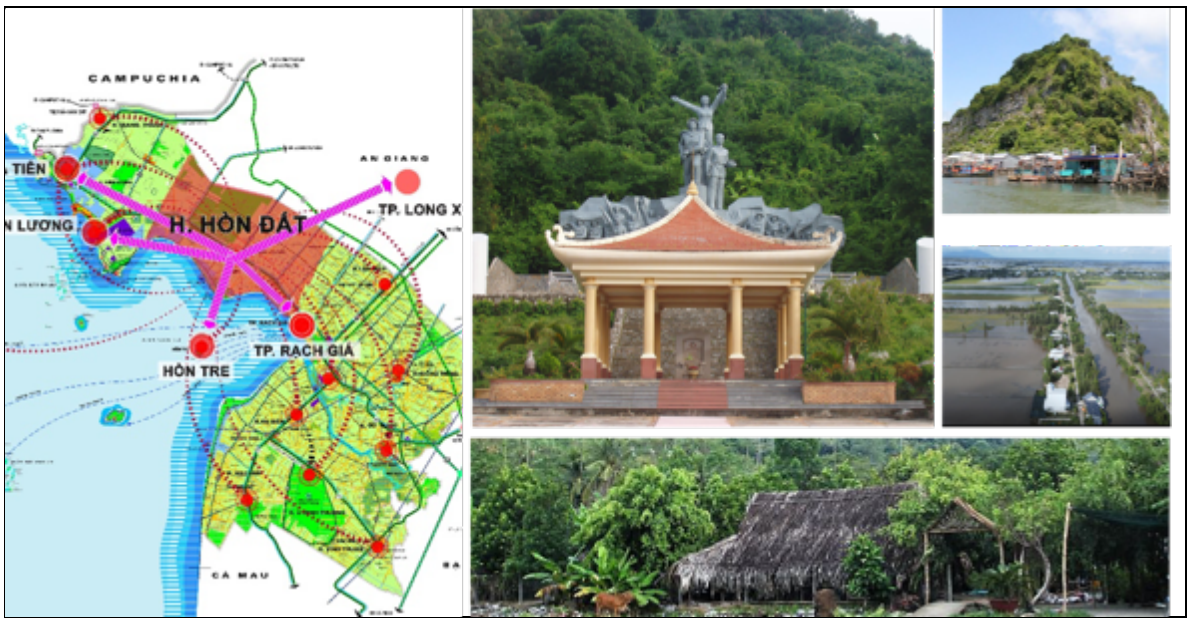
PEOPLE'S COMMITTEE OF AN GIANG PROVINCE

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KIEN GIANG SUSTAINABLE FISHERIES DEVELOPMENT PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT



An Giang, August – 2025

Confidential

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LIST OF ABBREVIATIONS

AH	:	Affected household
AF	:	Associated Facilities
CC	:	Climate change
CPC	:	Commune People's Committee
CSC	:	Construction supervision consultant
CSRC	:	Compensation, support and resettlement committees
DAE	:	Department of Agriculture and Environment
DARD	:	Department of Agriculture and Rural Development
DH	:	Displaced household
DMS	:	Detailed Measurement Survey
DOERA	:	Department of Ethnic and Religious Affairs
DONRE	:	Department of Natural Resources and Environment
DPC	:	District People's Committee
EHSG	:	Environment, Health, and Safety Guideline
EM	:	Ethnic Minority
E&S	:	Environmental and social
ESIA	:	Environmental and Social Impact Assessment
ESCP	:	Environmental and Social Commitment Plan
ESS	:	Environmental and Social Standard
ESF	:	Environmental and Social Framework
ESMP	:	Environmental and Social Management Plan
FS	:	Feasibility study
HH	:	Household
IMC	:	Independent Monitoring Consultant
IOL	:	Inventory of losses
IRP	:	Income restoration program
GRM	:	Grievance redress mechanism
GoV	:	Government of Viet Nam
LFDC	:	Land Fund Development Center
LXQ	:	Long Xuyen Quadrangle
MAE	:	Ministry of Agriculture and Environment
MARD	:	Ministry of Agriculture and Rural Development

MD	:	Mekong Delta
MOHA	:	Ministry of Home Affairs
MOERA		Ministry of Ethnic and Religious Affairs
MONRE	:	Ministry of Natural Resources and Environment
NH	:	National Highway
ODA	:	Official Development Assistance
PAH	:	Project affected household
PAP	:	Project affected person
PC	:	People's Committee
PPMU	:	Provincial Project Management Unit
PPC	:	Provincial People's Committee
RCS	:	Replacement cost survey
RP	:	Resettlement plan
SC	:	Structural component
SFDP	:	Sustainable Fisheries Development Project
SIWRR	:	Southern Institute of Water Resources Research
WB	:	World Bank

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EXECUTIVE SUMMARY

Project background

Kien Giang (now An Giang) is a coastal province of the Mekong Delta (MD) with a relatively long coastline (about 200 kilometers) that is directly affected by climate change (CC), particularly sea level rise (SLR). After many years of transitioning the production structure from rice cultivation to a combination of rice and aquaculture, the value of products produced in the same conversion zone has increased. The transformation structure is gradually being implemented in the right direction, resulting in the creation of several effective coastal rural areas and the prospect of agriculture that combines sustainable, comprehensive, and harmonious development with nature. Currently, the province has more than 90,000ha of aquaculture, with nearly 71,500ha dedicated to rice-aquaculture farming. The central government has recently mobilized several capital sources for Kien Giang (now An Giang) province to carry out transportation and irrigation projects for aquaculture development. This has improved investment efficiency, as well as socioeconomic development and social security of the province. However, due to a lack of capital, no coastal area in the province has been adequately and fully invested in infrastructure for optimal value-added production. In addition, the situation of riverbank erosion, coastal erosion, saltwater intrusion, etc. in recent years in the province has become complicated and the trend is becoming more and more serious. The province has implemented solutions to urgently overcome serious landslides in some coastal sections, affecting the dyke body, saltwater prevention and freshwater sluice structures, etc. However, this requires investment costs. The investment is very large and the province has not been able to meet it, so there are still many sections with particularly dangerous landslides that have not been treated. This has greatly affected people's lives, production, and coastal infrastructure. Therefore, investing in the project "*Kien Giang sustainable fisheries development project*" to promote socio-economic development of the province and the region to adapt to climate change, protect the environment and gradually associate with the development of sustainable, quality and diverse fisheries is necessary.

The project aims to the following specific objectives: (i) To build and improve infrastructure, innovate technology, strengthen management capacity, and organize production to promote the fisheries sector in the direction of value enhancement, deep international integration, environmental friendliness, and adaptation to climate change; and (ii) To encourage and attract all economic sectors to contribute to the sustainable development of the province's fishery sector, and promote socio-economic development associated with environmental protection. The project's objectives will be achieved through the implementation of 02 components consisting of (i) Building new basic infrastructure and upgrading current infrastructure for shrimp farming area in the south of NH80 of Hon Dat district (now Binh Giang and Binh Son communes), including: 23 new sluice gates with a width of 8 to 10 m; a new road of 7.03 km; 25.18km of medium and low voltage lines and 18 upgraded sluice gates; and (ii) Technological innovation, increased management capacity, and improved production organization in brackish shrimp farming. The project will be implemented in 2021 – 2026 with total investment cost of 25.45 million USD.

Legal and technical basis for ESIA

The environmental assessment carried out during project preparation confirmed that the project's environmental risks were classified as moderate. The environmental and social standards (ESS) applied to the project are as follows: ESS1: Assessment and management of environmental and social risks and impacts; ESS2: Labor and working conditions; ESS3: Resource Efficiency and and pollution prevention and management; ESS4: Community Health and safety; ESS5: Land acquisition, restrictions on land use and involuntary resettlement; ESS6: Biodiversity conservation and sustainable management of living natural resources; ESS7: Indigenous Peoples-Sub-Saharan African Historically Underserved Traditional Local Communities, ESS8: Cultural heritage, and ESS10: Stakeholder engagement and information disclosure. The Environmental and Social Impact Assessment (ESIA) document is prepared according to ESF. Scope of the ESIA is focused on the project's structural components involving construction activities.

Project description

The project is to build new basic infrastructure and upgrading current infrastructure for shrimp farming area in the south of NH80 of Hon Dat district (now Binh Giang and Binh Son commune)[1], including:

- Building 23 sluice gates with a width of 8 to 10 m and management houses to separate fresh and brackish water areas for agricultural restructuring, aquaculture, and rice cultivation;
- Building a delta grade-V road with a total length of about 7.03 km (running along the East bank of Binh Giang 1 canal, connecting NH80 to the sea dyke);
- Installing 25.18km (including 21.54km medium-voltage power lines, 3.64km low-voltage power lines), and 30 transformer stations to operate sluices;
- Upgrading the gates and operation devices of 5 sluices along the sea dike, and 13 in-field sluices along the Don Dong canal for the current aquaculture area in the project area;
- Other ancillary works.

In addition, technological innovation, increased management capacity, and improved production organization in brackish shrimp farming are non-structural solutions are implemented in the project.

Social and environmental baselines

In November 2023, 10 air samples, 20 surface water samples, 10 groundwater samples, 10 wastewater samples, 16 soil and sediment samples, and 20 aquatic life samples were taken and analyzed to evaluate the background environment quality in the project area. The analysis results reveal that the ambient ai, groundwater quality in the project region is reasonably good, with no indicators of pollution resulting from the local population's socioeconomic development and livelihood. Also, the majority of surface water samples in the area are still relatively good (meeting water quality Class B standards), with only the locations near NH 80 showing slight signs of pollution (meeting water quality Class C standards). Water sources heavily contaminated with bacteria often only meet Class C water quality standards. This also reflects the current distribution of the population in the project area mainly along canals and the low sanitation conditions. Most domestic wastewater of local people is directly discharged

[1]Hon Dat District ceased to exist as an administrative unit of Vietnam effective June 30, 2025.

into the canals, which is the main cause of bacterial contamination in the water sources in the area. Besides, the analysis results indicate heavy organic pollution in the wastewater in the area, with COD values ranging from 31.5 to 127 mg/L. All collected wastewater samples are untreated domestic wastewater discharged into the environment from households and residential areas. However, the amount of wastewater from these sources is low, so the impact on the receiving water quality is low also. Futhermore, all 16 soil and sediment samples from the project area have heavy metal concentrations within standards. This indicates that the heavy metal content in all soil samples is suitable for various land use purposes such as agriculture, residential, industrial, commercial, and service activities. Additionally, the organic matter content in the soil indicates that the soil samples are on average, ranging from 1.72 to 2.88%. The pH values of the soil samples range from 3.20 to 4.79, classified as moderately to heavily acidic soil.

The majority of the new sluices are situated in sparsely inhabited regions, encompassed by vacant land and a few trees. There are 2 water supply plants in the project area, namely Binh Giang commune plant and Binh Son commune plant. The 2 plants take surface water to supply. The water intake point of the Binh Giang plant is 200m from the T6-1 sluice and 320m from the VR-1 sluice for the Binh Son plant. Around the sluices to be improved in the frame of the project, there are no residents living nearby. The sluice gates are operated automatically based on the tidal differences, which affects water source regulation for production. Additionally, some of the wooden sluice gates are currently decayed, causing saltwater leakage into freshwater production areas.

The road is situated on the eastern side of Binh Giang 1 canal, commencing at NH80 and terminating at the seadike. It spans a total length of 7.03 kilometers. Currently, it is unpaved and of poor quality, making it challenging for people to travel, especially during the rainy season. The east side of the road is Binh Giang 1 canal and the west side of the road is rice fields and fruit gardens of local people. There are total of 74 households living along the road but they concentrate in the section from NH80 to canal 200. Houses in this area are mainly level-4 houses, temporary houses (corrugated iron roof houses, and corrugated iron huts). As a result, contractors need to be careful not to damage these houses.

There are a few sensitive receptors within a radius of 300m from the project items, including schools, churches, temples, and water intake points of water supply plants, etc.

Environmental and Social Impacts and Risks and Mitigation measures

ESIA has identified both the potential negative and positive impacts and risks of the project during 3 phases (preparation, construction and operation).

During preparation phase, the negative potential impacts and risks include (i) impacts due to land acquisition. About 15.46 ha of land will be used for the project, but only 2.77 ha will be acquired from 57 households, in which 12 households will be relocated; (ii) impacts on livelihood; (iii) land use change; (iv) impacts due to UXOs. Most impacts are temporary, local and reversible due to medium scale construction. These impacts and risks can be mitigated by applying the approved resettlement plan (RP) of the project and the project owner will contract with relevant unit to clear UXOs before commencing construction activities and must closely monitor and consult with local people about the land acquisition and clearance and UXO clearance.

During construction phase, dust, exhaust gas, noise, vibration; wastewater; solid waste; ecosystem; labor influx; improper access, hard-working conditions, health and safety of workers and locals; local flooding; local traffic; land subsidence, soil erosion; raw material supply, etc. are generic impacts and risks of the project. These impacts can be considered as low to moderate for each item and can be minimized by the application of Environmental and Social Code of Practices (ESCOPs). In addition, the project implementation causes specific impacts and risks, including impacts on domestic water supply, impacts on livelihoods, impacts on water traffic, impacts by the relocation of infrastructure, impacts on ethnic minorities (EMs) and impacts on sensitive receptors, etc. These impacts and risks can be mitigated by specific measures including consultation with local authorities about the project activities and construction plan, the arrangement of a temporary road, construction in the dry season and the offseason for water taking; informing people of construction time; not using high-noise machinery and equipment that emit a lot of dust and noise through the sensitive areas during major religious holidays/study time; spraying sufficient water to reduce dust during dry and windy days; providing safety measures as installation of fences, barriers warning signs, lighting system against traffic accidents; prohibiting gathering of construction materials within 100m in front of the sensitive objects; cleaning up construction areas at the end of the day, especially construction around the sensitive structures; immediately addressing any issue/problem caused by the construction activities; reinstating and providing adequate compensation for any impacts which will be identified as caused by the construction activities.

During operation phase, the generic impacts and risks are dust, air emmision; noise and vibration; domestic wastewater and solid waste; increase of traffic accidents; land use change; and damage to traffic roads on the bridges over the sluices. The generic impacts and risks can be mitigated by training and raising the awareness of the road and bridge's users, arranging suitable speed limit signs in the crowed areas; planting and maintaining trees on both road sides to prevent noise from spreading into local people's houses along the road; regular maintenance of the project items, preparing an Emergency Contingency Plan; etc. In addition, the project operation cause specific impacts and risks, including impacts on water drainage; risks of the road damage; impacts due to electromagnetic field; degradation of surface water quality; impacts of saline and/or brackish water on construction works; damage to sluice gates; increase in water use conflict; impacts on aquatic life; impacts on waterway where the sluices are built; impacts on flood drainage; canal bank erosion; risk that failure of livelihood models adversely impacting welfare of beneficiary households; farmers' resistance to adapting to livelihood models; and Risk of land salinization. The impacts and risks are mitigated by specific measures including communicate, raise local awareness of environmental protection, especially water quality in canals; consulting local people and authorities about the operational procedure for the sluice gate; early notify local people and authorities regarding sluice gate operation (opening and closing times); conduct water/ecology monitoring at the monitoring sites to provide baseline data prior to sluice gate operations, no later than 1 month before completion of construction; collect packages, excessive foods during the argicultural and aquacultural production; prohibit littering in surrounding area or water sources; etc.

Environmental and social management plan

The project's ESMP includes measures to minimize negative impacts, roles and responsibilities for ESMP implementation, monitoring and supervision, environmental compliance framework, reporting organization, and control program. Environmental capacity building program and ESMP implementation costs. The estimated cost is about 233,461 USD not including the cost

of construction related mitigations measures which will be included in the civil works contract during implementation.

During the construction process, ESMP requires the participation of a number of stakeholders and agencies, each with a unique role and responsibility, including the An Giang PPMU, Department of Agriculture & Environment of An Giang province, Contractor, Construction supervision consultant (CSC), Independent environmental and social monitoring consultant (IMC) and local community.

Public consultation and Information disclosure

Public consultation activities were conducted in 2 communes (Binh Giang and Binh Son) of former Hon Dat district, Kien Giang (now An Giang) province January 2023. The consultation was conducted with representatives of the government agencies and mass organizations, such as: Representatives of People's Committee, Vietnam Fatherland Front Committee, Women's Union, households affected by the project. The local authority and people in the project communes were completely in agreement with the implementation of the project, which will bring about socio-economic and environmental benefits. However, 2 affected communes all require proper environmental sanitation during construction, traffic safety and travel condition, control of dust and reinstatement of any damages on infrastructure.

All the draft E&S documents for the project (ESIA/ESMP, RP, EMDP, ESCP, LMP, and SEP) in Vietnamese will be properly disclosed at the project sites, Kien Giang (now An Giang) province's website and the WB's external website on 15 August 2025. The final project safeguards instruments will be disclosed locally at the project sites, Kien Giang (now An Giang) province's website and the WBs external website on 15 September 2025 as well.

CHAPTER 1. PROJECT INTRODUCTION AND DESCRIPTION

1.1. BACKGROUND AND OBJECTIVES OF THE PROJECT

1.1.1. Background

1. Vietnam's fisheries industry has grown to become one of the key export sectors driving the country's booming economy; concerted efforts will be needed, however, to address the multitude of challenges and keep this momentum. The fisheries industry has been in a rapid transformation becoming a commodity industry with its exports reaching close to US$ 9 billion a year. Fishery and aquaculture commodities represent Vietnam's 5th largest export products in value, accounting for 4.1% of the country's exports. The industry also contributes to approximately 5% of the Gross Domestic Product (GDP) and provides a total of 4.7 million jobs.

2. The ten-year fisheries sector development master plan currently in place has guided sectoral development for the past decade. The 2013 Fisheries Development Master Plan to 2020 with Vision to 2030 envisions the fisheries sector to become a commodity production sector with prestigious brands and high competitiveness at the international level. The revised 2017 Law on Fisheries provides robust legal foundations for sustainable sectoral development; its enforcement is critical going forward. Institutionally, the Ministry of Agriculture and Rural Development (MARD), now the Ministry of Agriculture and Environment (MAE) and the 28 coastal provinces play key roles in fisheries governance and sectoral development. The Government of Vietnam (GoV) has proposed to the World Bank (WB) to finance the Sustainable Fishery Development Project (SFDP) to invest in 'smart' infrastructure to enable improved management of and increased value from target fisheries. The total cost of the project is US$414 million. The proposed project will be implemented from 2025 - 2026. The Project comprises of four components:

- Component 1: Improving Fisheries Governance for Value Addition [IBRD: US$30 million; GoV: US$ 7 million].
- Component 2: Boosting Sustainable Fisheries with Smart National Infrastructure Upgrades [IBRD: US$150 million; GoV: US$ 37 million].
- Component 3: Boosting Sustainable Fisheries with Smart Subnational infrastructure development [IBRD: US$ 150 million; GoV: US$ 30 million].
- Component 4: Project management, monitoring, and evaluation [GoV: US$10 million].

3. Each of the components will be implemented by the Ministry of Agriculture and Environment (MAE) at the central level as well as the participating provinces including Hai Phong, Thanh Hoa, Soc Trang (now Can Tho), Bac Lieu (now Ca Mau), Ca Mau and Kien Giang (now An Giang). Kien Giang sustainable fisheries development project is under Component 3.

4. Kien Giang (now An Giang) is a coastal province of the Mekong Delta (MD) with a relatively long coastline (about 200 kilometers) that is directly affected by climate change (CC), particularly sea level rise (SLR). After many years of transitioning the production structure from rice cultivation to a combination of rice and aquaculture, the value of products produced

in the same conversion zone has increased. The transformation structure is gradually being implemented in the right direction, resulting in the creation of several effective coastal rural areas and the prospect of agriculture that combines sustainable, comprehensive, and harmonious development with nature. Currently, the province has more than 90,000ha of aquaculture, with nearly 71,500ha dedicated to rice-aquaculture farming.

5. The central government has recently mobilized several capital sources for Kien Giang (now An Giang) province to carry out transportation and irrigation projects for aquaculture development. This has improved investment efficiency, as well as socioeconomic development and social security of the province. However, due to a lack of capital, no coastal area in the province has been adequately and fully invested in infrastructures for optimal value-added production.

6. In addition, the situation of riverbank erosion, coastal erosion, saltwater intrusion, etc. in recent years in the province has become complicated and the trend is becoming more and more serious. The province has implemented solutions to urgently overcome serious landslides in some coastal sections, affecting the dyke body, saltwater prevention and freshwater sluice structures, etc. However, this requires investment costs. The investment is very large and the province has not been able to meet it, so there are still many sections with particularly dangerous landslides that have not been treated. This has greatly affected people's lives, production, and coastal infrastructure.

7. Therefore, investing in project "*Kien Giang sustainable fisheries development project*" to promote socio-economic development of the province and the region to adapt to climate change, protect the environment and gradually associate with the development of sustainable, quality and diverse fisheries is necessary.

1.1.2. Project Objectives

1.1.2.1. Overall objective

8. The overall objective of the project is to strengthen fisheries management and increase product value through smart infrastructure upgrades.

1.1.2.2. Specific objectives

9. The project aims to the following specific objectives:

- To build and improve infrastructure, innovate technology, strengthen management capacity, and organize production to promote the fisheries sector in the direction of value enhancement, deep international integration, environmental friendliness, and adaptation to climate change.
- To encourage and attract all economic sectors to contribute to the sustainable development of the province's fishery sector, and promote socio-economic development associated with environmental protection.

1.1.3. Project components

1.1.3.1. Structural components (SCs)

10. The project is to build new basic infrastructure and upgrading current infrastructure for shrimp farming area in the south of NH80 of Hon Dat district (formerly), including:

- Building 23 sluice gates with a width of 8 to 10m (including 3 bridges of HL93 load each; 8 concrete bridge of 0.65HL93 load each; and 12 pedestrian bridges of girder rural road I400 each) and 4 management houses to separate fresh and brackish water areas for agricultural restructuring, aquaculture, and rice cultivation (see details in *Table 2*);
- Building a delta grade-V road with a total length of about 7.03 km (running along the East bank of Binh Giang 1 canal connecting NH80 to the sea dyke);
- Installing 25.18km (including 21.54km medium-voltage power lines, 3.64km low-voltage power lines), and 30 transformer stations to operate sluices;
- Upgrading the gates and operation devices of 5 sluices along the sea dike, and 13 in-field sluices along the Don Dong canal for the current aquaculture area in the project area;
- Other ancillary works.

Table 1: Summary of main items of the Project

No.	Investment items	Unit	Quantity
1	Sluice gates (B=8-10m)	items	23
2	Delta V-level roads (along the right side of Binh Giang 1 canal, connecting NH80 to the sea dike)	km	7.03
3	Medium and low voltage power lines	km	25.18
4	Sluices with the gates and operation devices to be upgraded	items	18

11. The layout of project items is shown in *Figure 1*.

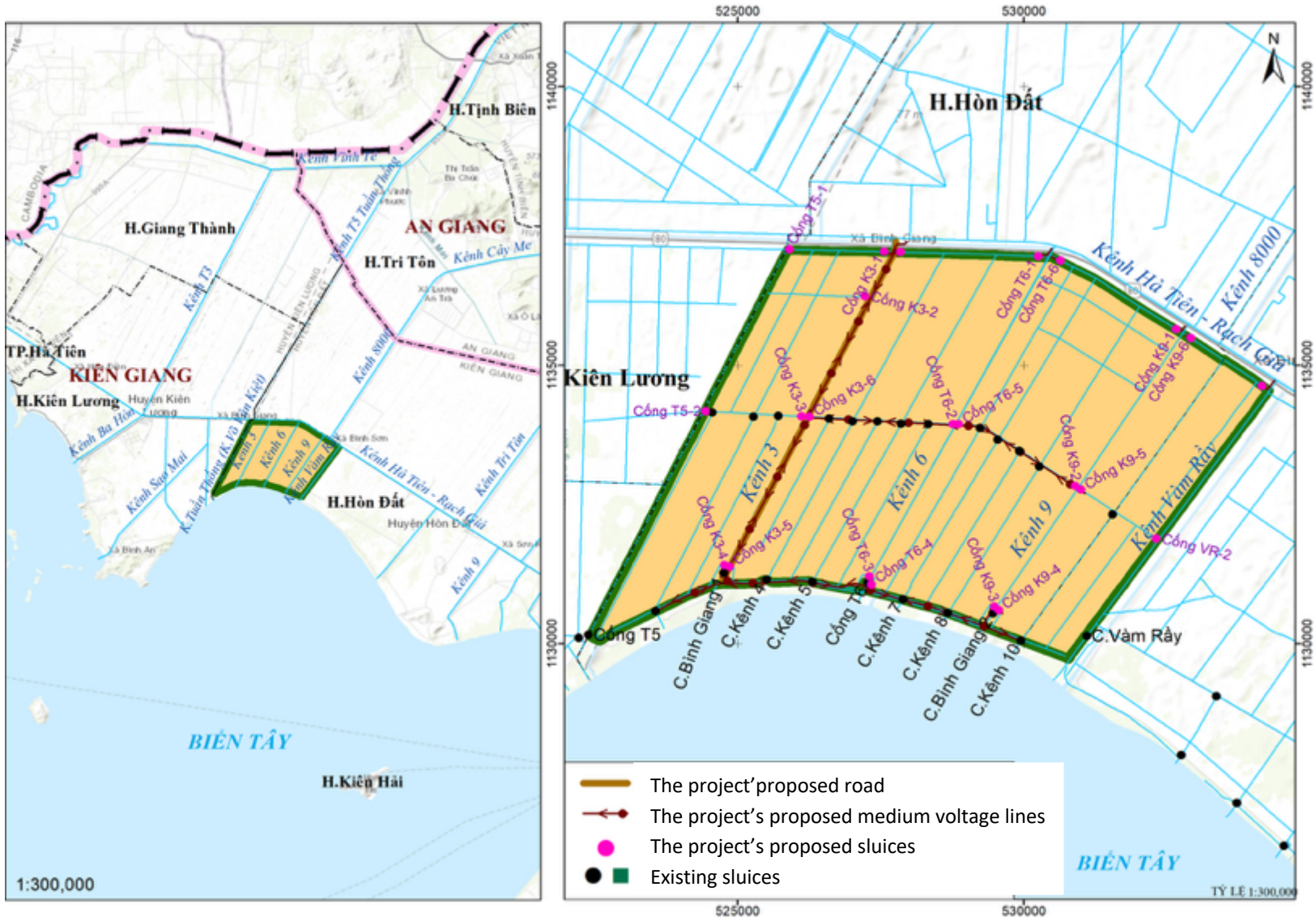


Figure 1: Project area and project structural items

12. Technical specifications of the project's work items are presented below:

a) Sluices

13. In the frame of the project, 23 sluices will be built in with the specification in *Table 2*. In addition, 4 level-IV management houses are built on the right bank of 4 sluices (K3-6, K3-7, K9-1, and K9-2) toward the field. It has a usable area of 40m^2, including an office, dining rooms, and bedrooms.

Table 2: Sluice gates to be built in the project

No.	Name of the sluice	Location	Width of sluice gates (m)	Type of the bridge over the sluice	Management house
1	T5-1	Binh Giang commune	10	Pedestrian bridge, girder rural road I400	
2	T5-2	Binh Giang commune	10	Pedestrian bridge, girder rural road I400	
3	K3-1	Binh Giang commune	10	Pedestrian bridge, girder rural road I400	
4	K3-2	Binh Giang commune	8	Pedestrian bridge, girder rural road I400	
5	K3-3	Binh Giang commune	8	HL93 load bridge	
6	K3-4	Binh Giang commune	8	HL93 load bridge	
7	K3-5	Binh Giang commune	8	HL93 load bridge	
8	K3-6	Binh Giang commune	8	Pedestrian bridge, girder rural road I400	Level IV house
9	K3-7	Binh Giang commune	8	Concrete bridge with 0.65HL93 load	Level IV house
10	T6-1	Binh Giang commune	8	Concrete bridge with 0.65HL93 load	
11	T6-2	Binh Giang commune	8	Pedestrian bridge, girder rural road I400	
12	T6-3	Binh Giang commune	8	Concrete bridge with 0.65HL93 load	
13	T6-4	Binh Giang commune	8	Concrete bridge with 0.65HL93 load	
14	T6-5	Binh Giang commune	8	Concrete bridge with 0.65HL93 load	
15	T6-6	Binh Giang commune	8	Concrete bridge with 0.65HL93 load	
16	K9-1	Binh Giang commune	8	Concrete bridge with 0.65HL93 load	Level IV house
17	K9-2	Binh Giang commune	8	Concrete bridge with 0.65HL93 load	Level IV house

No.	Name of the sluice	Location	Width of sluice gates (m)	Type of the bridge over the sluice	Management house
18	K9-3	Binh Giang commune	8	Pedestrian bridge, girder rural road I400	
19	K9-4	Binh Giang commune	8	Pedestrian bridge, girder rural road I400	
20	K9-5	Binh Giang commune	8	Pedestrian bridge, girder rural road I400	
21	K9-6	Binh Giang commune	8	Pedestrian bridge, girder rural road I400	
22	VR-1	Binh Son commune	8	Pedestrian bridge, girder rural road I400	
23	VR-2	Binh Son commune	8	Pedestrian bridge, girder rural road I400	



Figure 2: Typical perspective of a sluice combined with a traffic bridge



Figure 3: Typical perspective of a sluice combined with a working bridge (pedestrian)

b) The connecting road

14. The project's connecting road has a length of 7.03km and 36 culverts along the road to take water from the Binh Giang 1 canal into the fields.

– Technical specifications of the road:

- Delta V road;
- Calculated axle load: 100kN;
- Length: L=7.03km;
- Centerline elevation: +2.5m to +3.2m.

– Cross-sectional scale of the road (*Figure 4*):

- Width of the carriageway : 2.75m x 2 = 5.5m;
- Sidewalk width : 1.75m x 2 = 3.5m;

  ++ Reinforced sidewalk : 1.25m x 2 = 2.5m;

  ++ Soil sidewalk : 0.50m x 2 = 1.0m;

  Total : 9.0m;

– Road surface structure:

- 3-layer asphalt, 4.5cm thick, asphalt standard 5.5kg/m^2;
- Crushed stone 15cm thick, K ≥ 0.98;
- Type I crushed stone aggregate, 20cm thick, K ≥ 0.98;
- Geotextile strength 12 kN/m;
- Backfill sand with compacted upper layer of 50cm K ≥ 0.98;
- Backfill sand with compacted lower layer K ≥ 0.95;

Confidential

- Peel off weathering 30cm thick, cover with sand to K ≥ 0.95.

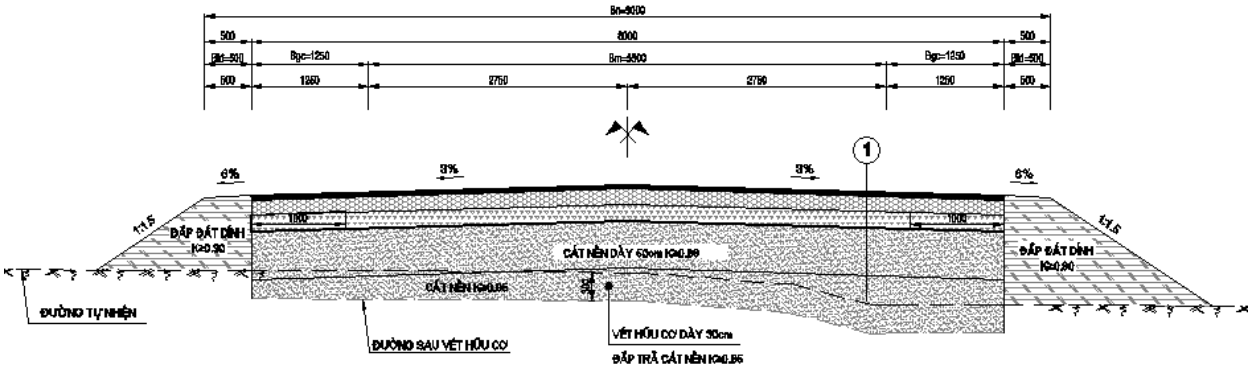


Figure 4: Cross-section of the connecting road

15. On the road, 36 new water intake culverts will be installed at the existing culverts. These provide water from Binh Giang 1 canal to the fields (*Figure 5*). The culverts are made of centrifugal concrete with a diameter D=0.6m, a length of 20m and load-bearing of H30-XB80. The culverts are placed on abutments reinforced with Melaleuca piles with a density of 16 piles/m^2.

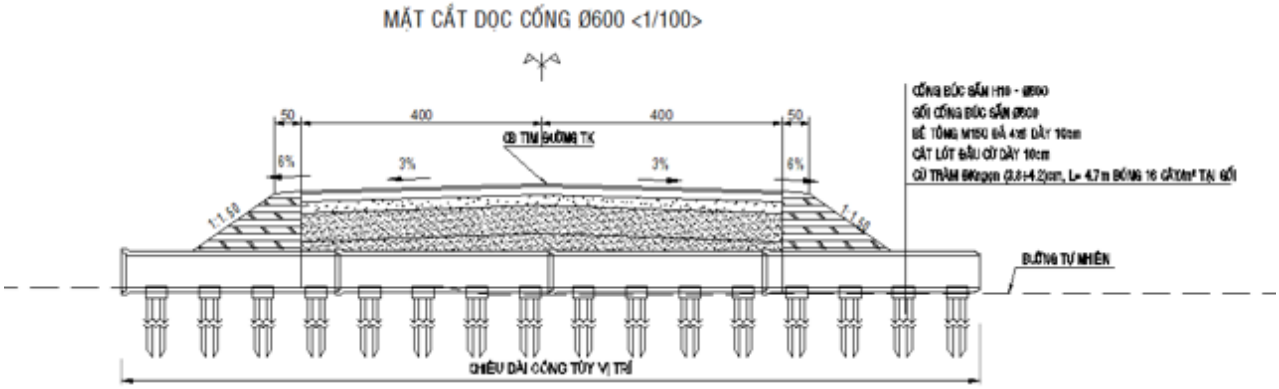


Figure 5: Typical longitudinal section of a culvert of D600

c) Medium and low voltage lines

16. Details of the main technical specifications of the medium and low voltage systems are presented in *Table 3*.

Table 3: Specification of medium and low voltage lines

No.	Descriptions	Length (km)
I	**The 3-phase medium voltage lines**	**21.538**
1	Route 1: along Binh Giang 1 (Canal 3)	7.470
	- Start point: NH80	
	- End point: sea dike	
2	Route 2: along the sea dike	6.385
	- Start point: canal 2	
	- End point: canal 10	
3	Route 3: along Don Dong canal	5.130

	- Start point: Tuan Thong canal	
	- End point: Vam Ray canal	
4	Route 4: Medium voltage lines from the 03-phase 04-wire power grid to to-be-built sluices and to-be-upgraded sluices	2.553
II	**The 3-phase low voltage lines** (from the current low voltage grid to the sluices with gates to be upgraded)	**3.640**
III	**The 3-phase transformer stations of 3x15kVA**	**30**

d) Upgradation of the existing sluices

17. Detailed technical parameters of the sluices to be renovated in the project are presented in *Table 4* to *Table 5*.

Table 4: Sluices with the gates and operation devices to be upgraded along the sea dike

No.	Name of the sluice	Location	Valve gate width (m)	Valve gate height (m)	Number of gates	Threshold level	Elevation of pillars	Upgraded solutions
1	Kenh Muoi	Former Hon Dat	5.5	4.7	1	-2.7	2.0	Replacing automatic valve gates with flat gates with hydraulic cylinders
2	Kenh Tam	Former Hon Dat	5.5	4.7	1	-2.7	2.0	
3	Kenh Bay	Former Hon Dat	5.5	4.5	1	-2.5	2.0	
4	Kenh Nam	Former Hon Dat	5.5	4.7	1	-2.7	2.0	
5	Kenh Hai (HD)	Former Hon Dat	5.5	4.7	1	-2.7	2.0	

Table 5: Sluices with the gates and operation devices to be upgraded along Don Dong canal

No.	Sluice name	Aperture (m)	Threshold level (m)	Gate top elevation (m)	Gate dimensions bxh (m)	Upgrading solutions
1	Kenh Mot	4	-1.8	2.2	4.2x4	Replacing the wooden valve gate that is opened and closed by a 10-ton chain hoist with the steel valve gate that is opened and closed by a TD4-2 electric winch.
2	Kenh Hai	3.5	-1.8	2.2	3.7x4	
3	Kenh Nam Tram (canal 2 - canal 3)	4	-1.8	1.7	4.2x3.5	
4	Kenh Nam Tram (canal 3 - canal 4)	4	-1.8	1.7	4.2x3.5	
5	Kenh Tu	3.5	-1.8	1.7	3.7x3.5	
6	Kenh Nam Tram (canal 4 - canal 5)	4	-1.8	1.7	4.2x3.5	
7	Kenh Nam	3.5	-1.8	1.7	3.7x3.5	
8	Kenh Nam Tram (canal 5 - canal 6)	4	-1.8	1.7	4.2x3.5	

No.	Sluice name	Aperture (m)	Threshold level (m)	Gate top elevation (m)	Gate dimensions bxh (m)	Upgrading solutions
9	Kenh Nam Tram (canal 6 - canal 7)	4	-1.8	1.7	4.2x3.5	
10	Kenh Bay- South bank of Don Dong canal	4.5	-1.8	2.2	4.7x4	
11	Kenh Nam Tram (canal 7 - canal 8)	4	-1.8	2.2	4.2x4	
12	Kenh Tam-South bank of Don Dong canal	4.5	-1.8	2.2	4.7x4	
13	Kenh Muoi-South bank of Don Dong canal	4.5	-1.8	1.7	4.7x3.5	Replacing the 10-ton chain hoist with the TD4-2 electric winch

18. There are 12 households to be relocated due to land acquisition of the project. However, there will be no construction of resettlement areas, the displaced households will be resettled at the current residential line along the Binh Giang 1 road if they want. The residential line was invested by state fund and be managed by Kien Giang (now An Giang) PPC. It has about vacant land plots and sufficient for the project's displaced households (DHs).

1.1.3.2. Non-structural activities

19. Non-structural solutions implemented in the frame of the project:

- Establish and strengthen production cooperation groups, including:
  - **Farmers' groups** to manage their members's activities in the direction of green agro products.
  - **Cooperatives** to negotiate the formation of production chains, and operate the chains effectively via the application of national and international standards into the production.
- Disseminate the activities of the project to build consensus and support from the people, reduce the rate of people utilizing groundwater in agricultural production, and enhance people's understanding of production linked with natural resource protection and regeneration, including:
  - Workshops, seminars, and propaganda panels to share experiences and communication of the project in 02 project communes.
  - Propaganda on mass media about the project.
- Develop demonstration livelihood models.
- Conduct training classes, transfer production techniques to improve capacity, and apply scientific and technical advances to meet market needs and reduce greenhouse gas emissions.
- Connect and replicate the project livelihood models, introduce and register product offtake businesses to help farmers apply sustainable and effective livelihood models that meet the needs of product offtake businesses and reduce production costs by the procurement of

substantial quantities of goods from retailers who supply goods of reputable origin and quality, including:

- At least 2 value chains (1 chain for one commune), with signed product offtake contracts for rice output certified green standards such as VietGAP, SRP, Organic, ASC, BAP.
- At least 2 value chains (1 chain for one commune), with signed product offtake contracts for rice output certified green standards such as VietGAP, SRP, Organic, ASC, BAP.

- Support training, consultation, and certification of national and international standards VietGAP, SRP, Organic, ASC, BAP) requested by the businesses of the value chains.
- Support the application of smart technology to adapt to climate change in production and apply technology in production to minimize chemical usage and carbon emissions.
- Building electronic traceability - QR code for 04 product chains.
- Evaluate the effectiveness of project livelihood models.

1.1.3.3. Auxiliaries of the project

20. Construction sites: Project construction sites will be established for the sluice system. Construction sites will be mostly located on agricultural land, vacant land, or public land of the communes and will include worker camps for 10-20 workers (including 10 workers for each sluice and 5-10 workers for nearby road sections and power lines), machinery gathering yards, material storage yards, etc.

21. The construction sites for the electrical systems and the road will be situated in the adjacent sluice construction sites. When required, construction materials will be gathered along the existing roads while ensuring that local traffic flow remains smooth.

1.1.4. Master Planning and Related Projects in the Project Areas

1.1.4.1. Master planning

a) Relationships of the project and other project plans and programs approved by the state agencies

22. According to Kien Giang (now An Giang) province's plan No. 46/KH-UBND dated March 21, 2019, high-tech areas for intensive shrimp farming and large-scale areas for shrimp-rice and improved extensive shrimp farming will be established with reasonable organization and synchronous infrastructure and technical services in the period of 2021 and 2025. The total area of brackish shrimp farming in Kien Giang (now An Giang) province is expected to reach 129,450ha during this period, with industrial and semi-industrial shrimp farming accounting for 10,000 ha, shrimp-rice farming for 94,400 ha, and extensive shrimp farming for 25,050 ha. The estimated contribution of the aquaculture sector to the Gross Regional Domestic Product (GRDP) of Kien Giang province is expected to reach around 58-60% by 2025. The southern region of NH80 (from Rach Gia to Ba Hon - Kien Luong) is planned for the development of brackish water shrimp farming with a total area of 29,000 hectares, of which 21,000 hectares is for Hon Dat district (former), including the transition/development of 5,500 hectares for brackish water shrimp farming.

23. Considering the local circumstances, it is crucial to invest in infrastructure that supports fishery exploitation and aquaculture. This will help the province and region with socio-

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economic development, adapt to climate change, protect the environment, and integrate with the sustainable, high-quality, and diverse development of the aquaculture sector. Therefore, the project is in line with the real production needs at the local level and both central and local government planning and production development directions (*Table 6*).

Table 6: Summarize the suitability of the project location with strategies and planning

No.	Legal strategies and planning related to the project	Conformity of the project location with the strategies and planning
1	Decision No. 450/QD-TTg dated April 13, 2022 of the Government approving the National Environmental Protection Strategy to 2030, vision to 2050	– Integrating solutions to address climate change into environmental protection strategies, plans, programs and projects. – Building environmental protection infrastructure for climate change resilience. – Building capacity and gradually proactively responding to climate change.
2	Decision No. 1216/QD-TTg of the Prime Minister approving the National Environmental Protection Strategy for 2020, vision to 2030	– Building capacity and gradually proactively responding to climate change. – Developing, testing, and replicating models to adapt and live with climate change
3	Desicion No. 287/QĐ-TTg on approval for planning for development of the Mekong Delta Region for the 2021–2030 period with vision towards 2050	The proposed project area, located in the saline-brackish area of the West Sea' coastal sub-region (M3), presents an opportunity to transform production to improve the livelihoods of residents previously affected by flood drainage into the West Sea.
4	Decision No. 79/QD-TTg dated January 18, 2018 of the Prime Minister promulgating the national action plan to develop Vietnam's shrimp industry until 2025	– Develop Viet Nam's shrimp industry into a large-scale, sustainable production sector that adapts to climate change, protects the ecological environment, enhances the quality, value, and efficiency of production, and benefits both farmers and businesses. – Organize production rationally, with a comprehensive investment in infrastructure. Utilize the natural potential on a large scale, aligned with ecological characteristics, and organize production cooperatively, linking small-scale facilities to create large-scale production areas. – Invest in power grid infrastructure, upgrade and improve irrigation and transportation systems, and essential infrastructure to support shrimp farming production. Construct head works (transportation, canals for water supply, and drainage) to serve shrimp farming activities. – Establish shrimp farming areas in mangroves, rice fields, and organic shrimp farming in coastal provinces of the Mekong Delta. – The shrimp farming area in Kien Giang (now An Giang) province is expected to reach 112,190 hectares by 2025.
5	Decision No. 1055/QD-TTG dated July 20, 2020 of the Prime Minister on promulgating the National plan for	Improving climate-resilient infrastructure is a priority. Implementing and scaling up agricultural rotation models suitable for drought and salinity conditions, as well as

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No.	Legal strategies and planning related to the project	Conformity of the project location with the strategies and planning
	climate change adaptation for the period 2021-2030 and a vision to 2050	cultivation and aquaculture models adaptable to climate change, are crucial. Seasonal crops should be arranged to capitalize on advantages.
6	Decision No. 255/QD-TTg dated February 25, 2021 of the Prime Minister approving the agricultural sector restructuring plan for the period 2021 - 2025	In the MD, pangasius catfish and shrimp are the main aquaculture species.
7	Decision No. 324/QD-TTg dated March 2, 2020 of the Prime Minister approving the Master Program for sustainable agricultural development adapting to climate change in the MD until 2030 and vision to 2045	- Shift the strategic focus towards aquaculture, fruits, and rice; increase the proportion of aquaculture and fruit production value while reducing the proportion of rice. - Consider saltwater and brackish water as resources for development. - Coastal areas: Develop agriculture primarily based on saltwater and brackish water resources, harness the advantages of aquaculture; promote the cultivation of specialized rice during the rainy season with freshwater, and encourage brackish-freshwater intercropping systems according to the specific seasonal conditions of the region. - Coastal areas: Invest in building and improving water control infrastructure to supply domestic water, and proactively supply freshwater and brackish water for production and aquaculture.
8	Decision No. 339/QD-TTg dated March 11, 2021 on approving Vietnam's fisheries development strategy to 2030, vision to 2045	- Develop aquaculture into a key economic sector of the nation, producing large-scale goods associated with industrialization and modernization, sustainable development, and proactive adaptation to climate change. Establish a rational structure and organization of production, ensuring high productivity, quality, and efficiency. Build reputable brands with international competitiveness and integration capabilities. Continuously improve the material and spiritual lives of the people, ensuring social security and contributing to national defense, security, and the maintenance of the country's independence, and sovereignty over seas and islands. - For the Mekong Delta, expand the area of aquaculture in areas affected by saline intrusion.
9	Decision No. 1105/QD-UBND dated May 23, 2014 of Kien Giang (now An Giang) PPC on fisheries development planning	The project area has been planned for the development of mono-shrimp and rice-shrimp farming
10	Decision No. 41/QD-UBND dated January 9, 2017 of Kien Giang (now An Giang) PPC on restructuring the agricultural sector until 2020	Efforts are concentrated on shifting coastal agricultural production areas to brackish-freshwater rotation farming, with shrimp-rice farming as the main model
11	Decision No. 558/QD-UBND dated March 12, 2018 of Kien Giang (now An	The project area is located within a brackish-freshwater intercropping zone. Expansion and construction of

No.	Legal strategies and planning related to the project	Conformity of the project location with the strategies and planning
	Giang) PPC approving the adjustment of water resource planning in Kien Giang (now An Giang) province	sluices are underway to proactively regulate water sources. Strengthening embankments and canal networks is also prioritized.

b) Consistent with the socio-economic development trends of the project area

24. The project region has a high potential for socioeconomic growth. However, there has been insufficient and disjointed funding for the building of basic infrastructure, particularly hydraulic works. Therefore, this area remains largely untapped. Every year, the entire area suffers from severe saltwater intrusion and a shortage of fresh water, posing numerous challenges to agricultural production, including low productivity, unstable outputs, and disruption of seasonal schedules. This leads to low socioeconomic growth in the area. Due to the poor quality of groundwater in the area, it is critical to provide fresh water for domestic, industrial, and aquacultural activities while also limiting saline intrusion.

