; there are more than 100 type of wild animal resources, 2775 types of plant resources, including more than 1200 type of medicinal plants, known as "warehouse of local products" and "natural Chinese medicine warehouse". As of 2013, the city has 57 proven minerals, which is one of the top ten nonferrous metal mining areas in China. Among them, the proven reserves of bauxite are 780 million tons, and the prospective reserves are more than 1 billion tons, accounting for about one fourth of China's production. The reserves of coal are more than 450 million tons, and which has become the main coal production base in Guangxi. In addition, there are more than ten type of mineral deposits, such as antimony, copper, oil, natural gas, gold, crystal, etc.

185. **Travel and tourism.** Baise has many enviable tourism resources, such as the world's largest Tiankeng group scenic spot Dashiwei Tiankeng group in Leye County, Jingxi Tongling Grand Canyon waterfall with the largest single-level drop in China, the beautiful scenery of Buliu River tropical rain forest with evergreen mountains and waters, and the rare ethnic customs such as nanyuo snow scene and Zhuang Yao Miao Nationality in Leye County, all these make Baise unique charm. Baise also has a famous revolutionary resort. Deng Xiaoping once launched and led the Baise uprising here, leaving a lot of valuable historical wealth in this hot land. This includes the existing Baise Uprising Memorial Hall, East Guangdong guild hall, Qingfeng building, Cen’s ancient building complex and other cultural landscape.

2. Overview of Chongzuo

186. **Administrative division and population profile.** Subprojects 3, 4 and 5 are in Chongzuo City. Chongzuo City governs Jiangzhou District and five counties, namely Fusui County, Daxin County, Longzhou County, Ningming County and Tiandeng County, and administers Pingxiang City. Chongzuo Municipal People's government is located in Shilin Avenue, Jiangzhou Town, Jiangzhou District. Chongzuo City governs one municipal district and five counties, and administers one county-level city. In 2010, the total population of Chongzuo city was about 2.42 million, of which the urban population was about 455,300 and the rural population was about 1,809,800. Among them, there were about 338,800 people in Jiangzhou District, 443,000 in Fusui County, 354,600 in Daxin County, 393,900 in Ningming County, 267,000 in Longzhou County, 403,400 in Tiandeng county and 102,000 in Pingxiang City. Chongzuo city has a multi-ethnic community with Zhuang as the main ethnic group. It is also inhabited by Zhuang, Han, Yao, Miao, Mulao, Shui, Dong, Jing, Hui, man, Tujia and other ethnic groups. The population of ethnic minorities is 2.087 million,

of which Zhuang is the largest at 88.5% of the total population. The total administrative area is 17,440 km^2.

187. **Economic development**. The annual GDP of Chongzuo is CNY76.8 billion in 2019. Among them, the added value of the primary industry was CNY17.020 billion, with an increase of 4.9%; the added value of the secondary industry was CNY21.370 billion, having an increase of 14.1%; the added value of the tertiary industry was CNY37.656 billion, an increase rate of 7.2%. The added value of the primary, secondary and tertiary industries accounted for 22.4%, 28.1% and 49.5% of GDP; respectively, and their contribution rates to economic growth were 13.5%, 44.4% and 42.1%; respectively. According to the resident population, the annual per capita GDP was CNY36,129, an increase of 7.9% over the previous year.

188. **Communication and transportation.** Chongzuo is located on the continental bridge leading to ASEAN countries, with the advantages of border, high-speed railway and capital. Chongzuo City has four counties and cities, namely Ningming, Longzhou, Daxin and Pingxiang, bordering Viet Nam. The border line is 533 km long, which is the longest prefecture level city in Guangxi. Chongzuo City has the geographical advantages due to the border area, the presence of river, the railway connectivity and close to the Bay, with convenient transportation. Nanyou expressway has been opened, Hunan Guangxi railway and national highway 322 run through from north and south. Chongzuo is the only land port city with railways and highways connected with the domestic transportation network on the southern border of China.

189. **Natural resources.** The total land area of Chongzuo city is 1735100 hectares, of which the cultivated land area is 520200 hectares, the per capita cultivated land area is higher than the average level of Guangxi; the garden area is 46500 hectares; the forest land area is 752800 hectares; the area of urban villages and industrial and mining land is 41400 hectares; the area of transportation land is 25000 hectares; the area of water and water conservancy facilities is 43000 hectares; and the area of other land is 238800 hectares. Chongzuo City has 32300 hectares of state-owned agricultural and forestry farms, which can be revitalized, and has abundant land reserve resources. Chongzuo city is rich in water resources, with 3800 cubic meters of usable water per capita in comparison of 2200 cubic meters of water per capita in China.

190. **Travel and tourism.** Chongzuo City has more than 500 scenic spots, cultural relics, rare animals, precious ancient trees, primitive ecology and other types of tourism resources. Among these, there are 1 national scenic spot, 1 National Nature Reserve, 4 provincial nature reserves and 17 provincial cultural relics protection units.

3. Overview of Fangchenggang

191. **Administrative division and population profile**. Subproject 6 is in Fangchenggang City in Fangchengzi. Fangchenggang City has two municipal districts (Port and Fangcheng), one city (Dongxing) and one county (Shangsi). The total area is 6,181 km^2. By the end of year 2019, there were 963,600 permanent residents, 10,300 more than the end of the previous year, including 575,200 urban residents. The annual birth rate was 13.24%, the mortality rate was 4.53%, and the natural population growth rate was 8.71%. According to the statistics of the public security department, the registered population of the city at the end of the year 2019 was 1.037 million, an increase of 10,500 over the previous year. Fangchenggang is the only city in China that is connected with other countries by land and

sea. It is considered as "the main gateway of Southwest China and the Pearl of China's border".

192. **Economic development**. In 2019, the gross domestic product has reached CNY70.123 billion, an increase of 5.4% (calculated at comparable prices, the same as below). According to the resident population, the per capita GDP was CNY73,163. The added value of the primary industry was CNY10.942 billion, having an increase of 5.1%; the added value of the secondary industry was CNY33.083 billion, with an increase of 5.9%; the added value of the tertiary industry was CNY26.098 billion, an increase rate of 4.8%. The contribution rates of the three industries to economic growth were 14.3%, 52.6% and 33.1% respectively, among which the contribution rate of industry to economic growth was 39.3%.

193. **Communication and transportation**. As a rapidly developing coastal industrial port city, Fangchenggang plays an important role in the development of Beibu Gulf Economic Zone. It is most convenient access to the sea in Southwest China, and also the forefront of communication between China and ASEAN countries. It is the largest port in Guangxi and has established trade relations with more than 180 countries and regions. The railway from Nanning to Fangchenggang and the expressway from QinZhou to Fangchenggang connect Fangchenggang with the national railway and highway network. With the rapid development of post and communication industry, program-controlled telephone and mobile phone can be used in the whole city. Telephone coverage reached 80% of the area. The communication system is mainly for regional communication and telecommunication information, mainly provided by network information service center.

194. **Natural resources**. The mineral resources of Fangchenggang include manganese, titanium, iron and granite. The proven reserves of manganese are 750000 tons, titanium 1000000 tons, iron 117200 tons and granite 150 million m^3. The main crops include rice, corn, sweet potato, sugarcane, banana, pineapple and other tropical fruits. The forest area is more than 346500 ha, and the forest coverage rate is about 57%.

195. Fangchenggang has four reserves, three of which are national reserves (Beilunhekou National Mangrove Nature Reserve, Shiwandashan National Forest Park, Fangchenggang Camellia National Nature Reserve). The protected area is 71100ha, accounting for 11.4% of the total area. All the above-mentioned reserves are not in or near the ecological assessment area of subproject.

196. **Travel and tourism.** With a long history, rich national culture, beautiful scenery and clean sea water, Fangchenggang has become one of the most popular tourist destinations in Guangxi. In 2014, the total number of tourists reached 13.62 million, an increase of 15%, and the tourism income reached CNY10.06 billion, an increase of 26.2% over 2014.

G. PHYSICAL CULTURAL RESOURCES

197. The status of the cultural heritage within the subprojects' area of influence have been reviewed in the domestic EIAs of the six subprojects and concluded that no physical cultural resources exist within the subproject areas of influence. This was also confirmed by local cultural bureaus. If buried artifacts of archaeological significance be uncovered during the construction stage within the project areas, construction will be stopped and immediately and reported to the Chongzuo, Baise and Fangchenggang Cultural Bureaus in accordance

with the PRC's *Cultural Relics Protection Law* (2002) and *Cultural Relics Protection Law Implementation Ordinance* (2003).

H. GREENHOUSE GAS EMISSIONS

198. Reducing greenhouse gas emissions through energy saving and effective management to mitigate the impact of climate change is one of Guangxi's top priorities. Considering the local climate change risk, Guangxi has established the climate change office in Guangxi development and Reform Commission in August 2011, with 15 staff members. The office has set carbon dioxide reduction targets (per unit of GDP) for cities in the region, which are also included in the five-year plan.

199. The greenhouse gas emissions of this project are mainly from two sources: (1) Greenhouse gases generated from vehicle exhaust emissions during road operation; (2) Energy using during infrastructure operation, including water and electricity. Subproject specific GHG emission reduction potential is presented in subsequent paragraphs.

200. **Subproject 1:** The total construction area of the project is 31311.3m^2, the annual power consumption is 3.84 million kwh, the annual water consumption is 108,200 m^3, which is converted into standard coal 481.21 tons, and the CO_2 emitted is 1,260.78 t/a. According to the estimation of the FSR preparation unit, the green-building area accounts for 93% of the total area. The energy consumption of part of the green-building area is 447.52 tons of standard coal, and the CO_2 emission is 1172.52 t/a. The average energy saving rate of China's green-building is 50%. Therefore, after the implementation of green-building in subproject 1, the greenhouse gas emission can be reduced by 586.26 t/a.

201. **Subproject 2:** According to the project feasibility study report, Greenhouse gas emissions are calculated in two parts.

(i) The annual electricity consumption is 26.9143 million kWh, the annual water consumption is 571,500 m^3, the annual comprehensive energy consumption is 833.86 tons of standard coal, and the CO_2 emissions are 2184.71 t/a. According to the estimation of the FSR preparation unit, the green-building area accounts for 39% of the total area. The energy consumption of part of the green-building area is 416.93 tons of standard coal, and the CO_2 emission is 1,092.36 t/a. The average energy saving rate of China's green-building is 50%. Therefore, after the implementation of green-building in subproject 2, the greenhouse gas emission can be reduced by 546.18 t/a.

(ii) Calculate the building energy consumption and carbon dioxide emission reduction of the solar power generation system according to the power generation capacity. In this project, the 3,300 kWh/a energy generated from the solar power system is equal to burning 12.8 ton/a stand coal, which is equivalent to CO_2 emission 31.49 ton/a.

202. **Subproject 3:** According to the estimation of the FSR preparation unit, the green-building area of the cold storage accounts for 9.4% of the total area, and there is no green-building in the bonded storage. The total construction area of the cold storage is 52067m^2, the project is expected to consume 197.182 million kWh of electricity annually, 79,800 m^3 of water, 6,349.26 tons of coal equivalent to energy, and 16,676.24 t/a of CO_2 emissions. According to the estimation of the FSR preparation unit, the green-building area accounts for 9.4% of the total area. The energy consumption of part of the green-building area is 596.83 tons of standard coal, and the CO_2 emission is 1567.57 t/a. The average energy

saving rate of China's green-building is 50%. Therefore, after the implementation of green-building, the greenhouse gas emission can be reduced by 783.79 t/a.

203. **Subproject 4:** The construction project includes the newly built 12.39 km urban road and the expansion of the water supply project of the sugar recycling economy industrial park in Jiangzhou District. Greenhouse gas emissions are calculated in two parts.

(i) **Road engineering:** According to the feasibility study report, use the "With or Without method" to calculate the fuel savings after the construction project is put into operation. Through calculations, a total of 211.04 tons of fuel has been saved during the 20 years of operation, which is equivalent to 305.58 tons of standard coal, and the CO_2 saved is 801.75 tons.

(ii) **Water supply engineering:** According to the feasibility study report, the project is expected to consume 4.6187 million kWh annually, consume 9979 m^3 of water, 568.52 t/a of energy converted to coal, and emit 1,489.52 t/a of CO_2. According to the experience value, after adopting energy, water-saving measures, the project can save energy by 10% and reduce CO_2 emission by148.95 t/a.

204. **Subproject 5:** The construction content includes a 16.282 km tourist road, a Sino-Vietnamese cross-border smart tourism center, a cross-border tourist distribution center in Renai Village, Xalei Town, etc. The greenhouse gas emissions calculated in two parts.

(i) **Road engineering:** According to the feasibility study report, use the "With or Without method" to calculate the fuel savings after the construction project is put into operation. Through calculation, the accumulated fuel oil saved is 277.69 tons during the 20 years, which is equivalent to 402.65 tons of standard coal, and the CO_2 emitted is 1054.94 t [6].

(ii) **Other buildings:** According to calculations, the total electricity consumption during the operation period of the Sino-Viet Nam Cross-border Smart Tourism Center, Ren'ai Village Cross-border Tourist Distribution Center in Xialei Town, and Guomen Mountain and Water Tour and Holiday Group is 2,642,900 kwh/a, and water consumption is 8600 m^3/a, converted into standard coal is 325.55 tons/a, and the CO_2 emitted is 852.95 t/a. According to the estimation of the FSR preparation unit, the green-building area accounts for 99.1% of the total area. The energy consumption of part of the green-building area is 322.62 tons of standard coal, and the CO_2 emission is 845.27 t/a. The average energy saving rate of China's green-building is 50%. Therefore, after the implementation of green-building, the greenhouse gas emission can be reduced by 422.64 t/a.

205. **Subproject 6:** According to the project feasibility study report, Greenhouse gas emissions are calculated in two parts.

（i）The annual power consumption is 4,864,500 kwh, the annual water consumption is 51,900 m^3, the annual natural gas consumption is 20,900 m^3, the annual comprehensive energy consumption is 602.3 t standard coal, and the CO_2 emissions are 1,578.06 t/a. According to the estimation of the FSR preparation unit, the green-building area accounts for 12% of the total area. The energy consumption of part of the green-building area is 72.28 tons of standard coal, and the CO_2 emission is 189.37 t/a. The average energy saving rate of China's green-building is 50%.