25. Gradually closing the western coastal dike in Kien Giang (now An Giang) is crucial in light of the current circumstances, as it serves to proactively regulate salinity, retain freshwater, prevent inundation, and mitigate water pollution. This aligns with the objectives of the Program to Consolidate and Upgrade the Coastal Dyke System from Quang Ngai to Kien Giang (now An Giang) under Decision No. 667/QD-TTg dated May 27, 2009, by the Prime Minister, while also creating conditions for the socio-economic development of Hon Dat district (former) according to the overall socio-economic development plan of Kien Giang (now An Giang) province.

26. It is important to change the way production works to fit the changing water conditions in the project area. Since the salinity intrusion incident in 2016, farmers have been shifting from growing 2 crops of rice to brackish aquaculture or shrimp-rice rotation. For example, in Binh Giang commune, 1,100 hectares have been shifted over to brackish aquaculture, with 20 hectares set aside for industrial shrimp farming. Based on how efficiently production is going now, this is a good way to adapt to changes in production conditions and also make production more valuable.

27. Furthermore, the project area is included in the province of Kien Giang (now An Giang)'s plan to transition to new production models (such as rice-shrimp farming). This is because it is an area suitable for shrimp farming under saline conditions (provided there are infrastructure solutions to control salinity without adversely affecting the freshwater ecosystem in the northern part of NH80). This transition, part of the province's larger strategy, presents significant opportunities for production and commodity consumption. As a result, economic improvement is inevitable.

c) Consistent with the current production situation of the area

28. The project area encompasses roughly 5,500 hectares of natural land, with around 3,400 hectares for rice cultivation and 20 hectares for industrial shrimp (*Figure 6*). The predominant farming model in this area remains centered on two rice crops (two rice crops and one freshwater aquaculture crop). According to research findings on production within the project area, the present production model yields average earnings of 30 to 40 million VND per hectare.

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29. Since approximately 2015, production in the region between the Don Dong canal and the coastal dike has transitioned from rice to rice-shrimp. It is worth mentioning that the rice-shrimp cultivation model has expanded to encompass an estimated 1,100 hectares as of 2019. The rice-shrimp cultivation model offers several benefits, including sustainability, environmental pollution reduction, and adaptation to the challenges posed by rising sea levels and increased saltwater intrusion. Additionally, the rice-shrimp farming demonstrates higher efficiency compared to monoculture rice farming. According to research conducted in the coastal rice-shrimp farming areas of the MD, this model generates earnings ranging from 38 to 68 million VND per hectare. Specifically, replacing one rice crop with one shrimp crop can result in revenues of 25 to 30 million VND per hectare. Hence, as a production paradigm, rice-shrimp farming can boost economic efficiency per farmed area in comparison to monoculture rice farming. In this farming model, the main intercropping target is shrimp.

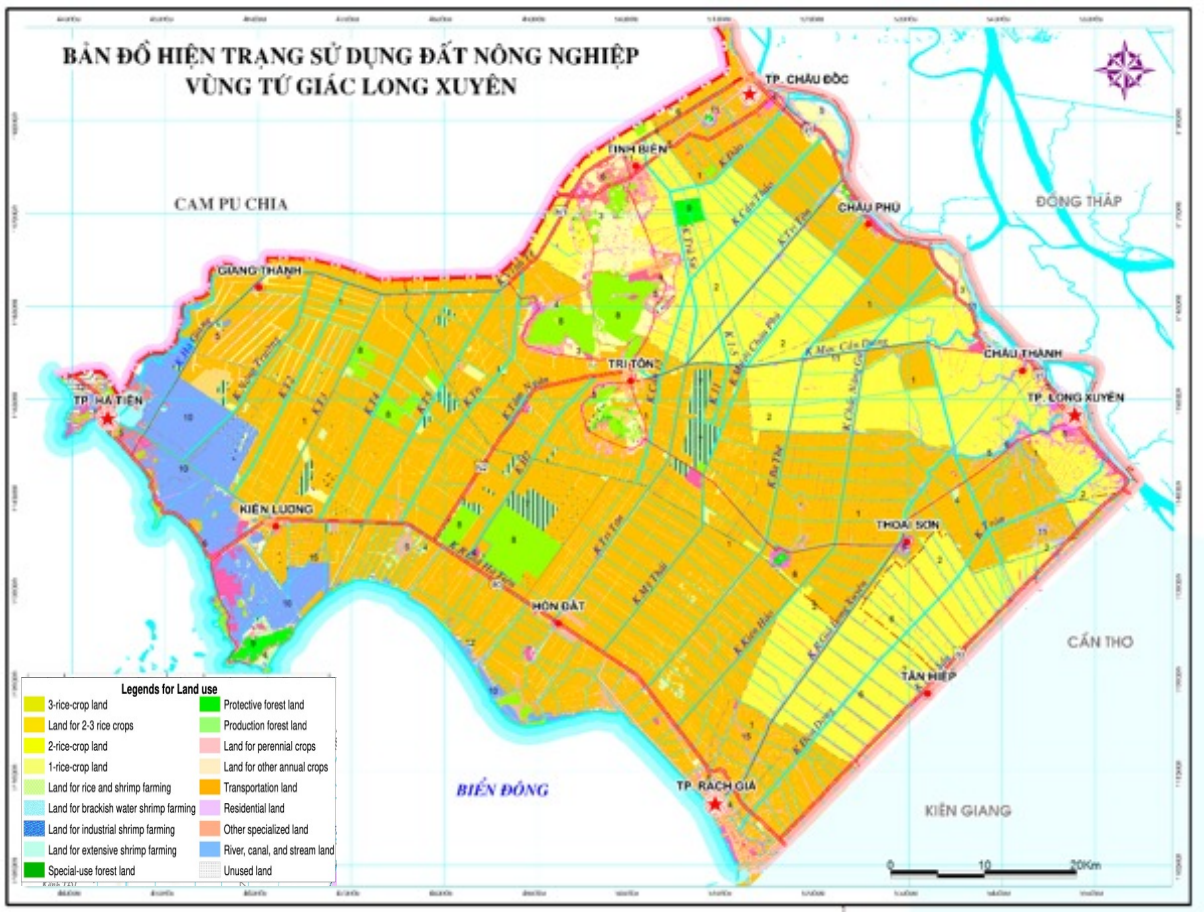


Figure 6: Map of current argicultural landuse in the Long Xuyen Quadrangle

d) Consistent with the water conditions in the area

30. Production in the project area primarily relies on rainwater and Hau river's freshwater. This region often experiences freshwater shortages during the dry season, exacerbated by saltwater intrusion and prolonged heat, leading to freshwater scarcity for production. Additionally, being situated along the western coast, drainage during heavy rainfall can be challenging due to low tide levels. Some areas may experience inundation for less than a week. In neighboring areas, production still predominantly follows freshwater ecosystems, with rice being the main crop.

31. Brackish aquaculture farming is gradually replacing mono-rice growing in the area between the Don Dong canal and the West Sea dike. The shifted area is defined by the farming

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size with closed embankments. Farmers who want to produce brackish aquaculture in places without closed embankments must build temporary dams and close sluices to separate fresh and saline water.

32. Furthermore, there is currently no electricity or transportation infrastructure in this area to facilitate the development of industrial shrimp farming and market access. As a result, investment in infrastructure is required to improve input material quality and productivity through better aquaculture management and increase product value. This contributes to increased capacity and technical support for the adoption of innovative sustainable and ecologically friendly management, exploitation, and farming technologies.

33. Additionally, in this area, there is currently no electricity system or transportation system to support the development of industrial shrimp farming and connect to markets. Therefore, to improve the quality of input materials, and increase productivity through better aquaculture management for added value of the products, investment in basic infrastructure is needed.

34. In the future, changes in Mekong River water caused by upstream hydroelectric activities, sea level rise, and land subsidence will have a severe impact on the MD's freshwater supplies. Current trends indicate a decrease in water flow at the end of the rainy season (due to hydropower reservoirs), resulting in earlier saltwater intrusion and increased water scarcity in the MD during the dry season.

35. The impact of sea level rise also manifests as abnormal weather changes, prolonged heatwaves, and the periodic occurrence of El Nino, posing a risk of saltwater intrusion and drought in most of the agricultural areas in the MD. Additionally, rising sea levels lead to increased saltwater intrusion further inland, especially during the dry season, affecting surface water in rivers and canals, and even groundwater sources, making them susceptible to salinization.

36. Furthermore, the production transition and development in the MD will increase water usage, exacerbating water shortages, particularly in downstream and coastal areas. Consequently, saltwater intrusion will become more predominant. Thus, transitioning production to adapt to changes in water sources is imperative, especially in coastal areas such as those along NH80 in Kien Giang (now An Giang) province.

1.1.4.2. Associated Facilities (AFs)

37. The Project will have impacts on land acquisition causing the relocation of 12 households. In this project, there will be no construction of resettlement areas, displaced households will be resettled at the current residential line along the Binh Giang 1 road. The residential line is being managed by the State.

38. The residential line is considered an associated facility because it is: (a) directly and significantly related to the project; (b) carried out, or planned to be carried out, contemporaneously with the project; and (c) necessary for the project to be viable and would not have been constructed, expanded or conducted if the project did not exist.

39. The residential line is considered as a AF of the project. As a result, the line will be subjected to a due diligence report to review any outstanding issues throughout its land acquisition and resettlement execution.

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1.1.4.3. Other Projects in Proposed Project Area

40. There are no on-going projects and future projects proposed in the project area.

1.2. LEGAL AND TECHNICAL BASIS OF ESIA PREPARATION

1.2.1. Legal Documents and Technical Standards of Vietnam

1.2.1.1. Laws

41. The following laws are applied in conducting environmental and social impact assessments, as well as environmental management during the preparation, construction, and operation phases of the project:

- Law No. 55/2024/QH15 dated November 29, 2024 on fire and rescue, effective from July 1, 2025.
- Land Law 2024 replaces Land Law 2013, effective from January 1, 2025.
- Law No. 03/2022/QH15 dated 11 January 2022 on amendments to certain articles of the law on public investment, the law on public-private partnership investment, the law on investment, the law on housing, the law on procurement, the law on electricity, the law on enterprises, the law on special excise duties and the law on civil judgment enforcement.
- Law on Environmental protection No. 72/2020/QH14 dated November 17, 2020.
- Construction law No. 50/2014/QH13 dated Jun 18, 2014.
- Law on amendments to Construction law No. 62/2020/QH14 dated Jun 17, 2020.
- The Law on Grievance No.02/2011/QH13 dated November 11, 2011.
- The Law on Denouncement No. 25/2018 dated June 12, 2018.
- Law on Irrigation No. 08/2017/QH14 dated June 19, 2017.
- Law on Children No. 102/2016/QH13 dated April 5, 2016;
- Law on Occupational Safety and Health No. 84/2015/QH13 dated on June 25, 2015;
- Law on plant protection and quarantine No. 41/2013/QH13 dated November 25, 2013;
- Law on Cultural Heritages No. 10/VBHN-VPQH dated 23 July, 2013;
- Law on Water Resources No. 17/2012/QH13 dated 21 June 2, 2012;
- Labor Law No. 10/2012/QH13 dated June 18, 2012;
- Law on Complaints No. 02/2011/QH13 dated November 11, 2011;
- Law on Biodiversity No. 20/2008/QH12 dated November 13, 2008;

1.2.1.2. Decrees

42. The following decrees are applied in conducting environmental and social impact assessments, as well as environmental management during the preparation, construction, and operation phases of the project:

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- Decree No. 05/2025/ND-CP dated January 6, 2025, amending and supplementing certain provisions of Decree No. 08/2022/ND-CP, which details the implementation of several articles of the Law on Environmental Protection.
- Decree No. 12/2024/ND-CP dated February 5, 2024 amending Decree No. 44/2014/ND-CP regulating land prices and Decree No. 10/2023/ND-CP amending the Decree guiding implementation Land Law.
- Decree No. 104/2024/ND-CP dated July 30, 2024 of the Government regulating land fund development.
- Decree No. 103/2024/ND-CP dated July 30, 2024 of the Government regulating land use fees and land rents.
- Decree No. 102/2024/ND-CP dated July 30, 2024 of the Government detailing a number of articles of the Land Law.
- Decree No. 88/2024/ND-CP dated July 15, 2024 of the Government regulating compensation, support and resettlement when the State recovers land.
- Decree No. 71/2024/ND-CP dated June 27, 2024 of the Government regulating land prices.
- Decree No. 20/2023/ND-CP dated 04 May 2023 on amendments and supplements to several Articles of the Government's Decree No. 114/2021/ND-CP dated December 16, 2021, regarding management and use of official development assistance (ODA) or soft loans from foreign donors.
- Decree No. 45/2022/ND-CP dated July 7, 2022 of the Government detailing a number of articles of the Law on Environmental Protection.
- Decree No. 08/2022/ND-CP dated 10 January 2022 of the Government detailing some articles of the Law on environmental protection.
- Decree No. 15/2021/ND-CP dated March 03, 2021 of the Government elaborates certain regulations on the management of construction projects.
- Decree No. 124/2020/ND-CP dated October 19, 2020 on guiding specific provisions of the Law on Grievance.
- Decree No. 136/2018/ND-CP dated October 5, 2018 of the Government amending a number of articles of Decrees related to business investment conditions in the field of natural resources and environment.

1.2.1.3. Circulars

43. The following circulars are applied in conducting environmental and social impact assessments, as well as environmental management during the preparation, construction, and operation phases of the project:

- Circular No. 07/2025/TT-BTNMT dated February 28, 2025 of the Ministry of Natural Resources and Environment (MONRE), now Ministry of Agriculture and Environment (MAE) on amendments to some articles of Circular No. 02/2022/TT-BTNMT dated January 10, 2022 on elaboration of Law on Environmental Protection.

- Circular No. 02/2022/TT-BTNMT dated 10 January 2022 of the MONRE (now MAE) detailing implementation regulations for a number of articles of the Law on environmental protection;
- Circular No. 09/2021/TT-BTNMT dated June 30, 2021 of the MONRE (now MAE) amending and supplementing a number of articles of circulars detailing and guiding the implementation of the Land Law.
- Circular No. 10/2021/TT-BTNMT dated June 30, 2021 by the MONRE (now MAE) stipulating regulations on environmental monitoring techniques and management of environmental quality monitoring information and data.
- Circular No. 24/2019/TT-BTNMT dated December 31, 2019 of the MONRE (now MAE) amending and abolishing a number of legal documents under the promulgation and joint promulgation authority of the MONRE.
- Circular No. 47/2017/TT-BTNMT dated November 07, 2017 of the MONRE (now MAE) on supervision of extraction and use of water resources;
- Circular No. 08/2017/TT-BXD dated May 16, 2017 by the Ministry of Construction stipulating regulations on construction solid waste management.
- Circular No. 04/2017/TT-BXD dated 30 March 2017 by the Ministry of Construction stipulating regulation on occupational safety management in the construction of works.

1.2.1.4. Applicable standards and regulations

44. The following standards and regulations are applied in conducting environmental and social impact assessments, as well as environmental management during the preparation, construction, and operation phases of the project:

- QCVN 03:2023/BTNMT - National technical regulation on soil quality.
- QCVN 05:2023/BTNMT: National technical regulation on ambient air quality.
- QCVN 07:2009/BTNMT: National technical regulation on hazardous waste thresholds.
- QCVN 08:2023/BTNMT– National technical regulation on surface water quality;
- QCVN 09:2023/BTNMT– National technical regulation on ground water quality.
- QCVN 14:2025/BTNMT: National technical regulation on domestic wastewater.
- QCVN 18:2021/BXD National Technical Regulation on Safety in Construction.
- QCVN 26:2025/BNNMT - National technical regulation on noise.
- QCVN 27:2025/BNNMT -National technical regulation on vibration.
- QCVN 43:2025/BNNTM- National technical regulation on sediment quality.
- TCVN 6705:2009 - Normal solid wastes – Classification.
- TCVN 6706:2009 - Hazardous wastes – Classification.
- TCVN 9167:2012 - Hydraulic structure - Saline soil - Saline leaching process.

1.2.1.5. Legal documents related to the project

45. The following legal documents are related to the project:

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- Decision No. 971/QD-TTg dated 01 July 2015 of the Prime Minister amending Decision No. 1956/QD-TTg dated November 27, 2009 of the Prime Minister approving the Program "Vocational training for rural workers until 2020".
- Decision No. 12/2024/QD-TTg dated July 31, 2024 of the Prime Minister on mechanisms and policies for job creation and vocational training for people whose land is recovered.
- Decision No.1956/2009/QD-TTg, dated November 17, 2009, by the Prime Minister approving the Master Plan on vocational training for rural labors by 2020.
- Decision No. 12/2022/QD-UBND dated June 9, 2022 of Kien Giang (now An Giang) PPC regulating the land price adjustment coefficient in Kien Giang (now An Giang) province in 2022.
- Decision No. 1223/QD-UBND dated May 20, 2022 of Kien Giang (now An Giang) PPC on promulgating the regulation on compensation prices for aquatic animals, and plants in Kien Giang (now An Giang) province in 2022.
- Decision No. 02/2022/QD-UBND dated January 25, 2022 of Kien Giang (now An Giang) PPC on amending and supplementing a number of articles of Decision No. 26/2020/QD-UBND dated December 22, 2020 dated 22 December 2020 on promulgating the regulation on compensation, support and resettlement when the State recovers land in Kien Giang (now An Giang).
- Decision No. 05/2021/QD-UBND dated June 24, 2021 of Kien Giang (now An Giang) PPC regulating land price adjustment coefficient in Kien Giang (now An Giang) province in 2021.
- Decision No. 940/2021/QD-UBND dated April 8, 2021 of Kien Giang (now An Giang) PPC regulating the construction prices of houses and other land-attached assets in Kien Giang (now An Giang) province.
- Decision No. 13/2021/QD-UBND dated January 5, 2021 of Kien Giang (now An Giang) PPC promulgating the regulation on compensation price list for plants and aquatic species in Kien Giang (now An Giang) province in 2021.
- Decision No. 26/2020/QD-UBND dated December 22, 2020 of Kien Giang (now An Giang) PPC promulgating the regulation on compensation, support and resettlement when the State recovers land in Kien Giang (now An Giang) province.
- Decision No. 2737/2020/QD-UBND dated November 27, 2020 of Kien Giang (now An Giang) PPC stipulating other support policies for land users when the State recovers land in Kien Giang (now An Giang) province.
- Decision No. 03/2020/QD-UBND dated January 13, 2020 of Kien Giang (now An Giang) PPC promulgating the regulation on land price list for the period of 2020 - 2024 in Kien Giang (now An Giang).
- Document No. 879/TTg-QHQT dated June 29, 2021 of the Prime Minister on "Approval of project proposals of the 5 provinces, including Nghe An, Binh Thuan (now Lam Dong), Soc Trang (now Can Tho), Kien Giang (now An Giang), and Ca Mau under the sustainable fisheries development project, funded by the World Bank".
- Document No. 3537/BKHDT dated June 8, 2021 of the Ministry of Planning and Investment submitted to the Prime Minister for seeking "Approval of project proposals for the 5

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provinces: Nghe An, Binh Thuan (now Lam Dong), Soc Trang (now Can Tho), Kien Giang (now An Giang), and Ca Mau under the Sustainable Fisheries Development Project, funded by the World Bank".

- Official Letter No. 2370/VPCP-QHQT dated April 5, 2021 of the Government Office on the proposal of Sustainable Fisheries Development Project with loans from the World Bank – projects in the provinces of Soc Trang, Binh Thuan, Kien Giang, and Ca Mau (now Can Tho, Lam Dong, An Giang and Ca Mau).
- Official Letter No. 3260/BTC-QLN dated March 30, 2021 of the Ministry of Finance on the proposal of Sustainable Fisheries Development Project financed by IBRD capital.
- Official Letter No. 478/UBND-KTCN dated April 16, 2021 of Kien Giang (now An Giang) PPC on finalizing the proposal of Kien Giang Sustainable Fisheries Development Project with IBRD loan.
- Decision No. 728/QD-SNNPTNT dated 22/07/2021 of Kien Giang (now An Giang) DARD (now the Department of Agriculture and Environment) on "Approval of the proposal and cost estimation for the preparation of investment policy proposal report of the Kien Giang sustainable fisheries development project".
- Resolution No. 67/NQ-HDND dated June 16, 2022 of the People's Council of Kien Giang (now An Giang) province on the investment policy of the Kien Giang sustainable fisheries development project.
- Official Letter No. 1100/UBND-KT dated July 1, 2022 of Kien Giang (now An Giang) PPC on the implementation of Resolution No. 67/NQ-HDND dated June 16, 2022 of the People's Council on the investment policy of the Kien Giang sustainable fisheries development project.
- Official Letter No. 1096/SNNPTNT-KHTC dated 07/7/2022 of Kien Giang (now An Giang) DARD (now the Department of Agriculture and Environment (DAE)) on expediting the implementation of the Kien Giang sustainable fisheries development project.
- Official Letter No. 80/BNN-HTQT dated January 4, 2023 of the MARD (now the Ministry of Agriculture and Environment (MAE)) on speeding up the preparation of the Feasibility Study Report for the Sustainable Fisheries Development Project in Soc Trang (now Can Tho) and Kien Giang (now An Giang) provinces.
- Official Letter No. 127/VP-KT dated January 6, 2023 of the Office of Kien Giang (now An Giang) PPC on speeding up the preparation of the Feasibility Study Report of the Sustainable Fisheries Development Project.
- Official Letter No. 1004/VP-KT dated February 20, 2023 of the Office of Kien Giang (now An Giang) PPC on the identification of the owner of the Kien Giang sustainable fisheries project.

1.2.1.6. Documents and data of the project owner to be used in the process of environmental and social impact assessment

- The feasibility study report of the Kien Giang Sustainable Fisheries Development Project.
- Technical drawings.

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- Environmental quality analysis, including air, surface water, groundwater, wastewater, soil, sediment, and aquatic life in November 2023.
- Results of the topographical and geological survey of the project area.
- Results of public consultations, including:
  - Consultations with organizations and agencies directly related to the project via document sending: People's Committees and Fatherland Front Committees of Binh Giang commune and Binh Sơn commune in January 2024.
  - Public consultations with affected households via meetings in January 2024.

1.2.2. Relevant International Agreements

46. Vietnam has signed several international agreements and conventions relating to environmental management, community rights, and ethnic minorities (EMs). International treaties are not always adopted to be national legislation. Some of the key agreements relevant to the project are listed in *Table 7*.

Table 7: International agreements relevant to environmental & social issues

Agreements/Conventions	Status	Objectives/Relevance
A. ENVIRONMENT		
United Nations Convention on Biological Diversity, 1992	Signed in May 1993	To promote the development of national strategies for the conservation and sustainable use of biological diversity. Often seen as the key document regarding sustainable development.
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention), 1982	Joined in 1989	The conservation and sustainable utilization of wetlands, i.e. to stem progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value.
Kyoto Protocol, 1997	Signed in December 1998	To provide international guidelines on restrictions of Greenhouse gas (GHG) emissions to prevent CC; the Project will emit GHGs from power generation through heavy fuel combustion
Paris Agreement	Joined in April 2016	The Paris Agreement set a goal for not only the reduction of GHG emissions but also focus on Adaptation and finance flows that support developing countries to commit to the agreement. The agreement aims to strengthen the global climate change response by increasing the ability of all to adapt to the adverse impacts of climate change and foster climate resilience.
Convention on the International Trade of Endangered Species of	Joined in 1994	To ensure that international trade in specimens of wild animals and plants does not threaten their survival and it accords varying degrees of

Agreements/Conventions	Status	Objectives/Relevance
Wild Fauna and Flora (CITES), 1973		protection to more than 33,000 species of animals and plants.
Stockholm Convention on Persistent Organic Pollutants, 2001	Signed in July 2002	UNEP calls for global action to be taken on POPs which are defined as chemical substances that persist in the environment, bio-accumulation in the food chain, and cause adverse impacts on human health.
Intended Nationally Determined Contribution (INDC) to the UNFCCC	Signed in June 1992	To provide national intention on restrictions of GHG emissions to prevent climate change
B. SOCIAL AND CULTURAL		
Protection of the World Cultural and UNESCO Convention Concerning the Natural Heritage, 1972 (World Heritage Convention)	Joined in 1987	To promote cooperation among nations to protect heritage from around the world that is of such outstanding universal value that its conservation is important for current and future generations.
Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) 1979	Signed in July 1980	The Convention defines what constitutes discrimination against women and mandates actions on a national level to put an end to discrimination.
International Covenant on Economic, Social and Cultural Rights (ICESCR)	Joined in 1982	This could protect the rights of minority ethnic groups

47. Vietnam has signed certain ILO Conventions, the details for which are provided in *Table 8*. Vietnam, which has now ratified 6 out of the 8 ILO Fundamental Conventions, becomes the 167th ILO Member State to ratify Convention No. 98 and the 20th State in the Asia and Pacific region to do so.

Table 8: Vietnam ratification to ILO Conventions

Convention	Date	Status
C029 - Forced Labour Convention, 1930 (No. 29)	05 Mar 2007	In Force
C098 - Right to Organise and Collective Bargaining Convention, 1949 (No. 98)	05 Jul 2019	In force
C100 - Equal Remuneration Convention, 1951 (No. 100)	07 Oct 1997	In Force
C111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111)	07 Oct 1997	In Force
C138 - Minimum Age Convention, 1973 (No. 138) Minimum age specified: 15 years	24 Jun 2003	In Force
C182 - Worst Forms of Child Labour Convention, 1999 (No. 182)	19 Dec 2000	In Force

1.2.3. Relevant World Bank Environmental and Social Standards and Guidelines

48. The World Bank Environmental and Social Framework[2] (ESF), which became effective on October 1, 2018, sets out the WB's commitment to sustainable development, through a Bank Policy and a set of Environmental and Social Standards (ESSs) that are designed to support Borrowers' projects, to end extreme poverty and promote shared prosperity.

49. The Bank is committed to supporting Borrowers in the development and implementation of projects that are environmentally and socially sustainable, and to enhancing the capacity of Borrowers' environmental and social frameworks to assess and manage the environmental and social risks and impacts of projects. To this end, the Bank has defined ten specific Environmental and Social Standards (ESSs), which are designed to avoid, minimize, reduce, or mitigate the adverse environmental and social risks and impacts of projects.

50. The project's environmental and social risk has been rated as Moderate. Nine out of the ten Environmental and Social Standards (ESSs) in the ESF are relevant to the project, including:

- ESS1: Assessment and Management of Environmental and Social Risks and Impacts
- ESS2: Labor and Working Conditions
- ESS3: Resource Efficiency and Pollution Prevention and Management
- ESS4: Community Health and Safety
- ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
- ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- ESS7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities
- ESS8: Cultural Heritage
- ESS10: Stakeholder Engagement and Information Disclosure

51. The scope of application of ESSs is presented below:

1.2.3.1. ESSs applicable for the project

a) ESS1: Assessment and Management of Environmental and Social Risks and Impacts

52. The ESS1 requires the Borrower to be responsible for assessing, managing, and monitoring E&S risks and impacts associated with each stage of a project supported by WB to achieve E&S outcomes consistent with the ESSs.

53. For the project, it is expected that the project will bring about numerous environmental benefits, i.e. positive impact on waste via investments and better regulatory enforcement. The overall project E&S risks are assessed as moderate and the reasons are as follows:

- On the social side, the main social risks and impacts would consist of loss of lands, assets on land, livelihoods, and other properties due to temporary and permanent land acquisition and relocation; disruption in the livelihood activities of farmers (due to upgrading/construction and operation of aquaculture infrastructure, and improved enforcement capacity); occupational health and safety (OHS), gender-based violence (GBV)

[2] https://www.worldbank.org/en/projects-operations/environmental-and-social-framework

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and Sexual Exploitation or Abuse (SEA)/Sexual Harassment (SH) due to labor influx; and related risks of community safety and disruption; increase of water use conflict between rice farming and brackish water aquaculture; farmers' resistance to adapting in livelihood models; risk that failure of livelihood models adversely impacting welfare of beneficiary households; uneven access to project benefits among vulnerable groups such as poor households, female headed households, and EM households; relocation of graves; and risks to human health due to potential overuse of antibiotics in livelihood activities. Although the potential impacts/risks of the project are diverse, they are all manageable and could be mitigated/compensated through appropriate E&S assessment and mitigation plans to be developed during the project preparation or implementation.

- The main environmental risks and impacts during the project implementation include (i) safety risk relating to UXOs; (ii) environmental pollution due to generation of dust, waste, waste water and excavated materials; (iii) water quality degradation and impacts to aquatic species; (iv) risks of erosion and subsidence during construction process; (v) impacts on areas of sensitivity such as natural habitats and modified natural habitats; (vi) risks of erosion and subsidence during the construction of sluices and traffic roads. The key environmental risks and impacts during operation include (i) soil erosion and embankment subsidence; (ii) threatening to aquatic biodiversity due to potentially escaping artificial and alien species into water bodies; (iii) contamination of aquatic systems, water sources due to chemicals/antibiotics usage for shrimp cultivation/breeding area and untreated wastewater directly discharged into the environment; (iv) air pollution and noise due to operation of vehicles on land; and (v) water pollution and disturbance of aquatic life due to improper waste management. The risks and impacts are predictable, mostly moderate, localized, and could be mitigated and managed. The implementing agencies have certain experience with safeguard policies but do not have knowledge and experience in the application of ESF during project implementation.
- Given the type, location, sensitivity of the project, and the capacity of the implementing agency, the potential environmental and social risks and impacts are rated as Moderate.

54. Although Vietnam has an advanced E&S Framework, there are gaps between the national environmental and social assessment (ESA) regulation and practice and good international practice. Discussion on the ESSs application to the project is provided below while *Table 9* describes key gaps between the national EIA requirements and the ESSs.

b) ESS2: Labor and Working Conditions

55. ESS2 recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. Project owner scan promotes sound worker-management relationships and enhances the development benefits of the project by treating workers in the project fairly and providing safe, secure, and healthy working conditions.

56. With the current design, it is expected that the project activities will require the use of direct, contracted, and Primary Supply workers (local workers are prioritized) to support the project management, and to carry out the upgrading of existing sluice gates, construction sluices, rural roads, and installation of medium and low voltage lines. It is estimated that the construction/upgrading project items are scattered and mostly of small and medium work scale with the number of workers at each construction site estimated at about 5-10 people. Most risks

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relate to occupational and community health and safety issues, and other risks associated with the construction activities including OHS, GBV/SEA/SH, and to the operation of project items.

57. To be consistent with the ESS2 requirement, as part of the ESA process, a project Labor Management Procedures (LMP) has been prepared as a stand-alone document and referred to in the project ESIA. The LMP sets out how the project workers will be managed under the requirements of national laws and ESS2.

c) ESS3: Resource Efficiency and Pollution Prevention and Management

58. The ESS recognizes that economic activity, and extensive agricultural and fisheries production often generate pollution to air, water, and land, and consume finite resources that may threaten people, ecosystem services, and the environment at the local, regional, and global levels. This ESS sets out the requirements to address resource efficiency and pollution prevention and management throughout the project life cycle. Given the type and scale of the project, several resources and construction materials will be required, and adverse impacts on human health and the environment are expected to be moderate. The risks and impacts related to the released pollutants, waste generation, management of the use of antibiotics and chemicals, impacts on the community, and resource use efficiency will be assessed and mitigation and management measures will be proposed during the preparation of each project as part of project Environmental and Social Assessment (ESA) process in the sections below.

59. The excavated materials from sluices' foundation construction could be polluted with organic substances or naturally polluted by acidic sulfate. However, the amount of excavated soil in each sluice is small and it can be reused for backfilling. Therefore, the adverse impacts and risks relating to excavating, storage, transportation, and disposal of excavated materials will be small.

60. Contamination of aquatic systems during operation by chemical residues may include the remains of veterinary drugs (e.g. antibiotics) that may have been applied to the cultivated species, and toxic substances such as formalin and malachite green, a cancer-causing agent, that may have been that are used to treat finfish for parasites and their eggs for fungal growth. Risk of exposure to hazardous materials and chemicals such as a variety of chemicals may be used in the operation of an aquaculture facility to treat and/or control disease organisms or to facilitate production (e.g. lime, diluted chlorine, or salt). To mitigate these risks and impacts, an Integrated Pest Management Plan has been included in the project ESIA process.

61. The project implementation will produce emissions due to exhaust gases during construction and operation, an estimate of gross Green House Gas (GHG) emissions will be required, provided that such estimation is technically and financially feasible. The project will adopt measures, specified in the WBG EHSG and other Good International Industry Practices (GIIP), for efficient use of raw materials and optimization of energy use, to the extent technically and financially feasible.

d) ESS4: Community Health and Safety

62. The ESS4 addresses the health, safety, and security risks and impacts on project-affected communities and the corresponding responsibility of the project owner to avoid or minimize such risks and impacts, with particular attention to people who, because of their circumstances, may be vulnerable. Given its nature and scale, the project is not expected to discharge a large number of hazardous materials, or dredged materials without proper management affecting

community health. It is also not expected to expose local people to any high or substantial risks of waterway and road traffic accidents, electricity uses as well as social disturbance due to labor influx. The project does not involve the construction or rehabilitation of dams or depend on water supply from existing dams.

63. Therefore, standard measures in the World Bank Group's Environment, Health, and Safety Guidelines (EHSG) to ensure the community health and safety of communities during the construction and operation of project-financed infrastructure should suffice. These include measures in general facility design and operation, communication and training, and the measures to address physical hazards, chemical hazards, personal protective equipment, special hazard environments, and monitoring. In addition, measures to prevent Gender-based violence (GBV), sexual exploitation, abuse, and harassment (SEA/SH) will be implemented, including requiring workers to sign a Code of Conduct and establishing a Grievance Redress Mechanism (GRM) capable of receiving and referring SEA/SH-related complaints in a safe and confidential manner.

e) ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

64. This ESS recognizes the adverse impact of the project on local people, especially those considered to be vulnerable or disadvantageous. Involuntary resettlement will be avoided. Where involuntary resettlement is unavoidable, it will be minimized and appropriate measures to mitigate adverse impacts on displaced persons (and on host communities receiving displaced persons) will be carefully planned and implemented.

65. Given that sluice gate improvement will be carried out within the confines of existing sluice gates, no land will be acquired for the items. The installation of medium and low-voltage power lines mainly uses temporary land during construction. Only the construction of sluices and traffic routes acquire land with a total acquired land of 15.46ha. This lead to the relocation of 12 households, permanent loss of approximately 93,907 trees of various types, as well as on-land assets such as fences, yards, mooring areas, and drilled wells. Using the mitigation hierarchy, the alternative analysis during the project designing stage will be made to avoid or reduce the land acquisition and restriction of land use as much as possible to minimize the negative physical and socioeconomic impacts on local people especially the vulnerable, RP and EMDP has been prepared in compliance with the project RPF and EMPF.

f) ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

66. The ESS6 recognizes that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development and it recognizes the importance of maintaining core ecological functions of habitats, including forests, riverine, littoral, coastal, and marine areas, and the biodiversity they support. The ESS6 also addresses sustainable management of primary production and harvesting of living natural resources and recognizes the need to consider the livelihood of project-affected parties, including Indigenous Peoples whose access to, or use of, biodiversity or living natural resources may be affected by the project.

67. As the project's nature and scope, some activities of the project will be carried out on the existing canals and rivers that have been used as waterways for fish capturing, storm sheltering; and water supply and drainage for fishery cultivating and breeding. These rivers and canals can

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be considered aquatic ecosystems and homes for aquatic species but would be classified as modified habitats under ESS6. All project construction activities are not expected to pose any adverse impacts on the natural conservation/protected areas.

68. The relevance of this ESS will be further discussed and assessed below. Mitigation measures will be in place to protect or minimize the adverse impacts on aquatic ecosystems during construction (e.g. increased water turbidity, accidental pollution from spillage of construction materials, and leakage of oil and grease).

g) ESS7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities

69. The ESS7 aims to ensure that the development process fosters full respect for the human rights, dignity, aspirations, identity, culture, and natural resource-based livelihoods of ethnic minorities (equivalent definition to Indigenous Peoples). ESS7 is also meant to avoid adverse impacts of projects, or when avoidance is not possible, to minimize, mitigate, and/or compensate for such impacts.

70. A number of EM households including Khmer, have been living with King people in the project area for years. Therefore, an EMDP has been prepared as a stand-alone document and referred to this project ESIA. The EMDP is consistent with the project EMPF.

h) ESS8: Cultural Heritage

71. The ESS8 recognizes that cultural heritage provides continuity in tangible and intangible forms between the past, present, and future. It sets out measures designed to protect cultural heritage throughout the project life cycle. Given the nature, scale, and location of the Project, it is not expected to cause significant adverse impacts on tangible and intangible cultural heritage. As the project may involve a moderate scale of excavation/dredging activities, there is a potential for chance finds during the Project construction period. A chance finds procedure has been included in the project ESMF and will be included in the project ESMP.

i) ESS10: Stakeholder Engagement and Information Disclosure

72. The ESS10 recognizes the importance of open and transparent engagement between the project owner and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation. For the Project, key stakeholders are the beneficiary communities and households, the project-affected people, the implementing agencies at the national level (MOF, MOC, MOIT, MEA, Ministry of Home Affairs (MOHA), and Ministry of Ethnic and Religious Affairs (MOERA), etc.), the local authorities (including PPC, DAE, Department of Home Affairs (DOHA), and Department of Ethnic and Religious Affairs (DOERA), DOF, DOC, DOIT and CPCs of Binh Giang and Binh Son).

73. A Stakeholder Engagement Plan (SEP) has been developed for the project. This is to ensure transparency and meaningful consultation with the affected and interested parties. Stakeholder engagement and consultations will be conducted throughout the project cycle. This includes discussions of project design and impacts among potential beneficiary communities, as well as provincial-level multi-stakeholder discussions on these issues during the preparation phase.

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Due attention will be given to identifying the "disadvantaged or vulnerable" project-affected individuals or groups during stakeholder identification and analysis. The SEP, along with other E&S instruments, will be subject to public consultation and disclosure per requirements of ESS10 and will be treated as a live document to be regularly updated along the pace of project implementation. Also, the SEP outlines the GRM for the project.

1.2.3.2. Other policies

74. The Project is also subject to comply with the legal operational policies on Projects on International Waterways (OP/BP 7.50).

75. World Bank Group Environmental, Health, and Safety Guidelines[3] will also apply to this project:

- World Bank-financed projects should also consider the World Bank Group Environmental, Health, and Safety Guidelines (known as the "EHS Guidelines"). The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice.
- The EHS Guidelines contain the performance levels and measures that are normally acceptable to the World Bank Group and are generally considered to be achievable in new facilities at reasonable costs by existing technology. The environmental assessment process may recommend alternative (higher or lower) levels or measures, which, if acceptable to the World Bank, become project- or site-specific requirements. This project should conform to the general EHS Guidelines and industry-specific EHS Guidelines on Water and Sanitationn.

1.2.4. Gap Analysis between Vietnam Legal Regulations and the WB's ESF

76. Vietnam's regulations on environmental and social assessment are different from the WB's ESF. Although Vietnam has made efforts to narrow the differences, there are still differences between the two systems. *Table 9* describes the differences and gap-filling measures.

3The EHS Guidelines can be consulted at www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines.

Table 9: Summary of the WB's ESA and National EIA Processes and proposed gap mitigation for the project

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam	Project Gap Filling Measures
Objectives	Borrowers are responsible for E&S risk and impact assessment, management and monitoring	LEP and related laws, decrees, standards and regulations on environmental protection. This law is supplemented and supported by the legal system and legal documents related to natural resource management, labor, construction management, etc. The following comparison focuses on the LEP 2020 No. 72/2020/QH14 and directives for implementation (Decree No. 05/2025/ND-CP, Decree No. 08/2022/ND-CP, Circular No. 07/2025/TT-BTNMT, Circular No. 02/2022/TT-BTNMT). Investment projects are required to submit EIA for approval.	The WB' ESF will be applied.
Screening	The WB will classify all projects into one of four classifications: high risk, substantial risk, moderate risk or low risk. To determine risk level of a project, the followings are considered: type of investments, location, sensitivity, and scale of the project; the nature and magnitude of the potential E&S risks and impacts; and the capacity and commitment of the Borrower (including any other entity responsible for the implementation of the project) to manage the E&S risks and impacts in a manner consistent with the ESSs. An ESRS (Environmental and Social Risk Summary) is prepared to specify the E&S instruments to be prepared. ESRS at Concept Stage is disclosed.	The project locations and types are classified in Groups I to V of Decree No. 08/2022/ND-CP and revised Appendices of I, II and IV under Decree No. 05/2025/ND-CP, and Circular No. 07/2025/TT-BTNMT. Basic technical parameters such as location, size, capacity, land area, are taken into account. The project owner shall prepare EA instruments based on annexes I, II and III or in consultation with MONRE/DONRE if needed. – Projects falls into Group I and certain projects in Group II: EIA is required. – Projects in Groups I, II, and III that generate wastewater, emissions, solid or hazardous waste, or involve resource exploitation: Environmental License is required – Projects in Group III that have moderate environmental impacts, not subject to EIA or	The ESF and national laws and specific WB's ESS requirements as agreed with WB will be applied.

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam	Project Gap Filling Measures
		environmental licensing: Environmental Protection Plan (EPP) is required. – Projects in Group IV: Environmental Registration	
ESA instrument	– Depending on the project risks and impact, a range of instruments and procedures required to meet the ESSs' objectives, these include: Environmental and Social Impact Assessment (ESIA), ESMF, ESMP; sectoral and regional ESIA; SESA, hazard of risk assessment, environmental and social audit, cumulative impact assessment; and social and conflict analysis. The WB provides general guidance for implementation of each instrument. – Based on information provided by the Borrower, the WB will conduct E&S due diligence for all projects requesting for WB support. – The Borrower will be required to prepare, submit, and disclose the Environmental and Social Commitment Plan (ESCP), and Stakeholder Engagement Plan (SEP) before appraisal.	The type of EA instruments such as SEA, EIA, EPP, Environmental License or Environmental Registration is decided based on Groups I to V of Decree No. 08/2022/ND-CP and revised Appendices of I, II and IV under Decree No. 05/2025/ND-CP.	– Preparation of an ESMF, ESIA/ESMP, RPF, RAPs, EMPF, EMDP, ESCP, SEP, and LMP for the Project will be required to meet the ESSs1, 2, 3, 4, 5, 6, 7, 8, and 10 while an EIA, or EPP/Environmental License/Environmental Registration will be prepared to meet GOV requirements.
Independent Expert	– For high risk and complex project, the Borrower may be required to retain independent ESA experts not affiliated with the project to carry out ESA. – For high risk projects, especially those related to dam safety, the Borrower should also engage an advisory panel of independent, internationally recognized environmental specialists to advise on aspects of the project relevant to ESA.	– Not regulated in Vietnam policies.	– Risk of the proposed Project is substantial and dam safety will not be involved. The Project will not require any independent experts.

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam	Project Gap Filling Measures
	– Experts/consulting firm will be selected through bid process under strict observation of the WB.		
Public consultation, stakeholder engagement, and GRM	– During the ESA process, the Borrower consults project affected groups and interested parties about the project's environmental aspects and takes their views into account. – In line with ESS10, preparation of a Stakeholder Engagement Plan (SEP), information disclosure, and establishment and operations of a GRM are required to ensure adequate consultation and transparency. – Consultation/stakeholder engagement is carried out throughout project life – ESS2 also require the preparation of the labor management procedures (LMP) and an establishment and operation of a GRM for project workers. – If ethnic minorities are present and adversely impacted (adverse impacts on IP Land/natural resources, Cultural Heritage or cause relocation of IPs), free, prior, and Informed Consent (FPIC) is required. – For meaningful consultations, the Borrower provides relevant project documents in a timely manner prior to consultation in a form and language that are understandable and accessible to the group being consulted. – Minutes of the public meetings are included in the reports.	Pursuant to Article 33 of Law 72/2020/QH14 (stipulated in Article 26 of Decree 08/2022/ND-CP and Article 1 of Decree 05/2025/ND-CP regulating consultation in environmental assessment) as follows: When assessing environmental impact, the project owner must consult the following two groups of subjects: a) Residential communities and individuals directly affected by the project's environmental impact, specifically: – Residential communities and individuals living, producing and doing business in land, water surface, water surface land and sea areas appropriated for project investment. – Residential communities and individuals within the direct impact of wastewater, exhaust gas, dust, noise, solid waste, and hazardous waste caused by the project. – Residential communities and individuals affected by subsidence, landslides, riverbank and coastal sedimentation caused by the project. – Other affected communities and individuals, identified through the environmental impact assessment process. b) Agencies and organizations directly related to the investment project include:	– Conduct EIA consultation as per GOV regulation taken into account the WB requirements, in presenting the ESMF, RPF, EMPF, ESCP, SEP, and LMP during consultation. The results from consultation will be incorporated into the EIA or can be submitted as a standalone report. – If consultation with ethnic minority is required, consultation with WB specialist will be made to ensure that the consultation is adequate.