[6] [for every ton of standard coal burned in an industrial boiler, 2,620 kg of carbon dioxide is produced.]

Therefore, after the implementation of green-building, the greenhouse gas emission can be reduced by 94.69 t/a.

（ii）Calculate the building energy consumption and carbon dioxide emission reduction of the solar power generation system according to the power generation capacity. In this project, the 252,300 kWh/a energy generated from the solar power system is equal to burning 91.60 ton/a stand coal, which is equivalent to CO_2 emission 240 ton/a.

206. In summary, the total greenhouse gas emission of the project is 25408.57 t/a and the emission reductions after energy-saving measures are taken is 4720.64 t/a. subproject wise details are presented in Table 32.

Table 33. Total greenhouse gas emissions of the project and emission reductions after project

Sub-project number	Energy consumption node	Energy consumption node Annual CO_2 emissions during project operation period (t/a)	CO_2 emission reduction after the project adopts energy-saving measures (t/a)	Calculation basis	ADB Climate Finance ($ Million)	Climate Co-Finance ($ Million)	Remarks
Sub-project 1	Other buildings	1260.78	586.26	The green-building area accounts for 93% of the total area.The average energy saving rate of China's green-building is 50%.	Mitigation: 0.7276 (Green-building)		
Sub-project 2	Other buildings	2197.51	577.67	Including 546.18 ton/a due to energy saving from green-building and 31.49 ton/a from solar power system (33,000 kWh/a)	Mitigation: 0.8767 (Water and electricity saving measures); 0.028 (Solar power system) Adaptation: 0.5470 (Sponge city); Subtotal: 1.4517	Mitigation: 0.061 (Solar power system)	Refrigerant was originally designed of using R22, but will be replaced by CO_2
Sub-project 3	Other buildings	18042.55	783.79	The green-building area accounts for 9.4% of the cold storage total area.The average energy saving rate of China's green-building is 50%.	Mitigation: 1.0330 (Green-building)	Mitigation: 0.2191 (Green-building)	
Sub-project 4	Road engineering	—	801.75	Use the "with or without comparison method" to calculate the amount of fuel saved within a period of time after project operation and then calculate the average annual saving digit	Mitigation: 0.2545 (Green-building) Adaptation: 0.110 (Drain pipes) 0.9853 (Sponge city) Subtotal: 1.3498	Adaptation: 0.171 (Drain pipes)	
	Water supply engineering	1489.52	148.9	According to the experience value, after adopting energy, water-saving measures, the project can save energy by 10%			

Sub-project 5	Road engineering	—	1054.94	Use the "with or without comparison method" to calculate the amount of fuel saved within a period of time after project operation and then calculate the average annual saving digit	Mitigation: 0.4123 (Green-building) Adaptation: 0.0026 (Tourism center drain) Subtotal: 0.4149	Adaptation: 0.0029 (Tourism center drain)	
	Other buildings	852.95	422.64	The green-building area accounts for 99.1% of the cold storage total area.The average energy saving rate of China's green-building is 50%.			
Sub-project 6	Other buildings	1669.12	344.69	Including 94.69 ton/a due to energy saving from green-building design and 240 ton/a from solar power system (252,300 kWh/a),The green-building area accounts for 12% of the total area.The average energy saving rate of China's green-building is 50%.	Mitigation: 0.6146 (One star Green-building) Adaptation: 0.082 (drainage system) 0.1844 (Sponge City) Subtotal: 0.881	Mitigation: 0.3419 (Solar power system) Adaptation: 0.024 (drainage system)	
Total		25512.97	4720.64		Mitigation: 3.9467 Adaptation: 1.9113	Mitigation: 0.6220 Adaptation: 0.1979	Subtotal; Mitigation: $4.5687 million Adaptation: $2.1092 million Total: $6.6779 million

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. POSITIVE IMPACTS AND ENVIRONMENTAL BENEFITS

207. **Promote the development of the cross-border tourism industry**. Currently, border resources are shared. Win-win cooperation with neighboring countries has become an important strategic goal of economic globalization. Subproject 5 centers on the cooperation plan between China and Viet Nam on the Detian-Banyo scenic spot, relying on the core scenic area of Detian Waterfall in Daxin County and thereby integrating cross-border tourism resources of Chongzuo City and regulating the tourism market in the border area. The subproject shall meet the personalized needs of domestic and even overseas third-country cross-border tourists, health and wellness vacations, business meetings, etc.

208. **Promote the construction of cross-border cooperation between China and Viet Nam**. The "One Belt, One Road" strategy provides Guangxi the opportunity "to build an international channel towards ASEAN", create a new strategic fulcrum for the opening up and development of the southwest, central and southern regions, and to form the three new positioning missions of "the 21st century Maritime Silk Road and the important gateway of the Silk Road economy with the opportunity to link up". The construction of subproject 3 will lay the foundation for the further expansion of foreign exchange and trade in China-Thailand Industrial Park. It will strengthen the economic development along the route corresponding to Chongzuo Port and enhance the trade image and economic strength of PRC as largest trading country. The development of subproject 4 will not only provide a large number of jobs in agricultural products processing sector, it will also further attract Vietnamese workers to work in China, improve the employment cycle and promote China-Viet Nam cross-border labor cooperation.

209. **Introduce cost-effective skilled Vietnamese workers**. This project will support Guangxi's pilot project to introduce foreign labor i.e. Vietnamese laborers. This project will establish training facilities for laborers in Viet Nam, the border and surrounding areas, with organized and relevant training programs. Subproject 1 will include several new experimental and scientific research centers. It will further enhance the faculty of Baise College, allowing expansion of the curriculum system, and build a platform for exchanges between China and Viet Nam in the fields of economy, culture, and education.

210. **It is an important part of building a new socialist countryside**. Conducive to the settlement of the "three rural" issues, the project meets the requirements of national industrial policy document. It is conducive to speeding up the construction of a modern rural circulation "one network" and a "one-stop" service for farmers, to the adjustment of industrial structure, and to the realization of agricultural efficiency and farmers' income. It will promote the integrated development of primary, secondary and tertiary industries, and help revitalize the rural strategy. The implementation of subproject 2 can effectively integrate the commodity resources of various products and achieve co-matching, solve the problems of the "first mile" and "last mile" in rural logistics while providing comprehensive services for "agriculture, rural areas and farmers" production and life is beneficial to farmers' income.

211. **The cross-border e-commerce no-source model breaks the monopoly of wholesalers, retailers, and importers**. The traditional development model that restricts import and export trade will be restructured to international trade. It will bring retailers,

wholesalers and enterprises in direct contact, effectively reduce the intermediate links and save working capital and improve efficiencies.

B. IMPACTS AND MITIGATION MEASURES DURING DESIGN AND PRE-CONSTRUCTION

212. The construction of buildings and related facilities in six subprojects will involve permanent land acquisition. This will have permanent and irreversible effects on land use and landscape.

(i) Subproject 1 covers an area of 49.376 hundred sqm (hm^2), all located in Baise College.
(ii) Subproject 2 has a total planned area of 55237 m^2 (equivalent to 83 mu).
(iii) Subproject 3 covers an area of 22.27hm2, which is in the China-Thailand Industrial Park
(iv) Subproject 4 covers an area of 7.28 hm2
(v) Subproject 5 covers an area of 146.42hm2, of which 56.42 hm2 is permanently occupied and involves temporary land requirement of 90 hm2. After the construction is completed, the project will be restored to its original state. For other subprojects, all construction activities will be implemented in the above-mentioned site so is does not involve temporary land requirement
(vi) Subproject 6 covers an area of 10.41 hm2. In view of the small permanent land acquisition scale of the subproject, its site selection and the current land use situation, although the impact of permanent land acquisition is irreversible, it is not significant.

213. **Measures during detailed design**. The detailed design of buildings and other facilities of six subprojects shall include the energy-saving performance proposed in the feasibility study report, including materials used in exterior walls, windows and roofs; electrical systems and automation equipment; air conditioning and ventilation facilities; lighting equipment, etc. Environmental protection measures are described below and in the "Environmental Management Plan".

214. The detailed design of buildings and facilities of the subprojects shall include the following environmental protection measures:

(i) The technical design of buildings and facilities should also include the energy-saving performance recommended in the feasibility study report, including house building materials; power systems and automation equipment; air conditioning and ventilation facilities; lighting equipment, etc.
(ii) The technical design of buildings and facilities should consider other "green building" properties besides energy saving, such as recycling of building materials, rainwater collection and reuse, and roof greening.
(iii) The road engineering in subproject 4 and subproject 5 should compare multiple schemes in terms of overall rigidity, strength of each layer, water stability, skid resistance, and durability of the pavement structure. The necessary side ditches, protection, bridges and culverts, safety facilities and other aspects have been optimized. The setting of borrow pits and spoil piles should be adapted to local conditions.

(iv) The water used by enterprises in the subproject 3 shall be separated from the turbidity, clean water shall be recycled and reused in time, and cooling water shall be recycled to reduce the consumption of fresh water.
(v) In the water supply and drainage project of subproject 4, the filter adopts air-water backwashing, and the water consumption during backwashing is 30-50% less than that of the traditional filter.
(vi) The roof of subproject 3 adopts 50 mm thick extruded polystyrene foam board, which is increased by 25% based on meeting the energy-saving calculation thickness of 40 mm.
(vii) The technical design of the drainage system of each subproject should increase the current standard by 10% to cope with extreme rainfall caused by climate change.
(viii) For subproject 2 and 3, the technical design institute will specify use of refrigerant with zero or low global warming potential (GWP) to minimize GHG emission from the project.

215. **Measures during Pre-construction.** Many environmental management measures shall be implemented in the pre-construction phase for the six subprojects to ensure environment management readiness. These include:

(i) The GPMO, as the executing agency, shall complete the following prior to construction commencement:

a. Establish a complaint mechanism for the project, including the opening of a complaint hotline.

b. Appoint qualified staff as the environmental coordinator to oversee EMP implementation.

c. Appoint the project management and capacity building consultant (PMC). The PMC shall have an environmental specialist on the team responsible for EMP implementation.

d. Appoint the project start up consultant who will be responsible for updating the IEE and EMP following detailed design.

e. Appoint external monitor consultant who undertake the role of external (third-party) environmental monitor (EEM) during loan implementation.

f. Include specifications for environmental protection in all civil works tender documents and contracts.

g. If necessary, update the EMP to reflect changes made (such as changes in construction methods and building layout, etc.) during the detailed design.

(ii) Each project implementation entity (PIE), as the implementing entity for the respective subprojects, shall complete the following prior to construction commencement:

a. Appoint a qualified staff as the environmental coordinator responsible for EMP implementation.

b. Appoint an environmental supervision engineer (ESE) responsible for the environmental supervision of contractors and environmental audit of construction sites for the subproject.

c. Appoint an environmental monitoring station (EMS) to undertake environmental monitoring according to the EMP during construction and operation of the subproject.

216. **Contractor prepares construction environmental management plan**. Following the award of the contract and before commencing work, the contractors will be required to prepare a site-specific CEMP that will address the conditions of EMP that has been attached to the bid and contract documents. The CEMP will outline how the contractor will address the activities in the construction stage in section of the EMP. An outline of the CEMP will be provided by the safeguards specialist of PMO. The contractor will submit the CEMP to the safeguards specialist of PMO for approval. The contractor will prepare the CEMP within 10 days of mobilization and the safeguards specialist will review the CEMP in 5 days.

217. **Induction of contractors to site**. Following the selection of the contractor and the approval of the CEMP, the contractor together with the person on the contractor's environmental, health, and safety officer who will be responsible for supervising the CEMP will meet the safeguards specialist on-site where the CEMP conditions will be confirmed with the contractor. When the safeguards specialist is confident that the contractor understands and can comply with the CEMP, the safeguards specialist will advise the project civil engineer that the contractor can now commence the construction work.

218. **Safety measures for COVID-19**. Prior to the arrival of external project personnel (e.g., workers and consultants), the PMO will implement safety procedures and screening to ensure that all staff test negative for COVID-19 and do not pose a threat to the local population. This will include: (i) requirement that all project personnel test negative for COVID-19, (ii) external workers and consultants confirm their COVID-19 – free status to PMO prior to arrival, and (iii) project safety and sanitation measures are distributed to all personnel and are included as contractual requirements for all staff. Each contractor must prepare and submit a COVID-19 Health and Safety Plan for prior approval to PMO.

C. IMPACTS AND MITIGATION MEASURES DURING CONSTRUCTION

219. **Impact Screening.** Construction activities will include site formation and construction of buildings and ancillary facilities such as internal roads and walkways, drainage system and landscaping etc. Potential environmental impacts arising from such activities would include air quality, noise, water quality, ecology, solid waste, and occupational health and safety.

220. Potential air quality impacts could occur due to fugitive dust generation at the construction site during earth works, from stockpiles of uncovered earth materials, and exhaust from construction equipment and vehicles. The use of powered mechanical equipment (PME) during construction activities will generate noise. Construction activities will generate process wastewater and construction workers will produce wastewater. Permanent land take might result in loss of vegetation. Construction works will produce construction and demolition (C&D) wastes and construction workers will generate refuse.

Workers will face occupational health and safety issues working on construction sites, such as above ground construction works and exposure to volatile organic compound (VOC) from paints and other organic solvents during interior fit-out. These potential impacts are assessed and addressed in the following sections. Land contamination would not be an issue in this project since there has been no industrial activity within the construction footprint of the subprojects.

1. Impacts and Mitigation Measures on Physical Resources

221. **Air Quality.** Main air pollutants during the construction stage in this project include (i) fugitive emissions of dust during earth works and from uncovered stockpiles, (ii) fumes and exhaust from construction vehicles and machinery, and (iii) fugitive emissions of VOC from paints and organic solvents during interior fit-out of buildings and facilities. Premixed asphalt and/or concrete will be purchased commercially, and the subprojects will not set up asphalt mixing or concrete batching plants on site.

222. According to the EIT, the dust generated during the construction process of earth and stone excavation, mixing station, construction material transportation, loading and unloading process will increase the TSP concentration in the surrounding atmospheric environment. According to the measurement of similar projects, the construction dust will generally be less than 0.1% of the earthwork in the case of sprinkling water; In dry conditions, it can reach more than 1% of the earthwork, and the impact will last less than 50m distance; in the case of watering and avoiding strong winds, the predicted concentration of TSP at 50m downwind will be less than 0.3 mg/m^3. Subproject 5 mainly affects 2090 people in 13 villages in the surrounding areas; Subproject 3 does not involve sensitive receptors; Subproject 4 mainly affects 24,961 people in 39 sensitive points around the road project and water supply area; Subproject 1 mainly affects 25 people in Milada Village, 335m on the west side; Subproject 2 mainly affects 7,576 people in 11 villages; Subproject 6 mainly affects Baikan Village, 12 meters to the south, with about 560 people. The EIA report concludes that water spraying can effectively reduce the impact of construction dust on air quality. The excavators, bulldozers and other construction machinery used in the construction work mainly use diesel as fuel, and their working processes will generate exhaust gas, including CO, NO_2, etc.; transportation vehicles will emit a small amount of exhaust gas at the construction site and along the transportation road, which mainly are CO and NO_2.

223. The Contractor shall include all necessary mitigation measures to reduce air pollution that would impact public and occupational health, by implementing the following air quality control measures. Some of these measures are generic measures that are applicable to all construction sites and construction activities. These are effective measures and are also described in WBG's EHS guidelines.

(i) Spray water at least twice each day on unpaved areas and exposed dust-prone stockpiles except on rainy days.
(ii) Store dust-prone materials in areas with shelters on four sides and on top. If such materials have to be stored in open area, cover with a strong tarpaulin.
(iii) Control vehicle speed to ≤ 8 km/h in unpaved areas. Post the speed limit signs in these areas.
(iv) Pave construction site exits with gravel or asphalt.

(v) Install wheel washing equipment or conduct wheel washing manually at each construction site exit to prevent trucks from carrying muddy or dusty substance onto public roads.
(vi) Vehicles with an open load-carrying trays, which transport potentially dust-producing materials, shall have proper fitting sides and tail boards. Dust-prone materials shall not be loaded to a level higher than the side and tail boards, and shall always be covered with a strong tarpaulin.
(vii) Provide personal protective equipment (PPE) such as goggles, gloves and respirators to construction workers doing interior fit-out to minimize skin exposure to chemicals and inhalation of VOC.
(viii) Regularly maintain construction vehicles and machinery to minimize exhaust emissions from these sources.
(ix) Unauthorized burning of construction and demolition waste material and refuse shall be subject to penalties for the Contractor, and withholding of payment.

224. These measures are defined in the EMP. Contractors are required to ensure compliance with relevant PRC emission standards. Air quality monitoring will be carried out by a licensed environmental monitoring entity (external) during the construction period. Potential air quality impacts during the construction stage would be of short duration and localized. With the above mitigation measures in place, potential air quality impacts during the construction stage would be reduced to acceptable levels.

225. **Noise**. According to the EIT, noise is emitted by construction machinery and construction vehicles travelling to and from the construction sites, with sound power levels of 85~105 dB(A). Based on these sound power levels, the EITs estimated that the day time [70 dB(A)] and night time [55 dB(A)] noise limits in *Emission Standard of Environmental Noise for Boundary of Construction Site* (GB12523 -2011) would not be met at the boundary of the construction site without any noise mitigation measure. In subproject 4, the sensitive receptors include 12 residential points and 2 schools. Subproject 1 in Chengbi campus of Baise College, will generate a huge noise influence in the school. Subproject 5 affected sensitive points including 12 residents; Subproject 3 has no acoustic environmental sensitive points nearby; Subproject 4 affected sensitive spots are 12 residents and 2 schools; The sensitive points affected in subproject 2 include 1,110 people in 2 villages; Subproject 6 affected sensitive points including residents in 8 locations.

226. Contractors shall be required to implement the following mitigation measures for construction activities to meet PRC construction site and WBG recommended noise limits and to protect sensitive receptors. Some measures are generic and are applicable to all construction sites and activities. Yet they are effective measures and are also in line with WBG's EHS guidelines. The use of temporary noise barriers or hoardings to shield off construction noise is particularly relevant to the construction of buildings and facilities on the Fangchenggang Poly Tech Vocational School site where students and staff will be having classes in nearby buildings on campus. Noisy construction activities shall also be avoided during examination periods.

(i) No construction works shall be conducted between 22:00 to 06:00 hours. Piling works shall also be prohibited between 12:00 to 14:30 hours.
(ii) During construction, the contractor shall:
    a. ensure regular equipment repair and maintenance to keep them in good working condition to minimize noise
    b. deploy low noise machinery or the equipment with sound insulation

c. erect temporary noise barriers or hoardings around noisy equipment to shield the noise from equipment
d. provide the construction workers with suitable hearing protection (earmuffs) when working near noisy machinery such as during piling
e. forbid the use of horns unless absolutely necessary, minimize the use of whistles

227. The WBG EHS guideline also provides the following guidance to mitigate noise and vibration impacts caused by the operation of pile drivers, earth moving and excavation equipment, concrete mixers, cranes and the transportation of equipment, materials and people during construction and decommissioning activities:

(i) Plan activities in consultation with local communities so that activities with the greatest potential to generate noise and vibration are planned during periods of the day that will result in least disturbance.
(ii) Use noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines.
(iii) Avoid or minimize project transport through community areas.

228. Noise impacts during construction would be of short duration. Potential sensitive receptors will be exposed to short term, temporary and localized impacts. With the above mitigation measures in place, potential noise impacts during construction would be reduced to acceptable levels.

229. **Water Quality.** Uncontrolled wastewater and muddy runoff from construction sites could potentially pollute nearby water bodies and clog up drains. Discharge of domestic wastewater generated by the construction workers could also pollute nearby water bodies if not treated. The EITs estimated that process wastewater for the subprojects would contain approximately 250 mg/L suspended solids (SS) and 20 mg/L total petroleum hydrocarbon (TPH). Process wastewater would be treated by oil-water separation then sedimentation on the construction site. The process wastewater after treatment would be used for dust suppression on site resulting in no discharge of process wastewater from the construction sites.

230. Subproject 5 will involve wastewater discharge. Wastewater will be discharged first into the oil separation tank followed by sedimentation tank. Oil separation precipitation treatment will be applied for this subproject. The treated water will be used for flushing construction equipment, spraying water during construction dust suppression, etc. Drainage ditches will be setup around the stockyard. A leaching water sedimentation tank with a volume of 10 m^3 will be set at the end which will collect and process leaching water. The leaching water so collected and treated, will be used for dust reduction in the stockyard on sunny days. The domestic sewage is treated by septic tank and discharged regularly after meeting the Standards for irrigation water quality (GB 5084-2005), which is used to fertilize the surrounding woodland and farmland. The generated domestic sewage of Subproject 3 in the China-Thailand Industrial Park will be treated in the Chongzuo Laituan Sewage Treatment Plant.

231. Domestic wastewater generated by the construction workers in Subproject 4 will be collected and treated for irrigation. The village is surrounded by widely distributed dryland and woodland. The area with a radius of 200 m is covered by dry land, and septic effluent is feasible for dry land irrigation. In Subproject 1, the domestic sewage generated during the construction period can treated by the existing wastewater treatment facilities in the

Chengbi campus of Baise University and be discharged into the municipal pipeline network after being treated by septic tank.

232. In subproject 2, construction wastewater will be discharged into the oil separation sedimentation followed by oil separation precipitation treatment. The treated water will be used for flushing construction equipment, spraying water during construction dust suppression, etc. Drainage ditches will be setup around the stockyard. A leaching water sedimentation tank with a volume of 10m^3 will be set at the end which will collect and process leaching water. The leaching water so collected and treated, will be used for dust reduction in the stockyard on sunny days. Domestic sewage will be treated by septic tanks and will be taken out regularly and will be used to fertilize surrounding woodland and farmland. In subproject 6 construction wastewater can be recycled after precipitation. It can be used for sprinkling water to reduce dust, not discharged. Before connecting to the regional sewage pipe network, domestic sewage must be treated in septic tanks and then comprehensively used for agricultural irrigation. After connecting the municipal sewage pipe network, the domestic sewage will be treated in the septic tank and discharged into the regional sewage pipe network.

233. The contractors will implement the following mitigation measures to prevent water pollution:

(i) Collect runoff from construction sites with drainage ditches to prevent runoff containing muddy water from polluting nearby roads, land and water bodies.
(ii) Install and operate oily-water separators and sedimentation tanks on construction sites to treat process water and muddy runoff with high concentrations of total petroleum hydrocarbon and suspended solids. If necessary, use flocculants such as polyacryl amide to facilitate sedimentation.
(iii) Provide portable toilets and small package wastewater treatment plants and/or septic tanks on construction sites for the workers. If there are nearby public sewers, install interim storage tanks and pipelines to convey wastewater to public sewers.
(iv) Store fuels, oil, and other hazardous materials on construction sites within secured areas on impermeable surfaces protected by bunds and provided with cleanup kits.
(v) Clean up any chemical spills into drains and water bodies within 24 hours of the occurrence, with contaminated soils and water treated according to HJ 25.4-2014 *Technical Guidelines for Site Soil Remediation*. Records must be handed over without delay to the PMO and local EEB.

234. With the above measures in place, potential water quality impact should be mitigated to acceptable levels.

235. **Solid Waste**. Solid waste generation during construction will include refuse generated by construction workers on construction sites and construction and demolition (C&D) waste generated during site formation and building construction. In Subproject 4, 284,600 m^3 of spoil and 9100 ton of C&D waste will be generated and it will be transported to designated spoil yard for storage to prevent the random stacking. In Subproject 1,80,000 m^3 of spoil and 200 m^3 C&D waste will be generated and the same will be transported to designated disposal site for disposal. During the construction period, the domestic garbage will be collected and transported by the sanitation department.

236. The estimated amount of spoil to be generated during the construction period of Subproject 5 is 528,808 m^3. This will be temporarily stored in the spoil ground, and later

used for road greening and filling. The road construction activity of this subproject involves demolition of about 5958 m^2 houses. The construction waste generated by the demolition work in project is estimated 7745.4 tons. This garbage should be sorted and recycled as much as possible. Wastes of no use value are used for landfilling and should not be discarded and dumped at will. About 132 tons of domestic garbage is temporarily stored in the garbage pool. It will be regularly transported to nearby village garbage recycling stations for unified disposal. Construction waste and steel bars in Subproject 3 will be recycled as much as possible; The spoiled earth and stone shall be used for construction backfill as much as possible. The construction units will be pre-designed in accordance with relevant regulations and then transported to the designated locations. The scrap waste generated during the finishing stage will be properly handled. Hazardous solid waste and waste paint buckets, etc. generated during the decoration process will be recycled and processed by a qualified unit and shall not be disposed of at will. Other concrete blocks, waste slag, etc. which cannot be recycled shall be handed over to the city administration for disposal. Domestic garbage during the construction period, after being collected by the garbage bin on the construction site, will be collectively disposed of by the environmental sanitation department. This part of solid waste has less impact on the regional environment. The amount of waste earthwork generated in subproject 4 is about 284,600 m^3. The amount of construction waste generated is estimated 9,100 tons. The clearing will be transported to the spoil ground of the overall design of the project for stockpiling. Eliminate sporadic stacking and stacking anywhere. Subproject 1 generates about 80,000m^3 of waste and 0.02 million m^3 of construction waste. The construction waste generated from abandoned and demolition shall be transported to the designated disposal site for disposal. Domestic garbage during the construction period will be collected and sent to the sanitation department for removal. The amount of domestic waste generated in subproject 5 is 25kg/d. The disposal plan is that domestic garbage and excess construction garbage are placed in a designated place, cleaned regularly and transported to the garbage treatment plant. The amount of construction waste generated in subproject 6 is 1680 tons. This garbage should be sorted and recycled as much as possible. Wastes of no use value are used for landfilling and should not be discarded and dumped at unapproved location. During the construction period, the domestic garbage is collected in a centralized manner, and the sanitation department is entrusted to clean it.

237. The contractors will implement the following mitigation measures to manage C&D waste and refuse generated during construction:

(i) Maximize the re-use of C&D wastes on the project.
(ii) Store all refuse and C&D waste generated on construction sites in designated areas and remove them from these locations for disposal or reuse regularly.

238. With the above measures in place, solid waste generated during construction should have minimal environmental impact.

2. Impacts and Mitigation Measures on Biological Resources, Ecology and Biodiversity

239. The current land for the new construction of subproject 5 is forest land and wasteland. The main vegetation are fruit trees and bushes. The vegetation type in the project evaluation area is relatively single. Animals are mostly common rats, insects, birds, etc. The current quality of evaluation area's ecological environment is average. Subproject 3 is in the China-Thailand Industrial Park, and the site has been leveled. There is basically no

vegetation cover on the subproject site. There are only a few grasslands and the ecological environment is relatively simple. The site of the expanded water treatment plant in sub project 4 has completed the vegetation clearing and land leveling. It was a waste land (abandoned land) before clearing. The current site has no ecological value. No protected animals (those listed in IUCN Red List and the National Animal and Plant Protection List and the National Endangered Animal and Plant Protection List) were found in the assessment area. The biodiversity of the project area is poor, and the ecological environment is relatively simple. No special protection targets were found within 500m of the surrounding area, including key protected wild animals and plants, non-scenic areas, nature reserves and cultural heritage. The ecological environment is less sensitive, and it is not an ecologically sensitive area. Subproject 1 is in the Chengbi campus of Baise College. The current land is green land, mostly ordinary artificial trees, shrubs and grassland such as eucalyptus and masson pine. There is no native vegetation in the evaluation area of Subproject 2. Except for industrial and construction land, it is basically an agricultural development zone. The vegetation is mainly cultivated land and fruit forest vegetation. During the site survey, no wild animals under national and local protection were found. There are no nature reserves and rare wild animals and plants belonging to national reserves in the evaluation area. There are no special protection targets such as scenic spots, nature reserves and cultural heritages in the vicinity of Subproject 6. The ecological environment is not a sensitive area. In the project construction land area, no national key protected plant species and rare species have been found. No wild animals and rare wild animals under national key protection have been found. Due to project development and construction and human disturbance, the quality of the ecological environment in this area is average.