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam	Project Gap Filling Measures
		– People's Committee at commune/ward level, Vietnam Fatherland Front Committee at commune/ward level where the project is implemented. – Management board, investor in construction and business of infrastructure of production, business, concentrated service zones, industrial clusters where the project is located within the management boundary. – State agencies managing irrigation works for projects that discharge wastewater into irrigation works or occupy irrigation works. – State management agencies assigned to manage areas with environmentally sensitive factors (if any). – Ministry of National Defense, Ministry of Public Security or Provincial Military Command, Provincial Police for projects related to security and defense factors (if any). The project owner sends the EIA report to the People's Committee of the commune/ward level of the relevant unit (as if above) along with a written request for comments. Within 15 working days from the date of receiving the EIA. Within 15 working days from the date of receipt of the EIA, the W/CPCs send their responses if they do not approve the project. Consultation with directly affected communities and individuals shall be conducted either through public consultation meetings or by written consultation. The project owner is responsible for	

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam	Project Gap Filling Measures
		coordinating with the Commune People's Committee to send invitations to all directly affected communities and individuals to attend the consultation meetings. In cases where communities or individuals do not attend the consultation meeting, their opinions must be collected in writing by distributing consultation forms. The total number of people attending the consultation meeting and those consulted via written forms must account for at least two-thirds of all directly affected individuals. Members of the same household may provide their opinions through a designated household representative. If an individual receives a consultation form but does not provide feedback within five days from the date of receipt, it shall be considered that they have been consulted.	
Disclosure	– The Borrower disclose ES documents at project sites; – The WB will disclose documentation relating to the E&S risks and impacts of high risks and substantial risks projects prior to project appraisal. – The WB disclose E&S documentation based on the Borrower's authorization. Once the WB officially receives the report, it will make the EA report in English available to the public through the Bank external website.	After the EIA report is approved, the project owner proceeds with the necessary procedures to make the Environmental Management Plan (ESMP) publicly available at the W/CPC's office in the project area, in which consultation of the community is made for people's information, examination, and oversight. (Article 26 of Decree No. 08/2022/ND-CP, Article 1 Decree No. 05/2025, Article 1 of Circular No. 07/2025/TT-BTNMT).	– Follow GoV requirements and WB requirements. – All ESIA/ESMP, RP, EMDP, ESCP, SEP, and LMP will be publicly disclosed
Clearance procedure	Review and clearance of ES documents will follow upfront agreements between the Borrower and the WB. If the Bank is not satisfied that adequate capacity exists on the part of the Borrower, all High	– The MAE shall appraise and approve ESIA reports for projects specified in Appendix III to the Decree No. 08/2022 and revised Appendix III under Decree	– GoV's approval of the EIA, or EPP will be required. – The province will approve all E&S documents of the project.

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EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam	Project Gap Filling Measures
	Risk and, as appropriate, Substantial Risk subprojects will be subject to prior review and approval by the Bank until it is established that adequate capacity.	No. 05/2025/ND-CP, except for projects dealing with national defense and security. - PPCs appraise and approve ESIA reports for projects in the province (except for projects specified above) and 7 types of project in Article 26a of Decree 05/2025/ND-CP.	
ESA supervision	- During project implementation, ensuring compliance is the responsibilities of the Borrowers. Borrowers shall carry out E&S requirements and monitoring E&S compliance in accordance with project legal agreement (including the ESCP) and providing regular monitoring report to the Bank. - The Bank carry out E&S monitoring proportionately to the potential E&S risks and impacts. The Bank carry out regular implementation support mission including E&S implementation monitoring. The E&S monitoring and reporting is based on provisions and arrangement specified in the loan agreement and described in the other project documentation, to determine whether the Borrower's compliance with environmental covenant (primarily with EMP) is satisfactory. - Based on the result of monitoring, any corrective and preventive actions will be identified and incorporated into an amended ESCP in a manner acceptable to the Bank. The borrower will implement, monitor and report on these actions following the amended ESCP.	- The DAE is entrusted to supervise the environmental compliance of the project. The local DAE and Environmental Police carry out inspections to major polluters or when there are issues such as complaints, environmental accidents, pollution etc. is entrusted to supervise the environmental compliance of the project. - By the end of the project construction stage, the Environmental Management Agencies will coordinate with Construction Management Agencies to supervise the compliance of environmental management activities stated in EIA.	Follow the approved ESCP ESIA/ESMP, RP, EMDP, SEP, LMP of the Project.

1.3. PROJECT DESCRIPTION

1.3.1. Project location

77. The Project will be carried out in the communes of Binh Giang and Binh Son of former Hon Dat district, Kien Giang province (now An Giang). It will cover an area of about 5,500ha and is limited by the Vam Ray Canal, Canal 200 (which runs along NH80), Tuan Thong Canal, and the West Sea dyke, as follows (*Figure 7*):

- To the northeast is Canal 200 (near NH 80);
- To the northwest is Tuan Thong canal;
- The Southeast is Vam Ray canal;
- The southwest is the West Sea dike.

78. Layout of the project items are depicted in *Figure 8*.

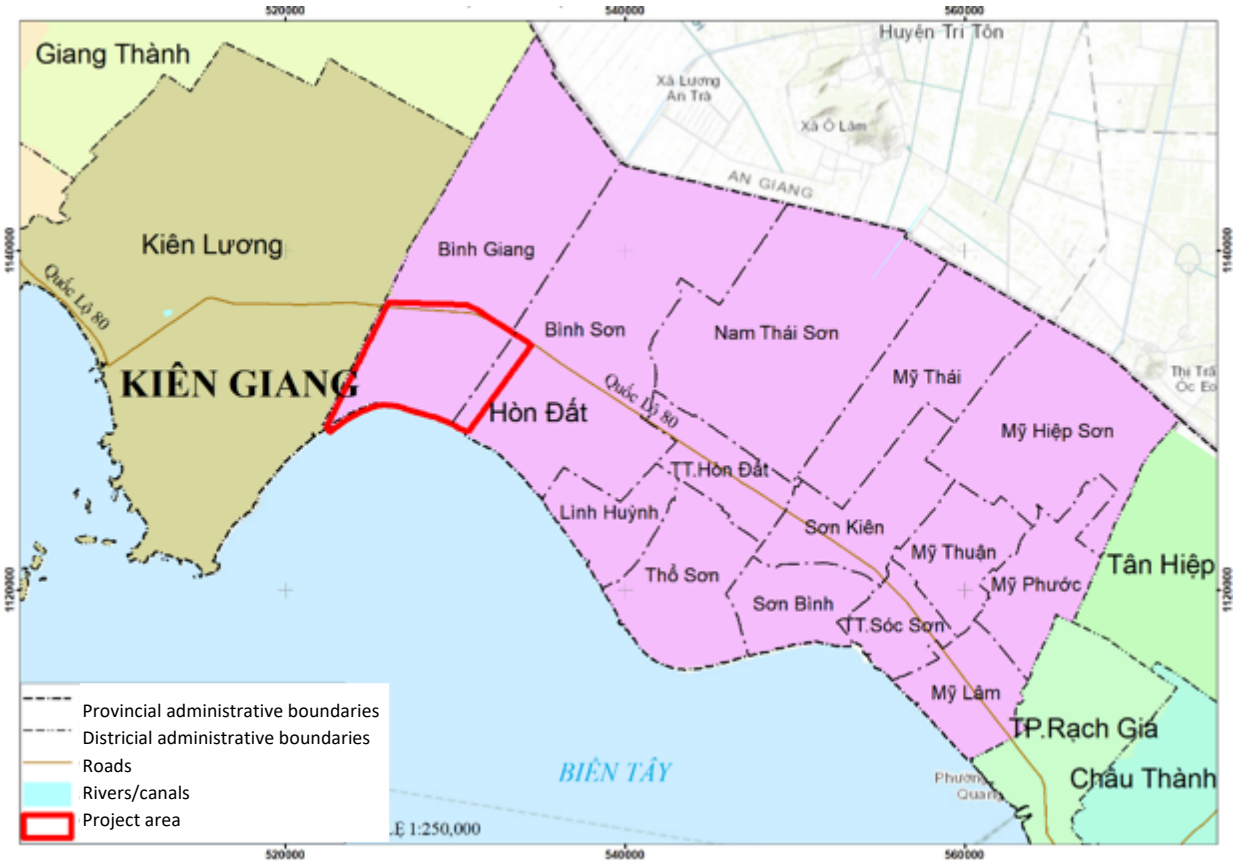


Figure 7: Project location before the merger

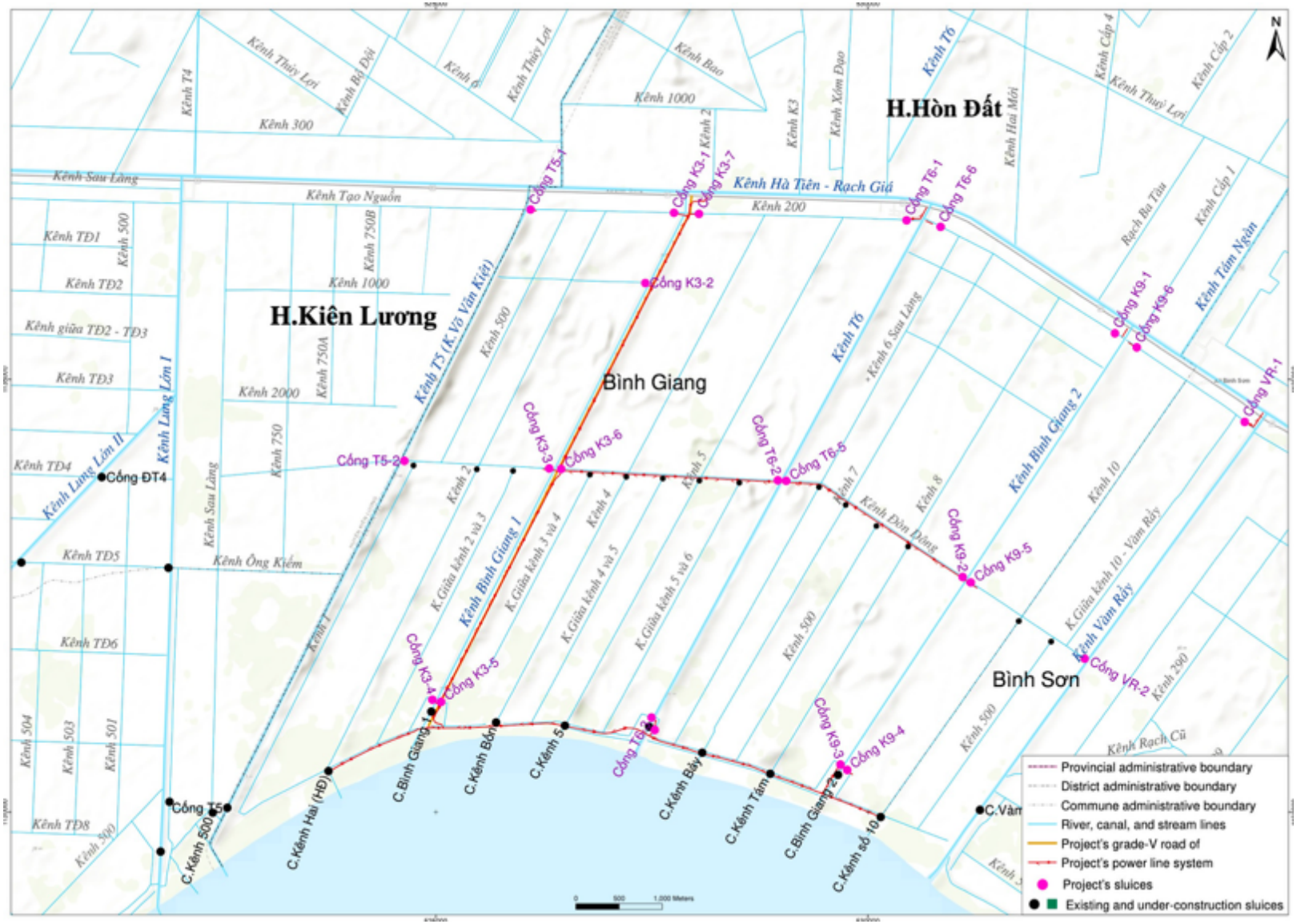


Figure 8: Layout of project items before the merger

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1.3.1.1. Location of sluices

79. The locations of the sluices constructed in the project are presented in *Table 10*.

Table 10: Location of project sluices

No.	Sluices	Locations	Coordinates VN2000 $104^0 30'$ Projection zone 3^0	
			X (m)	Y (m)
1	T5-1	The sluice is located on canal 200 and its center is about 100m from Tuan Thong canal	1137079.33	525967.22
2	T5-2	The sluice is located on Don Dong canal and its center is about 50m from Tuan Thong canal	1134172.26	524471.09
3	K3-1	The sluice is located on canal 200 and its center is about 65m from canal T3	1137036.96	527601.43
4	K3-2	The sluice is located on horizontal canal and its center is about 70m from T3 canal	1136230.8	527186.13
5	K3-3	The sluice is located on Don Dong canal and its center is about 120m from T3 canal	1134087.98	526039.43
6	K3-4	The sluice is located on the canal along the sea dike and its center is about 50m from T3 canal	1131421.61	524744.15
7	K3-5	The sluice is located on canal 2 and its center is about 25m from T3 canal	1131388.51	524856.76
8	K3-6	The sluice is located on canal 2 and its center is about 20m from T3 canal	1134077.7	526254.57
9	K3-7	The sluice is located on canal 2 and its center is about 50m from T3 canal	1137035.83	527725.87
10	T6-1	The sluice is located on canal 200 and its center is about 120m from T6 canal	1136952.26	530304.85
11	T6-2	The sluice is located on Don Dong canal and its center is about 25m from T6 canal	1133945.41	528762.59
12	T6-3	The sluice is located on the canal along the sea dike and its center is about 20m from T6 canal	1131203.84	527294.11
13	T6-4	The sluice is located on the canal along the sea dike and its center is about 80m from T6 canal	1131143.99	527380.28
14	T6-5	The sluice is located on Don Dong canal and its center is about 25m from T6 canal	1133942.11	528856.93
15	T6-6	The sluice is located on canal 200 and its center is about 20m from T6 canal	1136963.16	530477.97
16	K9-1	The sluice is located on canal 200 and its center is about 15m from canal 9	1135596.85	532747.21
17	K9-2	The sluice is located on Don Dong canal and its center is about 15m from canal 9	1132820.06	530917.33
18	K9-3	The sluice is located on the canal along the sea dike and its center is about 15m from canal 9	1130663.06	529488.64

No.	Sluices	Locations	Coordinates VN2000 $104^0 30'$ Projection zone 3^0	
			X (m)	Y (m)
19	K9-4	The sluice is located on the canal along the sea dike and its center is about 15m from canal 9	1130609.97	529555.33
20	K9-5	The sluice is located on Don Dong canal and its center is about 75m from canal 9	1132745.19	531031.2
21	K9-6	The sluice is located on canal 200 and its center is about 85m from canal 9	1135522.91	532858.65
22	VR-1	The sluice is located on canal 200 and its center is about 220m from Vam Ray canal	1134677.71	534100.91
23	VR-2	The sluice is located on canal 200 and its center is about 100m from Vam Ray canal	1131937.06	532240.01

1.3.1.2. Location of the connecting road

80. The connecting road runs above the existing embankment on the left bank of the Binh Giang 1 canal and connects to NH80 and the sea dike (*Table 11* and *Figure 9*):

- The section from the start of NH80 to Canal 200: the route links to NH80 near Ranh Hat Pagoda (between Binh Giang 1 bridge and Ranh Hat bridge). The route runs behind the residential houses along NH80, and is adjacent to the supporting wire of the telecommunication tower, about 40m from NH80 towards the sea. This segment deviates from the Binh Giang 1 canal embankment due to obstructions caused by the Cultural House of Ranh Hat hamlet (*Figure 10*).

Table 11: Coordination of the road

No.	Descriptions	Coordinates VN2000 $104^0 30'$ - Projection zone 3^0	
		X (m)	Y (m)
1	Starting point connecting to NH80	1137220.33	527939.92
2	End point connecting the sea dike	1131080.07	524877.37

- The section along Canal 200 doesn't follow the existing bank along Binh Giang 1 canal because of the Ranh Hat hamlet cultural house, the ongoing Ranh Hat water plant project, and the new Canal 200 bridge (rural traffic bridge with vehicle lane width of 3m). Instead, it's skewed toward the field, 5 to 12m from the Canal 200 bridge.



Figure 9: The connecting road location on Google Earth

- The section from canal 200 to Don Dong canal: the route runs close to the embankment along Binh Giang 1 canal, in front of a row of residential houses, and parallel to the existing road, about 12 to 15m from the edge of the Binh Giang 1 canal (*Figure 11*).

- The section from Don Dong canal to the canal along the sea dike:
  - The sub-section near Don Dong canal: The sub-section follows the embankment of the Binh Giang 1 canal, toward the fields and around 10-15 meters from the Binh Giang 1 canal embankment, about 12 to 15m from the edge of the Binh Giang 1 canal (*Figure 12*).
  - The sub-section near the canal along the sea dyke: the sub-section close to the embankment of the Binh Giang 1 canal, in front of Giong Ke Secondary School and a row of residential houses along the existing road, about 7 to 10m from the edge of the Binh Giang 1 canal (*Figure 13*).
- The segment intersecting with the canal along the dike follows the Binh Giang 1 canal embankment and coincides with the existing rural traffic bridge with a vehicle lane width of 2m, which has been in operation for a long time and is presently being degraded.
- The section from the canal along the sea dike to the sea dike: the route connects to the road over the sea dike at Km 21+450 towards Rach Gia City (*Figure 14*).

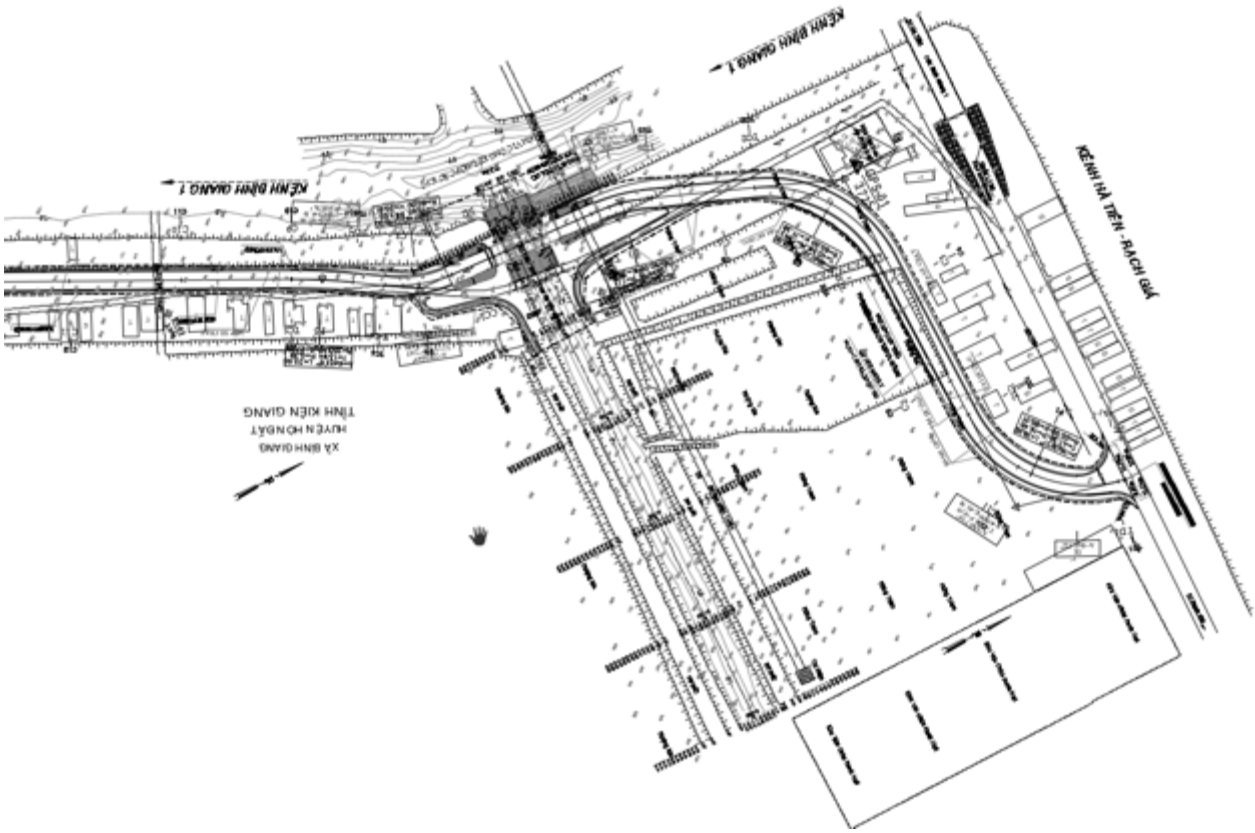


Figure 10: Road section from the start of NH80 to Canal 200

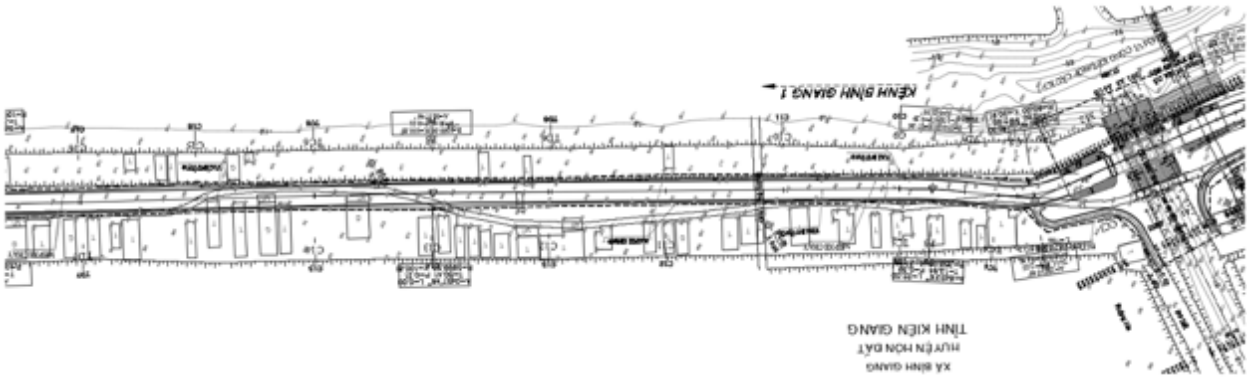


Figure 11: Road section from canal 200 to Don Dong canal

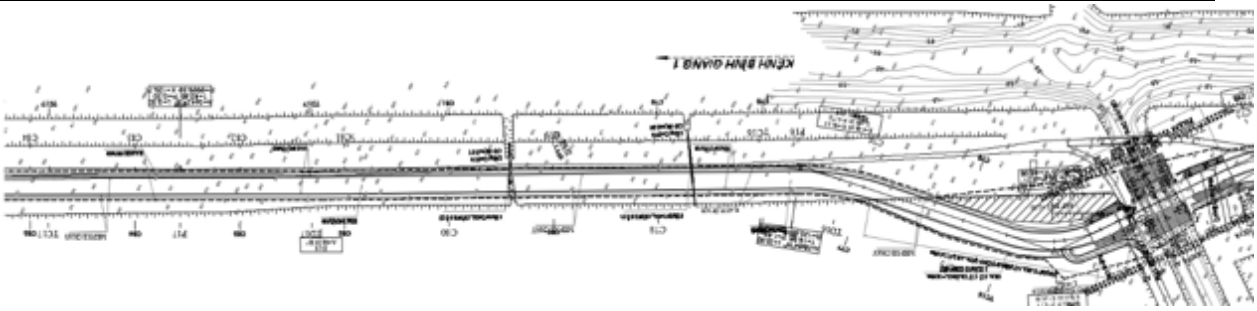


Figure 12: Road sub-section near Don Dong canal

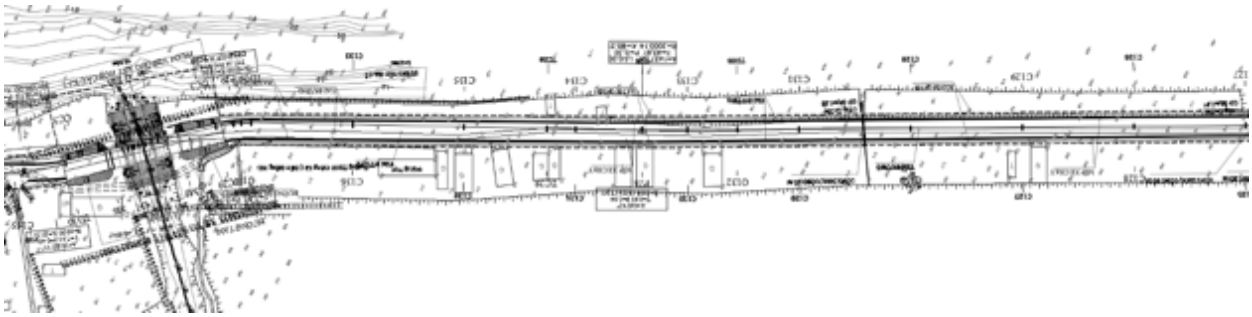


Figure 13: Road sub-section near the canal along the sea dike

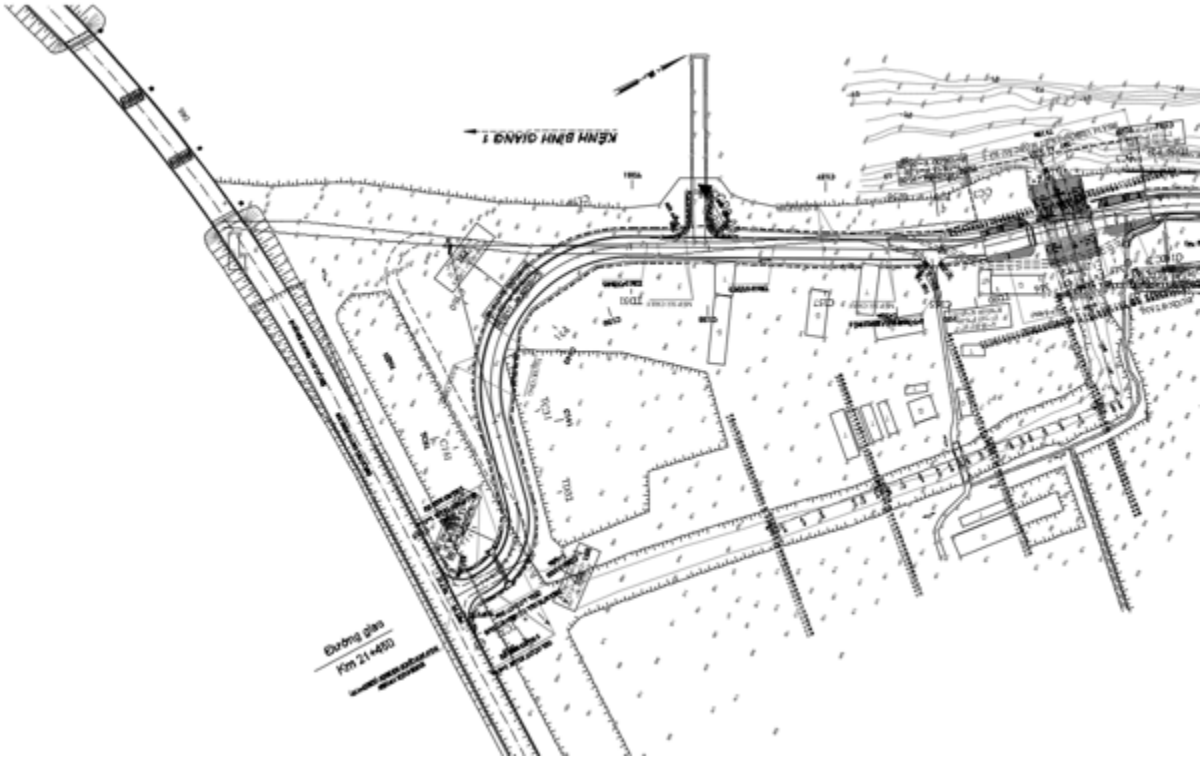


Figure 14: Road section from the canal along the sea dike to the sea dike

1.3.1.3. Location of low and medium voltage lines

81. Medium voltage lines: the project will invest in about 21.54km of 12.7/22kV 3-phase, 4-wire medium voltage power lines leading to the sluices to be built and the sluices to be upgraded and connection to the transformer stations to supply electricity to open and close sluice gates with specific volume and connection locations are in *Table 12*.

Table 12: Locations and scale of the 3-phase medium voltage lines

No.	Name of sluices/routes	Expected length (m)	Connection location	Voltage
I	**New main routes of the 3-phase, 4-wire medium-voltage power line**			
1	New 3-phase, 4-wire medium-voltage power line along the Kenh Binh Giang 1 road	7,470	Pole No. 472HD/238	12.7/22kV
2	New 3-phase, 4-wire medium-voltage power line along Dong Dong canal	5,130	Follow the 3-phase, 4-wire medium power line along Binh Giang 1 canal	12.7/22kV
3	New 3-phase, 4-wire medium-voltage power line along Bao Bien 1 road (from Binh Giang 1 canal to canal 2)	1,390	Follow the 3-phase, 4-wire medium power line along Binh Giang 1 canal	12.7/22kV
4	New 3-phase, 4-wire medium-voltage power line along Bao Bien 2 road (from Binh Giang 1 canal to Canal 10)	4,995	Follow the 3-phase, 4-wire medium power line along Binh Giang 1 canal	12.7/22kV
II	**Medium voltage lines from the 03-phase, 04-wire power grid to project new sluices**			
1	T5-1 sluice	80	472HĐ-264/4A	12.7/22kV
2	T5-2 sluice	60	472HĐ-264/46A	12.7/22kV
3	K3-1 sluice	130	Follow the 3-phase, 4-wire medium power line along Binh Giang 1 canal	12.7/22kV
4	K3-2 sluice	130	Follow the 3-phase, 4-wire medium power line along Binh Giang 1 canal	12.7/22kV
5	K3-3 sluice	210	Follow the 3-phase, 4-wire medium power line along Binh Giang 1 canal	12.7/22kV
6	K3-4 sluice	118	Follow the 3-phase, 4-wire medium power line along Binh Giang 1 canal	12.7/22kV
7	K3-5 sluice	-	Follow the 3-phase, 4-wire medium power line along Binh Giang 1 canal	12.7/22kV
8	K3-6 sluice	-	Follow the 3-phase, 4-wire medium power line along Binh Giang 1 canal	12.7/22kV
9	K3-7 sluice	-	Follow the 3-phase, 4-wire medium power line along Binh Giang 1 canal	12.7/22kV
10	T6-1 sluice	268	472HĐ-199A	12.7/22kV
11	T6-2 sluice	-	Follow the 3-phase, 4-wire medium power line along Don Dong canal	12.7/22kV
12	T6-3 sluice	255	Follow the 3-phase, 4-wire medium power line along Bao Bien road	12.7/22kV

No.	Name of sluices/routes	Expected length (m)	Connection location	Voltage
13	T6-4 sluice	10	Follow the 3-phase, 4-wire medium power line along Bao Bien road	12.7/22kV
14	T6-5 sluice	-	Follow the 3-phase, 4-wire medium power line along Don Dong canal	12.7/22kV
15	T6-6 sluice	90	472HĐ-199/3A	12.7/22kV
16	K9-1 sluice	100	472HĐ-161A	12.7/22kV
17	K9-2 sluice	-	Follow the 3-phase, 4-wire medium power line along Don Dong canal	12.7/22kV
18	K9-3 sluice	441	Follow the 3-phase, 4-wire medium power line along Bao Bien road	12.7/22kV
19	K9-4 sluice	230	Follow the 3-phase, 4-wire medium power line of the sluice K9-2	12.7/22kV
20	K9-5 sluice	-	Follow the 3-phase, 4-wire medium power line along Don Dong canal	12.7/22kV
21	K9-6 sluice	90	472HĐ-160A/2	12.7/22kV
22	VR-1 sluice	275	472HĐ-137	12.7/22kV
23	VR-2 sluice	66	472HĐ-138/26	12.7/22kV
III	**Medium voltage lines from the 03-phase 04-wire medium power grid to project upgraded sluices (replacing automatic valve gates with powered valve gates)**			
1	Kenh Muoi	-	Follow the 3-phase, 4-wire medium power line along Bao Bien road	12.7/22kV
2	Kenh Tam	-	Follow the 3-phase, 4-wire medium power line along Bao Bien road	12.7/22kV
3	Kenh Bay	-	Follow the 3-phase, 4-wire medium power line along Bao Bien road	12.7/22kV
4	Kenh Nam	-	Follow the 3-phase, 4-wire medium power line along Bao Bien road	12.7/22kV
5	Kenh Hai	-	Follow the 3-phase, 4-wire medium power line along Bao Bien road	12.7/22kV

82. Low voltage line: Besides, the project will invest in about 3,640m of low voltage power lines leading to the sluices being upgraded to supply electricity to open and close sluice gates with specific volume and connection locations in *Table 13*.

Table 13: Scale and location of the low-voltage power lines

No.	Name of sluices/routes	Expected length (m)	Connection location	Voltage
1	Kenh Mot	80	Using the current transformer station of T5-2 sluice	0.23/0.4kV
2	Kenh Hai	735	Using the current transformer station of K3-3 sluice	0.23/0.4kV
3	Kenh Nam Tram (canal 2 - canal 3)			
4	Kenh Nam Tram (canal 3 - canal 4)	1,080	New installation of 3x15kVA transformer station on the main shaft of Don Dong canal at pole No. 238/83/26	0.23/0.4kV
5	Kenh Tu			
6	Kenh Nam Tram (canal 4 - canal 5)			
7	Kenh Nam			
8	Kenh Nam Tram (canal 5 - canal 6)			
9	Kenh Nam Tram (canal 6 - canal 7)	1,080	New installation of 3x15kVA transformer station on the main shaft of Don Dong canal at pole No. 238/83/84	0.23/0.4kV
10	Kenh Bay- South bank of Don Dong canal			
11	Kenh Nam Tram (canal 7 - canal 8)			
12	Kenh Tam- South bank of Don Dong canal			
13	Kenh Muoi- South bank of Don Dong canal	665	Using the current transformer station of T9-5 sluice	12.7/22kV

83. Locations of low and medium-voltage lines of the project are described in *Figure 15* and *Figure 16*.

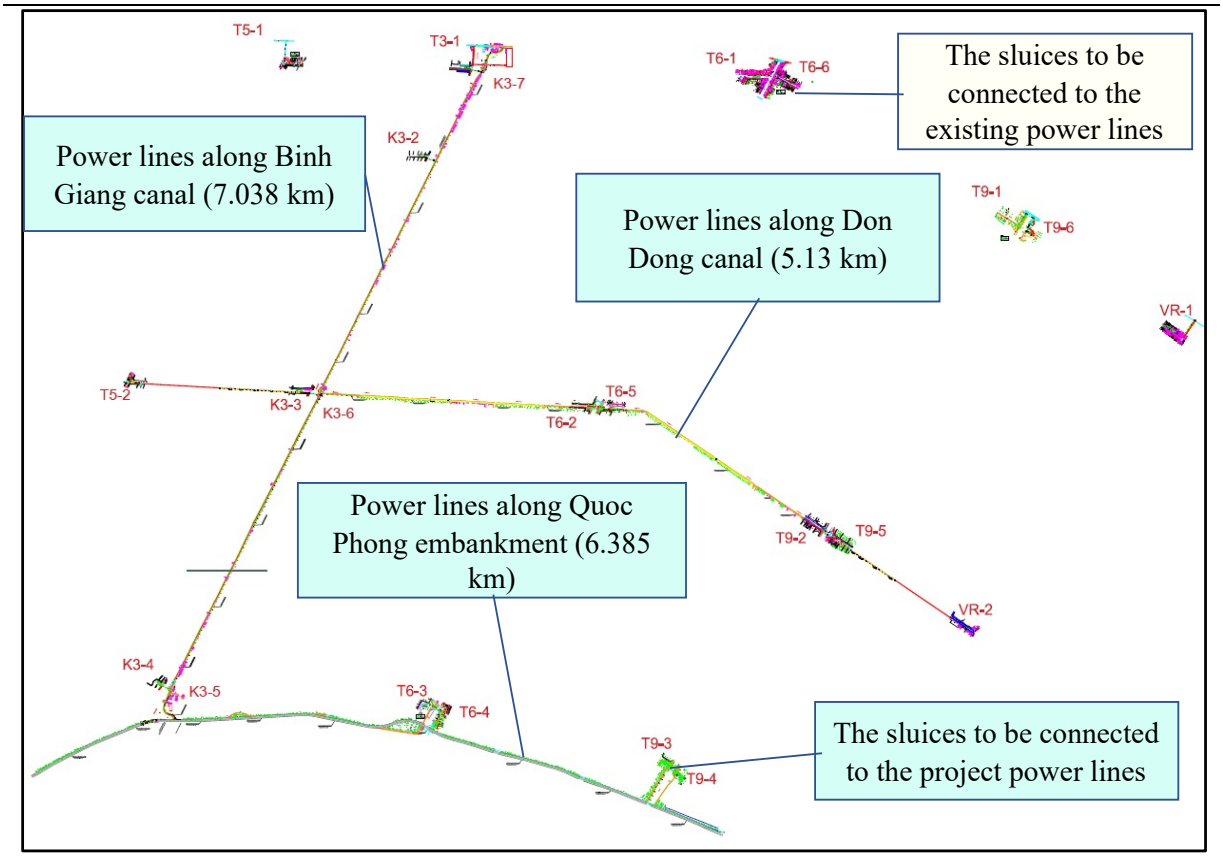


Figure 15: Locations of power lines of the project

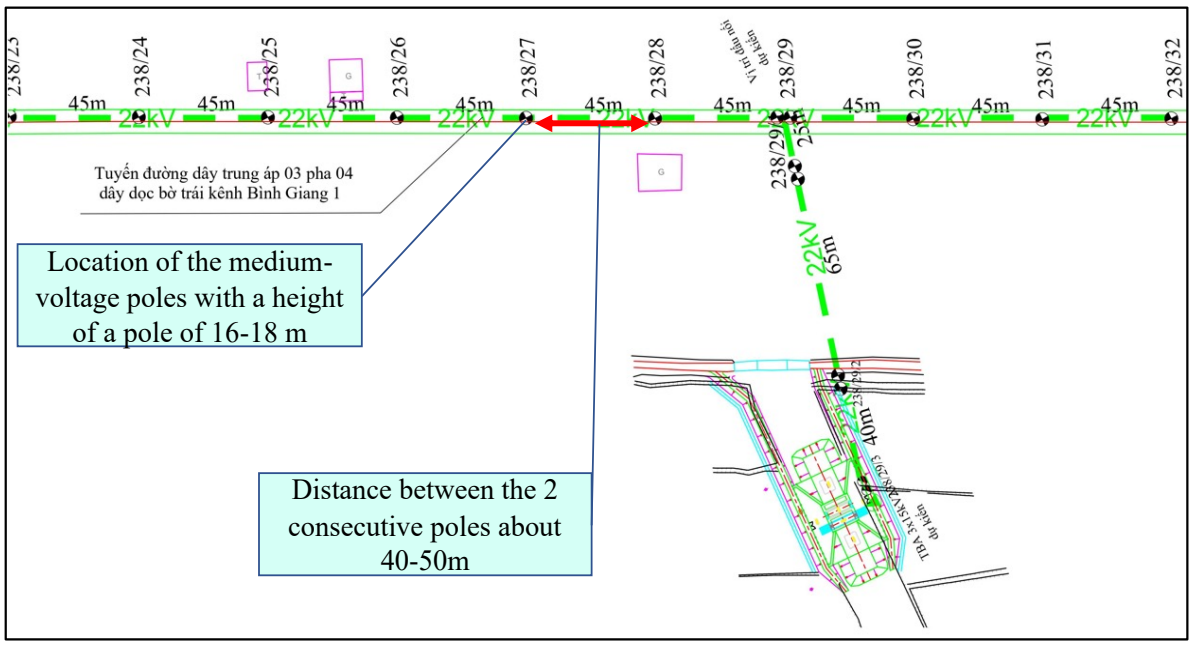


Figure 16: Layout of power line along Binh Giang 1 canal road

1.3.2. Project descriptions

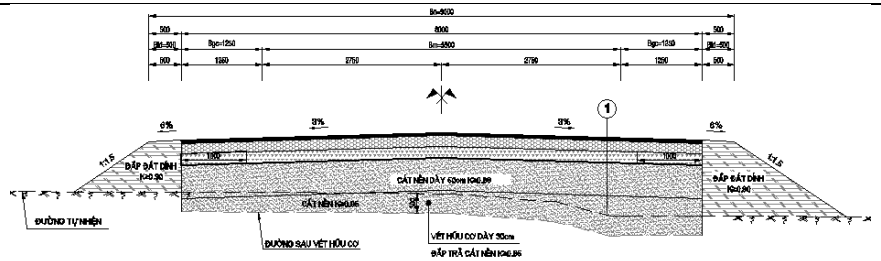
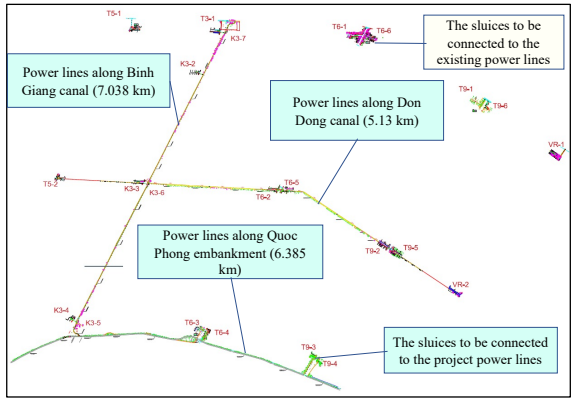
84. The scope of the ESIA is focused on structural component (SC)s involving with construction activities. The detailed descriptions of structural components with construction activities is presented in *Table 14*.