240. The contractors will implement the following mitigation measures during construction for protection of biological resources.

(i) Construction workers are prohibited from capturing/hunting any wildlife during construction.
(ii) Where a tree must be removed or an area of grassland disturbed, replant trees and re-vegetate the area after construction. Tree planting shall be done by planting 5 new trees for each tree removed for the project. The planting shall use local species with local provenance. Planting of exotic of invasive species shall be prohibited. The location for planting the trees shall be identified during implementation stage.

3. Impacts and Mitigation Measures on Socio-economic Resources

241. **Land acquisition and resettlement**. Subprojects 1, 2, 4, 5, and 6 involve land acquisition and house demolition. At present, the progress of land acquisition and demolition of each subproject is different. All land acquisition is carried out by the local government in accordance with applicable domestic laws and regulations. The proposed land for Subproject 1 does not involve land acquisition and demolition. In summary, there are no unresolved land acquisition and resettlement issues in the project. Impacts and mitigations associated with land acquisition and resettlement plans are included in the subproject resettlement plans.

242. **Physical cultural resources.** Assessment undertaken did not reveal the presence of physical cultural resources within the footprints of the proposed subproject sites. Should buried artifacts of archaeological significance be uncovered during the construction stage within these sites, construction shall be stopped and immediately reported to the local

cultural bureaus in accordance with PRC's *Cultural Relics Protection Law* (2002) and the *Cultural Relics Protection Law Implementation Ordinance* (2003). Also, a chance find procedures will be put in place in the EMP.

243. **Occupational health and safety.** Due to its nature the construction industry is considered to be one of the most hazardous industries where a number of potentially hazardous operations are carried out. The contractors shall implement the following measures and precautions to protect the health and safety of construction workers.

(i) Environment, health and safety officer: Each contractor shall appoint at least one environment, health and safety (EHS) officer to manage occupational health and safety risks on construction sites by applying the following measures.

(ii) Construction site sanitation: (i) Each contractor shall provide adequate and functional systems for sanitary conditions, toilet facilities, and waste management with waste separation; (ii) Effectively clean and disinfect the site. During site formation, spray with phenolated water for disinfection. Disinfect toilets and refuse bins and ensure timely removal of solid waste; (iii) Exterminate rodents on site at least once every 3 months, and exterminate mosquitoes and flies at least twice each year; (iv) Provide public toilets in accordance with the requirements of labor management and sanitation departments in the living areas, if any, on construction site, and appoint designated staff responsible for cleaning and disinfection; (v) Construction site domestic wastewater shall be discharged into the municipal sewer system or treated on-site using a portable system.

(iii) Occupational safety: (i) Provide personal protective equipment (safety hats and shoes, high visibility vests, and safety belt and harness for above ground works) to all construction workers and strictly enforce all workers to put on the PPE; (ii) Provide safety goggles, gloves and respiratory masks to workers doing building interior fit-out works; (iii) Provide ear plugs to workers operating and working near noisy PME.

(iv) Food safety: (i) Inspect and supervise food hygiene in canteens, if any, on site regularly. Canteen workers must have valid health permits. If food poisoning is discovered, implement effective control measures immediately to prevent it from spreading.

(v) Disease prevention, health services: The following disease prevention measures and health services shall be undertaken: (i) Construction workers must have physical examination before start working on site. If infectious disease is found, the patient must be isolated for treatment to prevent the disease from spreading. From the second year onwards, conduct physical examination on 20% of the workers every year; (ii) Establish health clinic at location where workers are concentrated, which should be equipped with common medical supplies and medication for simple treatment and emergency treatment for accidents; (iii) Provide induction and training by local health departments on prevention and management of communicable diseases.

(vi) Social conflict prevention: No major social risks and/or vulnerabilities are anticipated from the project. The project construction workers will be engaged locally. Civil works contracts shall stipulate priorities to (i) employ local people for works, (ii) ensure equal opportunities for women and men, (iii) pay equal wages for work of equal value, and to pay women's wages directly to them; and (iv) not employ child or forced labor.

(vii) **Health and safety plan including a COVID-19 plan.** The project CEMPs will include a COVID-19 health and safety plan to address COVID-19 health risks. The plan will be prepared in line with WHO and government regulations and guidelines on COVID-19 prevention and control, and in consultation with public health agencies

in the area. The plan will include (a) measures to record the locations that workers have visited/lived immediately before and during project work; (b) schedules for disinfecting/cleaning offices, yards, stores, and labor camps; (c) measures to implement temperature checks and other health checks on-site; (d) physical distancing measures, particularly in worker camps; (e) requirements for mandatory use of personal protective equipment such as facemasks, and provision of handwashing stations, hand sanitizers, and other appropriate protective measures; (f) how workers and residents living near project sites will be provided with information to protect themselves from COVID-19; (g) procedures to be adopted in the event a worker is suspected of having contracted COVID-19; and (h) other COVID-19 prevention and control measures appropriate for the local context.

244. **Community health and safety.** Temporary traffic diversions, continual generation of noise and dust on haulage routes, and general hindrance to local access and services are common impacts associated with construction works within or nearby local settlements. The potential impacts on community health and safety will be mitigated through a number of activities defined in the EMP. The contractors shall implement the following measures:

(i) Traffic management: A traffic control and operation plan shall be prepared together with the local traffic police prior to any construction. The plan shall include provisions for diverting or scheduling construction traffic to avoid morning and afternoon peak traffic hours, regulating traffic at road crossings with an emphasis on ensuring public safety through clear signs, controls and planning in advance.

(ii) Information disclosure: (i) Construction billboards, which include construction description, schedule, responsible person and complaint phone number, shall be erected at the entry to each construction site and construction staging area. (ii) Residents and businesses shall be informed in advance of noisy construction activities such as piling, given the dates and duration of expected disruption and made aware of the project GRM.(iii) Clear signs shall be placed at construction sites in view of the public, warning people of potential dangers such as moving vehicles, hazardous materials, excavations etc. and raising awareness on safety issues.

(iii) Construction sites: All sites shall be made secure, discouraging access by members of the public through appropriate fencing, signage and/or security personnel, as appropriate. Each site needs to have an emergency response plan and suitable medical first aid on site.

(iv) Develop a health and safety plan including aspects to cover COVID-19 prevention guidelines including SOP in compliance with WHO and national guidelines to minimize community health risk from COVID-19.

245. **Utilities provision interruption.** Construction may require relocation of municipal utilities such as power, water, communication cables. Temporary suspension of services (planned or accidental) can affect the economy, industries, businesses and residents' daily life. Mitigation of impacts on utilities provision shall be through activities defined in the EMP, to be incorporated in the tender documents and construction contracts:

(i) Contractors shall assess construction locations in advance and identify potential for disruption to services and risks before starting construction. Any damage or hindrance/disadvantage to local businesses caused by the premature removal or insufficient replacement of public utilities is subject to full compensation, at the full liability of the contractor who caused the problem.

(ii) If temporary disruption is unavoidable the contractor shall, in collaboration with relevant local authorities such as power company, water supply company and communication company, develop a plan to minimize the disruption and communicate the dates and duration in advance to affected persons.

D. IMPACTS AND MITIGATION MEASURES DURING THE OPERATIONAL STAGE

246. **Impact overview**. During the operation of the six subprojects, the main pollutants are exhaust gas from automobile, catering oil fume, and odor generated during sewage treatment. Wastewater generation mainly from domestic sewage, production wastewater etc. The noise pollution from traffic noise during road operation, equipment operation noise etc. Solid waste includes domestic garbage, laboratory hazardous waste, etc.

247. During the operation period of subproject 5, waste engine oil generated in the motorcycle track maintenance room will be generated. Hazardous wastes such as medical waste will be generated from first-aid station. The first-aid station of subproject 5 mainly provides emergency medical assistance for emergencies in the scenic area, and the waste generated mainly includes commonly used drugs and first-aid drugs, such as band aids, cotton swabs, drug packaging boxes, etc.. Subproject 4 road transportation projects may cause the leakage of toxic and hazardous substances. Thereby causing environmental risks. The wastewater produced by the water supply and drainage project mainly include sedimentation tank sludge water, filter backwash water and domestic sewage. Subproject 1 solid waste during the operation period include laboratory waste (part of laboratory waste liquid, waste containers, waste chemical reagents, experimental waste, etc.), kitchen waste, domestic waste, waste grease and waste activated carbon. During the operation period of Subproject 2, the main waste is the gases generally produced from the sewage treatment station and the fermentation waste residue storage yard. Employee domestic sewage, production wastewater and concentrated wastewater from the production process of deionized water. Subproject 3 will use refrigerant in cold storage system this could lead to release of emissions of GHG. The mitigation measures for the above impacts of the six subprojects are described below.

1. Impacts and Mitigation on Air Quality

248. The experiment of directly producing toxic and harmful gases in subproject 1 is required to be carried out in the fume hood. Activated carbon will be installed in the fume hood, and the toxic and harmful gases generated will be filtered and treated by activated carbon and then introduced into the shaft to the roof of the 46 m-high laboratory building. After the canteen oily wastewater is pretreated by the grease trap and discharged into the septic tank together with domestic sewage, it will be discharged into The Baise Municipal sewage treatment plant through the municipal sewage pipe network after reaching the level-III standard in the Comprehensive Sewage Discharge Standard (GB8978-1996).

249. Subproject 2 exhaust gas generated during its operation is mainly from the gases produced by sewage treatment station and fermentation waste residue storage yard. Seal the sewage treatment station with a cover. The fermented residues will be stored in a closed storage yard. Regularly spray deodorant and other measures. The odor concentration value meets the second-level new renovation and expansion standard in Table 1 of the "Emission Standard for Odor Pollutants" (GB14554-93).

250. No waste gas will be generated during the operation of subproject 3. However, this subproject will use refrigerant in cold storage system this could lead to release of emissions of GHG. The project team has analyzed the regulatory and market environment and drafted clauses in the EMP on permitted refrigerants, requiring the use of zero or low GWP refrigerant. The EMP will form part of the bidding documents. Bidders will submit bids on a design-build basis based on use of a conforming refrigerant and evaluation of bids will be made on a whole life cost basis.

251. Volatile components will be present in the laboratory (expanded pharmacy laboratory of Jiangshui water supply project) during the operational phase of subproject 4. A small amount of experimental waste gas will be generated during the experiment and a small amount of odor will be generated during the sludge storage process in the sludge drying tank. According to the EIA report content, by analogy with tap water purification and supply projects, discharge of pollutants with the unstructured for chlorine, hydrogen chloride and ozone concentration of the Nanning city Henan water transformation expansion phase of the project completion environmental protection acceptance monitoring report (hereinafter referred to as "henan water plant project"), a chlorine, hydrogen chloride concentration achieves the comprehensive atmospheric pollutant discharge standard "(GB16297-1996) table 2 new sources of atmospheric pollutants emission limits, ozone concentrations reach the odorous pollutants discharge standard" (GB14554-93) secondary standards in table 1. The site of the water treatment plant is relatively flat and wide, which is conducive to exhaust gas diffusion, and there is no residential area within 100 m of the surrounding area, and therefore the impact on the environment after diffusion is nominal. The lampblack produced by the project staff canteen can meet the emission concentration 2.0mg/m^3 standard requirements in the "Lampblack Emission Standard for Food and Beverage Industry" (GB18483-2001) after being treated with lampblack purifier.

252. During the operation of subproject 5, the main exhaust gas pollutants are catering oil fume. The project kitchen (staff canteen of China Vietnam cross border smart tourism center) must install oil fume purification facilities. After the cooking fumes reaches the standard, it can be discharged through the special flue of the canteen. The selected oil fume purification equipment should comply with "Technical Requirements and Testing Technical Specifications for Cooking Fume Purification Equipment in the Catering Industry" HJ/T62-2001 (Trial). The selected oil fume purification equipment should comply with "Technical Requirements and Testing Technical Specifications for Cooking Fume Purification Equipment in the Catering Industry" HJ/T62-2001 (Trial). The project road is not an urban road. There are no tunnels and service management facilities. The project vehicle exhaust mainly comes from various parking lots. Car exhaust emissions from garages have little impact on the indoor and surrounding environment. The sewage treatment station adopts underground integrated sewage treatment equipment. A green isolation belt will be set around. Irregular discharge will be absorbed by green belt plants. The project regularly sprays biological deodorant, which has little effect on the surrounding air.

253. Subproject 6 air pollution during operation is mainly from the automobile exhaust, restaurant kitchen oil fume, spare generator exhaust. The parking spaces of the project are all above-ground parking spaces, which are non-point source unorganized emissions. It is easy to dissipate in open air. Therefore, vehicle exhaust during the operation period of the project has little impact on the ambient air quality of the area along the route. Project restaurant kitchen fume exhaust gas will be collected by the gas hood and processed by the electrostatic oil fume removal device. It will be directed to the top of the Youyi Building from the special pipe for cooking fume and discharged. Implement oil fume collection and

treatment measures. The cooking fume emission of this project has little impact on the surrounding atmospheric environment. Diesel generator sets will be used as emergency power sources and have limited use frequency. The amount of pollutant emission is small, and the discharge of exhaust gas is intermittent. The impact on the surrounding environment is minor.

2. Impacts and Mitigation on Water Quality

254. The oily wastewater from canteen under subproject 1 will be pre-treated by use of the grease trap and discharged together with domestic sewage into the septic tank to meet the level-III standard in the Comprehensive Sewage Discharge Standard (GB8978-1996), and then will be discharged into Baise Municipal sewage treatment Plant through the municipal sewage pipe network. The laboratory of the construction project is a conventional laboratory. The water used in the chemical laboratory is mainly for the cleaning of glass instruments and the configuration of solution, while the water for the biological laboratory is mainly for the cleaning of personal hygiene and utensils. The laboratory wastewater will be separately collected in the collection pool outside the basement, with the size of 5mx5mx6m and the effective volume of 150 m^3. After acid-base neutralization, the pH value is within 6-9, and it will be discharged into Baise sewage treatment plant through municipal sewage pipe network.

255. Wastewater will be generated during the operation period of subproject 2. It will be mainly the domestic sewage, production wastewater and deionized water production process of the concentrated wastewater. Domestic sewage, after being treated in a septic tank, can meet the "Water Quality Standard for Sewage Discharged into Urban Sewers" (GB/T 31962-2015). The sewage in Table 1 is discharged into the urban sewer water quality: B grade standard, and then discharged into the municipal sewage pipe network. The amount of waste water produced from washing vegetables and fruits is approx. 131200m3/a. After filtering and sedimentation it contain a small amount of sediment, and can be directly discharged into the municipal sewage pipe network. Fruit deep processing equipment, cleaning wastewater enters the factory sewage treatment station for treatment. The biochemical treatment process is mainly based on "anaerobic twelve-stage contact oxidation". After the treatment reaches the standard, it will be discharged into the municipal sewage pipe network.

256. Subproject 3 domestic sewage will be treated by a tertiary septic tank to meet the water quality requirements of the Chongzuo City Setan Wastewater Treatment Plant. Through the sewage pipe network of the park, it will enter the Laituan sewage treatment plant for treatment. It reaches the first level A standard of the "Emission Standard of Pollutants for Urban Sewage Treatment Plants" (GB18918-2002) and will be discharged into Zuojiang.

257. The backwash wastewater from subproject 4 tank will be recovered and treated in a reuse sedimentation tank for the production process. Sludge discharge water from the sedimentation tank will be discharged into the sludge regulating tank and then into the sludge dewatering room for dehydration. This will ensure that the supernatant fluid of pollutants concentration reaches the GB5084-2005 "the irrigation water quality standard" dry standard. Therefore, recycled water can be directed to the dry land. Near the location of water treatment plant is primarily eucalyptus forest and dry land. According to the project EIA report, office sewage after septic tank treatment, the concentration of the pollutants can reach GB5084-2005, dry standard farmland irrigation water quality standard, therefore, can be applied directly to the surrounding dry land.

258. Subproject 4 bypasses protection area of drinking water resource. The main influence will be during operation period and is the environmental risk of the transport of dangerous goods in the road section of the water source protection area. This the impact of environmental risks of dangerous goods transportation on water source protection areas will be reduced by setting drainage ditches and accident emergency pools.

259. The road runoff from the road during the operation period of subproject 5 will be discharged into the storm water network. Through the municipal rainwater pipe network in the area, it will be finally discharged into the nearby surface water. The catering wastewater and domestic sewage of tourists and staff are treated in a tertiary septic tank to meet the third-level standard of "Integrated Wastewater Discharge Standard" (GB8978-1996).

260. The wastewater generated during the operation period of subproject 6 is mainly restaurant oily wastewater and domestic sewage. The oily waste in the restaurant will be pretreated by the grease trap and discharged into the septic tank. It will be pretreated together with domestic sewage and discharged into the sewage pipe network of the cooperation zone and then to enter the regional sewage plant for further advanced treatment.

3. **Acoustic impact and mitigation analysis**

261. The main environmental noise pollution sources of subproject 1 are traffic noise, equipment noise, and teaching activity noise. After taking measures, it will have little impact on the surrounding environment

262. The noise from subproject 2 is mainly the noise generated by the operation of the equipment, and the noise source strength is 80~120dB(A). After measures such as plant sound insulation, equipment shock absorption, and distance attenuation. It has reached Class 2 standards in the "Environmental Noise Emission Standards at the Boundary of Industrial Enterprises" (GB12348-2008).

263. No noise is generated during the operation of subproject 3.

264. Subproject 4 road works during the operation period mainly include traffic noise from passing vehicles. After distance attenuation, barriers, original window sound insulation and noise reduction, greening and noise reduction measures, etc., the noise emission can reach the standard. The noise of the water supply and drainage expansion subproject is mainly the running noise of water pumps. After taking measures, the impact on the surrounding environment will be minor.

265. The noise sources of subproject 5 during the operation period mainly include three aspects. First, the supporting public facilities in the area, such as noise from water pumps, generators, and fans; second, the noise generated from social activities by tourists and staff; and traffic noise. The equipment room will be fully enclosed. The inner wall and ceiling will adopt sound insulation building. The generator will be fitted with unit silencer and machine room sound insulation. The base will be provided with rubber vibration isolator. An elastic bellows will be installed at the junction of the exhaust pipe and the exhaust port of the diesel engine, and a silencer pipe will be added. Noise absorbing materials will be installed at the flue outlet of the roof. The exhaust port of the fan will be equipped with silencing material. There will be no significant impact on the surrounding environmental noise. The use of high-noise equipment (such as audio, etc.) will be prohibited. The noise at the boundary of the project can meet the category 2 limit requirements of the "Emission Standard for Noise in

Social Living Environment" (GB22337-2008). It has little impact on the surrounding acoustic environment. According to the EIA report, it is predicted that all sensitive points along the project can meet the corresponding standard requirements in the "Acoustic Environmental Quality Standard" (GB3096-2008). The road traffic noise from the project has less impact on the existing sensitive points of residents along the route.

266. The main environmental noise pollution sources during the operation period of subproject 6 are motor vehicles and standby generators. After taking measures, it will have little impact on the surrounding environment.

4. Impacts and Mitigation on Solid Waste

267. Subproject 1 hazardous waste shall be cleaned and transported by qualified units, household garbage shall be cleaned and transported uniformly by the sanitation department, and kitchen waste shall be consigned to the recycling company for recycling and disposal.

268. Subproject 2 generates solid waste during the operation period will be mainly produced by the fruit and vegetable sorting center: leftovers, peels, remaining materials after fermentation of the pit, sewage treatment station sludge, and domestic garbage. After reasonable disposal, the impact on the surrounding environment is minor.

269. No solid waste will be generated during the operation of subproject 3.

270. Subproject 4 solid waste during the operation of road network works is mainly generated from the cargoes scattered by transport vehicles, the cargoes scattered by traffic accident vehicles and the cargoes discarded by passengers. After project completion works will be mainly maintenance of the entire road by the municipal environmental sanitation department and the urban greening department. The maintenance will be carried out on the road at the same time, also for the garbage collection, cleaning, centralized processing along the road, the sediment generated from water treatment plant will be transported to the general industrial solid waste landfill places, the transportation of sludge should be entrusted to a specialized company, the laboratory waste should be entrusted to the qualified unit. Household garbage should be cleared, transported and treated uniformly by the sanitation department.

271. Subproject 5 solid waste mainly comes from domestic waste generated by staff and tourists in the area, waste motor oil generated in the motorcycle track maintenance room, and medical waste generated in the medical rescue center/first-aid station. Domestic garbage will be collected by management personnel. Other measures such as entrust an environmental sanitation professional unit; timely clear and transport to municipal solid waste landfill for safe disposal; waste engine oil and medical waste generated by medical rescue centers are regularly entrusted to qualified units; and unified foreign transportation processing arrangement.

272. Subproject 6 solid waste will be mainly domestic garbage, kitchen waste, waste grease and waste packaging. Domestic garbage and waste packaging materials shall be collected and processed by the sanitation department after being collected. The kitchen waste and waste oil are entrusted to a specialized company for recycling

273. The following mitigation measures for subproject 1 and 4 have been identified in the Environmental Management Plan i.e. chemical or other hazardous wastes generated under subproject 1 and 4 shall be collected and disposed of by a selected qualified company.

5. Environmental risk and mitigation analysis

274. Subprojects 1 and 4 involve environmental risk substances and are mostly experimental reagents, which shall be properly placed in the explosion proof cabinet according to their chemical characteristics. The experiments shall be carried out in accordance with the specification requirements, and the experimental wastes shall be disposed of by qualified units according to the requirements.

275. The main environmental risks of subproject 3 are leakage and pipe bursting in the sewage pipe network. Choose a drainage pipe with sufficient strength, corrosion resistance, and good impermeable quality can minimize these risks. The staff strictly implement the equipment maintenance system established by the company. Regularly checking of the pipe network for damage and blockage. Whether each pool body is damaged or broken. Develop equipment maintenance plans, quantify management, and promptly repair equipment failures. Groundwater monitoring wells should be set up downstream of the plant area. And regularly monitor in accordance with the monitoring plan. If there is a significant change in water quality, the reasons should be analyzed, and all sewage treatment facilities should be investigated. Ensure that the facilities are in good condition to prevent accidental leakage.

276. Subproject 4 traverses the drinking water source protection area. The impact of the operation period of this project on the drinking water source protection area of Nanuo, Xinhe Town is mainly the environmental risk of the transport of dangerous goods along the road section located within the water source protection area. In order to reduce environmental risks, in the EIA report of the project it is proposed that anti-corrosion and anti-seepage concrete drainage ditches should be set on both sides of the road section in the land area of water source. The drainage ditch will be collecting the road runoff and discharge it into the accident emergency pool along the route, the bridge and culvert section in the water area of the water source protection area sets up the anti-collision parapet, and the warning board is set up on both sides of the boundary section within the scope of the water source protection area.

277. Subprojects 2, 5, and 6 do not involve environmental risks.

6. Vibration impacts

278. Only some buildings of subproject 1 have basements. During the construction period, equipment such as pile driver that will produce vibration effects will be used. The teachers and students in the school will be mainly affected from the vibrations. After taking the following corresponding sound insulation and vibration reduction measures, the impact on the surrounding environment will be reduced: (1) Pile driving and other construction technologies are carried out in non class hours; and (2) Select the equipment with weak vibration and take vibration reduction measures. There are no impacts anticipated on the nearby buildings.

E. CUMULATIVE IMPACTS

279. Other projects in the vicinity, particularly the simultaneous construction of other buildings or infrastructure during the construction period of the six sub-projects, will have a cumulative impact. There is no information to indicate that the construction activities of other projects during the construction period of the six sub-projects overlapped with them.

280. Construction related cumulative impacts would be effectively minimized by adopting proper mitigation measures, including: (i) coordination between all project components and other projects in the area of influence in terms of construction schedule, possible access road and borrow/disposal sites and spoil sharing; (ii) contractors will develop material transport plan with consultation of local road management authority and local community; (iii) enforcement of good construction management to minimize dust, noise and waste generation; (iv) education of construction workers to minimize social disturbance and cultural conflict; (vi) provision of temporary access to local traffic to minimize construction traffic interruption; (vii) proper maintenance of the access roads and timely restoration/strengthening upon completion. With effective implementation of good construction management measures, these common construction-related cumulative impacts can be adequately mitigated to acceptable levels.

F. INDIRECT AND INDUCED IMPACTS

281. Tranche 3 subprojects would induce growth in cross-border trade with Viet Nam, Thailand and other ASEAN countries. This could induce transboundary and cross border environmental issues such as an increase in wildlife trafficking, human trafficking, import and export of agricultural produces with pesticides, and health and safety from increased dust and emission due to increase in traffic on both sides of the border.

282. Wildlife Trafficking. This issue has been addressed in the wildlife trafficking assessment (carried out as part of Tranche 1 preparation). The study was undertaken by the Wildlife Conservation Society aimed at an assessment of potential illegal wildlife trafficking and trade in border areas in the areas covered by the investment program. Wildlife enforcement data, consultations and site visits indicate shows that Guangxi is a major wildlife trafficking trade center between Viet Nam and PRC. Key animals and their products include ivory, reptiles and turtles. Pingxiang is the main trade center for hard wood, such as rosewood. Many CITES appendix II species were found in the market without CITES permits.

283. The study identifies that the government agencies with a role in wildlife trade management include Customs, the State Forestry Administration, the Bureau of Fisheries (under the Ministry of Agriculture), the Ministry of Commerce, the Administration of Industry and Commerce, and Ministry of Police, and suggests that these agencies need to work together in an integrated role and emphasizes the need to strengthen the wildlife enforcement capacities of these agencies in these cities and also in the region. As recommended in the study budgetary provision of USD 30,000 has been kept under tranche 3 towards training and capacity building on law enforcement towards wildlife trafficking.

284. Human Trafficking. Data collected as part of socio-economic studies for the project indicated that Baise and Chongzuo regions facing human trafficking issues across border. Table 30 present the human trafficking data from project counties/districts. It can be seen from the table that there is trafficking of both domestic population as well as Vietnamese women.

Table 30: Human Trafficking of Project Counties/Districts (2015-2020)

	Baise	Chongzuo	Fangchenggang	Total

1.Whether there are cases of abduction and trafficking of domestic population (yes or no)	Yes	Yes	No	/
If yes, how many cases	21	15	0	36
Trafficked persons	25	15	0	40
Including women	9	9	0	18
kids	16	5	0	21
mentally retarded people	0	1	0	1
2.Whether there are cases of abduction and trafficking of Viet Nam women (yes or no)	Yes	Yes	No	/
If yes, how many cases	7	10	0	17
Trafficked women	14	10	0	24
3.Instituties involved in crack downing the trafficking	The Policy Bureau set up a Special Action Group to crack down on abduction, and the Criminal Investigation Detachment set up a "cracking down on abduction and trafficking in women and children" are in charge of the special action against the crime of abducting and trafficking in women and children within the jurisdiction of the whole city within the jurisdiction of the whole city of Baise, Chongzuo and Fangchenggang. At the same time a joint meeting system of Chongzuo anti abduction operation was established.			
Policy and regulations issued	《China's action plan against human trafficking (2013-2020)；《Implementation rules for implementation of China's action plan against human trafficking (2013-2020) in Baise City, Chongzuo City and Fangchenggang City；《Rescue mechanism for abducted women and children in Baise City, Chongzuo City and Fangchenggang City》			
Complaint Telephone	110/0776-2837833	110/0771-7835900	110/0770-2820751	/

285. Despite the institutional and policy/regulatory measures are in place the human trafficking is still reported in the project locations of Baise and Chongzuo. The implementation of subprojects may further induce human trafficking. The issue has been discussed in detail and measures such as human trafficking awareness campaigns and training are included in the social management plan (as part of resettlement plan).