Table 14: Detail descriptions of the structural components of the project

No.	SCs of the project	Descriptions	Investment scales	Figures
1	SC1: The system of 23 sluices	– Location: the 23 sluices are situated on canals of Don Dong, K3- Tuan Thong, No. 200 and the canal along the National defense dike within Binh Giang and Binh Son communes. – Construction time: 24 months – Acquired land: 6.71ha – Affected HHs: 36 – Displaced HHs: 8 – Social status: The majority of the sluices are situated in sparsely inhabited regions, encompassed by vacant land and a few trees. There are 2 water supply plants in the project area, namely Binh Giang commune plant and Binh Son commune plant. The water intake point of the Binh Giang plant is 200m from the T6-1 sluice and 320m from the VR-1 sluice for the Binh Son plant. – Environmental status: Air quality in this area is quite good. Water quality on the canals where the sluices will be buit is not contaminated with acid sulfate. This indicates that water exchange was relatively good during the sampling time, and floodwater from the LXQ was very effective in flushing acid sulfate from the area. Water sources heavily contaminated	– 23 sluices will be built with a width from 8 to 10m, crest elevation of 2.5m – 4 level-IV management houses with a area of 40m^2 for sluices: K3-6, K3-7, K9-1, and K9-2 – 3 HL93 load bridges for sluices (B=9m) : K3-3, K3-4, K3-5. – 8 concrete bridges with 0.65HL93 load (B=4m) for sluices: T5-1, T5-2, K3-1, K3-2, K3-7, T6-1, T6-3, T6-4, T6-5, T6-6, K9-1, K9-2. – 12 pedestrian bridge with girder rural road I400 (B-2.5m) for sluices: K3-6, T6-2, K9-3, K9-4, K9-5, K9-6, VR-1, VR-2	 Location of 23 sluices (pink dots)  Typical perspective of a sluice combined with a traffic bridge

		with bacteria often only meet Class C water quality standards. This also reflects the current distribution of the population in the project area mainly along canals and the low sanitation conditions. Most domestic wastewater of local people is directly discharged into the canals, which is the main cause of bacterial contamination in the water sources in the area. Soil in this area is classified as moderately to heavily acidic soil. Sediments in the canal have concentrations of heavy metals meet the current standards.		 Typical perspective of a sluice combined with a working bridge (pedestrian)
2	SC2: The connecting road	– Location: The road is situated on the eastern side of Binh Giang 1 canal, commencing at NH80 and terminating at the seadike. It spans a total length of 7.03 kilometers. Currently, it is unpaved and of poor quality, making it challenging for people to travel, especially during the rainy season. The east side of the road is Binh Giang 1 canal and the west side of the road is rice fields and fruit gardens of local people. – Construction time: 18 months – Acquired land: 8.76 ha – Affected HHs: 21 – Displaced HHs: 4 – Social status: There are total of 74 HHs living along the road but	**Specifications of the road:** – Delta V road, asphalt surface; – Calculated axle load: 100kN; – Length: 7.03km; Width: 9m – Centerline elevation: +2.5m to +3.2m. – Auxiliary works: water intake culverts (36) and drainage culverts, lighting system, other technical infrastructures	 Current situation of Binh Giang 1 road  Map of Binh Giang 1 road

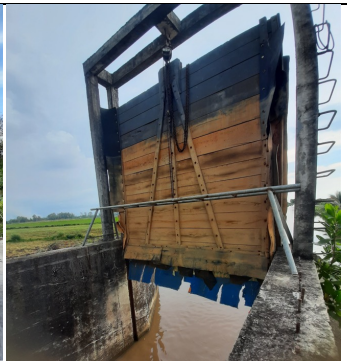
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		they concentrate in the section from NH80 to canal 200. Houses in this area are mainly level-4 houses, temporary houses (corrugated iron roof houses, and corrugated iron huts). As a result, contractors need to be careful not to damage these houses. – Environmental status: Air quality in this area is relatively good, with no signs of pollution and the soil is classified as moderately to heavily acidic soil. Therefore, contractors should take care to keep it that way while they work.		 Typical cross-section of the road
3	SC3: The power line system	– Location: – Construction time: 10 months – Current situation: there is no power lines to operate the current sluices and the project sluices. – Acquired land: 0 ha – Affected HHs: 0 – Displaced HHs: 0 – Social conditions: there are sparse people living along the power lines, only 74 households in the Binh Giang 1 road but they concentrate in the section from NH80 to canal 200. In addition, some people living along Don Dong canal. Houses in this area are mainly level-4 houses, temporary houses	– About 21.54km of 12.7/22kV 3-phase, 4-wire medium voltage power lines leading to the sluices to be built and the sluices to be upgraded and connection to the transformer stations to supply electricity to open and close sluice gates – About 3,640m of low voltage power lines leading to the sluices being upgraded to supply electricity to open and close sluice gates – 30 transformer stations	 Locations of power lines of the project

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		(corrugated iron roof houses, and corrugated iron huts). As a result, contractors need to be careful not to damage these houses. – Environemental conditions: Air quality in this area is relatively good, with no signs of pollution and the soil is classified as moderately to heavily acidic soil. Therefore, contractors should take care to keep it that way while they work.		
4	SC4: Upgradation of 18 existing sluice gates	– Location: 5 sluices along the seadike and 13 sluices along Don Dong canal – Construction time: 6 months – Acquired land: 0 ha – Affected HHs: 0 – Displaced HHs: 0 – Social status: Around these sluices, there are no residents living nearby. The sluice gates are operated automatically based on the tidal differences, which affects water source regulation for production. Additionally, some of the wooden sluice gates are currently decayed, causing saltwater leakage into freshwater production areas. – Environmental status: Air quality in this area is quite good. Water quality on the canals where the sluices will be buit is	– 5 sluices along the sea dike (Kenh Muoi, Kenh Tam, Kenh Bay, Kenh Nam, and Kenh Hai (HD)): replacing automatic valve gates with flat gates with hydraulic cylinders with valve gate width of 5.5 and valve gate heigh of 4.5 -4.7. – 13 sluices along Don Dong canal (Kenh Mot, Kenh Hai, Kenh Nam Tram (canal 2 - canal 3), Kenh Nam Tram (canal 3 - canal 4), Kenh Tu, Kenh Nam Tram (canal 4 - canal 5), Kenh Nam, Kenh Nam Tram (canal 5 - canal 6), Kenh Nam Tram (canal 6 - canal 7), Kenh Bay-South bank of Don Dong canal, Kenh Nam Tram (canal 7 - canal 8), Kenh Tam-South bank of Don Dong canal, and Kenh Muoi-South bank of Don Dong canal): Replacing the wooden valve gate that is opened and closed by a 10-ton chain hoist	 Current conditions of sluice gates along the sea dike

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		not contaminated with acid sulfate.	with the steel valve gate that is opened and closed by a TD4-2 electric winch	 Current condition of the Kenh Mot sluice gate along Don Dong canal  Current condition of the Kenh Nam sluice gate along Don Dong canal

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1.3.3. Construction methods

1.3.3.1. Construction of the connecting road

- Positioning the road;
- Excavating and peeling the surface soil and excavating road molds;
- Filling the roadbed with sand in each layer, combined with foundation reinforcement at design locations;
- Building the road surface in layers;
- Installing traffic lights and signing boards;
- Completing the road and handing over the road.

1.3.3.2. Sluice gate construction

a) Flow diversion

85. The project's sluices are located within the production area, which contains an intricate network of canals with few boats going through. In theory, when constructing the major portions of a sluice, it is feasible to block the entire flow for a length of time. However, entirely obstructing the canal bed will cause environmental problems as well as interfere with nearby residents'water intake needs. As a result, a flow diversion solution is required to ensure that environmental flow continues over the construction site.

86. The construction of a sluice is anticipated to require a duration of around 10-12 months. Out of these tasks, the construction of the sluice body, which involves redirecting the flow of water, will take around 6 months. In order to adhere to the planned timetable, it is anticipated that the sluice body will be built within a steel sheet pile cofferdam located directly in the canal bed. This will include diverting the flow of water through the remaining space on both banks, taking into account the size, structure, and flow diversion needs of the sluice body.

87. In addition, sluices shall be built close to each other at the same time, but rather alternately, to provide water diversion and water supply for production.

b) Main construction steps

88. Construction of hydraulic structures at site:

- Step 1: Build construction roads and electricity lines to the construction site.
- Step 2: Implement the construction categories, material supply for abutments, and preliminary dredging of the minimum channel for equipment to be used for construction.
- Step 3: Pile the bottom of the sluice, bridge abutments, and load-reducing floors.
- Step 4: Install waterproofing piles of sheet steel for the construction.
- Step 5: Construct the frame in stages to pour concrete into the sluice compartment.
- Step 6: Install prestressed piles and reinforced piles of sluice sides and embankment walls.
- Step 7: Pour concrete into plinth beams and floors of sluice sides.

- Step 8: Build concrete bridge abutments, retaining walls of the bridgehead, and load-reducing floors.
- Step 9: Install bridge girders, construct concrete bridge deck and railing barriers.
- Step 10: Build the road structure connecting to the bridge.
- Step 11: Dredge the river bed to the designed elevation, spread geotextile, and drop gabions to reinforce the upstream and downstream channels.
- Step 12: Build management houses and other categories in the management area, completion of the campus, railings, and completion of the construction.

89. Manufacturing and installating mechanical and hydraulic equipment of the valve gates:

- Step 1: Process and manufacture valve gate at the factory.
- Step 2: Transport to the construction location and complete assembly.
- Step 3: Crane to install into positions.
- Step 4: Order, transport, and install opening and closing equipment of valve gate.
- Step 5: Test operation.

c) Dredging canal beds within the construction area

90. The sludge dredging of the canal bottom within the construction area is carried out using a wire bucket excavator placed on a floating buoy system. Dredged sludge is transported to a designated disposal area within the construction area.

d) Construction methods for underwater reinforced concrete piles

91. The piles under the pillars, valve beams, and sluice sides are driven underwater by a hammer on the barge. Because it is built underwater, to ensure the exact position of the pile, a guiding floor frame system is required. In addition, the piles of battery piers, valve beams, and boat locks are buried below the water level so there must be guiding piles.

92. The construction sequence is as follows:

- Gather piles at a convenient location on the construction site or put them on barges;
- Drive positioning piles and build the system of floor frame using cranes and vibrating hammers as designed;
- Determine the position of the pile center using a theodolite;
- Use a 25T crane on a 200T barge to hoist and install the pile in the correct position, fixing the pile with a system of guiding bars;
- Install the diesel hammer head to drive the pile down until the top of the pile is at a height of + 2.00m, then stop;
- Install guiding piles, continue driving piles down to design height;
- After completing the number of piles for 1 tracking system, proceed to rotate the tracking system for the next section.

93. Driving piles on land:

Piles of the bridge abutment and load-reducing floors at the bridgehead are driven by a system of land-based hammers, without the need for guiding piles or guiding tracking systems:

- Gather piles at a convenient location on the construction site;
- Install system of piling rig + hammer rack
- Determine the position of the pile center using a theodolite;
- Install the pile into the hammer rack by using a 25T crane;
- Use a diesel hammer to drive the pile down to the design height
- After finishing hammering, move the hammer to the next pile position.

e) Construction method for waterproofing piles

94. Construction steps:

- Identify the center of the piling route;
- Drive positioning piles, build the deck frame with a vibrating hammer and crane on the barge;
- Use a vibrating hammer to combine and drive piles to an elevation of +1.00m;
- Position the guiding bar into the guide deck;
- Use a vibrating hammer combined with a guiding bar (sound closing) to drive the pile to the designed height;
- After completing the number of piles for 1 track system, proceed to rotate the track system for the next section.

95. Construction methods: This is an important structure of construction to ensure stable seepage at the bottom, so the construction of waterproofing piles must ensure continuity. The piles must be hooked together and aligned, and the height of the top of the pile must not be different. The deviation is too large (error about ±5cm). Driving of the waterproofing pile is done on the water surface, so it is necessary to use cranes and hammers to drive piles placed on a floating system, using a system of guiding floor including locating piles with a segment distance of 4m/pile, and a clamping system of shaped steel to control horizontal and vertical displacement. The pile is lowered using the vibration method. The piles are constructed below the water surface so they must have clamps to connect the piles. In addition, due to the short length of the piles, for the piles to be threaded together, it is necessary to construct in ladder order, of which the first pile must be a 12m long pole protruding above the water each time rotating the deck frame. To ensure the level of the row of piles is flat, the first pile after lowering to the designed height must be hung to the floor system by cables to avoid falling when lowering the next pile. The following pile bars are supported on the previous pile bar by a locating gauge structure welded to the top of each pile bar.

f) Construction methods of coffer dams

96. The pillars, valve beams, and sluice bodies are constructed within a piling frame of sheet steel right at the canal bed, including the following steps:

- Drive positioning piles, build floor system, and construct piles of sheet steel;

- Drive larsen piling frame by a vibrating hammer system on the barge;
- Install temporary anti-slip system;
- Excavation of soil within the enclosure to the designed elevation;
- Clean the foundation's pit, pour concrete for the sluice's foundation;
- Proceed to complete the lowering of the supporting floors;
- Check the safety of the piling frame;
- Pound pile's heads, clear the site, construct structures;
- Dismantle the piling frame and move to the next segment.

g) Concrete and reinforced concrete

97. Bottom plate, pillar; Valve towers, abutment structure, load reduction floors:

- Bottom plate steel, battery pier, and valve towers are processed in the material yard at the construction site and then transported and installed at the construction site.
- Concrete for battery piers, valve beams, and valve towers is produced at the construction site by mixing plants or using fresh concrete purchased from factories in the area.

h) Girders

- Bridge girders are constructed at factories and transported to the construction site by waterway;
- Use a crane to install the beam into position on the pier;
- Install steel reinforcement and formwork for bridge decks and bridge railings.

i) Construction of sluice sides and upstream and downstream walls

- Drive prestressed reinforced concrete piles by a vibratory hammer combined with vertical hydraulic scouring on a barge. Use the guiding system to position the pile line.
- Install steel reinforcement, and beam formwork to brace the top of the embankment, and carry the sluice manually.
- Construction of prefabricated paving slabs, installed on the floor of sluice sides.
- Finish the side surface according to the design.

j) Measures of spreading geotextile fabric under gabions

98. Geotextiles used for the project are mainly lined under gabions to reinforce the upstream and downstream of the sluice. Construction is carried out entirely underwater on floating devices with the following technical measures:

- Check the positioning buoy system before construction;
- The fabric is wound into a roll with a core tube inserted into the roller and wheel. After loading the fabric from the tube, the entire width of the fabric is braced to the river bottom thanks to the rotating tail shaft attached to the frame pressing down on the edge of the fabric.

- The fabric spreading starts from the edge of one side (adjacent to the position of the roof beam) to the other side. The edges of the fabric are held by sharp iron pins hammered into the river bottom. Steel staples are placed along the edge of the fabric, stapled every 30 cm. The diver checks the edge of the fabric and staples the horizontal edge of the fabric to the end of the construction length.
- After completing a horizontal lane, move the equipment upstream so that one fabric edge overlaps the other one by 1 meter and proceed with the work according to the steps above until the entire canal bank is covered.
- The diver inspects after the fabric covering is completed.

Notes:

- Carefully check the flatness of the canal bottom as per the designed drawing before starting to spread the filter fabric.
- The filter fabric is spread when the flow velocity is V < 2m/s.

k) Construction measures of gabions to reinforce the channel

- Position vertical construction lanes using a positioning buoy system on the river.
- Extend the cable to keep the winch moving the equipment along the construction lane.
- Start rolling the carpet. After setting the first stone carpet at the base of the revetment in the correct position, start moving equipment 5m into the shore before starting to drop the next gabions until the designed elevation is reached.
- After releasing the first vertical carpet, move the equipment upstream and begin releasing the carpet for the next embankment roof in the correct order above.
- Reposition the buoy system to continue construction.
- Always check the carpet position, and make sure the carpets are always next to one another with no gaps between the baskets.
- After the construction of each vertical lane, an inspection by a diver must be conducted. At locations of the carpet delivery, if not guaranteed to be adjacent, 20x30 loose stones must be dropped to fill the gap and divers must tie the carpet covers before proceeding with the next construction.

1.3.3.3. Construction methods for the road

- Positioning construction routes;
- Digging organic soil and dig road molds;
- Building sand embankment for the roadbed in each layer, combined with reinforced foundation at design locations;
- Building road surface structure in layers;
- Installing traffic signal structures;
- Completing and handing over the construction items.

1.3.3.4. Construction methods for the sluice gate upgradation

- Complete of the sluice gates at the factory;
- Use a crane assembly to lift the gates onto a barge;
- Transport the gates to the construction sites;
- Use the crane assembly on the barge to lift the sluice gates onto two support beams at the top of the pin structure at the gate slot;
- Temporarily secure the sluice gate firmly on top of the structure;
- Install the sliding guide rails on the gate tower;
- Install the opening and closing equipment on the gate tower;
- Inspect, remove temporary parts, and operate the hydraulic system to lift the gate to the open position;
- Remove the horizontal support beams from the top of the structure;
- Operate the cylinders to lower the sluice gates into the closed position;
- Monitor and inspect the gate's water tightness and the operation of the opening and closing equipment.

1.3.3.5. Construction methods of medium and low voltage lines

a) Construction of poles

a.1). Earthwork

99. Construction standards:

- Construction and acceptance of foundation work: TCVN 9361-2012;
- Earthwork - Construction and acceptance regulations TCVN 4447-2012 and other related standards and regulations.

100. Construction steps:

- Once the foundation has been leveled by the design, the contractor checks the central line before excavating the foundation pit. The opening of the slope is suitable for the geography and depth of each foundation. Both mechanical and manual repair techniques are used for foundation excavation. In case of chance finds the contractor shall stop excavating immediately and inform the construction supervision consultant (CSC).
- Sheet pilling to protect foundation walls.
- Steel sheet pilling.
- Sheet drawing: When the foundation is finished, the piles are removed. A presser is also used for removing piles, although the removing order is reversed compared to the pressing procedure. It should be noted that when pulling out piles, holes in the earth will be made. To correct this, the contractor will re-insert the piles with sand and water, allowing the sand to readily fill the holes and return the construction ground to the project owner.

a.2). Construction of reinforced concrete foundation slab and footing

- Concrete lining for the foundation pit.

- Placing reinforced steel and joining foundation formwork.
- Concreting the pit (*Figure 17*).

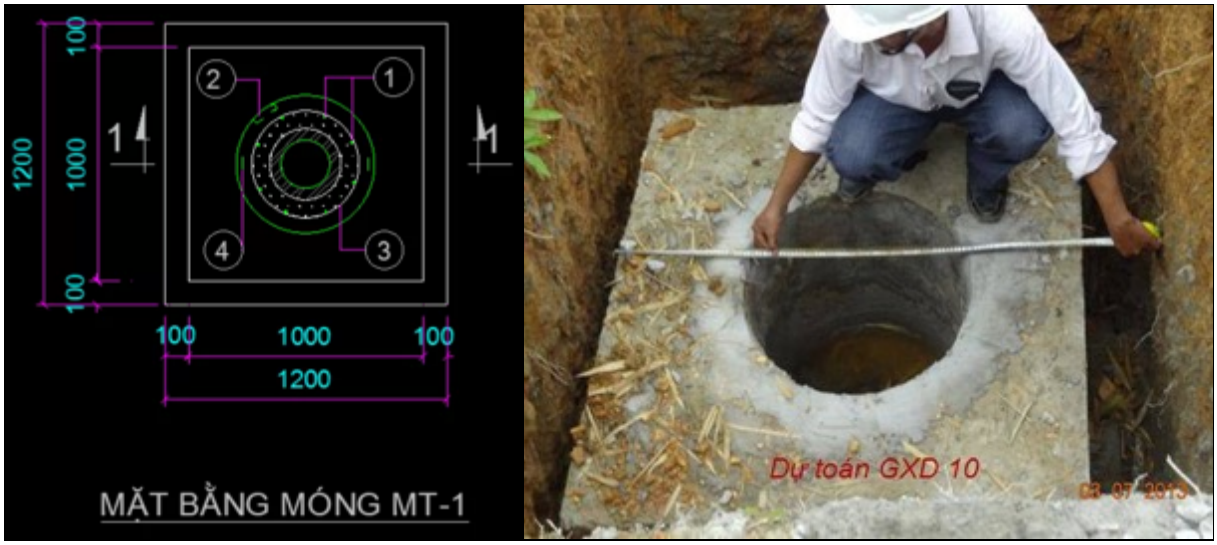


Figure 17: Layout of a power pole

a.3). Construction of reinforced concrete foundation stump

- Preparing formwork and reinforced concrete
- Concreting the stump

a.4). Installation of anchor bolts

- Anchor bolts are installed at the same stage as formwork installation and stump reinforcement alignment.
- Gavari is used to fix anchor bolts.
- Place each anchor bolt in the hole and use the Electronic Control Unit to temporarily screw it into Gavari to prepare for position and elevation alignment.
- Mark the center line of the stump on the Gavari to install the anchor bolts.
- Use an electronic total station and leveling machine to align anchor bolts.
- After the alignment is complete, a welding machine is used to secure the anchor bolts to the stump, and tape or sleeves are used to keep the bolt heads from sticking to the concrete while concreting the stump.
- After the concrete has hardened, Gavari is removed.

a.5). Installation of earthing system

- Determine the length and direction of earthing.
- Dig earth ditches
- Line ground wires
- Do acceptance and move to the next steps.
- Backfill earthing ditches
- Measure the grounding resistance.

a.6). Backfilling

101. Manual backfilling is performed, with an additional 20 cm layer of soil being backfilled after each 20cm of compaction, in accordance with the design drawing. The backfilling soil is meticulously compacted using a compactor to achieve the design density.

b) Installation of poles

102. Installation of electric poles will be conducted by experienced contractors from Vietnam Electricity contractors with the following activities:

b.1). Installation of base plates

103. Erect climbing pillars on the surface of the foundation pit according to the diagram and proceed to erect the base section. The climbing poles are built on the foundation level using self-made forks and winch systems, then holding the poles with ropes at the top of the poles, pits, and brake winches. Anti-sink, anti-slip, and fixed base with wood and cable. Install the base plate onto the anchor bolts after leveling. Do not tighten the nuts too tight, leave them a little loose. Next, install the 4 main bars of the base section and tighten the anchor bolts to the base plate, install the main tie bars to create a solid frame, then install the small tie bars, and then install the web tie bars (anti-torsion, positioning); tighten the connecting bolts.

b.2). Installation of the middle part of the poles

- Proceed sequentially as with the bottom part.
- Move the pole.
- Complete the middle part.

b.3). Installation of the top of poles

104. After completing the middle section and temporarily tightening the bolts, the contractor proceeds to erect the top section.

b.4). Completing the installation of poles

- Tighten all the bolts of the column bars by arranging 4 workers to work simultaneously on opposite sides at the same height to tighten the bolts and nuts from top to bottom with a typical wrench or force wrench (At least one force wrench is turned around to make sure that the nuts on all four sides of the column are tight).
- Make the bolts below 10 meters high and the base plate's anchor bolts immobile (*Figure 18*).



Figure 18: Installation of electric poles

c) Methods of pulling and tensioning electric wires

105. The construction process for laying cables involves manual methods combined with machinery and follows the following sequence (*Figure 19*):

- Prepare and arrange construction tools and machines according to the approved plan.
- Hang pulleys as scaffolding to support wires over current roads and power lines.
- Temporarily increase anchors and tie anchors at both ends.
- Lay primer cable.
- Winches for collecting bait cables and pulling conductors.
- Press the left-hanging anchor.
- Press wire connections using a 100-ton hydraulic press.
- Tension the rope to achieve the designed deflection.
- Press the right suspension lock.
- Lower the rope into the support lock at the positions of the support columns.
- Construct the crossbeam and complete the finishing touches.



Figure 19: Pulling and tensioning electric wires

1.3.3.6. Solar power supply solutions

106. Solar energy is proposed as the power source for lighting along the Binh Giang 1 canal, traffic and management bridges, embankments, and management houses, which has a minimum capacity of 100W and is mostly used at night, as below:

- Solar lamps with a minimum power of 100W are used to light up the Binh Giang 1 road and the traffic/work bridges over the sluices. The minimum lamp parameters are as follows:
  - LED chip: high power SMD 3030;
  - Solar panels: 6V/22W poly;
  - Storage battery: 18,000mAh;
  - Lighting time: 10 to15 hours/day;
- A solar panel system with a battery storage system is used to light up the management houses. The technical specifications of the solar panel system are as follows:
  - Solar battery capacity: ≥ 3kW;
  - Grid-tied inverter with storage system (or grid tie with limiter with battery storage): 5kW;
  - Solar power storage system (Lithium battery or telecom battery): maximum storage of 50kWh.

107. Benefits of this power source include using renewable energy, which is abundant in the sun, and helping to protect the environment by not producing carbon emissions like thermal, gas, or liquid electrolysis, which are common methods for producing electricity.

1.3.4. Operational and production technology

108. When the project is completed, the rice/vegetables model will be replaced with a shrimp-rice model in the north of Don Dong canal. The system of irrigation works will operate as follows to meet the water needs of the shrimp-rice model (*Table 15*):

Table 15: Operational procedure for the irrigation system in the project area

No.	Time	Water need (freshwater/saline water)	Proposed operational procedure
1	From March to August	Saline/brackish water	- The sluices that separate saline and freshwater in Tuan Thong and Vam Ray are closed. - The sluices that separate saline and freshwater in Don Dong canal are open. - The sluices for saline water taking in the cluster BT2-TS follow the Long Xuyen Quadrangle (LXQ) irrigation system's operational procedure: open to take saline/brackish water. - The sluices in the cluster of BT2: follow the LXQ irrigation system's operational procedure (closed to keep freshwater when Chau Doc station's water level lower than 2.5m and open to let floodwater out when Chau Doc station's water level higher than 2.5m)
2	From September to the end of October	Flood/rainwater drainage	- The sluices that separate saline and freshwater in Tuan Thong and Vam Ray are open. - The sluices that separate saline and freshwater in Don Dong canal are open. - The sluices in the cluster BT2-TS and TL BT2 follow the LXQ irrigation system's operational procedure: closed to keep freshwater when Chau Doc station's water level is lower than 2.5m and open to let floodwater out when Chau Doc station's water level is higher than 2.5m.
3	From November to March of the following year	Freshwater, flood/ rainwater drainage	- The sluices that separate saline and freshwater in Tuan Thong and Vam Ray are open. - The sluices that separate saline and freshwater in Don Dong canal are open. - The sluices in the cluster BT2-TS and TL BT2 follow the LXQ irrigation system's operational procedure: closed to keep freshwater when Chau Doc station's water level is lower than 2.5m and open to drain floodwater when Chau Doc station's water level is higher than 2.5m.

1.3.5. Machinery and Equipment Used for Construction

109. *Table 16* lists the key equipment and machinery used for construction. However, they vary depending on the nature of the work, contractor capacity, and weather conditions. These machinery and equipment are mostly new or 80-90% like new.

Table 16: List of construction machinery and equipment used for the project

No.	Equipment	Structural components of the project			
		The 23 new sluices	The road	The power lines	The upgrade sluices
1	Bulldozer	13	3	4	4
2	Digger	13	6	4	
3	Truck		3		
4	Boat	26	3		4
5	Concrete mixer	13	3	4	
6	Air compressor	13	3		
7	Roller	13	3		
8	Front-hoe excavator	13	3		
9	Tractor	13	3		
10	Road paver		3		
11	Movable crane	13	3		4
12	Power generator	13	3		4
13	Pile driver	13			4
14	Concrete compactor	13	3	4	
15	Hammer	26	3	4	

1.3.6. Demand for Raw Materials, Fuels and Disposal Sites

1.3.6.1. Construction materials and supply sources

110. According to the project's FS report, the demand for raw materials required for the project construction is depicted in *Table 17*.

111. Sources: All material sources have been granted with the exploitation and business license issued by the relevant authorities:

- Filling soil: As mentioned in *Table 17*, the filling activities of the project will require approximately 158,146.7 m^3 of soil. This is a small amount, therefore, excavated soil will be reused for all project items to mitigate impacts caused by its disposal. However, it is necessary to evaluate the quality of excavated soil before use.
- Sand, and stone: purchased at licensed shops in An Giang province, etc.
- Steel, cement: steel will be purchased in An Giang, Can Tho, and Ho Chi Minh City while cement will be purchased in An Giang.
- Melaleuca piles: purchased at licensed shops in An Giang

112. An Giang PPMU/Construction Supervision Consultant (CSC) will be responsible for verifying the quality, capacity, and legal status of the suppliers, including the environment and social requirements (official certificates for EIA, labor contracts), before approving them as the primary suppliers for the project, following the bidding process. Each awarded contractor will select their own suppliers for construction materials. All materials are tested for quality in accordance with current regulations in place. If the materials don't match the technical

standards, the contractor has to find other reliable suppliers. Materials and technical supply demands will track the development of the project. Materials will be supplied once depreciation from transportation and unloading has been calculated.

Table 17: Raw materials used for the project

No.	Descriptions	Unit	Project structural components				
			23 sluices	Road	Power line	18 sluice gate upgradation	Total
1	Excavated soil	m^3	134,451.4	16,456.5	671.8		151,579.7
2	Backfilling soil	m^3	108,440.4	55,612.8	210.9		158,146.7
3	Sand	m^3	28,440.4	11,628.4	19.7	1,422.0	41,510.4
4	Geotextile	$100m^2$	1,463.9	232.3		73.2	1,769.4
5	Stones of all kinds	m^3	13,453.8	34,937.0	347.9	-	48,738.7
6	Maleuluca pile	100m	93,504.4	169,142.9	-	4,675.2	267,322.5
7	Steels	ton	1,531.0	723.1	1.3	76.6	2,332.0
8	Cement	ton	4,901.4	1,726.1	103.5	5,4	6,731.0
9	Concrete of all types	m^3	78,206.3	12.8	83.3	3,910.3	82,212.7
	Total construction materials need to be transported to construction sites	**Tons**	**66,487**	**137,212**	**1,942**	**9,984**	**215,625**

113. The project will not require the establishment of any new quarry, as it will not involve the large-scale extraction of sand, stone, and soil materials. This means that none of the quarries are an exclusive source for the project.

114. Transportation methods: Given that the project is situated in an area with a good waterway, construction materials, fuel, tools, and machinery will be transported by waterway via the Rach Gia-Ha Tien (RG-HT) canal, the Rach Soi-Long Xuyen canal, flood drainage canals, etc.

115. The project will use 200-ton barges to transport materials for construction. The estimated construction period is 6-24 months, with the barges operating 26 days each month. Therefore, the total number of barge trips to transport materials for the construction activities will be calculated as 2.36 trips per day.

116. These materials, including cement, stone, sand, and steel, will primarily be purchased from Hon Dat town and Kien Luong (former), with an average distance to the construction site of 3-30 km per trip (*Figure 20*).

1.3.6.2. Fuel and power supply

117. Electricity: Electricity for the project construction will come from the national grid through the installation of power lines and 150 kVA transformer stations in the area where the sluice gates are planned to be built. These take power from the 16 kV medium voltage grid to lower the voltage of 0.4 kV for project construction and operation. Furthermore, to ensure the consistent progress and functionality of the project in the event of power disruptions, 200-kilowatt-hour automatic generators will be used.

118. Fuel: The fuel need for operating construction machineries, equipment and trucks will be provided by the local gas stations located within a 1km radius of the construction site (*Figure 20*).

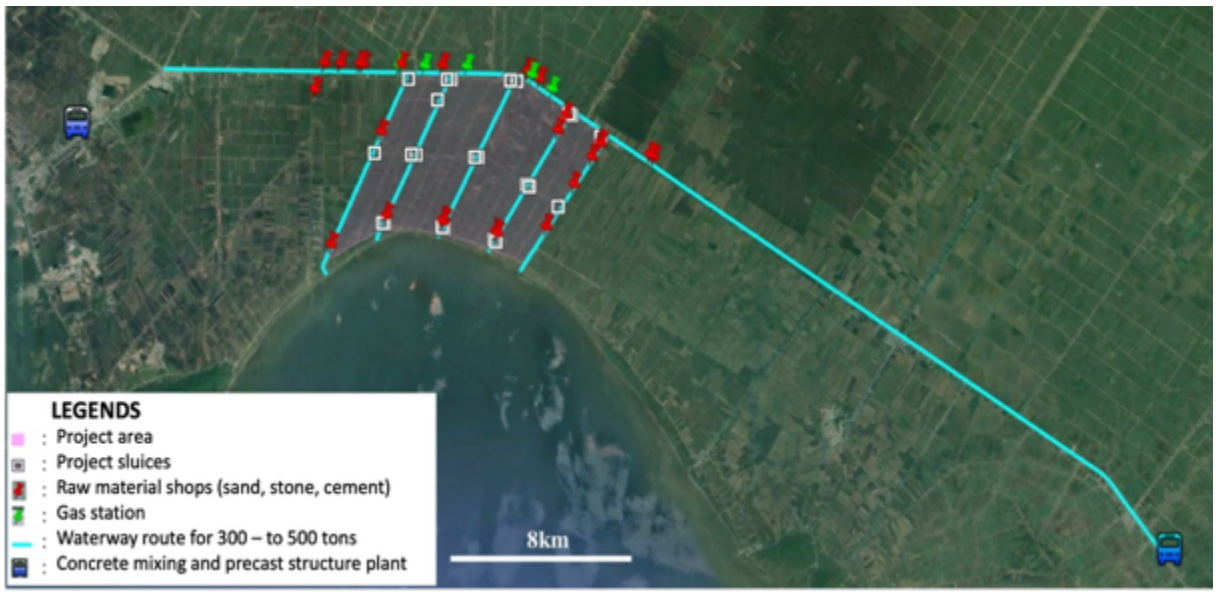


Figure 20: Potential construction material transportation routes

1.3.6.3. Water supply

119. The contractors will sign contracts to purchase water from local houses as agreed upon for use in construction, since the locations are not too far from residential areas. Prior to commencing construction, the contractors will perform surveys of the freshwater supply sites in the vicinity, collect water samples, and send them for analysis to guarantee the water quality. Supply contracts will only be signed if the water meets the quality criteria for domestic use (QCVN 01-1:2018/BYT) and mixing concrete use (TCVN 4506:2012), in accordance with the construction plan.

1.3.6.4. Solid wastes and disposal sites

120. Workers's domestic waste: This garbage would be generated by construction workers on-site. During the construction phase, it is projected that approximately 80kg will be produced every day. Hon Dat District URENCO will collect and transfer the waste to the authorized landfill every three days.

121. Construction waste:

- Excavated soil:

  - From the construction of 23 sluices: The soil excavated from the foundation pits, roughly 11,679 m^3 per sluice, will be stored within the construction area. After the material has been dried, it will be utilized for leveling the site and filling in the foundations, banks, and canal banks both upstream and downstream of the sluice.
  - For road construction: all excavated roadbed soil will be directly used to construct the road slopes, ensuring no waste is generated in the environment.For powerline: all excavated soil will be directly used to backfilling the surface.

- Other construction waste: such as formwork, cement bags, iron, etc. will be collected and sold to informal sectors. The remaining will be collected and transported by the legal entity of Binh Giang commune landfill and Binh Son commune landfill every 3 days

122. Workers's domestic waste: This garbage would be generated by construction workers on-site. During the construction phase, it is projected that approximately 80kg will be generated every day. The remaining will be collected and transported by the legal entity of Binh Giang commune landfill and Binh Son commune landfill every 3 days.

123. Hazardous waste: This waste generated during construction will be collected and temporarily stored in the storage area located in the construction area before prior to being transported to an appropriate waste treatment facility in accordance with the agreement between the contractor and the waste treatment facility.

1.3.6.5. Demand on workers

124. The implementation of the project is expected to mobilize 210 people, including 200 construction workers and 10 professional consultants. The work items are dispersed on a large scale and the number of construction workers at each site is 5-10 people and 16 workers' camps during the project construction. See details in *Table 18*.

Table 18: Project personnel requirements

No.	Categories	Human resource (people)	Staying periods	Number of camps (camps)	Notes
1	**Construction workers**	**200 people**			
1.1	Construction of 23 sluices	13 teams x 10 people/team	24 months	13	1-2 sluices for each team
1.2	Connecting road	3 teams x 10 people/team	18 months	3	Rolling construction, 100m per section
1.3	Power line system	4 teams x 5 people/team	10 months	0	Rolling construction, Workers for power lines can either rent local houses or move to the nearby sluice construction camps.
1.4	Sluice gate renovation	4 teams x 5 people/team	6 months	0	Rolling construction Workers for sluice gate improvement can either rent local houses or move to the nearby sluice construction camps.
2	**Professional consultants**	**10 people**			
2.1	Construction supervision consultancy	1 team x 5 people/team	During construction	0	Not staying often
2.2	Environmental and Social consultancy	1 team x 5 people/team	During construction	0	Not staying often
	Total	**210**		16	

1.3.7. Current land and water management and use of the project

125. The project will acquire permanently 15.46 hectares of land, of which:

- Land of water surface and canals: 2.06 hectares.
- Canal bank land: 4.41 hectares.
- Road land: 8.00 hectares.
- Rice land: 0.33 hectares.
- Land for planting trees used by local people: 0.65 hectares.

1.3.8. Project Implementation Arrangements

1.3.8.1. General Information

126. General information about the project:

- Project name: Kien Giang sustainable fisheries development project (SFDP).
- Project type: newly built.
- Agency for approving project policy proposal report: People's Council of Kien Giang (now An Giang) Province.
- Agency for approving the project feasibility study report: Kien Giang (now An Giang) Provincial People's Committee (PPC)
  - Address: No. 06 Nguyen Cong Tru, Rach Gia Ward, An Giang province
  - Telephone: (0297) 3862135 , Fax: (0297) 3862687
  - Representative: Mr. Ho Van Mung- Chairman of the PPC
- Agency for allocating counterpart funds: An Giang PPC.
- Project appraisal agency: Department of Agriculture and Environment of Kien Giang (An Giang) province.
- Project owner: Management board of construction investment projects on agriculture and rural development (PPMU) of Kien Giang (An Giang) province:
  - Address: No. 40 - Lot B11 - Ton Duc Thang street - Vinh Bao Ward (now Vinh Thanh Van), Kien Giang Province (now An Giang).
  - Telephone: 0297.3860189; Fax: 0297.3922201
  - Representative: Mr. Nguyen Van Tu – Director
- Project operating agency: Kien Giang (now An Giang) Department of Agriculture and Environment (DAE) and local authorities.
- Location: Binh Giang and Binh Son communes, former Hon Dat district, Kien Giang (now An Giang province.

1.3.8.2. Implementation Arrangements

127. For this project, the management agency of the project is Kien Giang (now An Giang) PPC. The project owner is Kien Giang (now An Giang) PPMU. The PPMU will coordinate

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directly with relevant agencies such as the Department of Finance (DOF), the Department of Agriculture and Environment, the Department of Construction (DOC), Department of Home Affairs, Department of Ethnic and Religious Affairs (DOERA) and the relevant localities (Commune People's Committees) during the implementation of the project.

a) An Giang PPC

- Coordinate with the Ministry of Finance, relevant ministries, branches and agencies in formulating strategies and planning to attract and use concessional loans; formulating policies, measures to coordinate and improve the efficiency of the use of concessional loans in the areas of provinces and towns;
- Coordinate with the Ministry of Finance in submitting to the Government on the signing of specific international treaties on concessional loans for programs and projects in their respective fields;
- Ensuring the quality and efficiency of using concessional loan directly managed and implemented by localities;
- Responsible for land acquisition, site clearance, implementation of compensation and resettlement policies for programs and projects in the area in accordance with law;
- Organizing and directing the effective implementation of projects according to the approved plans;
- Approving the feasibility study report for the project;
- Acting as the line agency in accordance with the provisions of law, international treaties on ODA;
- Coordinating with provincial departments to propose and implement the project from the project preparation step to the end of project implementation;
- Organizing acceptance and handover of the ground and hand over of the project when the it is completed;
- Organizing site clearance activities and handing over the completed construction work within the permitted scope.

b) Project owner – Kien Giang (An Giang) PPMU

- Carrying out the bidding in accordance with the current law on bidding;
- Providing relevant information and documents for contractual parties and consultants to formulate and implement programs and projects; taking responsibility for the legal basis and reliability of the information and documents provided; archiving files and documents on programs and projects according to the provisions of law;
- Taking comprehensive and continuous responsibility for the management and use of investment capital sources from the preparation of investment, implementation of investment and putting programs and projects into operation;
- Monitoring, evaluating projects, managing and exploiting programs and projects;

- Taking full responsibility for mistakes in the process of managing programs and projects that cause adverse consequences to the economy, society, environment and national reputation;
- Being responsible under the provisions of law, may have to compensate for economic losses or have to change the project owner, for the slow implementation, not in accordance with the investment decision and the decision on approval of the documents of technical assistance programs and projects, causing loss, waste and corruption, affecting the overall objectives and efficiency of programs and projects;
- Taking responsibility for receiving and solving (arrangement of suitable personnel) issues related to the community's complaints on safety, health, environment, labor and other issues regarding compensation and resettlement upon land acquisition;
- Taking other rights and responsibilities as prescribed by law.

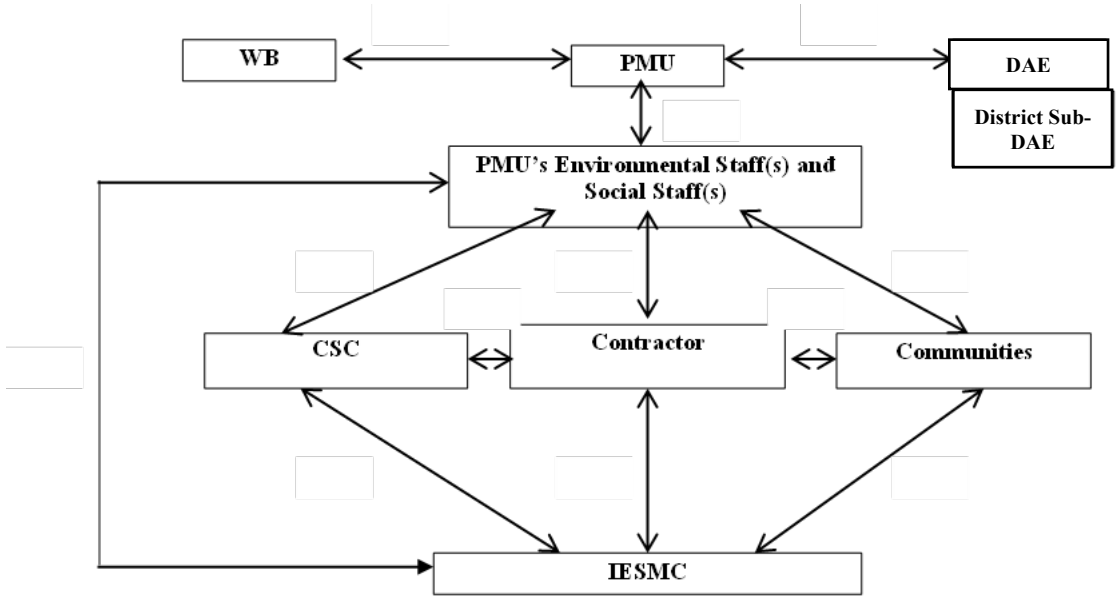


Figure 21: Organization diagram for ESMP implementation

1.3.8.3. Progress of the project

- Preparation phase: 2021 – 2024.
- Implementation phase: 2024 – 2026, in which:
  - Construction of 23 sluices: 24 months.
  - Sluice gate upgradation: 06 months.
  - Binh Giang 1 road: 18 months.
  - Power system: 10 months.

1.3.8.4. Total investment of the project

128. The total investment of the project is 624 billion VND. See details in *Table 19.*

Table 19: Total investment of the project

No.	Descriptions	Estimated cost (bil. VND)					Estimated cost (mil. USD)				
		WB's IBRD fund			Counterpart fund	Total	WB's IBRD fund			Counterpart fund	Total
		Allocation of funds	Partial on-lending of loans	Subtotal			Allocation of funds	Partial on-lending of loans	Sub total		
1	Cost for construction + equipment	**212**	**212**	**425**	**42**	**467**	**8.67**	**8.67**	**17.34**	**1.73**	**19.07**
1.1	*Sluices construction*	*150*	*150*	*300*		*300*	*6.13*	*6.13*	*12.26*		*12.26*
1.2	*Road*	*21*	*21*	*41*		*41*	*0.84*	*0.84*	*1.68*		*1.68*
1.3	*Power lines*	*20*	*20*	*40*		*40*	*0.81*	*0.81*	*1.62*		*1.62*
1.4	*Upgradation of existing sluice gates*	*9*	*9*	*17*		*17*	*0.35*	*0.35*	*0.70*		*0.70*
1.5	*SCADA system*	*13*	*13*	*26*		*26*	*0.54*	*0.54*	*1.08*		*1.08*
1.6	*VAT*				*42*	*42*				*1.73*	1.73
2	Project management cost				6	6				*0.26*	0.26
3	Consultant cost				30	30				*1.23*	1.23
4	Others				12	12				*0.47*	0.47
5	Land compensation, clearance and resettlement costs				20	20				*0.82*	0.82
6	Cost for livelihood model transition (shrimp-rice; giant freshwater shrimp; other aquatic products)				15	15				*0.59*	0.59
7	Contingencies	18	18	35	39	74	*0.72*	*0.72*	*1.43*	*1.58*	3.01
	Total:	**230**	**230**	**460**	**164**	**624**	**9.39**	**9.39**	**18.77**	**6.68**	**25.45**

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1.4. ENVIRONMENTAL AND SOCIAL ASSESSMENT METHODS

1.4.1. Rapid assessment method

129.The method was issued by the World Health Organization (WHO) in 1993. The basis of this method is the nature of materials, technologies, and rules of natural processes as well as experiences in rating pollution load.

130.In Vietnam, this method is introduced and applied in many ESIA reports, performing the relatively accurate calculation of the pollution load in the context of limited measurement and analysis instruments. In this report, the pollution load coefficients are taken under the EIA guidelines of the World Bank (Environmental Assessment Sourcebook, Volume II, Sectoral Guidelines, Environment, World Bank, Washington D.C 8/1991) and Handbook of Emission, Non-Industrial and Industrial source, Netherlands). This method was used in **Chapter 3**.

1.4.2. Impact identification method

131.This method is applied through the following specific steps: describe the environment system; identify the project components that affect the environment; and identify the full range of related waste streams, and environmental issues to serve the detailed evaluation. The method was applied to **Chapter 1** and **Chapter 3**.

1.4.3. Mapping method

132.This method is applied to assess the spatial interventions of the project. It can also be used to evaluate the scope of influence of the project. This method was used to show the project locations and sampling locations on the administrative map and was applied throughout **the entire report**.

1.4.4. Impact matrix method

133.This method is to simultaneously list the activities of the project with a list of environmental factors that may be affected. Combining these lists in the form of rows and columns, we obtain an environmental matrix. It then shows more clearly the causal relationship between the activities of the project and the environmental factors impacted simultaneously in the matrix plots. Depending on usage, the environment matrix can be divided into the following categories: simple matrix, complex matrix, and complex quantitative matrix.

134.In this report, the quantitative matrix method is used, in which the inventory is listed for the activities of the project and the column is the list of environmental factors affected. Each matrix of matrix evaluates the possible impact of project activity on an environmental factor. This method was applied to **Chapter 3**.

1.4.5. Household survey method

135.A household (HH) survey is conducted after the completion of the review of secondary data and field observations. Before fieldwork, a household questionnaire was developed to guide the collection of additional data. Questionnaires developed include (i) guide questions (for focus group discussion and community consultation); and (ii) household survey (for an

interview with selected households). This method was used to assess the current socio-economic situation of households affected by the project implementation as a basis for proposing mitigation measures. It was utilized in **Chapter 2** of the report.

1.4.6. Focus group discussion and public consultation

136.Community consultations are conducted in the form of focus group discussions and community meetings, or posted on relevant agency websites to validate findings from fieldwork as well as household interviews. Additionally, the community consultation method is used to gather community opinions on environmental and social impacts, as well as management and mitigation measures mentioned in the report. This method is utilized in **Chapters 2 and 6** of the report.