286. **Import of Agriculture Products**: Subproject 3 includes construction of a facility to handle imports of agriculture imports including fruits and vegetables from ASEAN countries mainly Viet Nam. The development of extensive cultivation has generated a larger quantity of agricultural commodities and helped to improve the living standards of farmers. However, it has also had negative effects on the environment. Chemicals/fertilizers used in agriculture such as insecticides, inorganic fertilizers, which boost productivity of crops, consist of inorganic fertilizers and weed killers. Such inappropriate use of chemicals has already

polluted and will continue to pollute, doing harm to people and even damaging the agricultural products. They may kill useful creatures, poison people, pollute soil and water, and leave toxic chemicals in the products.

287. The project will have strict procedure and guidelines for agriculture product management including quarantine in compliance with international treaties and protocols. The project will control import of agriculture goods (with illegal fertilizers or not registered fertilizers for China side) and products prohibited/listed by international bodies for cross border transport such as the Food and Agriculture Organization and the World Health Organization, under the Basel Convention, and the Montreal Protocol. With these measures the induced impacts of these import will be insignificant.

288. **Increased cross border traffic**. Subprojects will lead to increase in cross border traffic both side of the border i.e. PRC as well as Viet Nam. Induced environmental impacts of cross border movement of vehicles include health and safety from pollutant emission mainly dust and gaseous emission. The exact data on the increase in traffic due to the project is not available however it is anticipated that the enforcement of existing emission norms the induced impacts from increased traffic will be insignificant.

289. The project would also induce increase in industrial activities from improved transport infrastructure in the Chongzuo BECZ and the China-Thailand Chongzuo Industrial Park. As described earlier, all industrial enterprises to be established in these industrial parks would have to go through the domestic environmental impact assessment process, which would provide a safeguard system against potential increases in pollution from induced increasing industrial activities.

VI. ANALYSIS OF ALTERNATIVES

A. NO PROJECT ALTERNATIVE

290. Tranche 3 subprojects are designed to improve regional cooperation and integration opportunities in border areas in Guangxi linking PRC and Viet Nam. Without the project, these border areas will continue to have difficulties in attracting investments for SMEs due to lack of infrastructure and services in the border economic zones, lack of new technologies such as e- commerce for accessing markets at and beyond the borders, inefficient cross-border financial transactions and settlement, and inability in customs inspection and clearance to handle the fast-growing cross-border trade. Without the support of the project, the development of the border areas of Guangxi will be greatly affected

B. ALTERNATIVES CONSIDERED

291. The buildings and facilities of the six subprojects are limited to the border areas. Subproject 1 is located within the existing campus. Subproject 3 is in the existing industrial park. Subprojects 2 and 6 are in areas planned for specific purposes. The alternative project sites that can be considered for these subprojects are limited. The project feasibility study report recommends that different buildings use different light intensity, different types of lighting equipment and toilet facilities, to save energy and water resources. The above factors should be considered in the detailed design stage. Subprojects 4 and 5 involve road network engineering, road routing, pavement structure, bridge structure, etc. Different options were compared for each aspect of road design and construction. The different water purification processes of the water supply project expansion project of subproject 2 were compared and selected.

292. **Alternative to Cooling System for Cold Storage Refrigerant:** Subproject 3 includes construction of a commercial cold storage facility which will use a refrigerant or refrigerants. The Project team analyzed different cooling systems and refrigerants for this subproject. Permitted refrigerants for commercial cold storage facilities include natural refrigerants - hydrocarbons (HCs), ammonia (NH3) and carbon dioxide (CO2), and lower GWP hydrofluorocarbons (HFCs).

293. Previous generations of refrigerants such as CFCs, HCFCs, and HFCs were non-flammable. The replacement natural refrigerants and lower GWP HFCs do have some potential safety hazards due to their flammability or toxicity. A comparison of some of the advantages and risks of common zero or low GWP refrigerants is presented below in Table 31.

Table 31: Cooling System Alternative Analysis

Coolant	Advantages	Risks
Ammonia- NH3	• Relatively low price • Cooling capacity high • Technology barrier low • Heat expulsion capacity high • Compressor size relatively small • Ozone depletion potential is zero • GHG emissions relatively low • Stringent local regulations	• Flammable • Toxic to humans
Carbon Dioxide- CO2	• Non-toxic • Non-flammable • Ozone depletion potential is zero • GHG emissions relatively low • Stable and safe • Does not produce dangerous gas at high temperatures	• Relatively high price • High pressure operations • New technology, high requirements • Cannot use a cascading system at super-high pressure
R290 (Propane)	• Dominant for commercial refrigeration appliances • Energy efficiency	• Flammable
R600a (Isobutane)	• Dominant for domestic fridge freezers • Energy efficiency	• Flammable
Blends	• Increased energy efficiency	• (Flammable)

294. Whilst the Project team examined and discussed options with the project owner, given the specialist nature of cold storage systems and the interrelation between construction cost, efficiency, safety, and lifetime cost, the project owner's preference is to use a design-build approach to the facility. According to the FSR of the Subproject 3, the refrigerant being proposed for refrigeration process is carbon dioxide (CO_2), so the same will be specified in the bidding document. Bidders will be required to show life cycle costs for the proposed solution including initial costs such as construction costs, safety features, staff training,

together with recurrent cost based on the efficiency of the proposed system and maintenance costs.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. LEGISLATIVE FRAMEWORK FOR CONSULTATION, PARTICIPATION AND INFORMATION DISCLOSURE

295. Meaningful participation and consultation during project planning, feasibility study, design and implementation is an important environment safeguards requirement. It can directly reflect the public's perceptions of environmental quality in the project's area of influence. Public participation and environmental information disclosure provisions are among the most significant changes introduced in the amended Environmental Protection Law (2014). The legislative framework also includes decrees on the preparation of EIA summaries for the purpose of public disclosure (see Table 2, item #25), information disclosure on construction project EIAs by government (Table 2, item #29), measures for public participation in environmental protection (Table 2, item #31), and technical guidelines (for comment) for public participation in EIAs (Table 2, item #57).

296. ADB Safeguard Policy Statement (2009) requires meaningful participation, consultation and information disclosure. ADB Public Communications Policy: Disclosure and Exchange of Information (2011) requires that the borrower shall provide safeguard information to affected people in a timely manner, in an accessible place, and in a form and language(s) understandable to them.

B. INFORMATION DISCLOSURE

297. Information disclosure on the six subprojects was conducted during public consultation for these subprojects. Information disclosed include the scope of these subprojects, potential environmental impacts and mitigation measures during construction and operation. ADB's environmental safeguard requirements with emphasis on the implementation of EMP and GRM during subproject implementation. The project environmental information will also be disclosed by ADB as follows: (i) this IEE is available at www.adb.org; (ii) copies of the domestic EIRs and EITs (in Chinese) for the subprojects are available on request from the GPMO; and, (iii) environment progress will be reported in the quarterly project progress reports and the semi-annual environmental monitoring reports (both internal and external monitoring reports) which will be disclosed on ADB's project website (www.adb.org).

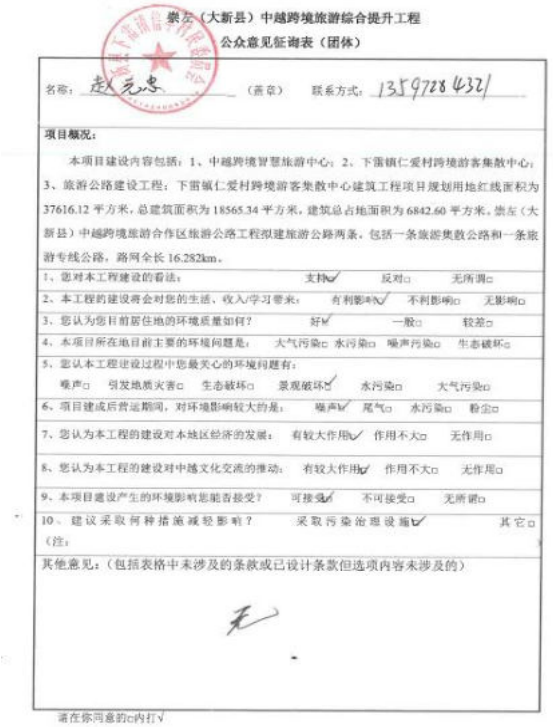
C. CONSULTATION AND PARTICIPATION IN THE PROJECT PREPARATION PERIOD

298. Public consultations for the tranche 3 subprojects were conducted as part of domestic EIA preparation. Public consultations were also conducted by the TRTA environmental team. Due considerations were given to COVID 19 safety aspects during the consultation process. Tools such as public participation questionnaire surveys and forum/group discussions were conducted as part of consultation process.

299. As part of IEE preparation the public participation ensured mainly through using questionnaire survey and forum discussion. The target participants are the public (formers, residents, local people/organization) and unit groups that may be affected by the

construction of each subproject. To make the affected public fully understand the project situation, in addition to introducing the project to the public on site, the questionnaire also introduces the subproject. Sample questionnaire used in presented in Figure below.

Figure 40. Sample questionnaire on public participation



崇左（大新县）中越跨境旅游综合提升工程

公众意见征询表（团体）

名称：赵元忠 （盖章） 联系方式：13597284321

项目概况：

本项目建设内容包括：1、中越跨境智慧旅游中心；2、下雷镇仁爱村跨境游客集散中心；3、旅游公路建设工程；下雷镇仁爱村跨境游客集散中心建筑工程项目规划用地红线面积为37616.12平方米，总建筑面积为18565.34平方米，建筑总占地面积为6842.60平方米。崇左（大新县）中越跨境旅游合作区旅游公路工程拟建旅游公路两条，包括一条旅游集散公路和一条旅游专线公路，路网全长16.282km。

1、您对本工程建设的看法：	支持√ 反对□ 无所谓□
2、本工程的建设将会对您的生活、收入/学习带来：	有利影响√ 不利影响□ 无影响□
3、您认为您目前居住地的环境质量如何？	好√ 一般□ 较差□
4、本项目所在地目前主要的环境问题是：	大气污染□ 水污染□ 噪声污染□ 生态破坏□
5、您认本工程建设过程中您最关心的环境问题有：	噪声□ 引发地质灾害□ 生态破坏□ 景观破坏√ 水污染□ 大气污染□
6、项目建成后营运期间，对环境影响较大的是：	噪声√ 尾气□ 水污染□ 粉尘□
7、您认为本工程的建设对本地区经济的发展：	有较大作用√ 作用不大□ 无作用□
8、您认为本工程的建设对中越文化交流的推动：	有较大作用√ 作用不大□ 无作用□
9、本项目建设产生的环境影响您能否接受？	可接受√ 不可接受□ 无所谓□
10、建议采取何种措施减轻影响？	采取污染治理设施√ 其它□

（注：

其他意见：（包括表格中未涉及的条款或已设计条款但选项内容未涉及的）

请在你同意的□内打√

中国-东盟（防城）经贸文化交流促进中心

公众意见征询表（个人）

姓名：卢新艳 性别：女 年龄：34 文化程度：初中 职业：务农

联系方式：13558201842 居住地：防城港市那良镇滩散村[illegible]93号

项目概况：

本项目建设场址位于广西防城边境经济合作区内，项目总用地 104184 平方米（约 156 亩），总建筑面积约 84000 平方米，主要建设综合服务大楼、会展中心、友谊大厦、跨境金融结算中心、跨境电商物流运转中心、东盟特色商品跨境体验店、检疫检验站以及露天停车场、供排水工程、道路工程、绿化工程等配套基础设施。一、TS-B2-11 地块部分区域 规划用地约 34389 ㎡；二、TS-B2-04 地块 规划用地约 69794 ㎡

1、您对本工程建设的看法：	支持□✓ 反对□ 无所谓□
2、本工程的建设将会对您的生活、收入/学习带来：	有利影响□✓ 不利影响□ 无影响□
3、您认为您目前居住地的环境质量如何？	好□✓ 一般□ 较差□
4、本项目所在地目前主要的环境问题是：	大气污染□✓ 水污染□ 噪声污染□ 生态破坏□
5、您认本工程建设过程中您最关心的环境问题有：噪声□ 引发地质灾害□ 生态破坏□ 景观破坏□	水污染□✓ 大气污染□
6、项目建成后营运期间，对环境影响较大的是：	噪声□ 臭气□✓ 水污染□ 粉尘□
7、您认为本工程的建设对本地区经济的发展：	有较大作用□✓ 作用不大□ 无作用□
8、您认为本工程的建设对中越文化交流的推动：	有较大作用□✓ 作用不大□ 无作用□
9、本项目建设产生的环境影响您能否接受？	可接受□✓ 不可接受□ 无所谓□
10、建议采取何种措施减轻影响？（注：	采取污染治理设施□✓ 其它□

其他意见：（包括表格中未涉及的条款或已设计条款但选项内容未涉及的）

无

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300. Consultations were carried out for all subprojects. A total of 18 groups and 352 individuals (186 male and 166 female) participated and provided their feedback on the project.

Table 32:Community consultation details

SP	Questionnaires Received		Participants			Number by Age Range (%)			Education Level (% by level)				Community consultation time
	Group	Indi-vidual	Male	Female	Female (%)	18-40	41-50	>=51	Junior High or below	High school	College	University	
SP1		60	27	33	55.0	(18-45) 93%	(45-60) 7%		Unspecified				August - September 2020
SP2	10	61	38	23	37.7	47.5	47.5	4.9	72	20	7	1	
SP3		102	49	53	52.0	31.5	51.9	16.6	84.5	13.7	0.9	0.9	September - October 2020
SP4		44	27	17	38.6	57	25	18	59	20	10	1	August - September 2020
SP5	5	24	13	11	45.8	79.1	12.5	8.3	8.3	37.5	8.3	45.8	September - October 2020
SP6	3	61	32	29	47.5	46.7	27.8	26.7	96.7	1.6	1.7	-	September - October 2020
Total	**18**	**352**	**186**	**166**	**47.2%**								

301. The findings are summarized in following sections together with photographs.

1. Subproject 1

302. Public opinions were sought through forum and public participation questionnaire survey. The consultations were attended by officers of government offices, investment section staff, staff, social section cadres, clerks, students, teachers, cadres, enterprises, engineers, and nearby residents. Those surveyed included the residents of Youjiang District, teachers and students of Baise College.