1.4.7. The method of inheritance, analysis, and synthesis of information and data

137. This method was used to identify and evaluate the natural and socio-economic conditions of the project area through data and information collected from various sources such as statistical yearbooks, socio-economic reports, the current environmental status, and relevant studies. Additionally, inheriting existing studies and reports to utilize all available findings and identify additional limitations is crucial. During the preparation of the report, data and information about the project information and socio-economic conditions in the project area were collected from relevant and reliable sources. This method was used in **Chapters 1 and 2**.

1.4.8. Secondary data assessment method

138. This method involves evaluating existing documents related to the project area and reviewing available information from project documents. Particularly important is reviewing data and information available from the project's feasibility study and other relevant information, as well as statistical data.

1.4.9. Site survey method

139. Site surveys are mandatory for ESIA/EIA to determine the current state of the project area, and relevant surrounding objects for selecting sampling locations, assessing the current state of the environment, hydrology, climate conditions, land use, vegetation cover, and biodiversity in the project area. In addition, site survey are a valuable source of information to verify the results of secondary data review for social assessment. It aimed to collect and supplement existing information to contribute to household surveys and group discussion questions. This method was used in **Chapters 1, 2, and 3** of the report.

1.4.10. Comparison method

140. This method involves assessing environmental quality, water quality, pollutant loads, etc., based on comparison with relevant environmental standards and regulations from the Ministry of Health and the MONRE (now Ministry of Agriculture and Environment), as well as related studies and experiments. This method was used in **Chapters 2 and 3** of the report.

1.4.11. Expert adjustment method

141. Based on their knowledge and experience with environmental and social impact assessment (ESIA), the ESIA specialists and other experts from universities and institutions discussed and agreed on the ESIA findings. This method was applied **throughout the report**.

1.4.12. Monitoring and analysis methods

142. To assess the current environmental status of the project area, the samples of air, soil, sediment, surface and aquatic water, wastewater, and groundwater, etc. were taken and analyzed in the project area. Sample analysis results were used as background data to evaluate the impact of project implementation on the environment and issues that the project owner need to pay attention to during project implementation. This method was used in **Chapter 2**.

1.4.13. Mathematical model method

143. Various models are presently available on a global and national scale for the investigation of flow hydrodynamics-related issues. One dimension (1D), two dimensions (2D), or three dimensions (3D) may comprise these models. The 1D model MIKE 11 + NAM has been selected for the project area based on the available data. In Chapter 4 of the report, the model is used to evaluate how the project will affect the local water resources.

144. The model has included the entire river and canal network of the Long Xuyen Quadrangle (LXQ) and Ca Mau Peninsula (CMP), with special attention to the detailed canals within the region. The canal and works system is developed in this model using conventional simulations, whereas cells in flooded areas are simulated as multiple-gated spill cells (appropriate for actual flood circumstances). Flowing through surface spill gates or sluices simulates the flow process from canals/rivers to cells and vice versa; sluices within cells are replicated as time-operated regulating sluices. This model inherits findings from the SIWRR's "Cai Lon - Cai Be Irrigation System Phase 2" project, which was completed in 2020. However, topography data and hydrological measurement documents from projects done in the area have been collected to update the detailed canal system information for the project.

145. The detailed model for the CMP and LXQ regions includes 3,824 river and canal sections, and 1,892 works (all types, including hypothetical works for overflowing the banks of field plots).

146. Boundary conditions of the CMP region model: the upstream boundary is the actual flow measured at Chau Doc and Vam Nao stations. The downstream boundary of the model is the water level at the East and West coast outlets. The internal boundary within the model is the flow due to rain calculated from the MIKE Nam model, evaporation and water intake for production are taken according to the results of the water demand calculation (*Figure 22*).

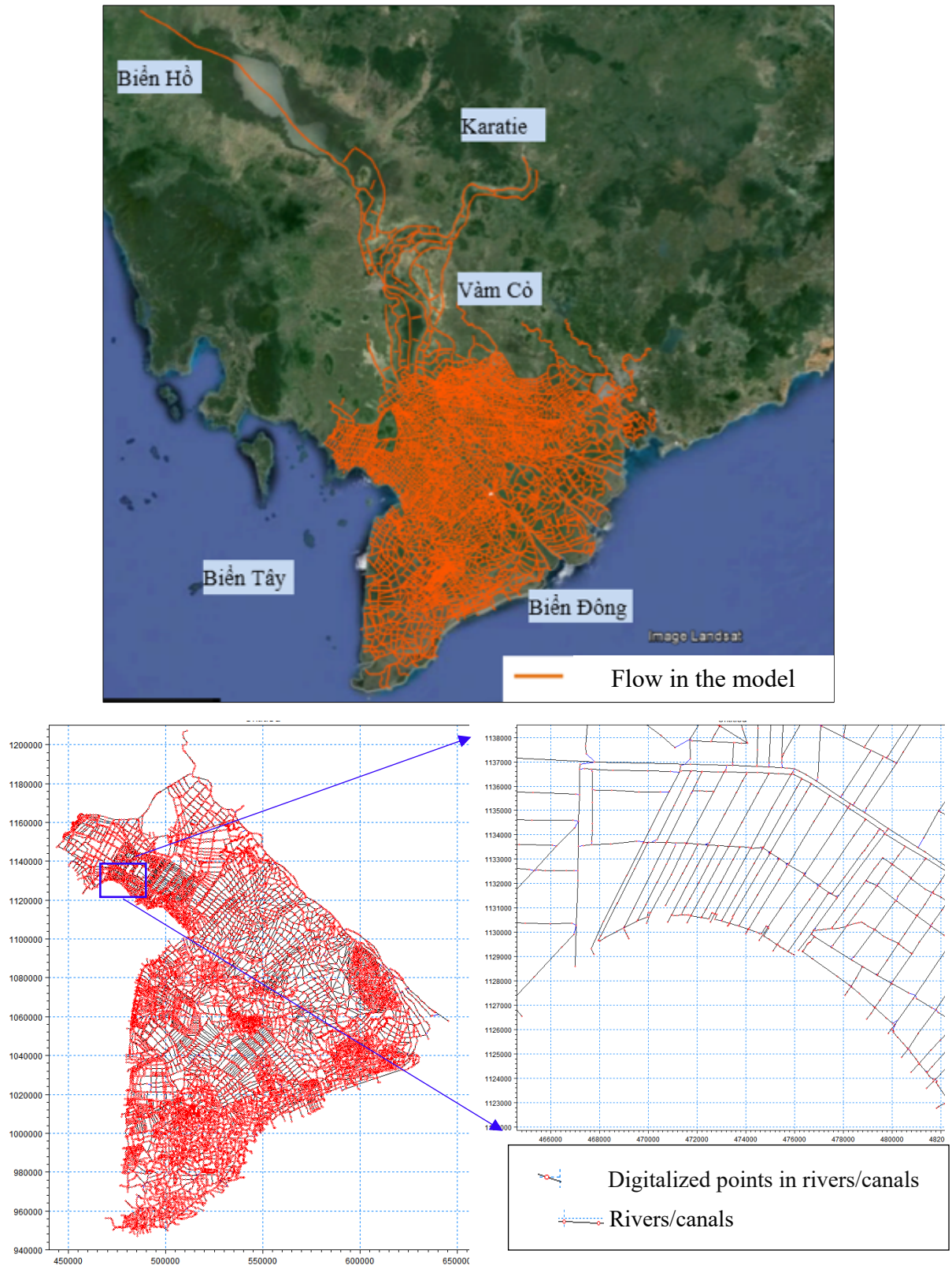


Figure 22: Detailed river and canal network in the CMP and project area

CHAPTER 2. NATURAL, SOCIO-ECONOMIC CONDITIONS AND CURRENT ENVIRONMENTAL STATUS OF THE PROJECT AREA

2.1. NATURAL CONDITIONS

2.1.1. Geographical Location

147. Before the merger, Hon Dat district is located on NH80, connecting Rach Gia city with Ha Tien town. It is the district with the largest natural area of Kien Giang (now An Giang) province with the district capital being Hon Dat town. Location of the district: the southwest borders the Gulf of Thailand, the northwest borders Kien Luong district, the southeast borders Rach Gia city, the east borders Tan Hiep district, and the northeast borders Thoai Son district (An Giang province).

148. Former Hon Dat district has 14 commune-level administrative units, including 2 towns: Hon Dat (district capital) and Soc Son, and 12 communes: Binh Giang, Binh Son, Linh Huynh, My Hiep Son, My Lam, My Phuoc, My Thai, My Thuan, Nam Thai Son, Son Binh, Son Kien, Tho Son with the largest rice area in the province of more than 80,000 hectares. In addition, this is also an area with development potential for aquaculture (especially the southern region of Highway 80), stone mining, and tourism,... Former Hon Dat district's population in 2022 is 158,883 people, mainly Kinh, Khmer, and Chinese.

149. The project area is located in the western coastal area of Binh Giang and Binh Son communes, with a total area of about 5,500 hectares (accounting for 16% of the area of the two communes), see *Figure 7*.

2.1.2. Climatic Conditions

150. The project area is situated in the LXQ's general climate zone, which is characterized by the tropical monsoon climate:

- Rain: During the period 2011 to 2023, the average annual rainfall in the project area reaches 2,331mm, the highest rainfall is 2,936mm (in 2023), and the lowest is 1,593mm (in 2015). The period from May to November has a high concentration of rainfall, contributing to around 90 to 92% of the overall annual precipitation (*Table 20*). This is one of the MD's areas with reasonably high rainfall.
- Temperature: This is an area of high temperature, with an average temperature of 28°C. The month with the greatest average temperature is May (29.6°C), and the month with the lowest average temperature is January (26.1°C). The temperature difference between months is fairly large, with 5.3°C in 2013 and 4.2°C in 2021. The change in temperature between months is no more than 3°C.

Table 20: Average annual rainfall in the period 2011 – 2023

Month	Year													Average
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
January	10.4	17.2	63.3	0.0	5.2	0.0	152.2	221.8	26.4	0.8	47.9	6.2	115.4	**51.3**
February	2.5	22.5	1.5	0.0	0.0	0.0	65.9	9.7	16.9	1.7	26.0	32.4	7.2	**14.3**
March	233.7	162.2	0.5	5.0	0.0	0.0	87.3	74.0	41.1	10.8	0.8	205.2	0.0	**63.1**

Month	Year													Average
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
April	95.9	100.4	101.7	86.0	30.8	0.0	204.3	95.5	53.1	107.4	159.4	146.2	77.7	**96.8**
May	275.9	181.9	242.2	148.3	197.4	377.3	254.6	203.1	207.1	151.0	340.6	260.4	285.3	**240.4**
June	209.4	145.5	448.5	296.5	320.0	270.8	128.7	284.5	406.0	316.3	176.5	192.1	270.7	**266.6**
July	261.3	193.0	325.5	380.0	142.8	241.3	294.3	493.0	306.4	241.7	553.0	384.8	676.5	**345.7**
August	463.4	218.5	157.6	252.6	154.9	187.6	339.7	356.6	487.5	301.4	433.3	354.2	213.9	**301.6**
September	289.7	554.6	386.5	304.6	465.6	307.3	224.5	297.9	463.7	513.8	403.2	406.6	677.7	**407.4**
October	176.9	188.5	310.3	238.1	110.2	431.4	408.3	236.5	242.3	483.3	179.1	236.3	364.7	**277.4**
November	274.6	137.0	154.4	196.0	166.0	294.8	218.6	156.0	152.6	167.0	273.4	211.5	193.2	**199.6**
December	73.2	10.5	70.0	25.7	0.5	124.8	131.8	201.5	0.2	96.3	21.5	71.4	53.9	**67.8**
Average	**197.2**	**161.0**	**188.5**	**161.1**	**132.8**	**186.3**	**209.2**	**219.2**	**200.3**	**199.3**	**217.9**	**208.9**	**244.7**	**194.3**

Source: Kien Giang (now An Giang) province statistical yearbook 2024.

Table 21: Air temperature in the project area in the period 2011 to 2023

Month	Year													Montly average
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
January	25.7	26.3	26.0	24.6	25.1	27.2	26.7	26.5	26.7	27.1	25.2	27.0	26.1	**26.2**
February	26.1	27.0	27.2	25.7	25.4	26.8	26.8	26.2	27.1	27.0	26.2	27.4	27.2	**26.6**
March	27.0	28.3	28.7	27.7	27.7	28.1	27.7	27.9	28.7	28.7	28.2	28.2	27.6	**28.0**
April	27.9	29.0	29.5	29.2	29.1	30.0	29.2	29.0	30.2	29.7	29.2	29.0	29.9	**29.3**
May	28.9	29.0	29.7	29.8	29.9	29.9	28.8	28.9	30.2	30.9	29.1	28.9	30.1	**29.5**
June	28.4	28.9	28.5	28.5	28.4	28.9	29.3	28.4	29.0	29.3	29.4	29.5	29.4	**28.9**
July	28.1	28.2	27.8	28.0	28.7	28.3	28.1	28.1	29.1	29.1	28.3	28.1	28.3	**28.3**
August	28.0	28.5	28.0	28.2	28.5	28.8	28.4	27.9	28.1	29.0	28.5	28.1	29.5	**28.4**
September	27.6	27.3	27.8	28.0	28.2	28.3	28.7	28.0	27.9	28.3	27.8	28.1	27.9	**28.0**
October	28.1	28.3	27.5	27.7	28.3	27.6	28.0	27.7	28.5	27.4	28.2	27.9	28.6	**28.0**
November	27.9	28.0	27.8	27.9	28.2	28.0	27.7	27.7	28.0	28.1	27.7	27.7	28.2	**27.9**
December	26.2	27.9	24.4	26.7	27.4	26.8	26.1	27.6	26.4	26.7	26.6	26.4	27.9	**26.7**
Yearly average	**27.5**	**28.1**	**27.7**	**27.7**	**27.9**	**28.2**	**28.0**	**27.8**	**28.3**	**28.4**	**27.9**	**28.0**	**28.4**	**28.0**

Source: Kien Giang (now An Giang) province statistical yearbook, 2024.

- Evaporation: the average annual evaporation reaches 1,241mm. March has the maximum evaporation, and since evaporation exceeds precipitation, drought is likely. October has the least amount of evaporation (*Table 22*), and because evaporation is significantly lower than precipitation, flooding is possible.

Table 22: Evaporation in the project area

Characteristic	Month												Year
	1	2	3	4	5	6	7	8	9	10	11	12	
En(mm)	153	161	173	180	150	140	141	136	129	120	118	133	1734
En_{max}(mm)	177	208	228	227	208	191	193	162	182	152	141	157	2020
En_{min}(mm)	115	123	152	132	108	96	71.3	77.5	66.0	74.4	81	115	1390

Source: Kien Giang (now An Giang) province statistical yearbook, 2024.

- Humidity: Over many years, the average relative humidity has reached 80.3%. The greatest humidity level is 83.3%, while the lowest is 76.5% (*Table 23*).

Table 23: Air humidity in the project area from year 2011 to 2024

Month	**Year**													**Montly average**
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	
January	80.0	81.0	80.0	76.0	78.0	78.0	80.0	82.0	76.0	75.0	78.0	78.0	76.0	**78.3**
February	80.0	80.0	76.0	77.0	77.0	74.0	79.0	78.0	77.0	73.0	77.0	78.0	75.0	**77.0**
March	79.0	79.0	75.0	75.0	74.0	77.0	79.0	76.0	75.0	74.0	77.0	78.0	74.0	**76.3**
April	81.0	79.0	79.0	75.0	75.0	76.0	78.0	76.0	74.0	75.0	78.0	79.0	76.0	**77.0**
May	83.0	83.0	81.0	79.0	78.0	80.0	83.0	81.0	78.0	75.0	82.0	82.0	78.0	**80.2**
June	85.0	82.0	85.0	84.0	83.0	72.0	81.0	83.0	83.0	80.0	80.0	79.0	81.0	**81.4**
July	84.0	84.0	84.0	85.0	86.0	83.0	84.0	85.0	80.0	80.0	84.0	84.0	84.0	**83.6**
August	85.0	84.0	84.0	82.0	83.0	84.0	84.0	84.0	84.0	80.0	83.0	84.0	81.0	**83.2**
September	87.0	87.0	84.0	83.0	84.0	84.0	82.0	83.0	84.0	83.0	85.0	83.0	86.0	**84.2**
October	82.0	82.0	83.0	82.0	82.0	86.0	82.0	86.0	80.0	86.0	84.0	81.0	83.0	**83.0**
November	81.0	82.0	79.0	82.0	81.0	82.0	81.0	84.0	78.0	78.0	83.0	83.0	80.0	**81.1**
December	77.0	79.0	76.0	79.0	78.0	82.0	78.0	82.0	75.0	77.0	76.0	77.0	76.0	**77.8**
Yearly average	**82.0**	**81.8**	**80.5**	**79.9**	**79.9**	**79.8**	**80.9**	**81.7**	**78.7**	**78.0**	**80.6**	**80.5**	**79.2**	**80.3**

Source: Kien Giang (now An Giang) province statistical yearbook, 2024.

- Wind: The predominant wind direction is North, followed by Northeast or Northeast. North and northeast winds prevail with a frequency of more than 30% at the start of the dry season (November and December). Westerly and southwesterly winds prevail throughout the wet season. The wind blows westward during the transitional month of October. The average yearly wind speed is 3.4m/s, and the frequency of calm wind can reach 40% in November and December (*Table 24*).

Table 24: Wind velocity and direction during the year in the project area

Parameter	Month												Year
	1	2	3	4	5	6	7	8	9	10	11	12	
Vbq(m/s)	1.6	2.4	2.4	2.8	2.9	3.9	3.9	4.5	3.4	1.8	1.7	1.6	3.4
V_{max}(m/s)	38	24	34	24	57	38	38	40	48	38	38	48	57
Direction	NS	S	S	W	W	W	WWS	WWN	W	W	NW	NS	W

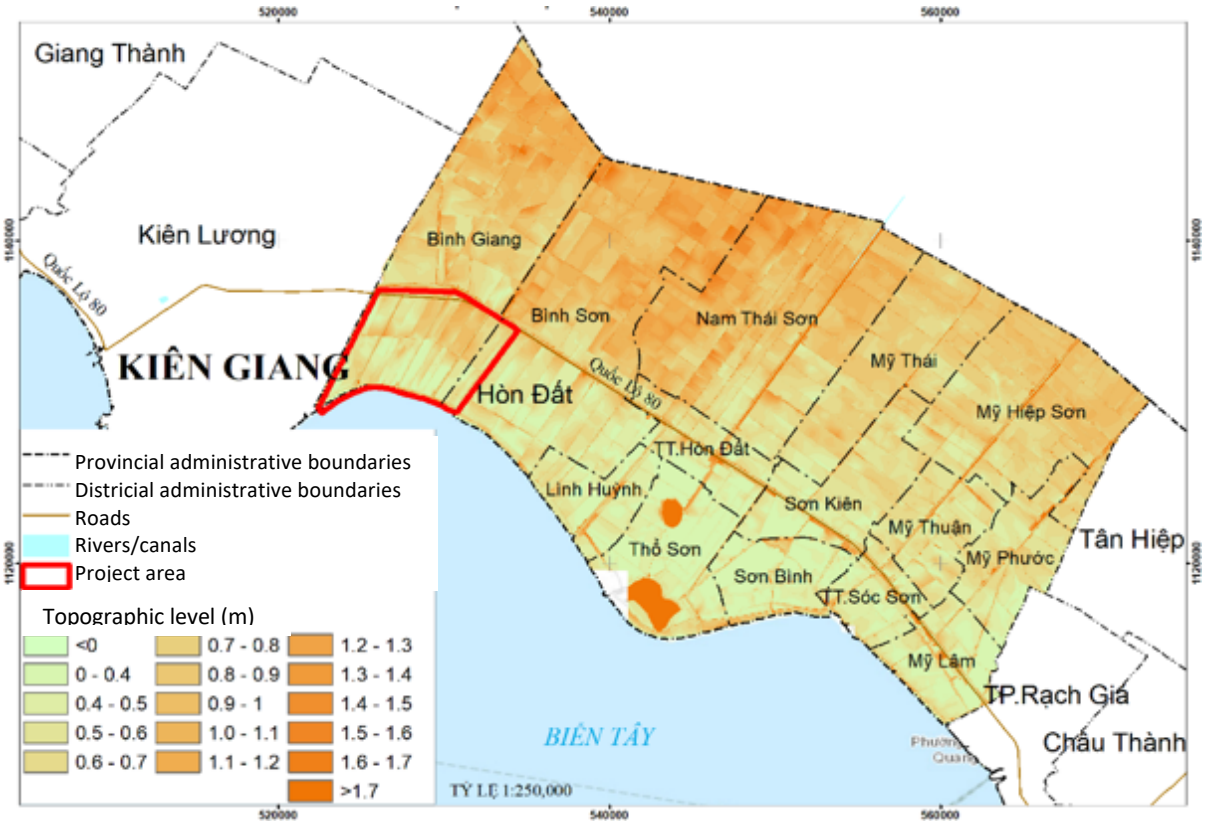
Source: Kien Giang (now An Giang)province statistical yearbook, 2024.

151. *Comments: The project area is located in a zone that experiences moderate rainfall and it entails excavation activities. It is recommended that the contractor prioritizes carrying out the majority of the construction work during the dry season and minimizes work during the rainy season in order to mitigate the impact of rainwater runoff. Further consideration should be given to the directions of the prevailing winds. Contractors should position the concrete mixing stations and material storage areas at the downwind side to minimize the impact on adjacent people.*

2.1.3. Topographic and geomorphological characteristics

2.1.3.1. Topographical characteristics

152. The project area is a coastal plain. Its terrain is highly varied, with hills, mountains, seas, and plains ranging in elevation from 0.25 to 0.75m on average (*Figure 23*) [*FS report of the project, 2023*]. Strips of high terrain can be seen around NH 80 and primary canals. Low-lying terrain is located primarily on the seaward side, with sub-areas reaching an elevation of -0.2m above sea level. This region is ideal for the growth of saltwater aquaculture, particularly saltwater and brackish water tiger shrimp production. Furthermore, the land slopes from northeast to southwest, allowing for natural drainage toward the West Sea.



Source: FS report of the project, 2023

Figure 23: Topographic map of the project area

2.1.3.2. Geological characteristics

153. Geological survey results conducted by the Southern Institute of Water Resources Research (SIWRR) at the construction sites of the project items showed that:

a) In the construction area of the sluices

154. The project area is situated in the West Coast's typical unstable soil. In addition to significant compaction and subsidence, the soil possesses a relatively low bearing capacity. Current geological documents from other construction projects in the project area indicate that the project area's geology comprises the following layers:

- Leveling soil layer: This layer is characterized by less plastic clay, with a yellow-brown to reddish-brown color. It is in a semi-soft to semi-hard state, with a thickness ranging from 1.4m to 2.2m

- Layer 1a: This layer consists of less plastic clay mixed with sand, displaying a gray-brown or yellow-brown color. It is in a soft plastic state and is present only in borehole K35-3 with a thickness of 2.6m
- Layer 1: This layer is highly plastic, containing both clay and organic matter. It appears in black, brown-gray, and green-gray colors, exhibiting a flowing-to-plastic consistency. The thickness of this layer ranges from 2.2m to 6.9m
- Layer 2c: This layer is characterized by less plastic clay with colors such as brown-red, yellow-brown, and white-gray. It is in a semi-hard to hard state and has a thickness ranging from 8.8m to 17.9m
- Layer 3: This layer consists of less plastic clay mixed with sand, occasionally forming aggregates. It appears in colors like brown-red, yellow-gray, and green-gray, exhibiting a soft plastic to semi-hard consistency. The thickness varies from 3.5m to 8.0m
- Layer 4: This layer is characterized by less plastic clay with colors such as brown-red, yellow-brown, and white-gray. It is in a semi-hard state and has a thickness of 5.1m, only appearing in borehole K37-2
- Layer 5: This layer consists of fine sand particles mixed with dust, displaying colors like yellow-brown, yellow-gray, and white-gray. It is in a firm to compact state, with a thickness ranging from 2.5m to 11.3m

Table 25: Typical physical and mechanical criteria of soil layers from layer 1 to 2b of the sluices

Physical Properties		**Label**	**Unit**	**Layer 1a**	**Layer 1**	**Layer 2c**
Particle size	Sand	P	%	0.0	0.0	0,0
	Silt		%	44.9	12.2	14,0
	Dust		%	31.9	41.3	43,3
	Clay		%	23.2	46.5	42,7
Natural Moisture Content		W	%	26.7	61.6	20.8
Natural Bulk Density		ρ	g/cm^3	1.858	1.594	1.989
Dry Bulk Density		ρ_k	g/cm^3	1.466	0.994	1.647
Specific Gravity		Gs	g/cm^3	2.685	2.633	2.695
Void Ratio		e	-	0.831	1.683	0.637
Porosity		n	%	45.4	62.3	38.9
Saturation		G	%	86.3	96.3	87.7
Yield stress		W_L	%	32.1	61.6	40.4
Plastic limit		W_P	%	20.0	28.9	19.0
Plasticity Index		Ip	%	12.1	32.7	21.3
Consistency Index		Is	-	0.55	0.98	0.08
Adhesion Force		C	kG/cm^2	0.106	0.083	0.405
Internal Friction Angle		φ	Degree	09°36'	04°56'	17°14'

Physical Properties	Label	Unit	Layer 1a	Layer 1	Layer 2c
Compression Coefficient	a_{1-2}	kG/cm^2	0.032	0.227	0.012
Deformation Modulus	E_{1-2}	kG/cm^2	53.00	9.73	127.51
Conventional Load-Bearing Strength	(R_0)	kG/cm^2	0.78	0.52	2.69
Permeability coefficient	K	cm/s	3.21E-05	5.12E-06	4.92E-04

Source: FS report of the project, 2024

Table 26: Typical physical and mechanical criteria of soil layers from layer 3 to 5 of the sluices

Physical Properties		Label	Unit	Layer 3	Layer 4	Layer 5
Particle size	Sand	P	%	0.0	0.0	0,0
	Silt		%	45.3	13.6	85,2
	Dust		%	32.5	42.6	12,7
	Clay		%	22.2	43.8	2,1
Natural Moisture Content		W	%	21.8	23.8	20.7
Natural Bulk Density		ρ	g/cm^3	1.959	1.977	1.951
Dry Bulk Density		ρ_k	g/cm^3	1.609	1.597	1.617
Specific Gravity		Gs	g/cm^3	2.693	2.697	2.675
Void Ratio		e	-	0.676	0.689	0.655
Porosity		n	%	40.3	40.8	39.5
Saturation		G	%	86.8	93.0	84.3
Yield stress		W_L	%	33.1	43.7	23.2
Plastic limit		W_P	%	18.6	20.1	18.8
Plasticity Index		Ip	%	14.6	23.6	4.5
Consistency Index		Is	-	0.22	0.16	0.64
Adhesion Force		C	kG/cm^2	0.222	0.425	0.071
Internal Friction Angle		φ	Độ	15°26'	16°35'	30°46'
Compression Coefficient		a_{1-2}	kG/cm^2	0.017	0.012	0.023
Deformation Modulus		E_{1-2}	kG/cm^2	103.36	130.24	66.39
Conventional Load-Bearing Strength		(R_0)	kG/cm^2	1.81	2.73	1.96
Permeability coefficient		K	cm/s	3.86E-04	6.32E-04	8.08E-03

Source: FS report of the project, 2024

b) In the construction area of the connecting road

155. Soil in the construction area of the connecting road is classified into the following layers:

- Leveling soil layer: Less plastic silt, yellow-brown or reddish-brown, in a soft to stiff plastic state. This layer appears from the top elevation of the layer (+1.57 to +2.85)m to the bottom elevation of the layer (-0.26 to +1.33)m, with a thickness varying from 1.0 to 2.7m.

- Layer 1: Very plastic silt, mixed with organic matter, black, brown, or green-gray, in a flow-plastic flow state. This layer appears from the top elevation of the layer ((-0.26 to +1.33)m to the bottom elevation of the layer (-7.56 to -0.76)m, with a thickness varying from (1.7 to 7.5)m.
- Layer 2a: Few plastic clay, brown-red, gray-white, gray-black, soft plastic state. This layer appears from the top elevation of the layer (-2.91 to +1.33) m to the bottom elevation of the layer (-4.21 to -1.17) m, and the thickness of the layer varies from 1.1 to 2.5 m.
- Layer 2b: Few plastic clay, brown-red, yellow-gray, semi-hard plastic state. This layer appears from the top elevation of the layer (-3.88 to -1.17) m to the bottom elevation of the layer (-7.18 to -3.77) m, and the thickness of the layer varies from 2.6 to 4.0 m.
- Layer 2c: Few plastic clays, brown-red, yellow-brown, gray-white, semi-hard to a hard state. This layer appears from the top elevation of the layer (-7.56 to -2.06) m to the bottom elevation of the layer (-10.41 to -9.15) m, and the thickness of the layer varies from 2.8 to 7.2m.
- Layer 3: Sandy clay with little plasticity, brown-red, gray-white, semi-hard state. This layer appears from the top elevation of the layer (-6.73) m to the bottom elevation of the layer (-8.73) m, and the thickness of the layer is (2.0) m. This layer only appears in the borehole GT-15.
- Layer 4: Few plastic clay, yellow-brown, gray-white, semi-hard state. This layer appears from the top elevation of the layer (-8.73) m to the bottom elevation of the layer (-10.43) m, and the thickness of the layer is 1.7 m. This layer only appears in the borehole GT-15.

Table 27: Typical physical and mechanical criteria of soil layers from layer 1 to 2b of the project's connecting road

Physical Properties		Label	Unit	Layer 1	Layer 2a	Layer 2b
Particle size	Sand	P	%	0.0	0.0	0.0
	Silt		%	12.3	11.8	11.8
	Dust		%	39.7	44.1	42.9
	Clay		%	48.0	44.1	45.3
Natural Moisture Content		W	%	66.3	30.0	22.9
Natural Bulk Density		ρ	g/cm^3	1.581	1.879	1.965
Dry Bulk Density		ρ_k	g/cm^3	0.969	1.445	1.600
Specific Gravity		Gs	g/cm^3	2.638	2.684	2.694
Void Ratio		e	-	1.806	0.857	0.686
Porosity		n	%	63.3	46.2	40.6
Saturation		G	%	96.8	93.9	89.7
Yield stress		W_L	%	64.6	39.2	39.5
Plastic limit		W_P	%	29.8	19.5	18.2
Plasticity Index		Ip	%	34.8	19.7	21.3
Consistency Index		Is	-	1.01	0.54	0.22

Physical Properties		Label	Unit	Layer 1	Layer 2a	Layer 2b
Adhesion Force		C	kG/cm^2	0.082	0.167	0.285
Internal Friction Angle		φ	Độ	04°47'	09°47'	14°37'
Compression Coefficient		a_{1-2}	kG/cm^2	0.256	0.030	0.018
Deformation Modulus		E_{1-2}	kG/cm^2	9.09	56.95	96.22
Compression Index		(Cc)	-	0.66	-	-
Load-Compression Index		(Cr)	-	0.19	-	-
Pre-Consolidated Pressure		(Pc)	kG/cm^2	0.66	-	-
Conventional Load-Bearing Strength		(R_0)	kG/cm^2	0.51	1.05	1.86
Standard compactness	Maximum dry density	γ	g/cm^3	1.596	1.796	1.864
	Optimal moisture Content	w_{opt}	%	16.89	13.00	11.88

Source: FS report of the project, 2024

Table 28: Typical physical and mechanical criteria of soil layers from layer 2c to 4 of the project's connecting road

Physical Properties		Label	Unit	Layer 2c	Layer 3	Layer 4
Particle size	Sand	P	%	0.0	0.0	0.0
	Silt		%	12.8	46.2	12.5
	Dust		%	42.5	33.6	48.9
	Clay		%	44.7	20.2	38.6
Natural Moisture Content		W	%	20.5	22.2	22.5
Natural Bulk Density		ρ	g/cm^3	1.991	1.980	1.973
Dry Bulk Density		$ρ_k$	g/cm^3	1.653	1.621	1.610
Specific Gravity		Gs	g/cm^3	2.695	2.691	2.695
Void Ratio		e	-	0.631	0.661	0.674
Porosity		n	%	38.7	39.8	40.2
Saturation		G	%	87.2	90.4	90.1
Yield stress		W_L	%	40.4	32.1	38.7
Plastic limit		W_P	%	19.1	19.2	18.3
Plasticity Index		Ip	%	21.3	12.9	20.4
Consistency Index		Is	-	0.07	0.23	0.21
Adhesion Force		C	kG/cm^2	0.399	0.281	0.367
Internal Friction Angle		φ	Độ	17°27'	18°45'	16°03'
Compression Coefficient		a_{1-2}	kG/cm^2	0.012	0.014	0.015
Deformation Modulus		E_{1-2}	kG/cm^2	128.20	116.74	105.67
Conventional Load-Bearing Strength		(R_0)	kG/cm^2	2.69	2.18	2.38

Physical Properties		Label	Unit	Layer 2c	Layer 3	Layer 4
Standard compactness	Maximum dry density	γ	g/cm^3	1.859	1.768	1.867
	Optimal moisture Content	w_{opt}	%	11.86	12.79	11.61

156. Comments: The ground in the project's construction areas belongs to Quaternary sediments, with a mixed origin from both the river and sea. Specifically, soil layers 1a and 1 consist of Holocene sediment belonging to the upper subsystem (ambQ23), which has very poor load-bearing capacity, high compression settlement, and is susceptible to structural damage when subjected to the effects of flowing water. This makes it unsuitable for foundation construction. Layers 2a, 2b, 2c, 3, and 4 are sediment layers from the Pleistocene upper to Holocene lower-middle (amQ13 - amQ21-2), exhibiting a state ranging from soft to stiff, with reasonably good load-bearing capacity, making them more suitable for foundation construction.

157. Due to the construction of the sluices and road on the weak ground (layers 1, 1a), which is characterized by high compression settlement and poor load-bearing capacity, it is essential to devise a reasonable ground treatment plan for the project. During construction, monitoring settlement is crucial, and the construction should be phased appropriately to avoid detrimental effects on the ground. Additionally, attention should be given to the consolidation settlement process of the ground for a suitable treatment plan. For a treatment plan involving pile foundations, it is recommended to use piles to transfer the load of the structure to areas with good load-bearing capacity. When treating the ground with piles, the diameter, length, and quantity of piles should be determined based on the geotechnical properties of the ground, considering the structural load. During construction, compression tests on the piles should be conducted to accurately determine the load-bearing capacity and adjust the range of ground reinforcement accordingly.

2.1.4. Hydrographical and Hydrogeological Conditions

2.1.4.1. Hydrographical conditions

158. The project area is located on the coast and are the tributaries that connect the Hau River and West Sea. The tides in the area are a mix of diurnal and semi-diurnal, with a preference for diurnal tides. Tide amplitudes range from 0.8 to 1.0m. Ebb tides have less fluctuation in water level than high tides. Maintaining a low water level requires a greater amount of time than maintaining a high water level. The average water level is close to the low tide water level.

159. Furthermore, surface water sources in the area are heavily reliant on West Sea tides and the ability of the main canal system to carry water from the Hau River. The Giang Thanh River, Ha Giang Canal, Nong Truong Canal, T3 Canal, etc. are responsible for transporting the upstream water flow in Chau Doc (about 5,400m^3/s during the rainy season and 300m^3/s during the dry season) to the project area. All of these canals are interconnected with the RG-HT canal and flow into the West Sea through several routes, including Dong Ho lagoon, Ta Sang canal, Tam Ban canal, Ba Hon canal, Tuan Thong canal, Binh Giang canal, etc. The project area is not suitable for freshwater supplies for rice growing due to the canal system's ability to transfer fresh water from the Hau River and saltwater intrusion from the sea.

160. Salinity intrudes deep inland during the dry season due to the low water level of Hau river branches, lack of rainfall, and lack of sluice gates to prevent salinity intrusion. It has a huge impact on the area's production and people's daily lives. The highest Kien Giang Sea tide

measured at the old Rach Gia market is +1.00, while the lowest is -0.72. According to the Southern Institute of Water Resources Research (2023), the hydrological characteristics at Rach Gia station are described in *Table 29* to *Table 31.*

2.1.4.2. Tidal regime

161. The hydrological regime of rivers and canals in the region is mainly influenced directly by the inland rainfall regime and the West Sea tides, and indirectly by the East Sea tides and adjacent areas.

Table 29: Water level in Rach Gia monitoring station

Parameters	Month											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
H_{max}	98	87	82	74	80	86	94	95	95	118	99	99
H_{min}	-48	-50	-48	-48	-53	-59	-45	-33	-18	-7	-7	-42
$\triangle H_{max}$	113	126	100	111	133	119	114	107	97	79	85	100
$\triangle H_{maxbq}$	90	80	68	66	73	77	88	86	89	105	94	94
$\triangle H_{min}$	-35	-43	-40	-43	-46	-45	-34	-26	-12	2	0	-29
$\triangle H_{minbq}$	101	103	93	101	111	106	103	96	86	72	75	93

Source: Southern Institute of Water Resources Research, 2023.

Table 30: Highest water level (Hmax) over the years of greatest floods

Year	1978	1982	1984	1991	1994	2000	2001
H_{max}(m)	1.27	0.95	1.00	0.92	0.95	1.07	0.96

Source: Southern Institute of Water Resources Research, 2023.

Table 31: The frequency of water level at Rach Gia station

Station	Maximum water level frequency (cm)				Minimum water level frequency (cm)			
	0,5%	**1,5%**	**5%**	**10%**	**99%**	**97%**	**95%**	**90%**
Rach Gia	126	120	109	104	-79	-76	-75	-72

Source: Southern Institute of Water Resources Research, 2023.

2.1.4.3. Hydrogeological conditions

162. The project area's groundwater is of low quality, with chlorine levels ranging from 400 to 1,000mg/L and water pH ranging from neutral to moderate base. The depth of exploitation is 40-60 m. Its reserves are quite abundant but of uneven quality. Currently, it is depleting in terms of aquifers and reserves, with symptoms of cascade. Many diverse groundwater layers and aquifers have formed as a result of the geological features of the region. It can only be used in shallow strata, and the amount of water that can be used in deeper layers is limited.

163. As of right now, certain areas lack a source of fresh water, leading to the continued practice of dispersed underground exploitation that does not adhere to state planning and regulations and thus has a negative impact on groundwater reserves and quality. If this condition persists, it will impact existing aquifers. It is important to remember that this is a coastal region and that the impact of saltwater intrusion on groundwater supplies is likely to be significant.

164. *The excavation operations of the project will be limited to surface layers, mostly for tasks such as installing utility poles, which require digging to a depth of approximately 3-4 meters. For this reason, the project will have a negligible effect on the groundwater layers in the project area.*

2.1.5. Natural Resources

2.1.5.1. Land resource

165. The total natural land area in the project area is 34,726.82 ha, including (*Table 32*):

- Residential land: 324.65ha, accounting for 0.93% of the total land area of the area.
- Agricultural land: 32,107.20 ha, accounting for 92.46% of the total land area of the whole region, agricultural land still accounts for a high proportion of the land use structure.
- Forestry land: 5,418.67ha, accounting for 8.32% of the total land area of the area.
- Aquaculture land: 341.19 ha, accounting for 0.98% of the total land area of the area.
- Water surface area (rivers and canals): 894.44 ha, accounting for 2.58% of the total land area.

Table 32: Current status of land use of the project area in 2023

TT	Land type	Year 2023			
		Binh Giang	Binh Son	Total	Percentage (%)
	Natural area	**16,370.45**	**18,356.37**	**34,726.82**	**100**
1	**Agricultural land**	**14,936.91**	**17,170.29**	**32,107.20**	**92.46**
1.1	Land for rice cultivation	12,982.26	11,907.09	24,889.35	71.67
1.2	Land for other annual crops	309.10	30.06	339.16	0.98
1.3	Soil for perennial plants	707.35	367.29	1074.64	3.09
1.4	Protection forest land	93.23	2971.26	3064.49	8.82
1.5	Productive forest land	613.80	1740.38	2354.18	6.78
1.6	Aquaculture land	226.33	114.86	341.19	0.98
1.7	Other farmland	4.84	39.35	44.19	0.13
2	**Non-agricultural land**	**1,433.54**	**1,186.08**	**2,619.62**	**7.54**
2.1	Defense land	0.18	147.25	147.43	0.42
2.2	Land Security		0.05	0.05	0.00
2.4	Serviced Commercial Land	1.05	1.32	2.37	0.01
2.5	Land for non-agricultural production and business establishments	2.78	18.02	20.80	0.06
2.6	Land used for mineral activity	7.25	160.88	168.13	0.48
2.7	Land for infrastructure development at national, provincial, district and commune levels	604.66	454.54	1059.20	3.05
2.8	Community Land	0.26	0.15	0.41	0.00
2.9	Residential land in rural areas	181.86	142.79	324.65	0.93

TT	Land type	Year 2023			
		Binh Giang	Binh Son	Total	Percentage (%)
2.10	Land for the construction of the agency headquarters	0.45	0.27	0.72	0.00
2.11	Land for the construction of the headquarters of the organization		0.28	0.28	0.00
2.12	Land of Belief	0.61	0.53	1.14	0.00
2.13	Land of rivers, canals, canals and streams	634.44	260.00	894.44	2.58

Source: Decision No. 1711/QD-UBND dated 07/7/2022 of Kien Giang (now An Giang) PPC.

2.1.5.2. Land resource

166. In general, the land fund of the project area is mainly light alkaline soil, the potential fertility is relatively high, the total organic content, nitrogen, and potassium is quite high, and the level of organic decomposition is slow, especially the total P_2O_5 (phosphate) is slightly poor and decreases with depth, P_2O_5 is easy to digest from poor to very poor. Therefore, in use, it is necessary to pay attention to measures of sour brass, and alum washing and in production, it is necessary to avoid bringing the alum layer above the surface layer. In recent years, the state has taken many measures to wash acid sulfate, so currently the soil contaminated with alum is quite few. *The project owner and constractors should pay attention in the excavation in the acid sulfate soil, especially when building the 23 sluice and the road.*

2.1.5.3. Mineral resources

167. Although Hon Dat's mineral resources are limited and diversified, they have great commercial value, including stone, clay, and peat. The district has 224.25 ha of peat mines spread throughout 85B canal, Bao canal, Hon Dat forest field (Nam Thai Son commune), and Than Bun canal (Binh Son commune). Currently, these mines are exploited by a variety of firms, including Kien Giang Agriculture and Forestry Co., Ltd., AAA Company, etc. Furthermore, a 99.98-ha stone quarry (granite) is located in Hon Soc mountain, Tho Son commune. *There is neither mineral sources nor construction material mines in the project's area. The supply of construction materials can be obtained from the surrounding neighboring districts with the distance to the project's sites is about 10-20 km.*

2.1.5.4. Forest resources

168. Former Hon Dat district's forest area was from 16,284.03 ha in 2010 to 8,647.23 ha in 2021, a drop of 7,636.80 ha. This was since the protection forest decreased from 6,695.54 ha in 2010 to 6,226.65 ha in 2020 and the production forest experienced a decrease from 9,588.49 ha to 2,420.58 ha between 2010 and 2020. The reason for the decline in production forest area is the approved plan's transition from production forest to rice farming, which provides higher economic efficiency and faster capital turnover than afforestation. Meanwhile, climate change and marine erosion are to blame for the loss of protection forest areas. As a result, numerous parts of the district and surrounding areas have been eroded to the foot of the protective dike. This increases the strength of the southwest wind, affecting the district's sea dike. *However, project implementation will not acquire forest land or causing impact on forest resources.*

2.1.5.5. Water resources

169. Kien Giang (now An Giang) is a province located downstream of the Hau River's freshwater source and also upstream of the Gulf of Thailand's brackish water source. As a result, several factors influence the hydrological regime of the province in general, and the project communes in particular: the tides of the Gulf of Thailand (brackish water source), the hydrological regime of the Hau River (freshwater source), the local rainfall regime (freshwater source), and, most importantly, the operation of the LXQ irrigation system (saltwater/freshwater regulation). These factors have different impacts during various periods of the year.

170. Saltwater source: Due to its closeness to the West Sea, the project is strongly affected by the West Sea tides. This is also a plus for developing a brackish/saltwater supply for aquaculture growth in the region. The sea tide in this location is a mixed kind, with a variation range of 0.8-1.0 meters, leaning toward diurnal tides. The low tide level is more stable than the high tide level.

171. Freshwater source: from rainfall and Hau River, wherein:

- From rainfall: mainly available in the rainy season. In the project area, the rainy season lasts from May to November, while the dry season lasts from December to April of the following year. Total rainfall during the rainy season accounts for around 90-92% of total annual rainfall, while just 8-10% occurs during the dry season. There are years when there is no rain for four months in a row, such as in 2016. The average annual rainfall in the project area is 2,166mm, with the best year receiving 2,925.2mm (1996) and the lowest receiving 1,307mm (2001).
- From Hau river branches' water: During the flood season (June to November), the water level on the Hau River is high, providing an abundant freshwater source to the project area. However, many reservoirs have been built in the Mekong River's upstream countries, such as China and Laos, in recent years. It has reduced the Hau River's water supply during the wet season. Furthermore, during the dry season, the water level on the Hau River drops, resulting in a poor freshwater source for the project area, especially in the last months of the dry season such as March and April. This causes a shortage of freshwater for summer-winter rice production, especially in the southern area of NH 80 (*Figure 24* to *Figure 27*).