303. **Project understanding and consent.** In terms of the understanding of the project, only participants from the department have some understanding of the concept of the training center, while most of them are not very clear about the concept of the training center. During the meeting, project team explained the concept of the training center by way of explanation and pictures. In terms of the impact the construction of this project will have on their life and income, 98% of the respondents support the construction of this project, 83% believed that the construction of the project would bring them employment opportunities and increase their income, while 13% believed that the construction would have no impact on their income. In terms of the environmental quality of their current residence, 30% of the respondents said it was good and 70% said average.

304. In terms of the current environmental problems in the project area, 30% of the people believe it was air pollution, 5% thought it was water pollution, 57% thought it was noise pollution and 8% thought it was ecological damage. Most people were concerned about environmental issues during construction, 42% about noise pollution and believe that noise will impact their lives, 10% worried about the destruction of the ecological, 5% worried about the destruction of the landscape, 15% worried about their drinking water source quality, 32%

were concerned about air pollution; regarding ongoing impacts during operation (after construction) 32% thought noise, 30% exhaust gas, 30% water pollution and 8% dust would have a greater impact on the environment.

305. 100% of people believe that the construction of this project will play a greater role in the economic development of the region. The construction process of this project can promote local employment, and the project will play a positive role in the local culture after completion. 100% of people believe that the construction of this project will promote the cultural exchange between China and Viet Nam. Of respondents, 97% were accepting for environmental problems arising at the site of the project; 100% of the workers hope that pollution control measures will be taken, that the construction unit will strictly observe environmental mitigation measures, control the impact of dust, noise and solid waste on the residential area, and take measures to restore the ecological environment.

306. **Respondent suggestions and requirements for environmental protection**. In terms of pollution control, measures should be taken to control the pollution of water, air, noise and solid waste, so as to reduce the damage to the original ecological environment. Environmentally friendly materials should be used and garbage should be classified and collected. Afforestation aspect, the proposal strengthens circumjacent afforestation.

307. The main concerns are the impacts of the project on the level of cultural exchange, the impact on residents' income, and pollution control. Overall, the environmental awareness of the public regarding the project has been greatly improved.

2. Subproject 2

308. Public opinions were sought through forum and public participation questionnaire survey. The public consultation was attended by officers of government agencies, investment department staff, staff, social science cadres, clerks, students, teachers, cadres, enterprises, engineers, and nearby residents.

309. **Project understanding and consent**. 10 questionnaires from groups show that they all support the construction of this project. It is believed that the construction of this project will have a beneficial impact on life of the people. Most groups think that the current living environment is good. Eight groups believe that the main environmental problem is noise pollution, one group air pollution, and one group thinks it is ecological damage. The most concerned environmental issues are during construction with 6 groups choosing noise, 2 groups water pollution, and 1 group ecological destruction as the reasons for concern. After the completion of the project, aspects that have a greater impact on the environment during the operation period was exhaust gas by all 10 groups. All groups believe that the construction of this project will have a greater impact on the economic development of the region. The environmental impact of this project can be accepted. Seven (7) groups put forward suggestions that the project should build a sewage treatment station.

310. From the 61 individual questionnaires all support the construction of this project. It is believed that the construction of this project will have a beneficial impact on life of the people. Most people think that the current living environment is good, 67% of people believe that the main environmental problem is noise pollution, 23% think air pollution and 10% think ecological damage. For environmental issues during the construction 54% chose noise as the main issue, 29% chose water pollution, and 17% chose ecological destruction. On aspects that have a greater impact on the environment during the operation period after the

project is completed, 54% thought exhaust gas, 32% ecological damage, 10% air pollution, and 4% water pollution. All believe that the construction of this project has a greater impact on the economic development of the region. The environmental impact of this project can be accepted. Three groups made suggestions that the project should build a sewage treatment station.

311. **Respondent suggestions and requirements for environmental protection.** In terms of pollution control, it is recommended to take measures to control mainly the construction of sewage treatment stations. Reduce damage to the surrounding water environment. The people and groups around the project support the construction of the project.

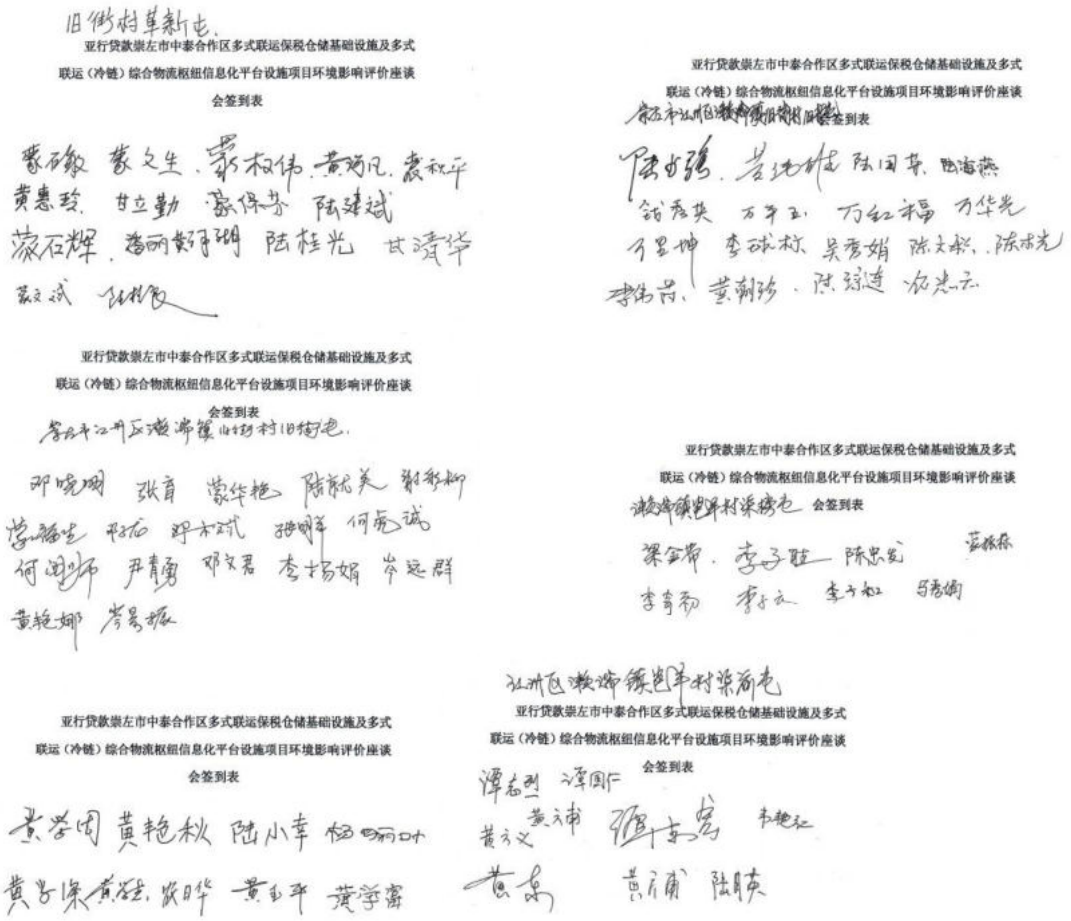
3. Subproject 3

312. **Public opinions were sought** through the forum and public participation questionnaire survey, feedback and answers to the public's questions. The public consultation was attended by farmers who will be most affected. The main respondents were from: Gexin Village, Jiucun Village in Jiujie Village, Qubang Town and Quqian Village in Bayang Village, Laituan Town.

313. **Project understanding and consent.** Of the surveyed persons, 50.9% learned about this project through this survey, 43.1% through other channels, and 6% through TV networks. For concerns 40.1% are worried that the project will increase local environmental pollution, 51.9% were not worried, and 8% undecided. For main environmental issues, 43% made multiple choices, and 57% single choices. The single-choice concerns were mainly noise pollution (36%) with the remainder being ecological damage and solid waste pollution. Of the 43% with multiple candidates, most choose noise pollution and ecological damage. Regarding adverse construction impacts 59% were concerned with living environment, 24% with economic losses, 15% with\ environmental hazards, and 2% undecided. Regarding impact on regional economic and social development, 36.2% of people think it is to promote employment, 36.2% that it is good for economic development, and 25.4% undecided. Among the respondents, 89 people supported the construction of this project, and 13 people raised concerns over the construction of this project, with the reasons being (i) dissatisfied with the standard amount of compensation for land acquisition; and (ii) too few plots are not conducive to long-term livelihood in the future. The concern PIE is following up with these concerns.

314. **Respondent suggestions and requirements for environmental protection**. The main impact of project implementation of concern is noise pollution, followed by ecological damage and solid waste pollution each of which requires strengthening of pollution control measures. Respondents were supportive towards the construction of this project but there are a small number (13) who raised concerns about this project. It is believed that the local government needs to do a better job.

Figure 41: Forum signature form of subproject 3



4. **Subproject 4**

315. Public opinions were sought through forum and public participation questionnaire survey, and from feedback and answers to the public's questions. The main participants of public participation are workers, self-employed, teachers, farmers, etc. The respondents were mainly from Xinhe Street, Xinhe Community, and Overseas Chinese Farm.

316. **Statistics related to the project.** Of respondents, 52% learned about the project through this survey, others through local media or other means. Of respondents 41% are satisfied with the current traffic conditions, 8.6% think that the current traffic is very congested, and 20.4% think conditions are very bad. Regarding the current major local environmental problems, 59% made a single selection, and 41% made multiple choices. For single selections, 27% thought that there was no environmental problem, and 25% thought dust the major issue. Among the multiple choice group, most people choose dust and noise. Among the environmental impacts on the construction of this project, 34% chose none, and the others have single choice or multiple choice. Through comprehensive comparative analysis, the most affected was by noise (45.2%) of the total number of people. For measures to reduce the environmental impact during the construction period, most people chose multiple options. Among them, the measures of "adopting advanced construction technology", "sprinkling roads" and "setting up fences" are the most selected

(67%). Among the impacts on the environment after the completion of the project, 70.4% think that there is no impact. Secondly, noise affects the most people (15.7%). In the investigation of environmental protection measures during the operation period of the proposed project, 76% of the people made multiple choices, among which “strengthening road traffic management” and “strengthening maintenance management” were the most frequent. Most people (59%) believe that normal life/production will not be affected by the construction/operation of this project while 41% think the impact is small. 79.5% of people think the construction of this project has a great effect on promoting regional development and traffic improvement; 20.5% of people think it has an improvement effect, but it is very small. 93% of people agree with the construction of this project, and 7% think it doesn’t matter. 100% of people support the construction of this project.

317. **Respondent suggestions and requirements for environmental protection.** During construction, measures such as road watering, reasonable arrangement of construction time, and advanced construction techniques to reduce pollution are required. During operation, it is necessary to strengthen maintenance management, road traffic management, increase greening, road watering, planning control, and reduce dust, noise and other pollution.

5. Subproject 5

318. Public opinions were sought through forum and public participation questionnaire survey. The main participants of the public participation are affected farmers, nearby public servants and related organizations.

319. **Statistics related to the project.** The questionnaires from 5 groups showed that they all support the construction of this project and project will have a beneficial impact on life and the current living environment. Two (2) groups believe that the main environmental problem is water pollution, 2 groups said air pollution, and one group said ecological damage. For the environmental issues that are most concerned during the construction of this project, two groups chose ecological damage, one group chose noise, one group chose landscape damage, and one group chooses water pollution and causes geological disasters. Three groups agree that noise will be caused during the operation period after project completion, and one group chose exhaust gas and water pollution. They believed that the construction of this project has a greater impact on the economic development of the region, and the environmental impact of this project can be accepted. The 24 individual questionnaires showed that they all support the construction of this project. 83.3% of people think that the construction of this project will have a beneficial impact on their lives, 4.1% adverse impact, and 12.5% no impact. For current living environment 58.3% think it is good, and 41.7% fair. For main environmental problem 37.5% say water pollution, 29.1% ecological damage, 12.5% say air and water pollution, 8.3% think air pollution and noise pollution. 41.6% of the people who are most concerned about the environmental issues during the construction of this project choose ecological destruction, and 25% choose noise. Other people choose water pollution, air pollution or multiple choices accounted for 33.4% for aspects that have a greater impact on the environment after the project is completed. 50% think it is noise, 16.6% think it is ecological damage and 8.3% of people think it is caused by geological disasters, 16.6% of them think it is water pollution. 100% of people think that the construction of this project has a greater effect on the economic development of the region and can accept the environmental impact caused by this project. 91.6% recommend to take pollution control measures to reduce the impact and 8.4% say other measures.

320. **Respondent suggestions and requirements for environmental protection.** The main implementation concern is noise pollution, followed by ecological damage and water pollution and these areas require strengthening of pollution control measures. Five (5) groups and 24 individuals were supportive of the project.

6. Subproject 6

321. Public opinions were sought through forum and public participation questionnaire survey, feedback and answers to the public's questions. The consultation was attended by the farmers who are mainly affected around.

322. **Statistics related to the project**. All 3 group questionnaires show support for the construction of this project. It is believed that the construction of this project will have a beneficial impact on life of the people. They think the current living environment is good. One group believes that the main environmental problem is noise pollution, one group air pollution, and the other says ecological damage. For the most concerning environmental issues during construction, 2 groups chose noise and 2 chose water pollution. Regarding aspects that have a greater impact on the environment during the operation period, all groups agreed that it was exhaust gas, and all groups believed that the construction of this project has a greater impact on the economic development of the region. The environmental impact of this project can be accepted.