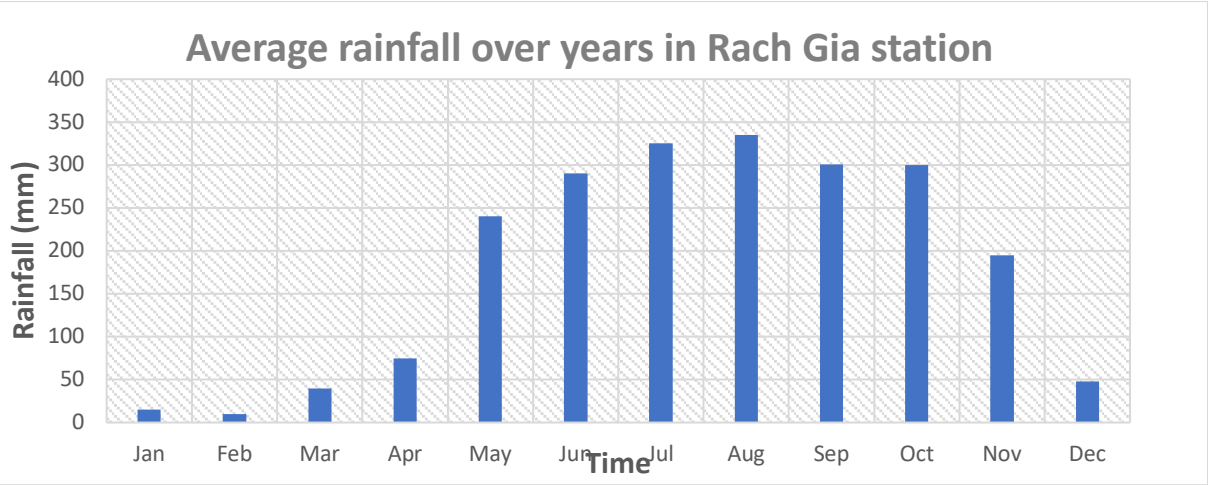


Figure 24: Average monthly rainfall over years (1980-2020) at Rach Gia station

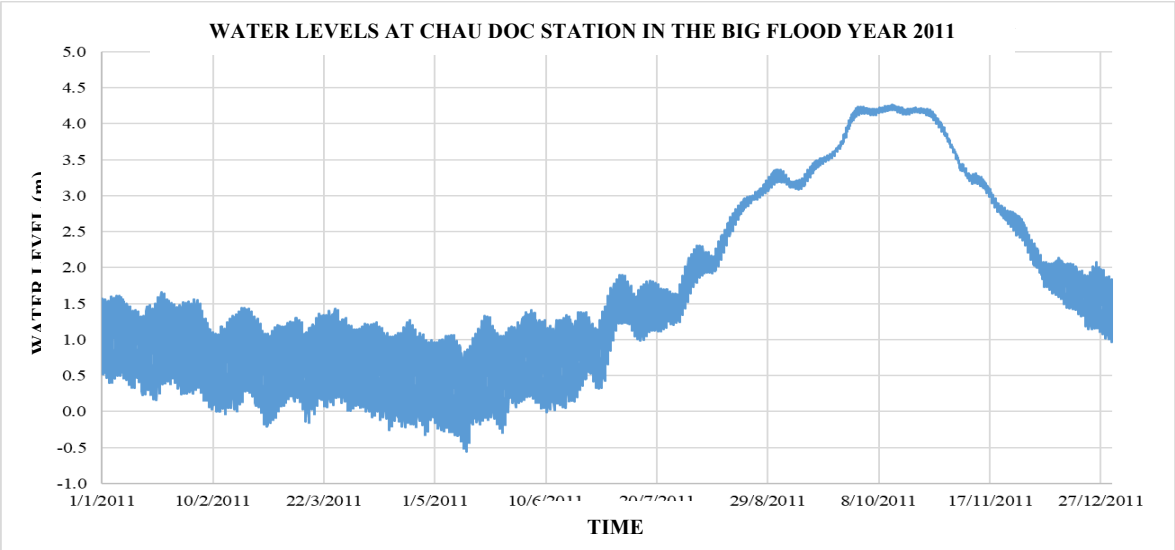


Figure 25: Change in water levels at Chau Doc station in 2011

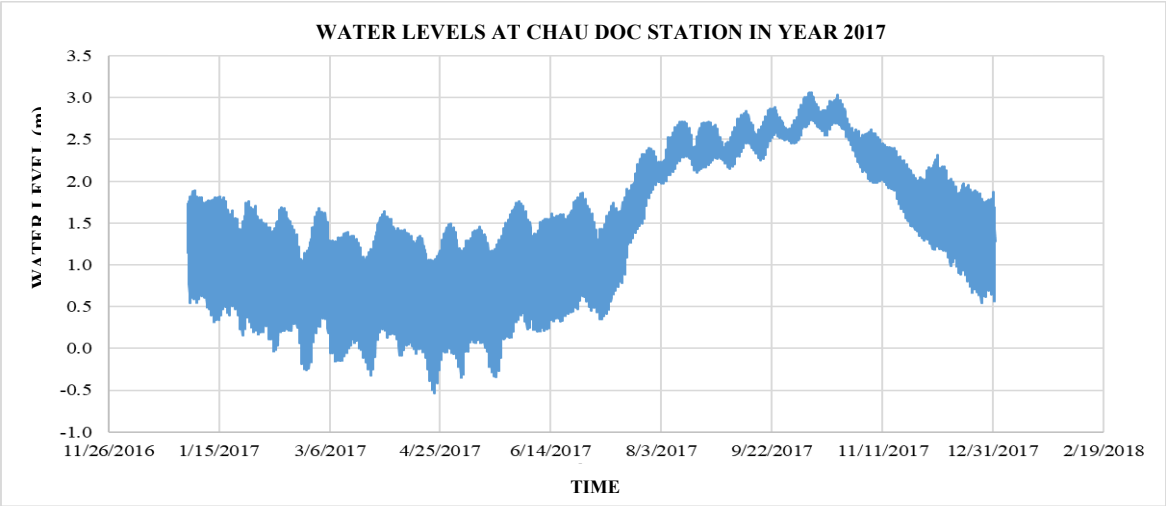


Figure 26: Change in water levels at Chau Doc station in 2017

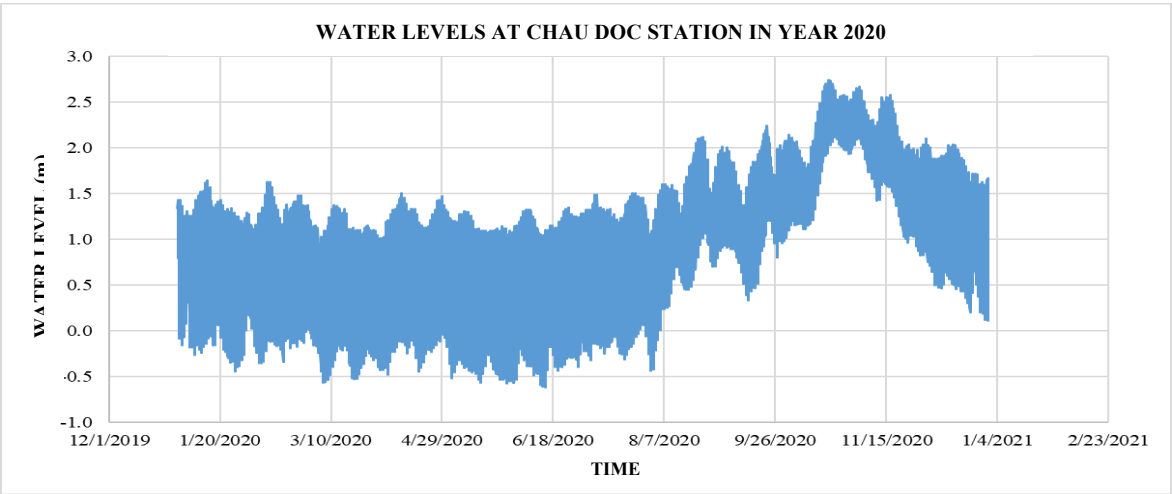


Figure 27: Change in water levels at Chau Doc station in 2020

172. Operation of the LXQ irrigation system: As previously stated, the brackish/freshwater supply in the LXQ in general, and the project in particular, is largely dependent on the system's operation mode. Previously, the system was not completed. As a result, saltwater intruded deep into the inland, having a profound impact on local people's production and daily life. The coastal sluice system from Rach Gia to Ha Tien is currently closed, allowing for improved

control of seawater intrusion into the project area. In addition, the project area is placed distant from the freshwater source and near the saltwater source. Thus, a reduction in the Hau river's freshwater supply to the region and sluice gate-induced saline intrusion from the Wet Sea also result in a shortage of freshwater for rice cultivation in the dry season. *As a result, shifting from a three-rice crop model to a shrimp-rice model is appropriate, with aquaculture taking place during the high-salinity dry season and rice production taking place during the rainy season. This production model is nature-based, long-lasting, and efficient. So, implementation of the project will help to boost the transition.*

2.1.5.6. Biological resources

a) Terrestrial flora and fauna

173. In Hon Dat district (former), there are no natural heritage sites. Currently, in 14 communes and towns of the district, only Tho Son commune has rare species that need to be protected according to the Red Book of Vietnam and IUCN, including: White-cheeked gibbon (*Nomascus leucogenys* - Vượn đen má hung), Asiatic black bear (*Ursus thibetanus* - Gấu ngựa), Sun bear (*Ursus malayanu* - Gấu chó), Bengal slow loris (*Nycticebus bengalensis* -cu li lớn), Pygmy slow loris (*Nycticebus pygmaeus*- Cu li nhỏ), Hawksbill sea turtle (*Eretmochelys imbricata* - Đồi mồi), Kemp's ridley sea turtle (*Lepidochelys kempi*i-vích), Asian small-clawed otter (*Aonyx cinereus*- Rái cá vuốt bé), Malayan Pangolin (*Manis javanica*- Tê tê java), Lesser adjutant (*Leptoptilos javanicus* - Già đẩy nhỏ), Sarus Crane (*Grus antigone sharpii* - Sếu đầu đỏ), Long tailed macaque (*Macaca fascicularis* - Khỉ đuôi dài), Pig tailed Macaqu (*Macaca leonina* - Khỉ đuôi lợn), Malayan snail-eating turtle (*Malayemys subtrijuga* - Rùa ba gờ), Giant Asian pond turtle (*Heosemys grandis* - Rùa đất lớn), Yellow-headed temple turtle (*Hieremys annandalei*-Rùa răng), Clouded monitor lizard (*Varanus bengalensis* - Kỳ đà vân) [*Former Hon Dat District People's Committee, 2022*]. These species, on the other hand, don't live in the project area. Instead, they live about 25 to 30 km away.

174. *The project area does not serve as a significant habitat or breeding ground for rare/ endangered/protected animals.*

b) Aquatic life

175. There are numerous water bodies in the project area, including canals and rivers. The project includes the construction and renovation of sluices on the Don Dong canal, K3-Tuan Thong canal, canal 200, and the canal along the National defense dike. No significant levels of aquatic biodiversity are known to exist in any of these bodies of water.

176. The analysis results of 20 aquatic life samples in the project area showed that no rare endangered or valuable aquatic species in the canals. The analysis results are shown in *Appendix 3*. Following is the summary of the aquatic life:

- Phytoplankton: There area 75 species of phytoplankton belonging to 6 phyla of algae. Among these, the Chlorophyta phylum predominated with 60 species (61.3%), followed by the Bacillariophyta with 14 species (18.7%), the Cyanophyta with 7 species (9.3%), the Euglenophyta with 4 species (5.3%), and both the Chrysophyta and Rhodophyta with 2 species each (2.7%). All species identified are common in aquatic environments, with none being endemic or requiring conservation efforts. The presence of 75 species across the 20 sampling sites indicates a high level of diversity in the phytoplankton in the project area.

The abundance of species from the Chlorophyta phylum suggests that the environment in the area is largely influenced by freshwater sources.

- Zooplankton: There are 32 species belonging to 3 subclasses have been identified in the project area, with the majority concentrated in 2 subclasses: Cladocera, with 16 species, and Copepoda, with 15 species, while Ostracoda has only 1 species. However, all identified species belong to widely distributed groups and are not considered endemic or in need of protection.
- Zoobenthos: in the project area, there are 29 species belonging to 5 classes, with the class of insects comprising 8 species (37.9%), followed by the class of bivalves with 8 species (27.6%), the class of Gastropoda with 4 species (13.8%), and both the class of oligochaetes and Crustacea having 3 species each (10.3%).

177. *Construction of the 23 sluice on the canals will have impacts on aquatic life. However, most of in-water construction activities will occur within coffer dams, so the impacts will be limited.*

2.1.6. Climatic Changes in Kien Giang (now An Giang) Province

2.1.6.1. Salinity intrusion and drought

178. One of the most obvious effects of climate change is the unusual changes of local weather. The increase in number and prolongation in time duration of high temperature weather waves and drought have caused significantly impacts on people's health and other agricultural productions, increasing forest fires.

179. Salinity intrusion: Damage from salinity intrusion has been mitigated mainly by the construction of sluices on the sea dike and temporary dams.

2.1.6.2. Increasing severe hot weather events

180. Based on the CC and SLR Scenarios for Vietnam issued by the MONRE in 2020, and considering climate parameters and anticipated socioeconomic development in the region, CC and SLR scenarios for the project area have been determined using the low average greenhouse gas concentration scenario (RCP4.5) and the high greenhouse gas concentration scenario (RCP8.5) as outlined in *Table 33* to *Table 35*. The results show that the maximum temperature is predicted to increase by less than the minimum temperature. By 2100, the maximum temperature is projected to be higher than the current record by about 2°C–2.5°C compared with an increase of 3.5°C–4.0°C for the minimum temperature in Kien Giang (now An Giang) province. in addition, by 2100, rainfall is expected to increase by about 3%–4% Kien Giang (now An Giang) compared to the baseline. Rainfall tends to increase in the rainy months (by up to 25% by 2100) and decrease in the dry months (from 30%–35%). By 2100, rainfall is projected to increase in Kien Giang (now An Giang) with an increase of 5%–10% compared with the baseline period. By 2100, the heaviest daily rainfall decreases in Kien Giang (now An Giang) at a rate of about 20%–30%. However, rainy days with rainfall anomalies of half or twice the current record will continue to exist.

Table 33: Change in the annual average temperature (^{0}C) of the project area compared to the baseline

Scenario RCP4.5	Scenario RCP8.5

2046 - 2065	2080 - 2099	2046 - 2065	2080 - 2099
1.3 (0.9 - 2.0)	1.7 (1.2 - 2.5)	1.8 (1.3 - 2.5)	3.2 (2.6 - 4.2)

Table 34: Change in the annual rainfall (° C) of the project area compared to the baseline

Scenario RCP4.5		Scenario RCP8.5	
2046 - 2065	**2080 - 2099**	**2046 - 2065**	**2080 - 2099**
14.5 (4.2 - 25.5)	19.2 (3.8 - 33.8)	19.0 (7.8 - 30.1)	24.9 (12.1 - 42.8)

Table 35: Sea level rise (cm) in Ca Mau Cape - Kien Giang (now An Giang) province

Scenario	2030	2040	2050	2060	2070	2080	2090	2100
RCP4.5	12 (7 - 17)	17 (10 - 24)	23 (14 - 31)	29 (17 - 40)	35 (21 - 49)	41 (25 - 59)	47 (29 - 68)	54 (33 - 78)
RCP8.5	14 (10 - 18)	20 (14 - 27)	28 (19 - 37)	33 (23 - 47)	42 (29 - 59)	52 (36 - 73)	63 (44 - 89)	75 (52 - 106)

2.1.6.3. Storms and floods

181. The current condition of storms and floods in the project area are summarised as follows:

- Storms: In recent years, due to the impact of climate change, the coastal area of Kien Giang (now An Giang) province is often affected by storms and tropical depressions. Former Hon Dat district was not directly affected by the storm. However, due to the effects of storm circulation, heavy rainfalls, thunderstorms, tornadoes, and lightning occurred in some locations, affecting local people's production and lives.
- Rain: Rainfall has been lower than usual during the last ten years. There has been unseasonal rain throughout the dry season since the beginning of 2019. The district's total rainfall in the first 4 months of 2019 was mostly from 20 to 50% greater than the long-term average. In 2018, 28 houses were fallen, 30 houses were damaged, and 02 people were killed by lightning strikes as a result of heavy rains accompanied by thunderstorms and tornadoes, causing a loss of 1.14 billion VND. Natural calamities have caused the collapse of 2 houses and the damage of 4 others in the communes of Binh Son, Son Binh, My Thuan, and Tho Son since 2019, resulting in a loss of 100 million VND.
- Flood: The following agricultural damage occurred in September and October 2018 as a result of rapid flood water: (i) 59 ha of Summer-Autumn rice of 13 households were damaged at a level of 100% (in which: damage of 52 ha belongs to 9 households at Mui Tau hamlet, Binh Giang commune and 7ha of 4 households in My Thuan commune); and (ii) 15,3 ha of vegetables were damaged (8.6 ha of 12 households in My Thuan commune and 6.70 ha of 3 households in My Hiep Son commune). It caused 3 billion VND in material damage.

182. *Therefore, during the design of the road and the sluices, the project owner and detailed design consultants should take into account the evelation of the road and the sluices to mitigate inundation during rains, storms and floods.*

2.1.6.4. Coastal erosion

183. Along the west coast from Ca Mau Cape to Rach Gia, erosion dominates accretion. Only some sections are affected by both erosion and accretion. In this area, the average erosion rate

is from 15 to 20m/year, with certain parts reaching 40 to 50m/year during high-wave years [*Southern Institute of Water Resources Research, 2019*].

184. There have been changes every year to the mudflats on the western coast of Kien Giang (now An Giang) province since 2009. Coastal erosion and accretion are affected by both the weather and the flow of water from canals to the sea. Currently, the total length of the eroded coastline is about 71.7 km, with 38.3 km located in the districts of An Minh and An Bien. Approximately 500 ha of coastal mudflats have been eroded over the last decade, with a loss of coastal forest belt spanning in width from 60 to 300 m. Especially, the width of the protection forest loss in certain coastal areas of former An Bien, An Minh, and Hon Dat districts is up to 20 m each year. Severe erosion is causing the coastline to encroach further from the mainland and the sea dike. There are places where the formerly protection forests no longer exist. The sea dike has thus been directly hit by waves, endangering the safety of nearby buildings as well as the people's production and daily activities (*Figure 28*).

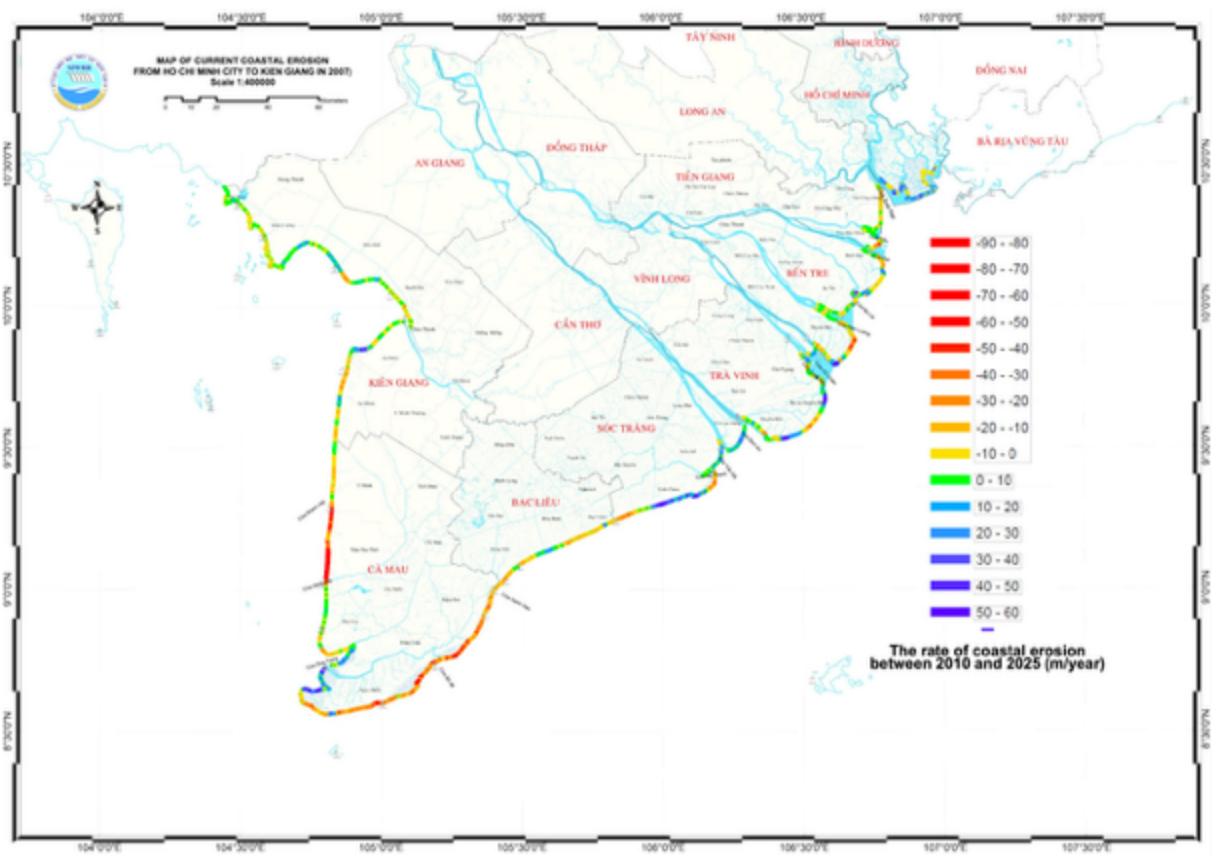


Figure 28: Map of the current state of erosion and accretion of the Mekong Delta coast

185. In front of the sea dike, there is a relatively good protection forest belt with a width of 50 to 1,600m, such as *Avicennia marina* and *Sonneratia caseolaris*. However, due to a variety of factors, certain parts of the protection forest have been damaged in recent years and can no longer operate as sea dike protection (*Figure 29*). *The project will not impact on the coastline and protection forests in the project area.*



Figure 29: Protection forests have been damaged, and dikes are located directly facing the sea in the project area

2.2. EXISTING ENVIRONMENTAL QUALITY IN PROJECT AREAS

186. As part of the ESIA preparation, the Consultant conducted a survey and collected samples of air, surface water, groundwater, wastewater, soil, sediment, and aquatic life in the project area in November 2023. These samples were then sent to qualified laboratories (VIMCERT 200) for analysis. The map and detailed list of the samples can be found in Appendix 2, while the analysis findings are presented in Appendix 3. The following are concise explanations of the analysis results.

2.2.1. Ambient Air Environmental Quality and Noise

187. A total of 10 sampling stations were selected in the project area to as the ambient air quality and noise level. The ambient air samples were assigned codes ranging from KK1 to KK10 (*Figure 30*). The analysis parameters were temperature, humidity, wind speed, wind direction, air pressure, total suspended particulates (TSP), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), ammonia (NH_3), and noise level. The air quality analysis results were compared to the QCVN 05:2023/BTNMT[4] and the ambient air quality criteria set by the World Health Organization (WHO).

188. The analysis results of 10 air samples show that the levels of pollutants such as SO_2, CO, NO_2, TSP, and NH_3 are lower than the QCVN 05:2023/BTNMT (Table 1 - hourly averages) and the WHO's ambient air quality guidelines. These findings reveal that the ambient air quality in the project region is reasonably good, with no indicators of pollution resulting from the local population's socioeconomic development and livelihood.

[4] QCVN 05:2023/BTNMT: National technical regulations on ambient air quality

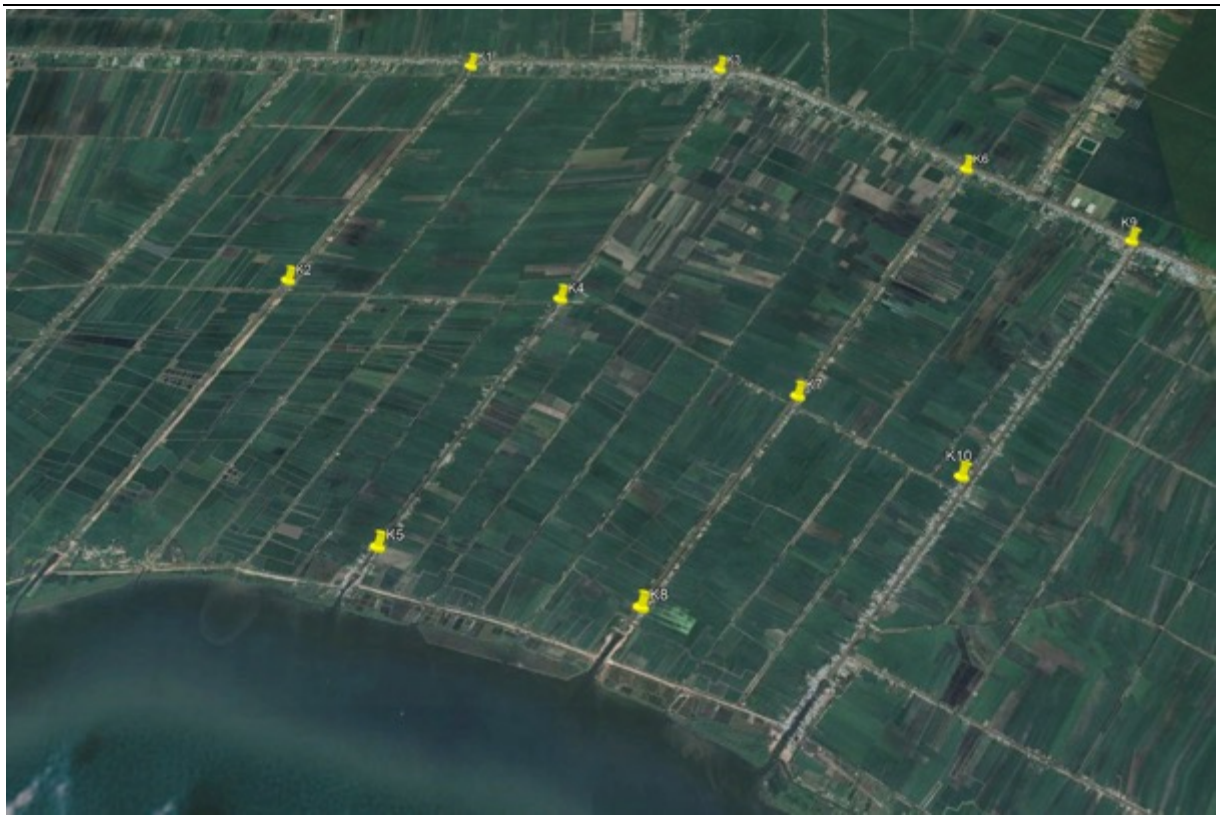


Figure 30: Air sampling sites in the project area in November 2023

2.2.2. Water Environmental Quality

2.2.2.1. Groundwater quality

189. A total of 10 sampling stations were selected to survey the quality of groundwater in the project area. The collected samples were labeled from G1 to G10 (*Figure 31*). The groundwater was analyzed for various parameters including temperature, pH, total dissolved solids (TDS), hardness, sulfate (SO_4^{2-}), chloride (Cl^-), ammonium (NH_4^+), nitrite (NO_2^-), nitrate (NO_3^-), total iron (Fe_{Ts}), arsenic (As), and coliform bacteria. The analysis results were compared with QCVN 09:2023/BTNMT[5].

190. The results indicated that the groundwater quality is relatively good, and all analyzed parameters meet QCVN 09:2023/BTNMT, except for the relatively low pH value of 5.03 at location G8. Additionally, all groundwater samples have low levels of dissolved solids, ranging from 141 to 402 mg/L. This indicates that groundwater in the drilled wells being exploited in the area has not been affected by saltwater.

[5] QCVN 09:2023/BTNMT: National Technical Regulation on groundwater quality

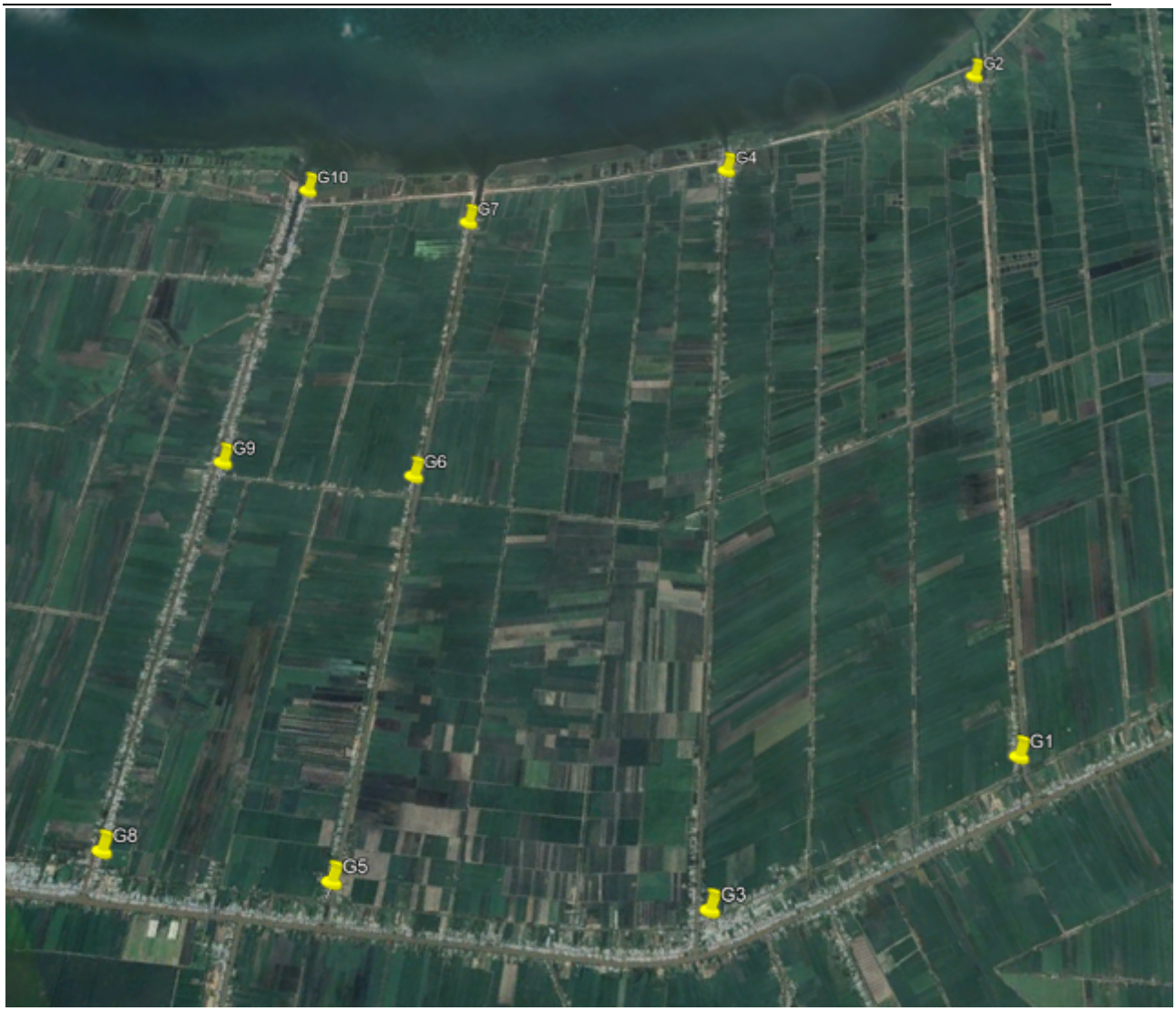


Figure 31: Groundwater sampling sites in the project area in November 2023

2.2.2.2. Surface water quality

191. To evaluate the quality of the surface water in the project area, a total of 20 sampling points were selected, with each location being sampled at two distinct periods (during high tide and low tide), see *Figure 32*. The taken samples were coded from NM1 to NM20, relatively. The analytical parameters for surface water were temperature, pH, DO, TDS, TSS, BOD_5, COD, Turbidity, Cl^-, NH_4^+, NO_3^-, NO_2^-, NO_4^{3-}, Mn, Fe_{TS}, Oils & Greases, Ecoli, and Coliforms. The analysis results were compared with QCVN 08:2023/BTNMT[6].

192. Analysis results of 20 surface water samples indicate that the majority of surface water samples in the area are still relatively good (meeting water quality Class B standards), with only the locations near NH 80 showing slight signs of pollution (meeting water quality Class C standards). At locations where water quality is classified as Class C, the concentrations of organic matter still meet Class B standards.

193. Even during high tide, the water was completely fresh when samples were taken. This is because the sampling occurred when the sea dike sluice gates were closed to retain freshwater for the fields and the LXQ was being inundated.

[6] QCVN 08:2023/BTNMT: National technical regulation on Surface water quality

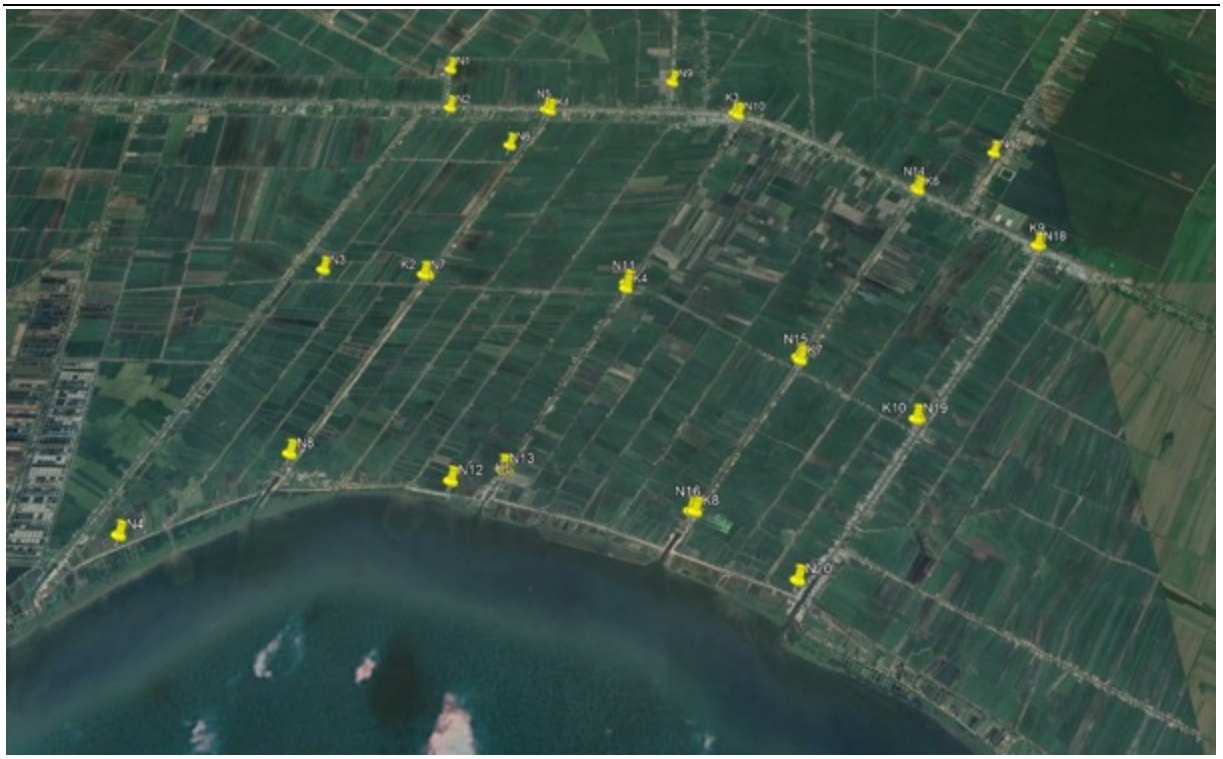


Figure 32: Surface water sampling sites in the project area in November 2023

194. Despite being classified as a high acid sulfate soil area, the pH levels of the water samples show that they are not contaminated with acid sulfate. This indicates that water exchange was relatively good during the sampling time, and floodwater from the LXQ was very effective in flushing acid sulfate from the area.

195. Water sources heavily contaminated with bacteria often only meet Class C water quality standards. This also reflects the current distribution of the population in the project area mainly along canals and the low sanitation conditions. Most domestic wastewater of local people is directly discharged into the canals, which is the main cause of bacterial contamination in the water sources in the area.

2.2.2.3. Domestic wastewater quality

196. To assess the quality of wastewater in the project area, 10 wastewater samples were collected in the project area. They were labeled NT1 to NT10, respectively (*Figure 33*). The analytical parameters for domesticwater were temperature, pH, DO, TDS, TSS, BOD_5, COD, Turbidity, Cl^-, NH_4^+, NO_3^-, NO_2^-, NO_4^{3-}, Mn, Fe_{TS}, Oils & Greases, Ecoli, and Coliforms. The analysis results were compared with QCVN 14-MT:2015/BTNMT[7].

197. The analysis results indicate heavy organic pollution in the wastewater in the area, with COD values ranging from 31.5 to 127 mg/L. All collected wastewater samples are untreated domestic wastewater discharged into the environment from households and residential areas. However, the amount of wastewater from these sources is low, so the impact on the receiving water quality is low also.

[7] QCVN 14-MT:2015/BTNMT: National technical regulation on domestic wastewater.

198. It is noted that the wastewater samples are heavily contaminated with coliform, ranging from 630,000 to 1,500,000 MPN/100 mL. This will be a source of microbial pollution for the surface water samples collected in the area.



Figure 33: Wastewater sampling sites in the project area in November 2023

2.2.3. Soil/Sediment Quality

2.2.3.1. Soil quality

199. There were totally 16 sampling points selected for surveying soil quality in the project area. The taken samples were coded from D1 to D16, relatively (*Figure 34*). The analytical parameters for soil samples were pH_{H2O}, pH_{KCl}, TOC, TN, TP, $P_{digestable}$, EC, As, Cd, Pb, Cu, Cr, Zn. The analysis results were compared with QCVN 03:2023/BTNMT [8].

200. The analysis results show that all 16 soil samples from the project area have heavy metal concentrations within the permissible limits set by QCVN 03:2023/BTNMT. This indicates that the heavy metal content in all soil samples is suitable for various land use purposes such as agriculture, residential, industrial, commercial, and service activities. Additionally, the organic matter content in the soil indicates that the soil samples are on average, ranging from 1.72 to 2.88%. The pH values of the soil samples range from 3.20 to 4.79, classified as moderately to heavily acidic soil.

[8] QCVN 03:2023/BTNMT: National technical regulation on soil quality.



Figure 34: Soil sampling sites in the project area in November 2023

2.2.3.2. Sediment quality

201. There were totally 16 sampling points selected for surveying sediment quality in the project area. The taken samples were coded from TT1 to TT16, relatively. The analytical parameters for sediment samples were pH_{H2O}, pH_{KCl}, TOC, TN, TP, EC, As, Cd, Pb, Cu, Cr, Zn. The analysis results were compared with QCVN 47:2017/BTNMT.



Figure 35: Sediment sampling sites in the project area in November 2023

202. The sediment sample analysis results indicated that all analyzed parameters in all sediment samples collected in the project area were within the permissible standards as outlined in QCVN 47:2017/BTNMT. The concentration of heavy metals (As, Cd, Pb, Cu, Cr, Zn) meet the QCVN. This implies that the sediment generated during the excavation of the sluices will be reused for the sluice embankments.

2.3. SOCIO-ECONOMIC CONDITIONS

2.3.1. Economic Conditions

2.3.1.1. Agriculture - forestry - fishery

203. **2-rice-crop production**: is concentrated in the north Don Dong canal. In 2022, the cultivated rice land area was 51,216 ha, and the average yield was 6.23 tons/ha, resulting in a total output of 319,170 tons (see *Table 36*). Project communes continue to carry out plans to restructure the agricultural sector, and improve the use of scientific and technological advances linked with production and consumption links. This contributes to the improvement of rice product quality and value.

Table 36: Rice production situation in the project area from 2019 – 2022

No	Project area	Year			
		2019	2020	2021	2022
1	***Rice cultivation area (ha)***	***50,940***	***50,722***	***51,218***	***51,216***
1.1	Binh Son Commune	24,385	24,291	24,449	24,491
1.2	Binh Giang commune	26,555	26,431	26,769	26,725
2	***Rice yield (ton/ha)***	***59.03***	***58.11***	***61.26***	***62.32***

2.1	Binh Son Commune	59.82	57.00	61.31	62.55
2.2	Binh Giang commune	59.57	59.13	61.21	62.10
2	***Rice output (tons)***	***300,714***	***294,751***	***313,754***	***319,170***
2.1	Binh Son Commune	144,470	138,463	149,896	153,202
2.2	Binh Giang commune	156,244	156,288	163,858	165,968

Source: Former Hon Dat district statistical yearbook in 2023

204. **Rice-shrimp farming**: mainly concentrated along Don Dong canal to the West Sea with an area of 2,284 ha, including shrimp–rice and improved extensive shrimp, the average output reached 33 tons/ha (*Table 37*). The total output value is 2.7 billion VND.

Table 37: Shrimp farming in the project area from 2019 – 2022

No.	Project area	Year			
		2019	2020	2021	2022
1	***Shrimp farming area, including rice shrimp and extensive shrimp (ha)***	***1,525***	***1,798***	***1,924***	***2,284***
1.1	Binh Son Commune	294.0	245.0	243.5	169.0
1.2	Binh Giang commune	1,231.0	1,553.0	1,680.0	2,115.0
2	***Shrimp yield (quintals/ha)***	***2.31***	***3.89***	***3.73***	***3.35***
2.1	Binh Son Commune	2.34	4.61	4.60	3.55
2.2	Binh Giang commune	2.30	3.78	3.60	3.33
2	***Shrimp production (tons)***	***351.93***	***700.00***	***717.00***	***764.00***
2.1	Binh Son Commune	68.80	113.00	112.00	60.00
2.2	Binh Giang commune	283.13	587.00	605.00	704.00

Source: Former Hon Dat district statistical yearbook in 2023

205. **Farming model of industrial whiteleg shrimp**: This model has the advantage of causing minimal harm to the shrimp while being profitable. After approximately 3 months, each 500 m2 pond raising white leg shrimp will yield 1 ton of shrimp, with the selling price ranging from 120,000 to 130,000 VND/kg. It has high economic efficiency but demands a large investment capital, making it difficult for people to invest in. Currently, Binh Giang commune has roughly 49 hectares of extensive whiteleg shrimp farming, while Binh Son commune has 50 households cultivating extensive whiteleg shrimp on a small scale.

206. **Livestock**: in 2022, the buffalo herd was 61 heads, the pig herd was 800 heads, and the poultry herd was 5,000 heads, with a total output value of VND 6.71 billion.

207. **Vegetables:** In 2022, the total crop area of the project area was 510 ha, the average output reached 7,650 tons, and the average yield was 15 tons/ha. The total value of vegetable output was 38.25 billion VND.

208. **Pineapple**: About 247 ha of land is available for pineapple growing in the project area, with most of it being in Binh Giang commune. Each hectare produces about 9.8 tons of pineapples, for a total output of 180 tons/year (*Table 38*). This crop generates substantial profits for the farmers. Because of this, this area needs to be taken into account when investing in saltwater supply works.

209. **Collective economy**: The project communes kept up the support for the growth of the collective economy through propaganda, advocacy, and good policy implementation. As a result, 5 agricultural cooperatives and 5 farmer groups were formed. In addition, they regularly review to consolidate the Steering Committee for collective economic growth in the communes. Besides, they hold conferences on evaluating and classifying agricultural cooperatives and farmer groups. They also helped cooperatives hold their yearly meetings in line with the Law on Cooperatives. Furthermore, they developed and implemented a plan to link the production and consumption of agricultural products between agricultural cooperatives and enterprises.

Table 38: Situation of pineapple planting in the project area from 2019 – 2022

No.	Project area	Year			
		2019	2020	2021	2022
1	***Planting area (ha)***	***223***	***239***	***247***	***247***
1.1	Binh Son Commune	10	7	15	15
1.2	Binh Giang commune	213	232	232	232
2	***Production (tons)***	***3,701***	***3,354***	***3,107***	***2,393***
2.1	Binh Son Commune	160	90	185	180
2.2	Binh Giang commune	3,541	3,265	2,922	2,213

Source: Former Hon Dat district statistical yearbook in 2023

210. *Figure 11* depicts the current status of agricultural production in the project area.

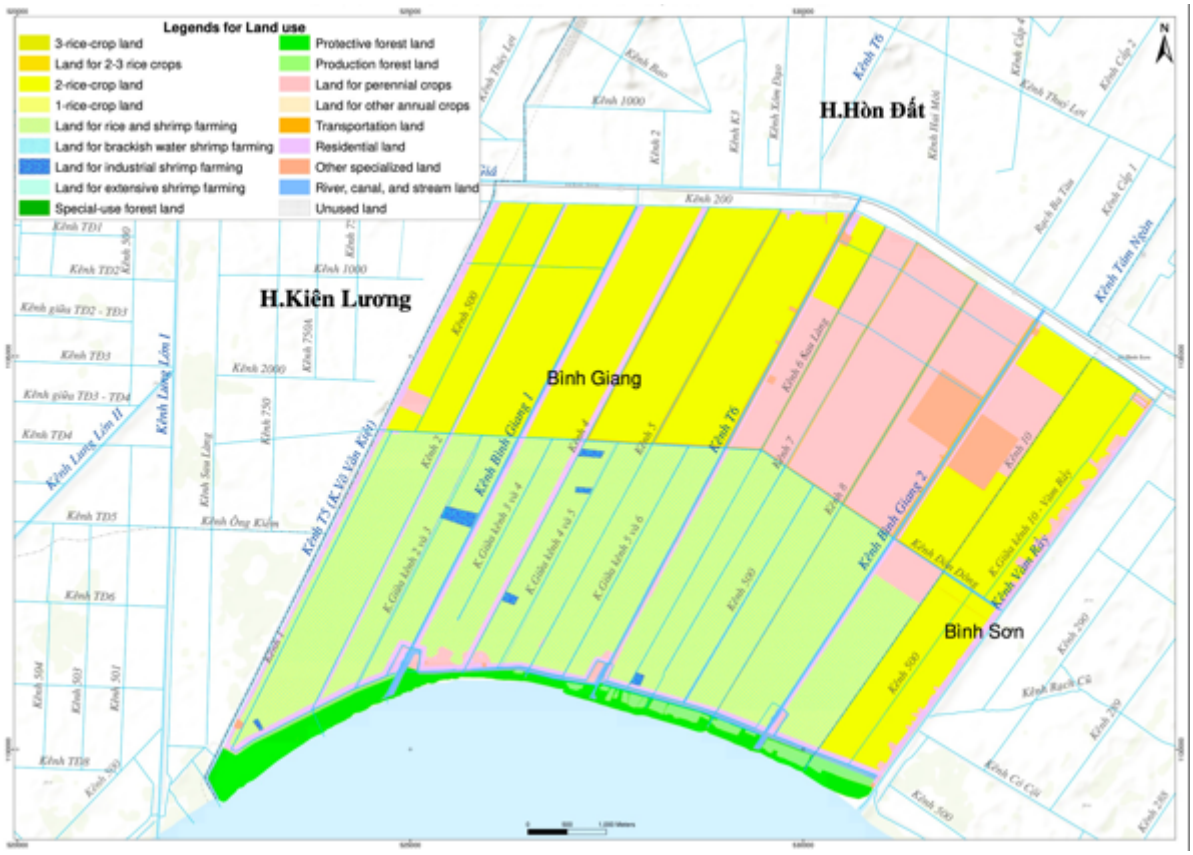


Figure 36: Current status map of agricultural production in the project area

211. *The investment in the infrastructure to shift from mono rice and vegetables to rice-shrimp rotation will help to increase the livelihood and living conditions of the local people in the area.*

2.3.1.2. Industry

212. In 2022, the value of industrial production was 985.8 billion VND. Furthermore, total retail sales of goods were 5,214 billion VND, while revenue from accommodation and catering services was VND 579 billion.

2.3.1.3. Cottage industry, trade, and services

213. In general, the cottage industry and service development in the project area lagged behind expectations. There are 59 companies and business households, including 04 rice milling plants, 05 minor repair establishments, 07 service providers, 01 ice-making factory, and 02 lime processing facilities, and the remainder are small trading households.

2.3.2. Social Conditions

2.3.2.1. Population, distribution of population, and labor

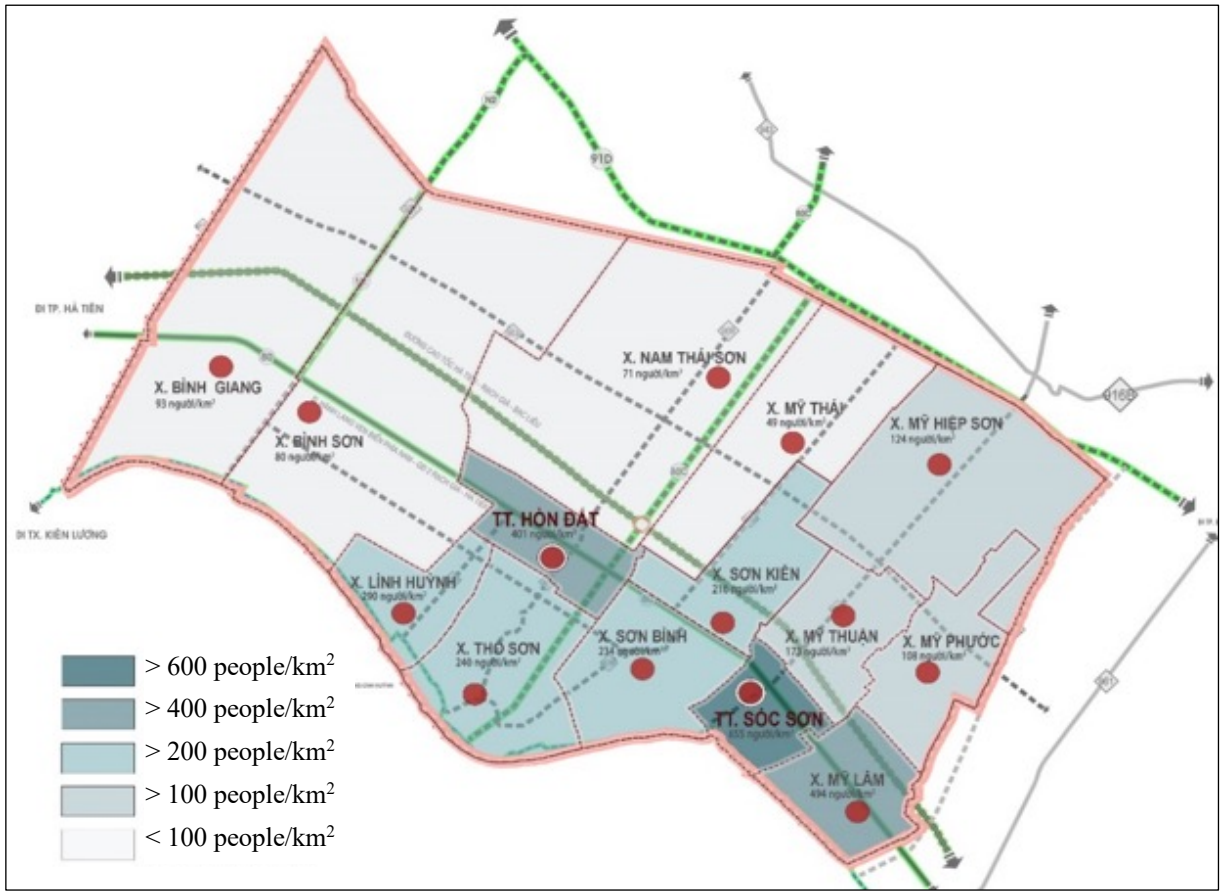
a) Population

214. According to 2022 figures, the project communes has a population of 29,035 people in 7,810 households (HHs, with a male population of 15,000 people (51.67%) and a female population of 14,035 people (48.34%). About 25.80% of the people live in urban areas, while 74.20% live in rural places. It has an average population density of 84 people per km^2, but most of the people live in the center of communes and along the main canals (*Table 39* and *Figure 37*). It is very dangerous for the dike route because some households are building homes and growing crops on the dike surface and safety corridor. Within the project area (approximately 5,500 ha), covering Ranh Hat, Giong Ke, No. 4, and Binh Hoa hamlets in Binh Giang commune, as well as Vam Ray and Thuan An hamlets in Binh Sơn commune, the total population is 10,579 people, **residing in approximately 2,650 households**.

Table 39: Population and population distribution in the project communes

TT	Name of commune	Area (km2)	Population (people)			Number of households	Population density (people/km^2)
			Total	Male	Female		
	total	***347,26***	***29.035***	***15.000***	***14.035***	***7.810***	***84***
1	Binh Son Commune	183,56	14.205	7.340	6.865	3.850	77
2	Binh Giang commune	163,7	14.830	7.660	7.170	3.960	91

Source: Former Hon Dat district statistical yearbook in 2023.



Source: General Construction Consulting Joint Stock Company, 2023

Figure 37: Population density of the project area and the whole Hon Dat district (former)

b) Labor

215. The human resource situation in the project area and the former Hon Dat district as a whole has improved significantly between 2010 and 2020. An increase of 3.6 times occurred from 14.8% in 2010 to 54.09% in 2020 in the proportion of trained laborers. Despite the fact that the rural labor force in the agricultural sector is substantial (approximately 51.5%), its quality is substandard and its application of advanced science and technology to production remains limited. Rural laborers in particular continue to be deprived of a material and spiritually prosperous existence due to the persistently low income system.

216. When people in rural places get vocational training, they mostly make their jobs because there isn't a strong link between training companies and hiring companies. A significant proportion of the total number of trained workers (49.7%) are technical workers without qualifications, although the proportion of trained workers has increased.

c) Incomes

217. The project area is part of the flooded Long Xuyen Quadrangle area, and the economy is purely agricultural, so the technical infrastructure and people's lives in the area are still difficult, with 3.52% of households being poor and 3.68% being near-poor (*Table 40*).

218. Between 2010 and 2015, annual per-person income averaged 42,5 million Vietnamese Dong (VND). In recent years, the economies of the two project communes have had many positive changes and achieved substantial successes in many respects, thus people's lives have gradually improved. Infrastructure is being improved in various areas such as transportation,

irrigation, education, healthcare, and cultural facilities. This has led to an overall improvement in the quality of life for the people, both in terms of material and spiritual aspects. Consequently, the per capita income raised to 55 million VND per person each year by 2016-2020.

Table 40: Number of poor and near-poor households in the project area

No.	Project area	Number of households	Poor households		Near-poor households	
			Number	Rate (%)	Number	Rate (%)
	Total	**7,810**	**849**	**3.52**	**1,077**	**3.68**
1	Binh Son Commune	3,850	281	2.60	308	2.52
2	Binh Giang commune	3,960	568	4.27	769	4.75

Source: Former Hon Dat district statistical yearbook in 2023.

2.3.2.2. Ethnic composition

219. Kinh people accounts 87.92% of the people in the project area, Khmer people accounts 11.03%, and other ethnic groups, including Chinese, accounts 1.05%, see details in *Table 41*. In recent years, the economic and socio-cultural life situation of ethnic minorities (EMs) in the area has remained steady and developed. Many policies have been put in place to make it easier for them to plan holidays and traditional festivities. Also, with a total budget of VND 514.8 million, the locality has collaborated with the Center for Water and Sanitation to hand over 750-liter plastic tanks to 396 EM houses and poor households in extremely difficult hamlets. Furthermore, 31,144 health insurance cards have been distributed to EMs and poor people in coastal districts.

220. According to the project's RP, construction of the sluices and the road will acquire land of 16 Khmer households and will impacts on Khmer households living near the construction sites. Details are in *Chapter 4*. The Khmer people are economically integrated with the Kinh; however, the Khmer community still maintains its own cultural–traditional institutions, customs, social structure, and language, which are legally recognized as part of their distinct ethnic identity. At the same time, they are also households affected by land acquisition and livelihood impacts. Therefore, FPIC will be applied to ensure meaningful consultation and secure the support of the Khmer community for the project.

Table 41: Ethnic composition in the project area

No.	Project area	Total (people)	Ethnic composition							
			Kinh		Khmer		Chinese		Others	
			Number of people (people)	Rate (%)	Number of people (people)	Rate (%)	Number of people (people)	Rate (%)	Number of people (people)	Rate (%)
	Total	**29,035**	**25,528**	**87.92**	**3,203**	**11.03**	**277**	**0.95**	**27**	**0.09**
1	Binh Son Commune	14,205	13,192	92.87	763	5.37	233	1.64	17	0.12
2	Binh Giang commune	14,830	12,336	83.18	2,440	16.45	44	0.30	10	0.07

Source: Former Hon Dat district statistical yearbook in 2023

2.3.2.3. Education and training

221. In the project area, there are currently 14 schools of all levels, including 04 kindergartens, 04 primary schools, 01 secondary school, 03 secondary + high schools, and 02 high schools.

There are a total of 213 classrooms and function rooms. The total number of teachers is 324 and the total number of pupils is 6,620 [*Former Hon Dat District Statistics Office, 2023*].

222. According to the result of social and economic surveys of affected households in the project area show that the affected people in the project area have a relatively low level of education, as indicated by the results of the household survey. Of the 260 members of the surveyed families, 249 have attended school, accounting for 95.8%, and 11 are illiterate, accounting for 4.2%. As a result, the proportion of persons who do not attend school in the project area exceeds the national average (2.15%, according to the Ministry of Education and Training in 2019). The top three reasons for not attending school are school expenses, the need to work from home, and a distaste for school. More than that, most of the people who went to school only finished secondary school (33.5%) or elementary school (31.9%), and only 3.8% went to college or higher. *Thus, it is important to have the correct strategy in place when consulting with stakeholders about the project's compensation policies, entitlement, and suggested technical options, and when disseminating information about the project, so that the communities can grasp its importance and contribute to its success.*

2.3.2.4. Health

223. In 2022, there were 2 health stations with a total of 12 beds in the project area. The 2 stations met the Ministry of Health criteria. The stations employ a total of 21 people, including 2 doctors, 2 pharmacists, 7 physicians, and 3 midwives. In 2022, 273 children under the age of one received vaccines [*Former Hon Dat District Statistics Office, 2023*].

224. *As such, the medical facilities and staff in the project area are limited. Consequently, the labor influx of the project may strain the local healthcare system.*

2.3.2.5. Socio-economic conditions of affected households of the project

During the resettlement plan (RP) preparation, the socio-economic survey (SES) of AHs was conducted for 61 affected households in the project area. The details are in the project's RP. The results are summarised below:

225. **Family size**: According to the survey results, there are 260 people in 61 AHs, with an average of 4.26 people in each HH, in which: households with 3-4 members account for the highest percentage (46,7%), followed by households with 5-6 members (26,7%), and households with 1-2 members account for 26.7%. There are 16 EM households with 65 people in the project area.

226. **Age profile**: The survey results show that of 260 surveyed people, people of working age (18-60 years old) accounted for 58.1%, followed by 27.3% of those of school age (<18 years old), and 14.6% of those over 60 years old.

227. Ocupation: The occupational structure of working-age respondents in the household survey shows that 46,4% of the respondents are involved in agriculture (cultivation, livestock raising, and aquaculture), followed by workers in companies.

228. Income: The survey results show that the average monthly income per capita of 61 affected households is VND 2,360,000. In which, the average monthly income per capita of the poor group in the survey area is 1,140,000 VND, while that of the middle group is 2,170,000 VND and the better income group is 3,850,000VND. Thus, compared with the income classification standards of Decree No. 07/ND-CP dated January 27, 2021 applied to rural areas,

there are 10 affected households as poor, accounting for 16.39%, and 23 households with average income, accounting for 54.09%, and 18 households with a well-off income, accounting for 29.5%.

229. **Water supply and quality**: The results of the socio-economic survey show that the percentage of affected households having access to clean water sources for drinking and daily life is quite high. The main water sources of water used for drinking are groundwater (48 households) and bottled water (9 households). The survey also shows that up to 78.7% of surveyed households said that the water source for their drinking and household activities was clear and clean, whereas 14.8% reported that the water was clear.

230. **Sanitation conditions**: The survey results indicate that 53 households (86.9%) have septic toilets, and 8 households (13.17%) have simple flush toilets. However, there is currently no wastewater drainage infrastructure in this area; hence, all domestic wastewater is discharged directly into the environment.

231. **Power supply**: The survey results show that all 61 surveyed households (100%) use electricity for daily life. Furthermore, 100% of the interviewed households use gas for cooking, while only 23% use wood.

232. **Access loans**: Taking out a loan is a common occurrence in rural communities. The survey in the project area illustrates that the majority of interviewed households (71.5%) are currently in debt. On the loan scale, 85.6% of households borrowed less than VND 60 million. The loan was taken out primarily to allow children and grandchildren to attend school. Generally, households do not take out larger loans due to unstable production conditions and low-profit returns from agricultural production, as well as a low ability to repay the loan capital and interest. The Bank for Social Policies is the most important source of funds for local households, accounting for 21,5% of all loans. The Bank for Agriculture and Rural Development comes next, providing about 20% of the borrowed funds. The remaining 5% of household borrowing comes primarily from credit funds managed by the local Women's Union and Farmer's Union. The Bank for Social Policies has the lowest interest rates, ranging from 0.65 to 0.8% over one month (depending on the borrower's socio-economic situation). Households typically borrow money over three years to invest in livestock (such as a cow or pig) or to start a business.

233. **Social connection**: According to the survey results, PAHs receive only 1-2% of their support from friends and neighbors, while they rely heavily on the support of siblings, parents, children, and local governments and organizations, such as Farmers' Union, Women's Union, Youth Union, and Veterans Association, in which:

- **Farmers' Union** has a function that directs and coordinates the implementation of a variety of programs and projects on economic, cultural, and social development in rural areas, as well as guiding members in the development of collective economies in agriculture and rural areas. Members of the union receive technical assistance in cultivation/livestock production, as well as participate in vocational training and science and technology transfer activities to aid in the development of production, the improvement of community life, and the protection of the environment. Furthermore, the Union is entrusted by the Bank for Social Policies with assisting its members in borrowing loans for family economic development or building houses/clean water/toilet facilities.
- **Women's Union** has taken an active role in empowering women economically by helping women start their own businesses. This helps achieve the goals of reducing poverty,

promoting sustainable development, and improving social welfare. Members of the Union can be able to participate in short training courses/sessions that teach them about economic development, agricultural and rural restructuring, the promotion of intensive farming, diversifying products, and promoting the development of high-quality agriculture. In addition, the Women's Union of Hon Dat district helps its members who need to launch a business to strengthen the family economy. The Union is also authorized by the Bank for Social Policies to provide its members with loans for family economic growth or the construction of houses/clean water/toilet facilities.

- **Youth Union:** tasks a mass organization of young people in the area to create an environment for young people to participate in activities that will help them train and develop the personality and capacity to meet the requirements of society. Its members receive support and encouragement to use scientific and technological advancements in production, business, and economic growth. In addition, members receive loans for economic development through the Bank for Social Policies, loans from the Central Union, support for seedlings and seeds, and assistance with the development of scientific and technological models.
- **Veterans Association** is a well-known and well-respected organization in the community. Members participating in the association will be supported with credit if needed for economic development/medical treatment, in addition to meaningful activities for members in difficult circumstances (building houses of gratitude).

234. The survey results show that the most affected people are members of the Farmer's Union (11 people, accounting for 50%), followed by the Women's Union (10 people, accounting for 45.5%). In other associations, like the Association of the Elderly, the Veterans' Union, and the Youth Union, fewer people join. At least one member of each family belongs to at least one organization, and some people belong to more than one.

235. **Decision-making in the households**. When asked who makes the major decisions in the household, i.e. who is the householder, the responses were 65% for husbands and 16% for wives. Other family members were reported by 19% of respondents (*Figure 38*). This percentage reflects the common family scenario in Vietnam, where the husband in the family is thought to have a more vital role in decision-making than his wife and is considered the householder in most circumstances.

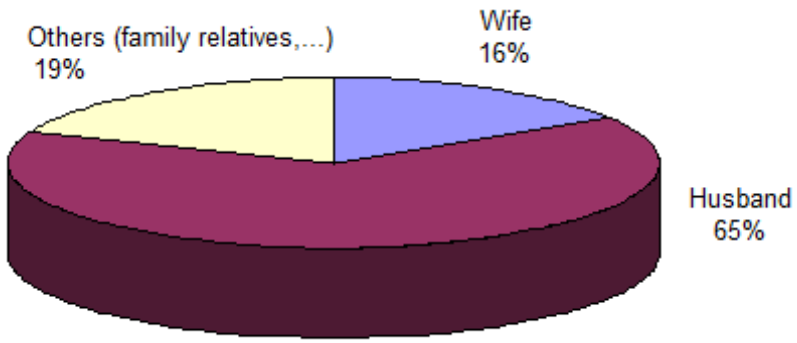


Figure 38: Percentage of husbands, wives, others as householders

236. **Land rights of men and women**. In terms of landownership among interviewees, the majority of husbands own land-use rights certificates (41%), whereas 13% of females own land. Other family members are landowners in 20% of the cases among the interviewees. Only 12% of the interviewees answered that the names of both spouses were registered in the land rights

certificates. In general, despite the new land regulation promulgated in 2004, which allows for having the names of both husband and wife in their land-use rights certificates, there are still much fewer female landowners than male landowners. The reason for this conservation of male landownership is that the transfer of land ownership to the woman is only being made in case of the death of the husband or divorce. With the land-use rights certificate as mortgage property, the owner can loan money from the bank for their business. Being the landowner can result in significant legal and financial assets and result in increased financial independence. This figure shows that men have three times more often access to land and related loans than women.

237. **Gender-relevant participation in shrimp farming**. Men, usually the husbands of the families, do most of the "hard work" in shrimp farming. This is because that's what people in the area think is proper for men and women in terms of work. The percentages range from 59% to 62% of all those asked. In some cases, both men and women worked together. 70% of the work that is done by both men and women is harvesting shrimp. When raising shrimp, this is the most important step. Not only does it require the work of both parents, but the whole family needs to be involved. The process of deciding about the price for selling the shrimp (*Figure 39*) is being done with equal participation of both spouses as 50% of the respondents answered. The participation of women who stated to be responsible for this task is slightly higher than the male, with 27% for females and 23% for men. This indicates that the role of the wife/ female regarding the pricing of the shrimp is mostly equal to that of men. However, it needs to be taken into account that most men are making the decisions regarding expenses of higher amounts.

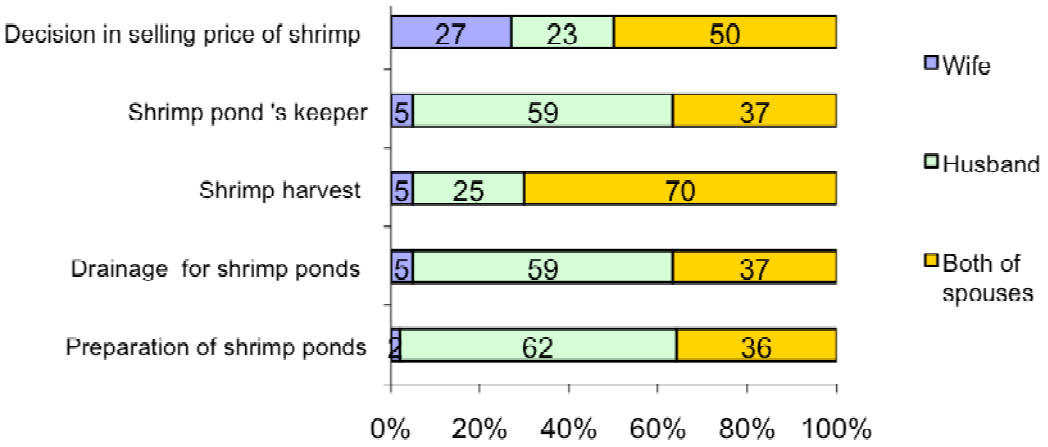


Figure 39: Participation of men and women in various steps of extensive shrimp farming

238. **Gender-relevant participation in rice farming**. The results of the interviews with 30 rice farming households revealed that the man charged for the majority of the job kinds, including soil preparation, rice sowing, rice curing, rice harvest, rice carrying, and decision-making on rice selling price, with 46% to 75% of each type of work. As a result, such tasks require the labor, skills, and experience of both male and female farmers. Male farmers/husbands answered that they not only worked in the field but also participated in decisions on rice selling prices (59%), see details in *Figure 40*.

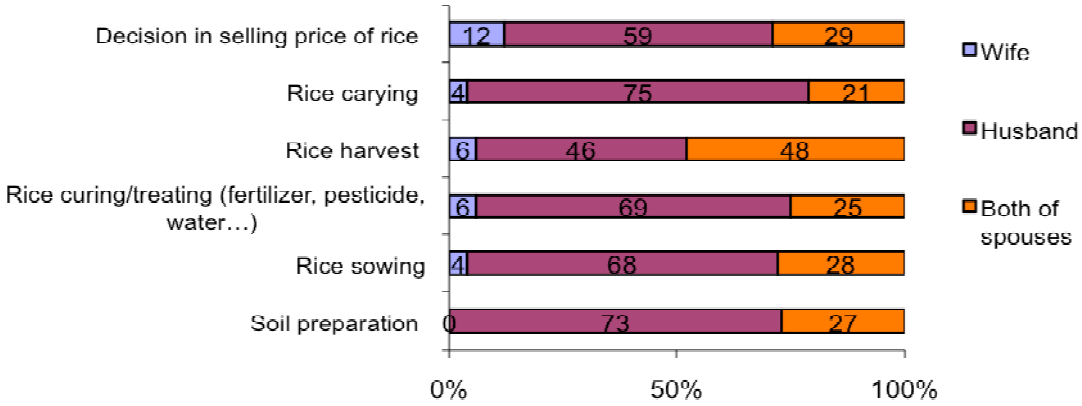


Figure 40: Participation of men and women in rice farming

239. **Gender differences in wages**. In terms of incomes for men and women, the survey showed that males consistently earn more than females. While men earn an average of 125,000-200,000 VND per day, women earn an average of 70,000-100,000 VND per day in the two communes, resulting in a salary gap of 31.2% lower for women.

240. **Gendered caretaking of children**. Concerning men's and women's engagement in childcare, including supplying food, drinking water, sanitation, and health care (taking care of sick children), about 87% of all respondents claimed that these duties are performed by women. Men participated in these home tasks at a relatively low rate (only 3%). See details in *Figure 41*.

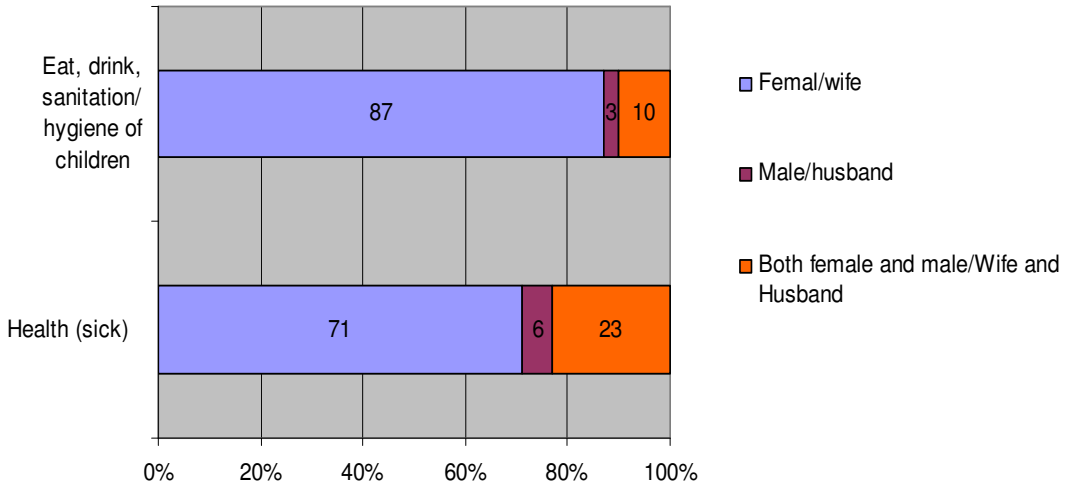


Figure 41: Participation of women and men in taking care of children

241. **Participation of women and men in training**. *Figure 42* demonstrates that more female than male respondents reported having attended seminars, training, or meetings about livelihood, occupation, or everyday labor. Out of 114 respondents, 47% were women and 32% were men who participated in such activities. 10% of respondents participated with their spouse. 11% of respondents' other relatives (sons, moms, and fathers) engaged in such training.

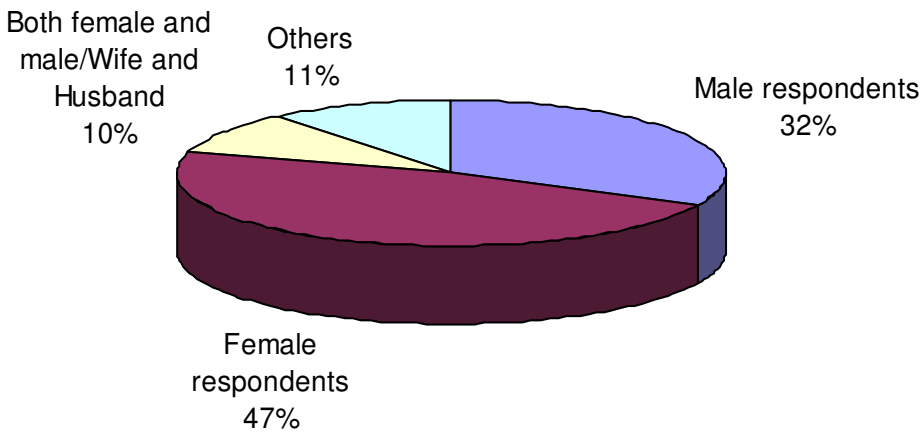


Figure 42: Participation of women and men in seminars, trainings, meetings on livelihood, occupation, daily labor

242. **Women's clubs and social activities**. The higher participation of women can be explained by the existence of various women's clubs in most of the surveyed communes where women can meet for social activities. These clubs are usually well accepted and play an important place for local women to meet, socialize, exchange information, learn, and develop their capacities in many fields. Especially, the clubs for capital pooling and family planning shall be highlighted as significant hubs for development. Reports from the Family Planning Club show that the activities carried out contributed to reducing the number of childbirths in the locality and to improving the economic situation of the participating households. These clubs help improve the general knowledge and technology of farming for women.

2.4. TECHNICAL INFRASTRUCTURES IN THE PROJECT AREA

2.4.1. Transportation Infrastructure

2.4.1.1. External transport system

243. **Road traffic**: The road infrastructure in the project area is underdeveloped. Previously, the region was served by a single national highway, NH80, which spanned 46.5km. It has a 15-meter-wide asphalt concrete road surface and a 22.5-meter-wide roadbed. Beginning in Rach Gia city, it passes through the towns of Soc Son and Hon Dat (formerly), as well as the communes of My Lam, Son Kien, Binh Son, and Binh Giang before ending at the border of Kien Luong district. It's the main road in the project area that links it to Rach Gia and Ha Tien, two big cities.

244. **Waterway**: The canal system in the project region is well-developed and convenient in general. It serves most commodities and travelers traveling inside the area as well as across adjacent provinces, including the RG-HT canal - an inland waterway route of class III, accommodating boats of 500 tons or tugboats of 900 tons. But there isn't much boat movement in the system and mostly small boats. Below are summarised main waterway routes in the project area:

- Main canals: There are five main canals (Tuan Thong, Binh Giang 1, No.6, No.9, and Vam Ray) that connect to the RG-HT canal and ultimately run into the West Sea. The canals have varying widths between 30 and 60 meters (as indicated in (*Table 44* and *Figure 44*), which is adequate for the navigation of boats weighing between 300 and 500 tons. Presently, as a result of the absence of coordinated road infrastructure in the region, these waterways play

a vital role in transporting raw materials and products for local agricultural and aquacultural activities in the project area.

- Horizontal canal 200: serves as the northern boundary of the project, which is situated approximately 800 meters from NH80. This canal is relatively small and sees minimal boat traffic. It is primarily responsible for the water supply and drainage of the region (*Figure 44*).
- Don Dong canal, which intersects the project area, is situated around 3.5 kilometers away from NH80 and the coastline (*Figure 44*). It efficiently partitions the project into northern and southern sections and functions as a crucial canal for local inhabitants. In addition to its role in providing water supply and drainage, the canal also functions as a means of transit for residents to convey agricultural and aquacultural machinery, supplies, and products.

2.4.1.2. Internal roads

245. In the 2 project communes, a grade-V-delta asphalt road is being built on the sea dyke route from Linh Huynh bridge to Hon Queo sluice. Besides, a number of other provincial and district roads are paved with asphalt or concrete to make driving in the area easier. Furthermore, rural roads leading to commune towns have been constructed. However, the majority of these roads only accommodate small cars and primitive vehicles, as follows [*Former Hon Dat DPC, 2022*]:

- Binh Giang commune: 13 routes with 106.5km long, including 17.8km of cement concrete road (accounting for 16.7%) and 88.7km of dirt road (accounting for 83.3%).
- Binh Son commune: 5 routes with 30.4 km long, of which 100% are dirt roads.

246. Furthermore, road traffic within the project area remains fairly limited, including (*Figure 43*):

- The road along the east bank of the Tuan Thong canal connecting NH80 to the sea has been paved with concrete. However, the road width is only about 2.5-3 meters, which can only accommodate motor vehicles under 4 tons.
- The road along the Binh Giang 1 canal: Both the east and west banks of Binh Giang 1 canal are dirt paths, with widths of 1 - 2 meters. Therefore, it is difficult for non-motorized and motorized vehicles can travel during the rainy season.
- The road along Canal No. 6: The west bank remains a dirt path, while the east bank has been concreted. However, the road is quite narrow, with a width of 2 - 2.5 meters. It is appropriate for rural traffic, as it can accommodate motorcycles and vehicles that weigh less than 2.5 tons.
- The road along canal 9: Like the road alongside canal 6, the western bank remains unpaved while the eastern bank has been paved with concrete. Nevertheless, the road remains narrow, with a width ranging from 2 to 2.5 meters, making it suited for rural traffic and capable of fitting motorbikes and cars weighing less than 2.5 tons.
- The road along Vam Ray Canal: The west bank, which is within the project area, has been concreted. However, the road is narrow, ranging from 3 to 3.5 meters, and only accommodates two-wheeled vehicles and small cars under 2.5 tons.
- The road along Canal 200: This road is low of quality, as it is approximately 200 meters from NH80. The south bank of the project area is primarily composed of field paths that are

defined by the borders of rice fields. These pathways are used by farmers to transport and care their crops. Along the north border of this canal, there is no road.

- Don Giong Canal: The south bank has been concreted with a width of 2 to 2.5 meters, but this route still lacks many bridges over the canals, causing incomplete traffic flow, mainly suitable for two-wheeled motorcycles.
- The road over the sea dike: Previously, it was only appropriate for motorcycles and pedestrians. It is currently a coastal corridor road connecting Kien Luong to Rach Gia.

247. *In general, the road network fails to adequately meet the travel needs of local people, both currently and in the future, while waterway transportation proves to be highly convenient for them. As a result, the project's waste will be conveyed via roads, while its construction materials will be transported by waterway. However, the number of trips needed to transfer waste is low. Therefore, impacts of the transporation of raw materials and waste of the project on local movement will be small.*



The road along the east bank of canal T5



The road along the east bank of canal K6



The road along the west bank of Vam Ray canal



The road along the east bank of Binh Giang 1 canal

Figure 43: Existing roads in the project area

2.4.2. Water Supply

248. The water utilized in the daily lives of people in the project area is taken from 3 main sources: surface water, groundwater (via groundwater plants), and rainwater. The groundwater

in the project area is extracted via local people wells from depths ranging from 80 to 100m, and its quality is suitable for human consumption. There are 4,540 private and state wells and 2 clean water supply stations with a capacity of 80m^3/day/station managed by local authorities in the project area. The 2 water supply stations take surface water and only provide water for houses in and around the commune center (*Table 42*). Approximately 87% of households have access to clean and sanitary water.

Table 42: Current status of water supply plants in the project area

No.	Name of the water supply station	Commune	Capacity (m³/day)	Number of supplied households (HHs)
1	Binh Son Water Supply Station	Binh Son	80	267
2	Binh Giang Water Supply Station	Binh Giang	80	267

Source: General report on Kien Giang (now An Giang) provincial planning in the period of 2021 - 2030 and vision to 2050 (2023)

2.4.3. Solid Wastes Management

249. Currently, only domestic solid waste from the Cau So Hai market to the commune center along NH 80 is collected and transported to Tam Sinh Nghia's waste treatment facility (capacity 500 tons/day) in Rach Gia City for treatment. The remaining waste is either sent to 2 landfills (*Table 43*) or people dispose of it through burning and landfilling in their gardens. Also, some households who live near canals dispose of their waste straight into the canals, while others burn it. Both, however, don't meet technical and environmental sanitation standards, which hurts the ecosystem around them.

250. The project owner/contractor will enter into a contract with the legal entity of Binh Giang commune landfill and Binh Son commune landfill to collect and treat the waste in compliance with current regulations at a minimum of 3 times per week. For construction sites where current collection vehicles cannot reach, the project owner/contractor will arrange for their workers to transport the waste to the nearest collection transfer point for proper collection and treatment.

Table 43: Summary of landfills in the project area

TT	Landfill name	Address	Acreage (m^2)	Year of use	Estimation of filled area	Process technology
1	Binh Giang Commune landfill	Kinh 4 hamlet, Binh Giang commune	5,035	2009	14%	Partial burning
2	Binh Son commune landfill area	Thuan Hoa hamlet, Binh Son commune	5,000	2009	24.6%	Partial burning

Source: Former Hon Dat district environmental protection report, 2022.

2.4.4. Electrical Supply

251. The proportion of households with access to electricity in the project area reached 99.05% from 2016 to 2020, an increase of 0.91% from 2010 to 2025 [*Former Hon Dat District Statistics Office, 2023*].

252. The expansion of the electrical grid has significantly altered the face of rural areas, contributing to the improvement of socio-cultural life, the strengthening of national defense and

security, and the formation of residential clusters. Presently, the administration of the public power system is inadequate due to insufficient fixing equipment and the extensive array of devices that require supervision, as well as the degradation of the system. Consequently, certain regions frequently experience power outages. *Therefore, the installation of the power lines will help to improve the electrical supply in the project area.*

2.4.5. Irrigation

253. In the project area, there are 4 primary canals totaling 36.65 km in length that are responsible for water supply and drainage for secondary canals (*Table 44* and *Figure 44*). There are also 9 secondary canals totaling 67.7 km in length (*Table 45*), as well as 46.84 km of tertiary and infield canals. Secondary, tertiary, and infield canals are responsible for providing water and drainage for about 5,500 hectares of cultivated land in the region.

254. In the livelihood model demonstration area of former Hon Dat district, the West Coast sluices for salinity intrusion prevention and flood drainage have been completed for the conversion of rice cultivation to sustainable aquaculture. There is also the Vam Ray sluice, which was built in 1999 as part of the West Sea flood drainage project. Furthermore, Kien Giang (now An Giang) province has invested in a closed sluice system, which includes T5, Kenh Hai, Binh Giang 1, and Binh Giang 2, to support the area's production (*Table 46* and *Figure 45*).

255. Embankments have been invested along the majority of primary and secondary canals for production purposes. Certain embankments, including Canal 200, Vam Ray Canal, and Tuan Thong canal, have been reinforced for rural traffic. By operating the existing network of canals, sluices, and embankments and the project sluices, water can be managed to accommodate a variety of production patterns in the region.

Table 44: Current status of primary canals in the project area

No.	Canal name	Canal dimensions			
		Length (km)	Surface width (m)	Bottom width (m)	Bottom elevation (m)
1	Tuan Thong Canal	8.9	30 - 35	15	-3.0
2	Binh Giang Canal 1 (Canal 3)	7.35	40 - 65	15 - 20	-3.0
3	Canal 6	7.2	24 - 30	15	-3.0
4	Binh Giang 2 Canal (Canal 9)	6.65	35 - 40	15	-3.0
5	Vam Ray Canal	6.55	30 - 40	15	-3.0

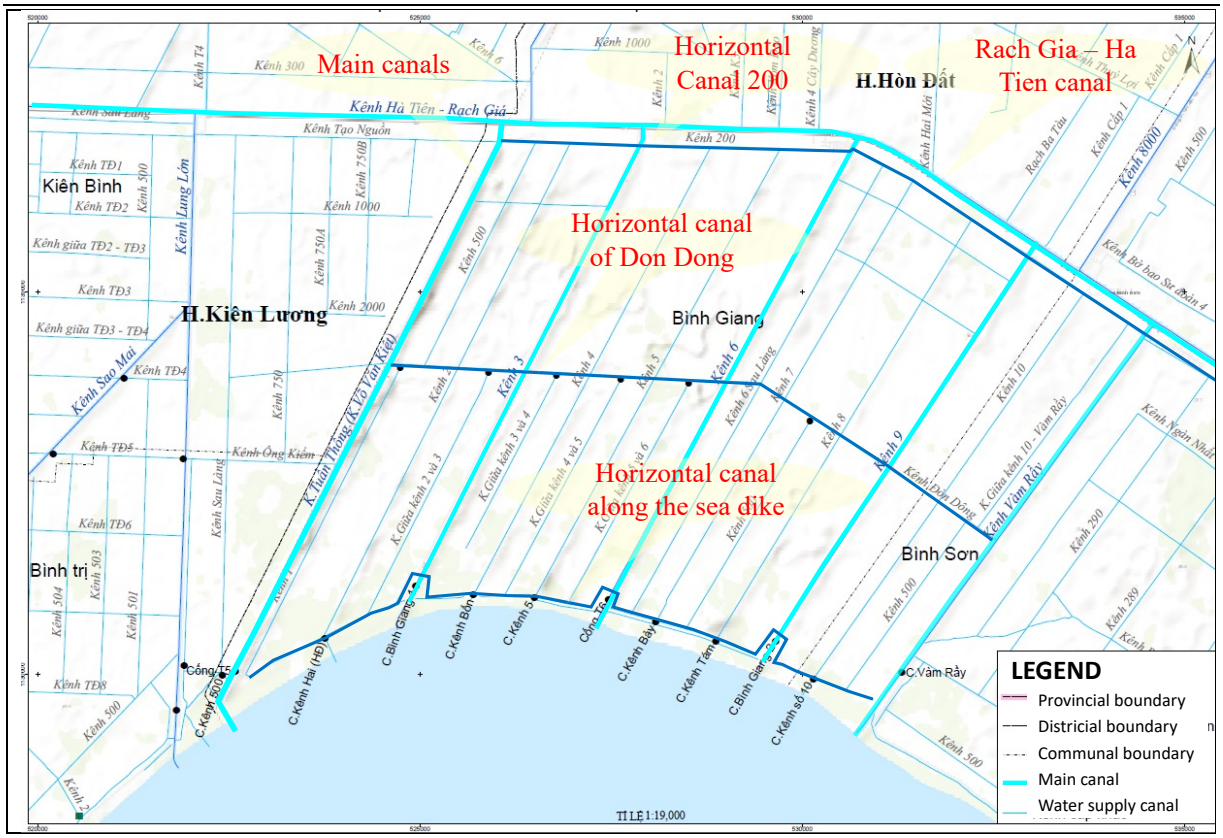


Figure 44: Main canals in the project area

Table 45: Current status of secondary canals in the project area

No	Canal name	Canal dimensions			
		Length (km)	Surface width (m)	Bottom width (m)	Bottom elevation (m)
1	Canal 200	9.0	14 - 18	8	-1.5
2	Canal 2	7.6	10 - 12	6	-1.3
3	Canal 4	6.7	12 - 16	6	-1.3
4	Canal 5	6.8	12 - 15	6	-1.3
5	Canal 7	6.7	12 - 15	6	-1.3
6	Canal 8	6.4	13 - 15	6	-1.3
7	Canal 10	6.4	10 - 12	6	-1.3
8	Don Dong canal	8.5	14 - 19	8	-1.5
9	De Quoc Phong canal (Binh Son)	9.6	12 - 18	6	-1.3

Table 46: Current status of water regulation sluices in the project area

No.	Name of sluices	Specifications				Year of construction
		Number of gates	Gate dimension	Top elevation (m)	Pillar elevation (m)	
1	T5	3	7.5m x 4.8m	-3	2.0	1998
2	Kenh Hai	1	5.5m x 4.7m	-2.7	2.0	2011

No.	Name of sluices	Specifications				Year of construction
		Number of gates	Gate dimension	Top elevation (m)	Pillar elevation (m)	
3	Binh Giang 1	3	7.5m x 6.2m	-4.2	2.0	2002
4	Kenh Bon	1	5.35m x 4.45m	-2.5	2.0	2012
5	Kenh Nam	1	5.5m x 4.7m	-2.7	2.0	2009
6	T6	2	7.5m x 5m	-3.2	2.0	1998
7	Kenh Bay	1	5.35m x 4.69m	-2.5	2.0	2011
8	Kenh Tam	1	5.5m x 4.7m	-2.7	2.0	2009
9	Binh Giang 2	3	7.5 m x 6.2 m	-4	2.0	2002
10	Kenh Muoi	1	5.5m x 4.7m	-2.7	2.0	2010
11	Vam Ray	3	7.5 m x 6m	-4.2	2.0	1999

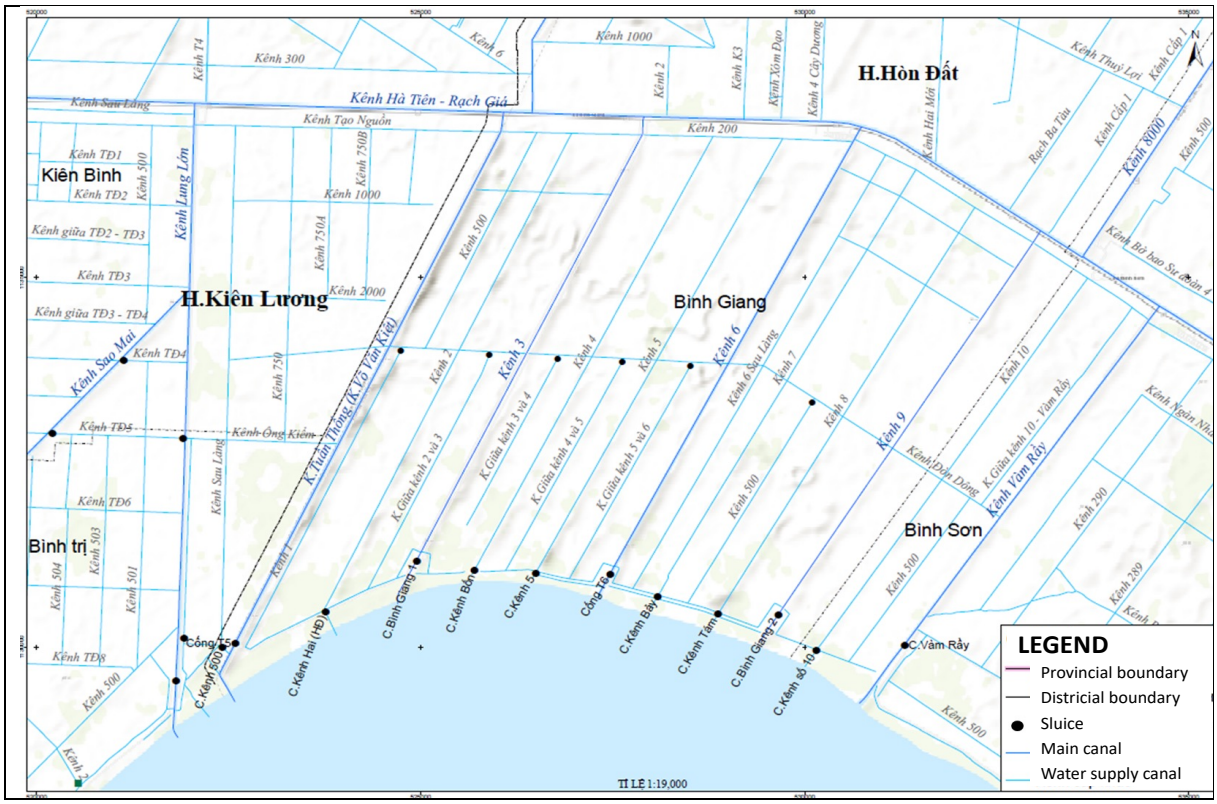


Figure 45: Current sluices in the project area

256. In addition, in the project area, there is the Hon Dat - Kien Luong sea dike, including:

- The section from sluice No. 2 to Hon Soc is 30,600m long and has the main dyke and branches that connect to sluices on the dyke:
  - The main dyke route is 25,683m long, going along the coastal protection forest invested in the period 2000-2005. It is covered by on-site soil. It has a width of 6m, a top elevation of +2.0m, a slope of 2, and a greenfield width of 10m. There are 10 sluices along the route, each with an aperture ranging from 3 to 22.5 m and a total aperture width of 88.5 m. The sluices are utilized for salinity regulation, freshwater retention, and floodwater drainage.