323. The 61 personal questionnaires received show that all support the construction of this project, and believe that the project will have a beneficial impact on life. Most people think that the current living environment is good. Regarding the main environmental problem 8.1% believe it is air pollution, 21.3% water pollution, 34.4% noise pollution, 34.4% ecological damage, and 1.6% of people choose more than one option, choosing water pollution and ecological damage. The most concerning environmental issues during the construction was ecological destruction for 32.7% of people, 19.6% for noise, 16.3% for water pollution, 13.1% landscape destruction, 13.1% geological disasters and 4.6% air pollution. The aspects that have a greater impact on the environment during the operation period of the project were exhaust gas (55.7% of people), 19.6% water pollution, 18% noise, and 6.5% dust. 100% of people believe that the construction of this project has a greater impact on the economic development of the region. The environmental impact of this project can be accepted.

324. **Respondent suggestions and requirements for environmental protection** The main impacts of project implementation concern are ecological damage, followed by noise and water pollution. In terms of strengthening pollution control measures, these are also the main aspects. All respondents held a supportive attitude for the project.

7. Summary of the public participation

325. Based on the summary of the above-mentioned public participation, the public are mainly concerned about the impact of the project on ecological protection, not only on pollution control. It can be seen that the overall environmental awareness of the domestic public has been greatly improved. After taking corresponding pollution control and ecological protection measures, the problems concerned by the public can be solved.

326. The public participation survey photos of each subproject are shown in the figure below. Project information was disclosed to the people through public notice displayed at subproject sites as well as published on PIEs website. The summary of the IEEs have been

disclosed in simplified forms within the communities. Photographs of public notice also shown in figures below.

Figure 42: The public participation survey photos of subproject 1

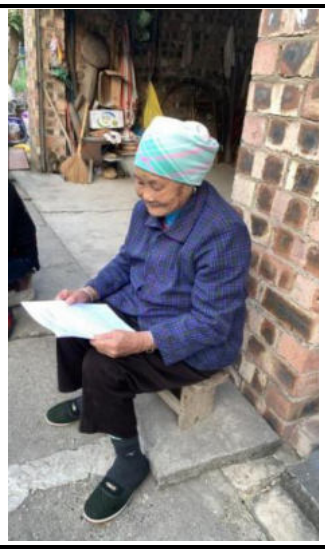


Figure 43: The public participation survey photos of subproject 2

Dingdong Village	Nadui Village

Bosaisewan Village	Donmoon Village

	
NampouVillage	Nam tuaiVillage
	
Pingmengxing Village	Tafa Village

Figure 44: The public participation survey photos of subproject 3

Figure 45: The public participation survey photos of subproject 4

Figure 46: The public participation survey photos of subproject 5

Figure 47: The public participation survey photos of subproject 6

327. Each sub project has also been publicized, including post publicity and website publicity. The public photos and screenshots are shown in the figure below.

Figure 48: Post public photos of subproject 1

Figure 49: Post public photos of subproject 2

Figure 50: Post public photos of subproject 3

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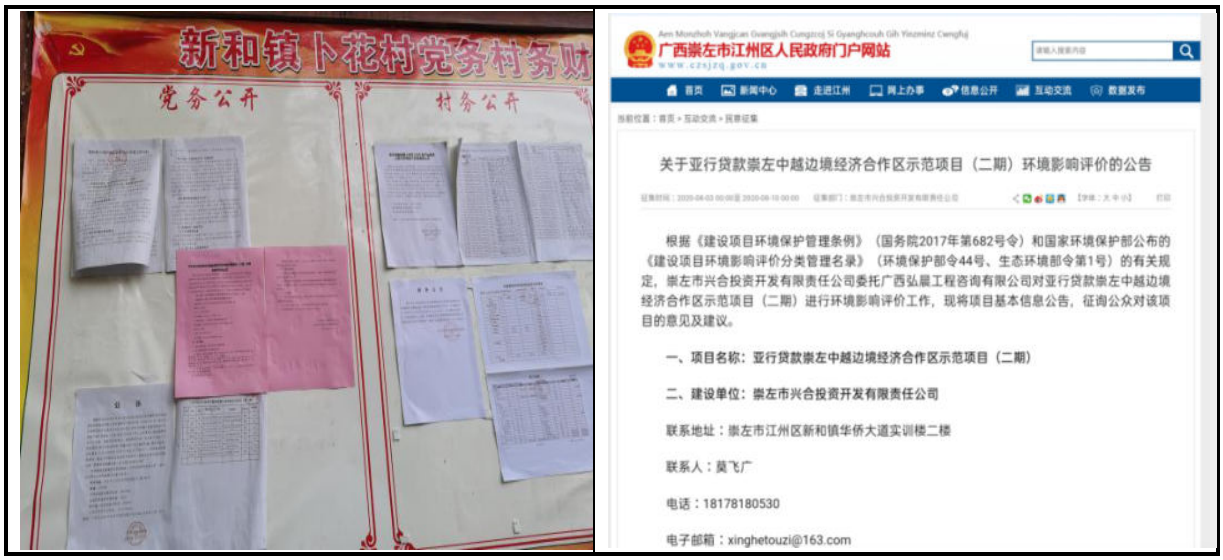
Figure 51: Post public photos and website screenshots of subproject 4



Source:（Public website：http://www.czsjzq.gov.cn/hdjllj/myzj/opinionDetail.shtml?opinionid=2049）

Figure 52: Website screenshots of subproject 5

Source: (Public website：http://www.daxin.gov.cn/xxgk/gstg/t7275152.shtml）

Figure 53: Post public photos of subproject 6

D. FUTURE PLANS FOR PUBLIC PARTICIPATION

328. Since some participants raised their concerns on construction programs and impacts, it is important to maintain a dialogue with the stakeholders throughout the construction stage. Continued public participation will facilitate such dialogue so that the stakeholders' concerns are understood and dealt with in a timely manner. Meaningful consultation to safeguard the environment and residents will continue before and throughout construction and operation phases consisting of information disclosure on project proponent and relevant government department web sites, posting of project information on community notice boards and discussion forums. The GPMO and the PIEs will be responsible for organizing the public consultations, with the support of the project management consultant (PMC) team. The contractors will be required to communicate and consult with the communities in the project area of influence, especially those near the subproject sites. Clearly visible public notice boards will be set at each work site to provide information on the purpose of the subproject activity, the duration of disturbance, the responsible entities on-site (contractors, PIEs), and the project level Grievance Redress Mechanism (GRM). Contact information of all GRM entry points and the GPMO complaint center hotline will be disclosed on the construction site information boards. Consultation will focus on public nuisances from construction and operation activities, such as noise, dust, traffic disturbance, as well as public concerns about the environment and resettlement.

329. Future consultation and participation will also include (i) involvement of affected people in discussion forums during inspection and monitoring of EMP implementation during construction and operation phases; (ii) participatory evaluation on the environmental and social-economic benefits and impacts in these forums; and (iii) consultation with the public after the project completion. The EMP provides plans for future public participation. The EMP for this project is included in Appendix 1 of this report.

VIII. GRIEVANCE REDRESS MECHANISM

330. As part of this environmental review, a public consultation on the six subprojects of the tranche 3 involving civil works has been conducted to collect and respond to major public concerns. Continued public participation and consultation have been emphasized as a key component of successful program implementation. Considering the nature of the subprojects and after public participation and safeguard assessment was carried out, no major issues of grievance are anticipated. However, unforeseen issues may occur. To settle such issues effectively, a transparent grievance redress mechanism (GRM) for lodging complaints and grievances has been defined for environment related issues.

331. The GRM has been designed to help achieve the following objectives: (i) open channel for effective communication, including the identification of new environmental issues of concern arising from the Tranche 3 subprojects; (ii) prevent and mitigate any adverse environmental impacts on communities caused by construction and operation of the Tranche 3 subprojects; (iii) improve mutual trust and respect and promote productive relationships with local communities; and (iv) build community acceptance of the program.

332. The GPMO should have established a complaints center with a hotline for receiving both environmental and resettlement grievances for tranche 1 and tranche 2. The GRM for tranche 3 could be integrated into the tranche 1 and tranche 2 GRM so that there won't be two different GRMs for these tranches. Detailed rules of the GRM are set out in the Environmental Management Plan (Appendix 1) and explained to stakeholders during the public participation survey of the tranche 3 subprojects involving civil engineering projects. The GRM shall be completed prior to the commencement of civil works.

333. In addition to the program GRM, ADB's overall accountability mechanism (2012) applies.[7] This mechanism provides opportunities for people adversely affected by ADB-financed projects to express their grievances; seek solutions; and report alleged violations of ADB's operational policies and procedures, including safeguard policies. ADB's accountability mechanism comprises two separate, but related, functions: (i) consultation, led by ADB's special project facilitator, to assist people adversely affected by ADB-assisted projects in finding solutions to their problems; and (ii) providing a process through which those affected by projects can file requests for compliance review by ADB's Compliance Review Panel.

IX. ENVIRONMENTAL MANAGEMENT PLAN

334. The EMP has been prepared for the tranche 3 subprojects. It is an essential document to ensure the implementation of mitigation measures. The full EMP will be attached to the Project Administration Manual (PAM) of this tranche.

335. The EMP defines all potential impacts of different project outputs and the mitigation and protection measures with the objective of avoiding or reducing these impacts to acceptable levels. The EMP also defines the institutional arrangements and mechanisms, the roles and responsibilities of different institutions, procedures and budgets for implementation of the

[7] The revised accountability mechanism became effective on 24 May 2012.

EMP. The EMP draws on the findings of the project IEE, TRTA, and ADB virtual review mission discussions and agreements with the relevant government agencies.

336. The EMP, presented in Appendix EMP, defines: (i) responsibilities and authorities for EMP implementation;, (ii) summary of impacts and mitigation measures; (iii) environmental monitoring and inspection plan; (iv) institutional strengthening and training plan; (v) reporting requirements; (vi) public consultation plan, (vii) cost estimates, and (viii) mechanism for feedback and adjustment. The EMP will be included as separate annex in all bidding and contract documents. Contractors will be required to develop CEMPs that are fully responsive to the EMP. The PMO- EO will be assigned with the responsibility to ensure Contractors' compliance with the CEMP and the project EMP.

X. CONCLUSIONS AND RECOMMENDATIONS

337. The tranche 3 subprojects will support construction and operation of physical infrastructure facilities (buildings, roads and water supply plant, warehouse and logistics infrastructure) to enhance the regional cooperation and integration in border areas of Guangxi and northern Viet Nam in PRC. The project facilities will be constructed in three municipalities of PRC (i) Fangchenggang Municipality; (ii) Chongzuo Municipality and Daxin County; and (iii) Baise Municipality and Baise City.

338. These facilities are in designated economic zones/industrial/trade parks and land areas mostly owned by the government. There are no environmental sensitive areas in and around the project sites and it is not envisaged that their construction will require the clearance of any forest or intact native vegetation.

339. The project underwent appraisal during project preparation and was classified as Category B for environment based on comprehensive site visits and ADB's Rapid Environmental Assessment checklist. In compliance with ADB's SPS 2009, an IEE including EMP has been prepared, covering the design and pre-construction, construction and operation phases of the project, drawing on the data and information from domestic EIAs, EITs, FSR, and discussions with the design institutes and executing/implementing agencies.

340. During construction, major anticipated impacts from tranche 3 subproject activities include (i) dust, noise, and soil runoff during construction; (ii) temporary traffic disturbances because of transportation of construction materials; (iii) risks to community and workers' health and safety during construction; and (iv) wastewater and solid waste generated during construction. Overall, construction- related impacts are localized, short term, and can be effectively mitigated through the application of good construction and housekeeping practices and implementation of construction phase community and occupational health and safety plans as defined in the EMP.

341. During operation, no major environmental impacts are anticipated. All buildings financed by the project will be constructed within designed areas with access to necessary public utilities such as wastewater sewers, electricity, solid waste collection system and water supply. All buildings will be designed in compliance with relevant design standards and codes for energy-efficient, safe and green public buildings, including but not limited to: GB 50011-2010 (Building Seismic Design Code); GB 50016-2006 (Code of Design on Building Fire Protection and Prevention); GB 50189- 2005 (Energy Conservation Design

for Public Buildings) and other applicable national design codes. The use of volatile organic compound-emitting materials (including paints, coatings, adhesives, carpet, and furniture's) will be avoided to ensure high indoor air quality. The project will use refrigerant with low GWP to minimize GHG emission from the project. Cross-border impacts including wildlife trafficking and human trafficking have been assessed and covered in the IEE and EMP.

342. An EMP has been developed for the design and pre-construction, construction and operation phases of the project. The EMP sets out (i) actions to implement mitigation measures; (ii) a monitoring and reporting program; (iii) institutional/organizational arrangements; (iv) capacity development and training; (v) an implementation schedule; and (vi) cost estimates. The final EMP forms part of the PAM and will be included as a separate annex in all bidding documents. The contractors will be made aware of their obligations to implement the EMP, to budget EMP implementation costs in their bids, and to develop site specific CEMPs fully responsive to the project EMP.

343. In the framework of the environmental due diligence, consultations were conducted with key stakeholders. The final IEE will be disclosed on the ADB website. Further consultation will take place before the start of construction works: Posters will be placed within the premises of industrial parks and campuses of project facilities, and public meetings (with due considerations to national and WHO guidelines on COVID-19 risks) will be conducted by the PIEs and the civil works contractors prior to construction works. A GRM has been defined to deal with public complaints related to project activities during project implementation and operation.

344. Environmental risks, and the assurances required to address these risks, have been identified. The major risks include (i) design of Project facilities not complying with relevant design standards and codes related to energy-efficient, safe and green public buildings; and (ii) inadequate capacity of the executing agency, implementing agency, and contractors in environment management, which could result in inefficient project and EMP implementation.

345. Commitments by the executing agency and the implementing agencies have been incorporated into the draft loan documents.

346. The domestic EIAs, EITs and this IEE conclude that all identified environmental impacts from implementation of tranche 3 subprojects can be mitigated to acceptable levels if the measures defined in the EMP and assurances are carefully implemented and monitored. Therefore, further environmental assessment is not warranted. However, in case of any change in the project component or change in locations during detailed design, this IEE and EMP will be updated. The project is feasible from an environmental safeguards point of view and will contribute to improving regional cooperation and investment.

XI. APPENDIX 1: ENVIRONMENTAL MANAGEMENT PLAN