- Branches of a total length of 4,923m, covered by soil. Most of them have a width of 3 to 4 m, a top elevation of +1.5m, and a slope of 1.5

- Section from Vam Ray sluice to Binh Giang II sluice: It is 1475m long and 6m wide, with a greenfield width of 15 to 18m and a canal width of 8 to 10m along the sea dike. Few individuals live on the river bank of the sea dike. The portion has a 605m branch that connects to the Binh Giang II sluice.



Figure 46: Current status of the sea dike from Vam Ray sluice to Binh Giang II sluice

- Section from Binh Giang II sluice to T6 sluice: is 2,090 m long, 6 m wide. The width of the greenfield is 6-8 m. This section is around 220 m from the sea. The fieldward canal is 12 to 15m wide, while the seaward canal is 15 to 17 meters wide. Aquaculture is practiced by locals on both sides of the section and near the sea. Both canals are used for water supply for shrimp farming. On the landward side of the section, there is a protection forest ranging in width from 30 to 50 m; however, certain areas lack protection forests. Two soil sub-sections that connect to T6 are 390 meters in length, and 4 meters in width, have a crest elevation of +1.8 meters, and a 1.5-meter slope.

- Section from T6 sluice to Tuan Thong sluice (T5): has a length of 4,885m, width of 6m, crest elevation of +2.0m, slope of 2. The seaward canal is used mostly for taking soil for the dike section, but not for the Giong Ke sub-section. The fieldward canal is used for water drainage. 400m of the section has eroded but no coastal protection works are planned for it. The sub-section linking to the Tuan Thong sluice on the left side is 300m long and made of soil, with a width of 5m, a crest elevation of +1.8m, and a slope of 1.

- Section from T6 sluice to Binh Giang I sluice: is 2,450m long, dike surface of about 6m, dike crest elevation of +2.0m, slope of 2. In this section, the canal for taking soil is on the seaside, while the drainage canal is on the field side. The greenfield is 15-17m wide. The canal inside the dyke has an inconsistent width, ranging from 7-18m, there is an outer canal 10-12m wide about 1000m from the T6 canal. T6 sluice is about 200m from the sea dike. The protection forest in this section is very thin, from 0-100m. This section is sparsely populated.

- Section from Binh Giang I sluice to Tuan Thong sluice (T5): is 2,435m long with a dike surface of about 6m, crest elevation of +2.0m, slope of 2. The canal for taking soil is located on the sea side and the drainage canal is on the field side. The greenfield is 15 to 20m wide, and the air space on the seaside is 12-15m wide. The canal inside the dyke is 8-10m wide, and the land canal on the sea side is 10-12m wide. This portion is in good condition, with the road on the dyke surface covered with concrete b=1.5m and not used for aquaculture. The majority of the locals live at the head of the Tuan Thong sluice. The dike sub-section

280m away from the Binh Giang 1 sluice toward the field has a 250-300m-wide protection forest strip (*Figure 47*).

257. *Thus, the current irrigation infrastructure does not meet the production conversion requirements of the project area.*



Figure 47: Current status of the sea dike section from Binh Giang I sluice to Tuan Thong sluice

2.5. ENVIRONMENTAL AND SOCIAL CONDITIONS AT SPECIFIC PROJECT SITES

2.5.1. The 23 sluices

258. Locations: the 23 are situated on canals of Don Dong, K3- Tuan Thong, No. 200 and the canal along the National defense dike within Binh Giang and Binh Son communes (*Table 10*).

259. Social status: The majority of the sluices are situated in sparsely inhabited regions, encompassed by vacant land and a few trees (*Figure 48*). *Table 47* provides the features of the sluices. There are 2 water supply plants in the project area, namely Binh Giang commune plant and Binh Son commune plant. The 2 plants with 80m^3 per day each take surface water to supply for 534 households (see *Table 42*). The water intake point of the Binh Giang plant is 200m from the T6-1 sluice and 320m from the VR-1 sluice for the Binh Son plant (*Figure 49* and *Figure 50*).

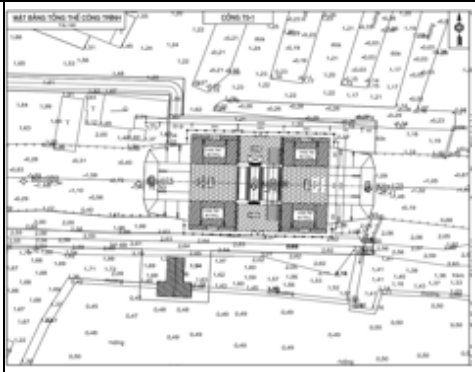
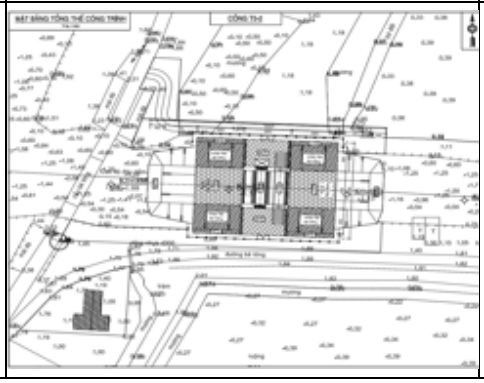


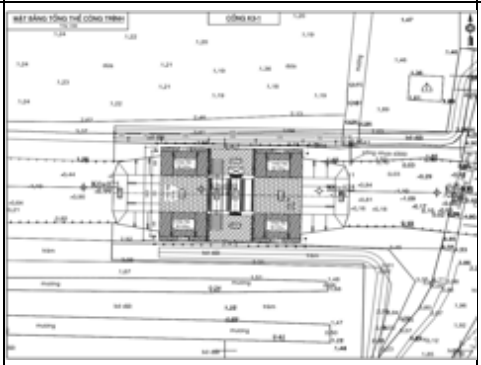
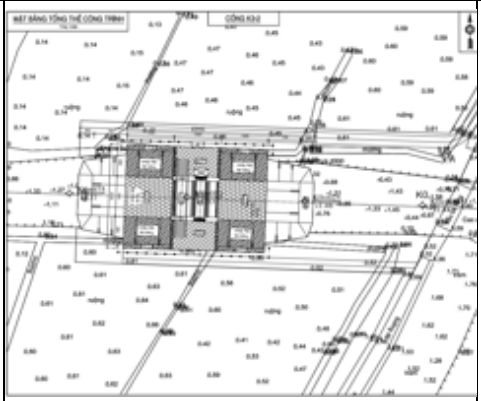
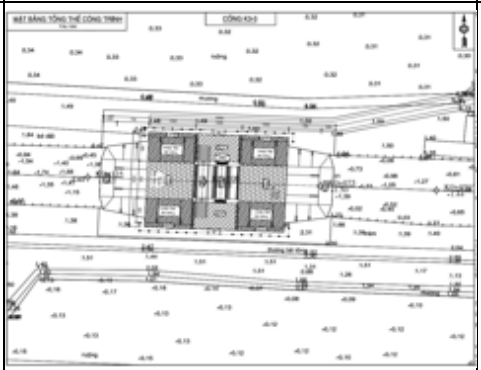


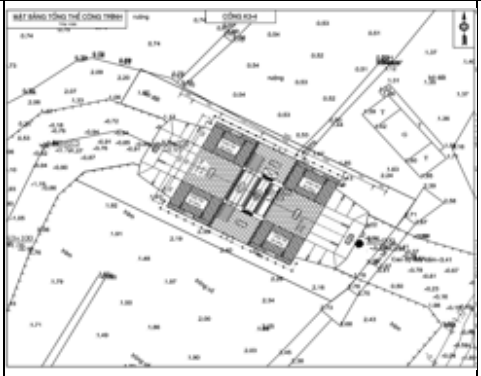
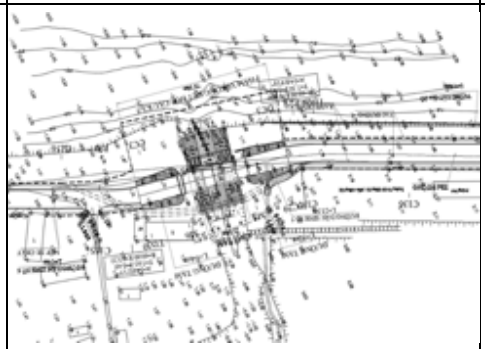
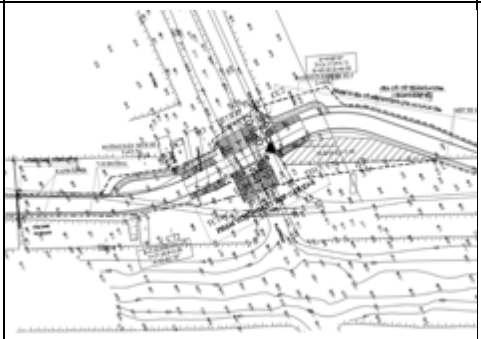
Figure 48: Surrounding area of the sluice construction area

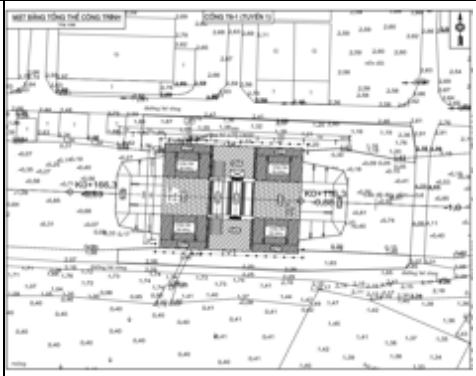
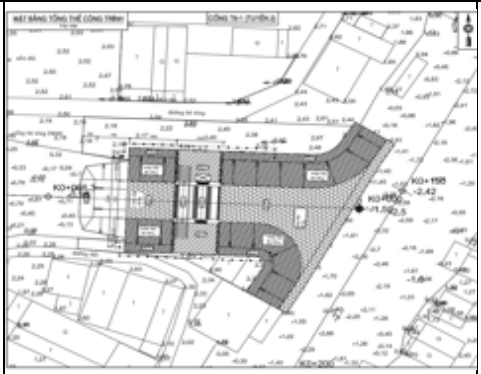
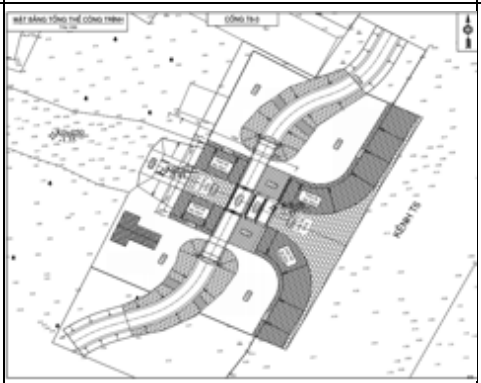
260. Environmental status: Air quality in this area is quite good. Water quality on the canals where the sluices will be buit is not contaminated with acid sulfate. This indicates that water exchange was relatively good during the sampling time, and floodwater from the LXQ was very effective in flushing acid sulfate from the area. Water sources heavily contaminated with bacteria often only meet Class C water quality standards. This also reflects the current distribution of the population in the project area mainly along canals and the low sanitation conditions. Most domestic wastewater of local people is directly discharged into the canals, which is the main cause of bacterial contamination in the water sources in the area. Soil in this area is classified as moderately to heavily acidic soil. Sediments in the canal have concentrations of heavy metals meet the current standards.

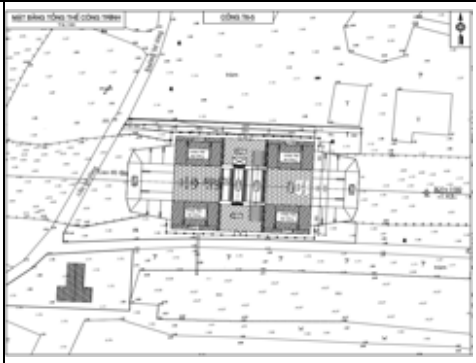
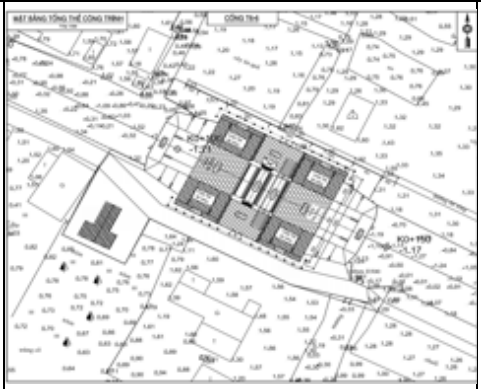
Table 47: Features of the 23 sluices

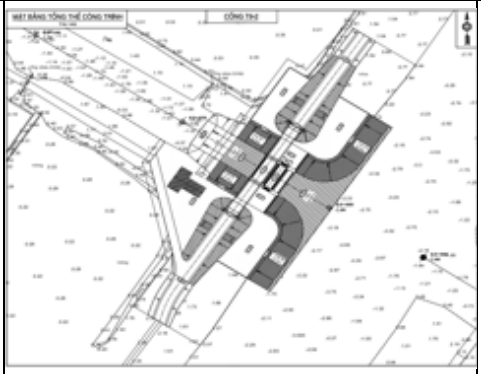
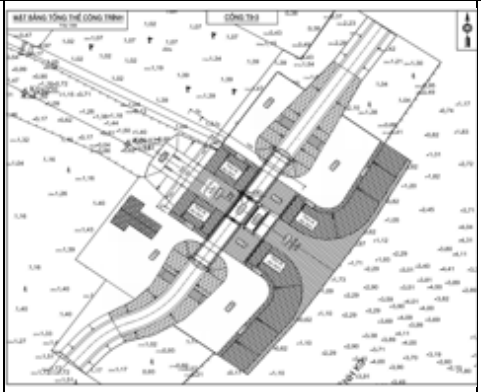
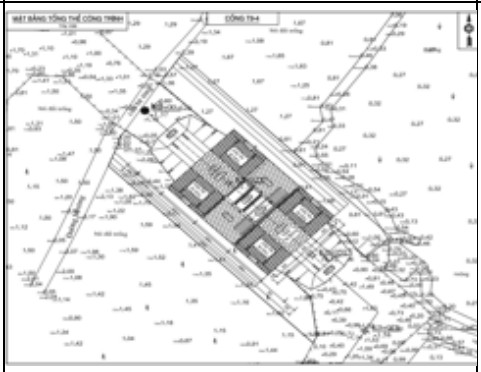
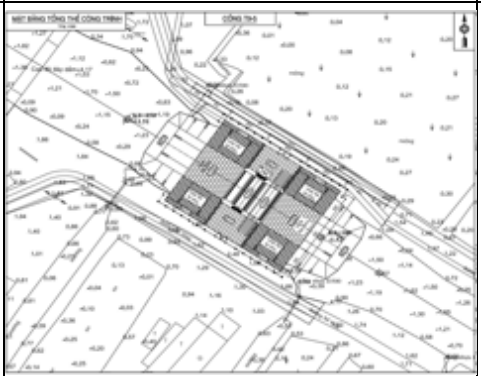
No.	Sluices	Features	Notes
1	T5-1		There are almost no residences surrounding the sluice. The nearest residential house is 100m from the construction site. Kenh Mot, a branch of Giong Ke Secondary School, located 100m from the sluice. 
2	T5-2		There are almost no residences surrounding the sluice. The nearest residential house is 100m from the construction site.

No.	Sluices	Features	Notes
			
3	K3-1		There are almost no residences surrounding the sluice. The nearest residential house is 300m from the construction site. A grave is located 50m from the sluice 
4	K3-2		There are almost no residences surrounding the sluice. The nearest residential house is 230 m from the construction site. 
5	K3-3		There are almost no residences surrounding the sluice. The nearest residential house is 100m from the construction site. 

No.	Sluices	Features	Notes
6	K3-4		There are almost no residences surrounding the sluice. The nearest residential house is 50m from the construction site. 
7	K3-5		There are almost no residences surrounding the sluice. The nearest residential house is 30m from the construction site.
8	K3-6		There are almost no residences surrounding the sluice. The nearest residential house is 100m from the construction site.
9	K3-7		There are almost no residences surrounding the sluice. The nearest residential house is 20m from the construction site. Siviranba Chanpa Pagoda is 260m far from the sluice

No.	Sluices	Features	Notes
10	T6-1		There are almost no residences surrounding the sluice. The nearest residential house is 10m from the construction site. Binh Giang is 160m far from the sluice and 360m away is Binh Giang Secondary School Water intake point of the Binh Son water supply plant located 310m from the sluice 
11	T6-2		There are almost no residences surrounding the sluice. The nearest residential house is 50m from the construction site.
12	T6-3		There are almost no residences surrounding the sluice. The nearest residential house is 30 m from the construction site. 
13	T6-4		The nearest residential house is 10m from the construction site. Vam Bien branch of Binh Giang Primary school is 200m from the sluice

No.	Sluices	Features	Notes
			
14	T6-5		There are almost no residences surrounding the sluice. The nearest residential house is 50m from the construction site. A pig farm is 90m from the sluice 
15	T6-6		There are almost no residences surrounding the sluice. The nearest residential house is 10m from the construction site. 
16	K9-1		There are almost no residences surrounding the sluice. The nearest residential house is 30m from the construction site. There is a grave 90m far from the sluice 

No.	Sluices	Features	Notes
17	K9-2		There are almost no residences surrounding the sluice. The nearest residential house is 210 m from the construction site. 
18	K9-3		There are almost no residences surrounding the sluice. The nearest residential house is higher than 150m from the construction site. 
19	K9-4		There are almost no residences surrounding the sluice. The nearest residential house is above 100m from the construction site. 
20	K9-5		There are almost no residences surrounding the sluice. The nearest residential house is 50m from the construction site. 

No.	Sluices	Features	Notes
21	K9-6		There are almost no residences surrounding the sluice. The nearest residential house is 200 m from the construction site. 530m from the sluice is the Temple of Ba Chua Xu Tam Ngan.
22	VR-1		There are almost no residences surrounding the sluice. The nearest residential house is 30m from the construction site. Binh Son Primary School and Binh Son Secondary School - High School are located within a radius of 50-100m from the sluice. Binh Son Commune Medical Station and the Vam Ray Temple are located within a radius of 300m Water intake point of the Binh Son water supply plant located 310m from the sluice 
23	VR-2		There are almost no residences surrounding the sluice. The nearest residential house is 50m from the construction site. 

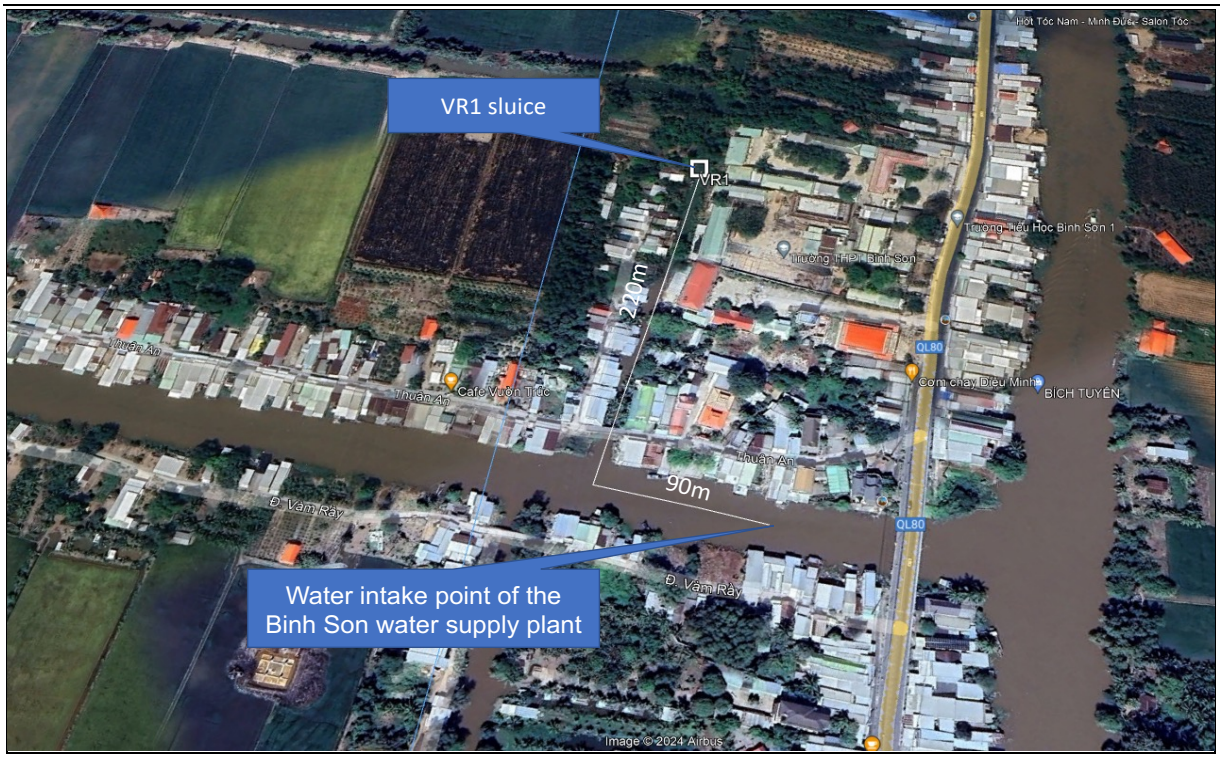


Figure 49: Water intake point of Binh Son water supply plant



Figure 50: Water intake point of Binh Giang water supply plant

2.5.2. The upgraded sluices

261. Locations: the upgraded sluices are located on Don Dong canal (13 sluices) and along the sea dike (5 sluices).

262. Social status: Around these sluices, there are no residents living nearby. The sluice gates are operated automatically based on the tidal differences, which affects water source regulation for production. Additionally, some of the wooden sluice gates are currently decayed, causing saltwater leakage into freshwater production areas (*Figure 51*).



Current condition of the Kenh Mot sluice gate along Don Dong canal

Current condition of the Kenh Nam sluice gate along Don Dong canal

Figure 51: Existing conditions of some sluices to be improved in the project

263. Environmental status: Air quality in this area is quite good. Water quality on the canals where the sluices will be buit is not contaminated with acid sulfate.

2.5.3. The connecting road

264. Location: The road is situated on the eastern side of Binh Giang 1 canal, commencing at NH80 and terminating at the seadike. It spans a total length of 7.03 kilometers (*Figure 9*). Currently, it is unpaved and of poor quality, making it challenging for people to travel, especially during the rainy season (*Figure 52*). The east side of the road is Binh Giang 1 canal and the west side of the road is rice fields and fruit gardens of local people (*Figure 54* and *Figure 55*).



Figure 52: Current status of the connecting road

265. Social status: There are total of 74 households living along the road but they concentrate in the section from NH80 to canal 200 (*Figure 53*). Houses in this area are mainly level-4 houses, temporary houses (corrugated iron roof houses, and corrugated iron huts). As a result, contractors need to be careful not to damage these houses.

266. Environmental status: Air quality in this area is relatively good, with no signs of pollution and the soil is classified as moderately to heavily acidic soil. Therefore, contractors should take care to keep it that way while they work.

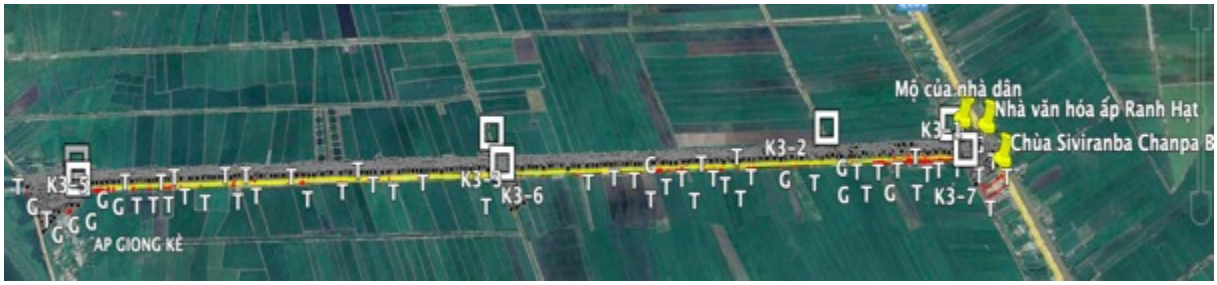


Figure 53: Local peope living along the Binh Giang 1 road route within the section from NH 80 to canal 200



Figure 54: Fruit gardens along the Binh Giang 1 road



Figure 55: Rice fields along the Binh Giang 1 road

2.5.4. The power lines

267. Locations: Along the Binh Giang 1 road, Don Dong canal, Bao Bien road.

268. Social conditions: there are sparse people living along the power lines, only 74 households in the Binh Giang 1 road but they concentrate in the section from NH80 to canal

200. In addition, some people living along Don Dong canal. Houses in this area are mainly level-4 houses, temporary houses (corrugated iron roof houses, and corrugated iron huts). As a result, contractors need to be careful not to damage these houses.

269. Environemental conditions: Air quality in this area is relatively good, with no signs of pollution and the soil is classified as moderately to heavily acidic soil. Therefore, contractors should take care to keep it that way while they work.

2.6. ENVIRONMENTAL AND SOCIAL SENSITIVE RECEPTORS IN THE PROJECT AREAS

2.6.1. Cultural Resources

2.6.1.1. Physical cultural heritage

270. Hon Dat district (formerly) not only includes many historical sites but also magnificent landscapes, making it a popular tourist destination. Among them is the Ba Hon historical relic, particularly the tomb of Hero of the People's Armed Forces Phan Thi Rang (also known as Ms. Su), the faithful daughter of Ba Hon land, and the Military Hospital cave, Cave No.5, Tam Bao Pagoda, Ky Vien Pagoda on Hon Queo mountain, etc. However, all these monuments and works are far (up to 5km) from the project's construction sites. Thus, there will be no direct impacts during preparation and construction phases.

2.6.1.2. Intangible cultural resources

271. Former Hon Dat district hosts several significant festivals, such as the memorial ceremony for Nguyen Trung Truc, held at various temples dedicated to him across the district's communes. The Ky Yen Festival at village temples attracts a large number of worshippers. Several pagodas, temples, and shrines located in the Hon Dat, Hon Me, and Hon Queo mountains also serve as spiritual destinations for people from within and outside the province. Notably, the memorial ceremony for Phan Thi Rang, on January 9th each year, draws thousands of participants. However, these festival sites are far from the project area, taken place outsite the project area.

2.6.2. Other Sensitive Receptors in the Project Areas

2.6.2.1. In the construction area of the sluices

272. The majority of sluices are strategically chosen for placement in areas with low population density. Therefore, there are relatively few sensitive receptors within a 300m radius of the project items, see *Table 48* and *Figure* 56 to *Figure 62*.

Table 48: Sensitive receptors in the construction area of 23 sluices

No.	Receptor name/picture	Distance to the project site (m)	Description
1	Branch Kenh Mot - Giong Ke Secondary School	100m from the sluice T5-1	- Open: 7h00-11h30 and 13h30-16h30 from Mondays to Fridays - 7 classes with 282 students - The road in front of the school is 3m wide

2	Binh Giang CPC	160m from the sluice T6-1	- Located on NH80 - Open: 7h00-11h30 and 13h00-17h00 from Mondays to Fridays, and 7h00-11h30 for Saturdays. - About 70-90 people coming daily.
3	Binh Giang Secondary School	360m from the sluice T6-1	- Located on NH80 - Open: 7h00-11h30 and 13h30-16h30 from Mondays to Saturdays - 15 classes with about 450 students
4	Kenh T5 bridge	56m from the sluice T6-1	- This is a concrete ones with a width of 3m and length of 20m - About 20-30 vehicles travelling every day
5	Water intake point of the Binh Giang commune water supply plant	200m from the sluice T6-1	- Located on Canal 200. - Capacity of 80m^3/h - Supply water for 267 HHs near Binh Son CPC - Surface water intake
6	Binh Giang Primary School - Vam Bien branch	200m away from the sluice T6-4	- Open: 7h00-11h30 and 13h30-16h30 from Mondays to Saturdays - 8 classes with about 260 students - The road in the residential area is 3m wide
7	Pig farm	90m from the sluice T6-5	- About 100 pigs are raising in the farm - The road in front of the farm is 3m wide
8	The residential area	10m from the sluice T6-5	- About 20 households living in the area - The road in the residential area is 1.7-2.5m wide and low of quality
9	Siviranba Chanpa Pagoda	240m from the sluice K3-7	- Opening: 7h00-12h00 for normal days and 6h00-19h00 for Buddish holidays. - About 20 visitors for normal days and 50 visitors for holidays - The road in front of the Pagoda is 3,5m wide
10	Ranh Hat Hamlet cultural house	160m from the sluice K3-7	- Located closely to NH80 - Open: only for holidays or meeting for maximum 70 people
11	Binh Son Primary School	100m away from the sluice VR-1	- Located on NH80 - 15 classes with 470 students - Open: 7h00-11h30 and 13h30-16h30 from Mondays to Saturdays
12	Binh Son Secondary and High School	100m away from the sluice VR-1	- Located on NH80 - 34 classes with 650 students

			- Open: 7h00-11h30 and 13h30-16h30 from Mondays to Saturdays
13	Binh Son Commune Health Center	150m away from the sluice VR-1	- Opening: daily. - About 30 people, including patients, their relatives and center staff
14	Temple of the Lady of Vam Ray	150m away from the sluice VR-1	- Located near NH80 - Opening: 7h00-16h00 for normal days and 6h00-19h00 for Buddish holidays. - About 10 visitors for normal days and 100 visitors for holidays
15	Water intake point of the Binh Son commune water supply plant	320m away from the sluice VR-1	- Capacity of 80m^3/h - Supply water for 267 HHs near Binh Son CPC - Surface water intake

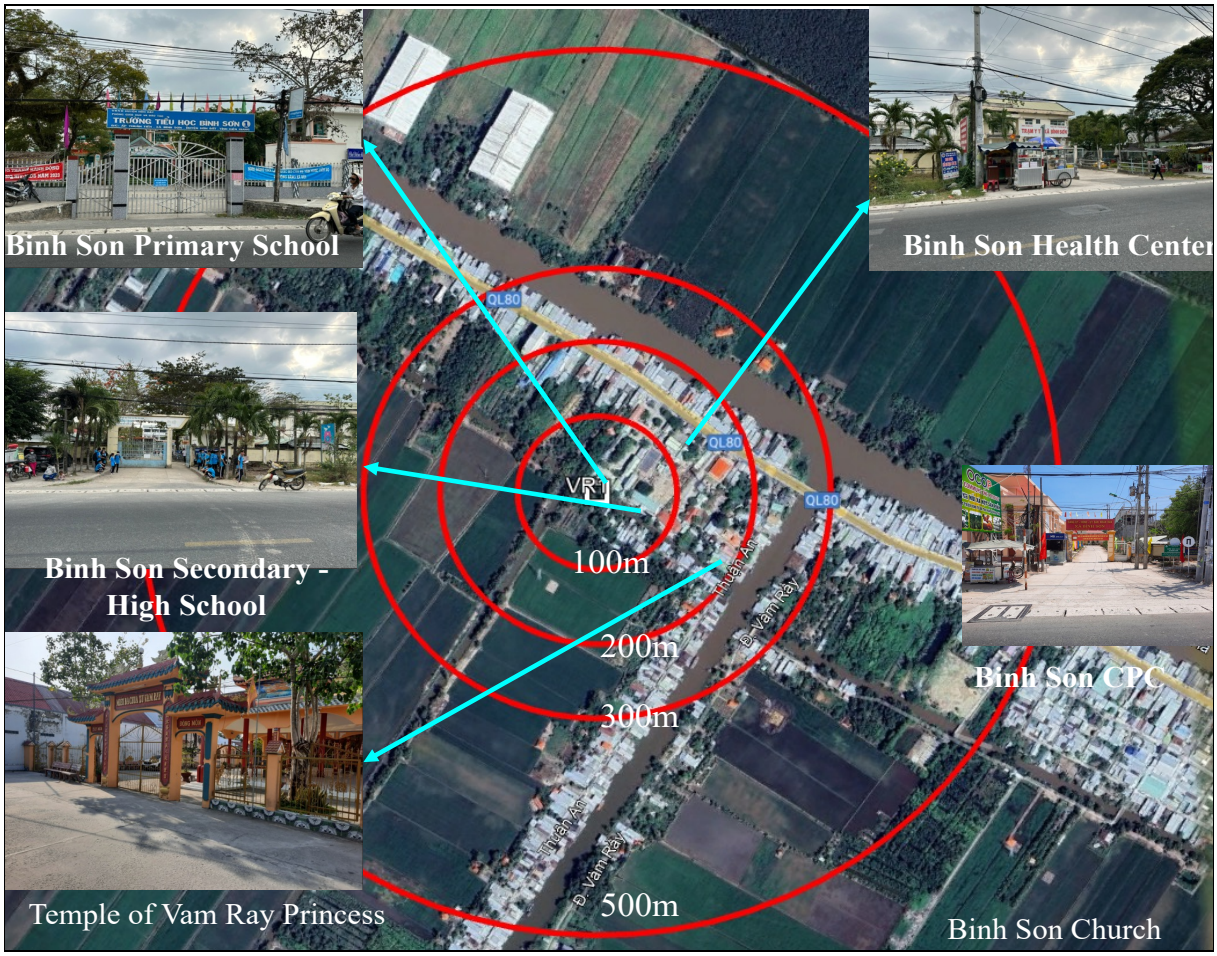


Figure 56: VR1 Sensitive receptors in the construction area of VR1 sluice

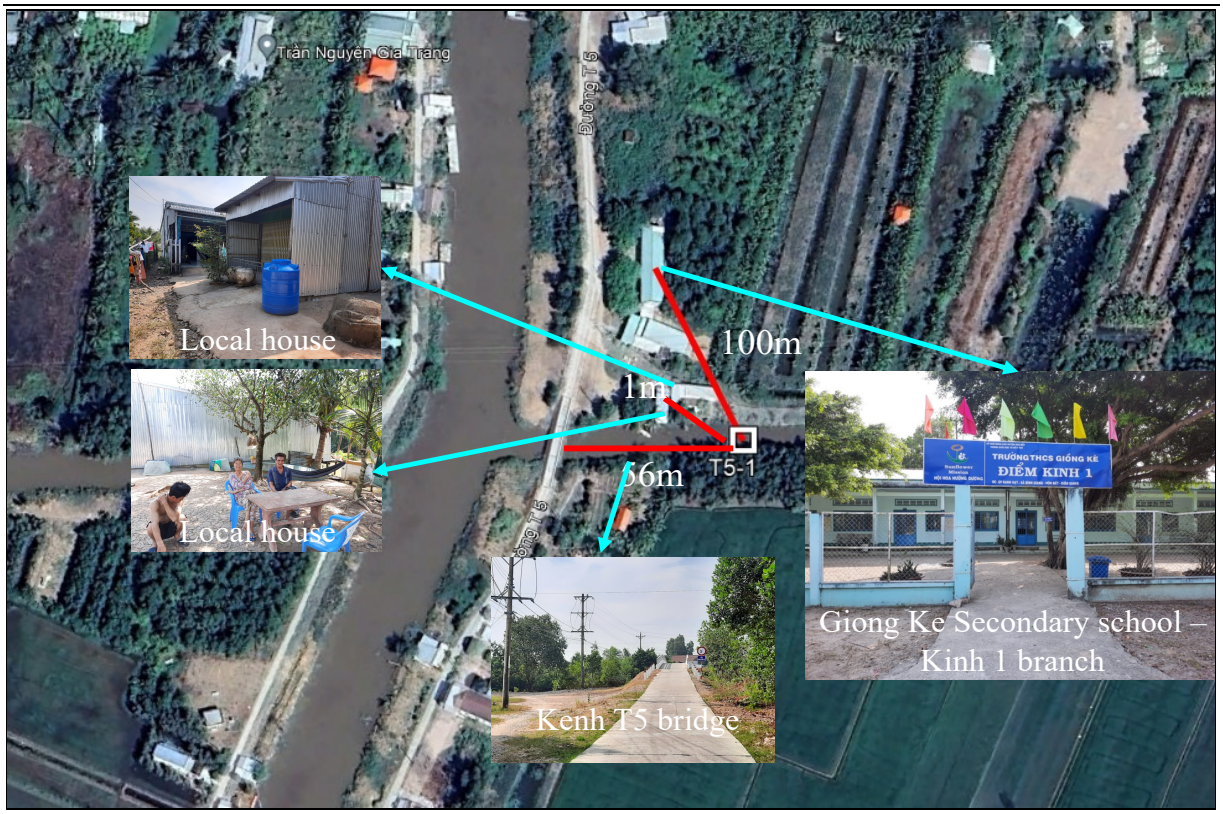


Figure 57: Sensitive receptors in the construction area of T5-1 sluice



Figure 58: Sensitive receptors in the construction area of T6-1 sluice



Figure 59: Sensitive receptors in the construction area of T6-4 sluice



Figure 60: Sensitive receptors in the construction area of T6-5 sluice

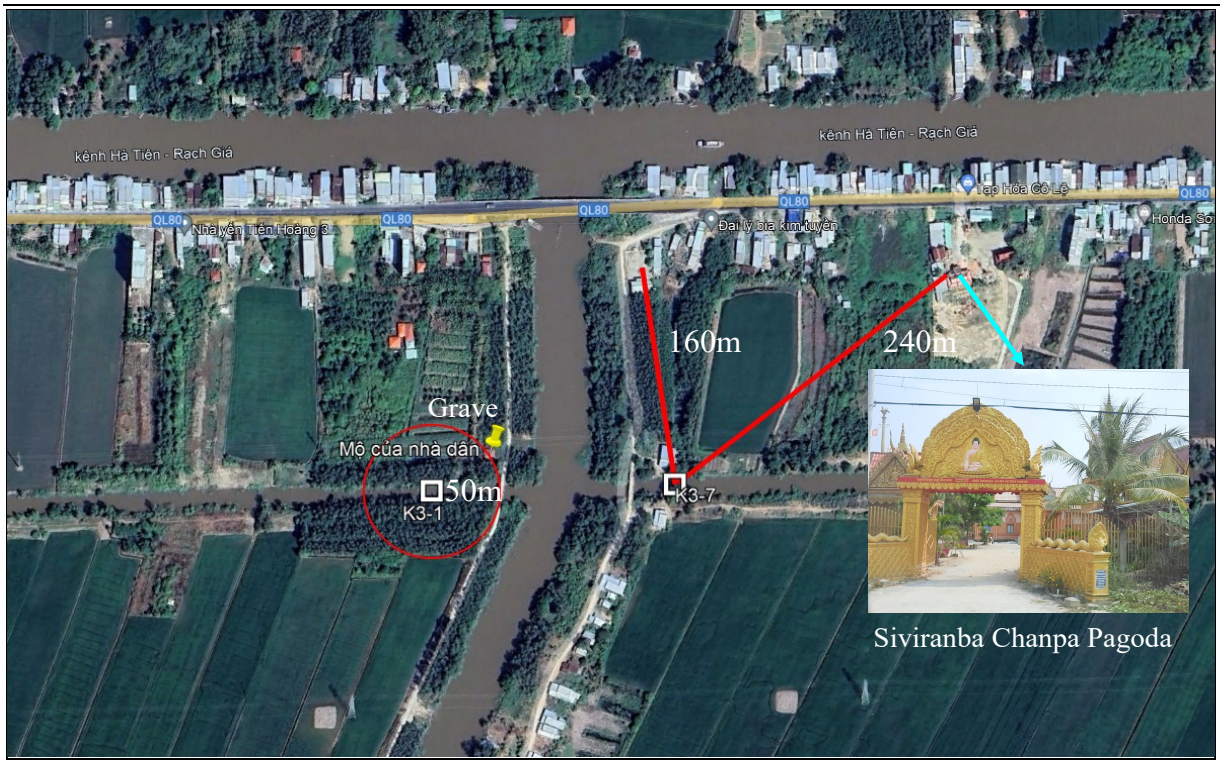


Figure 61: Sensitive receptors in the construction area of the sluices K3-1 and K3-7



Figure 62: Sensitive receptors in the construction area of sluices K9-1 and K9-6

2.6.2.2. In the construction area of the road

273. Within a 100m radius from the construction site of the road, most of the sensitive objects such as residential houses, the Cultural Center of Ranh Hat Hamlet, Siviranba Pagoda, etc., are concentrated in the section from NH80 to canal 200 (*Table 49*).

Table 49: Sensitive objects in the construction area of the road

No.	Receptor name/picture	Distance to the project site (m)	Description
1	Siviranba Chanpa Pagoda 	100	- Opening: 7h00-12h00 for normal days and 6h00-19h00 for Buddhist holidays. - About 20 visitors for normal days and 50 visitors for holidays - The road in front of the Pagoda is 3,5m wide
2	The residential area	10	- About 74 households living in the area - The road in the residential area is 1.7-2.5m wide and low of quality
3	Ranh Hat Hamlet Cultural House 	30	- Located closely to NH80 - Open: only for holidays or meetings for maximum 70 people

2.6.2.3. In the construction area of the power lines

274. Within a 100m radius from the construction site of the power lines, the sensitive objects are as the same as in the road, including such as residential houses, the Cultural Center of Ranh Hat Hamlet, Siviranba Pagoda, etc., are concentrated in the section from NH80 to canal 200 (*Table 49*).

2.6.2.4. In the construction area of the upgraded sluices

275. There is no sensitive receptor within a 100m radius from the construction site of the upgraded sluices.

CHAPTER 3. PROJECT ALTERNATIVES

3.1. "WITHOUT PROJECT" ALTERNATIVE

276. A comparison of the economic, social, and environmental aspects of "with" and "without" the project is presented in *Table 50*.

Table 50: Comparison of economic, social, and environmental aspects of "with" and "without" the project

No.	Aspects	"Without" the project	"With" the project
1	Infrastructure	– The current infrastructure is insufficient, particularly the drainage system and transportation remains challenging, limiting the ability to carry agricultural products. – Freshwater is scarce for daily living and production during the dry season.	– 23 sluices will be built to provide saltwater for shrimp farming while still ensuring freshwater for other livelihood models. – 18 existing sluices will be improved their sluice gates and operation devices. – About 7.03 km of roads have been built to facilitate the movement of goods and others for the area. – About 25.18km of medium and low-voltage power lines will be installed to supply electricity for production, replacing the use of diesel-powered equipment. – The shrimp-rice model will incorporate a two-stage shrimp farming model, which entails the right-dense release of high-quality shrimp seedlings, feed management, and water quality monitoring in the ponds.

			– Aquatic diseases will be under control, and the environmental quality will be regularly monitored. In addition, guidelines on shrimp farming will be provided to farmers on the timing of water taking and the implementation of a water circulation system in shrimp ponds for proper water supply and discharge to ensure the safety of water bodies. – Resources management, community participation, and production collaboration will be facilitated for farmers through the organization of field excursions and training sessions.
2	Livelihood models	– Currently, people make a living by growing perennial trees, rice, rice and shrimp rotation, and aquaculture (white leg shrimp, improved black tiger prawn, and all-male giant freshwater shrimp). They have low productivity and are inefficient. As a result, the local population's livelihoods are insecure.	– Farmers of two crops of rice/vegetables will receive support to shift to the shrimp-rice model and boost production efficiency. – Technical assistance help will be provided for two-stage shrimp farming, releasing high-quality shrimp seedlings at the appropriate density, managing feed and water quality in shrimp ponds, and developing market connections. – Production collaboration, community participation, and resource management for farmers will be improved via training, study tours, etc. – Enhance production collaboration, community participation, and resource management for the local population: provide training, organize field trips, and educate the residents in the production area.
3	Social and environmental issues	– Water sources are polluted due to inadequate environmental treatment in aquaculture areas. – Local people's livelihoods are still precarious.	– Environmental quality will be improved via the implementation of water management measures for shrimp farming. – Local people's living standards will be improved through the suitable development of infrastructures and livelihood models.

3.2. "WITH PROJECT" TECHNICAL DESIGN ALTERNATIVES

3.2.1. Options for the construction of sluices

3.2.1.1. Options for sluice arrangement

277. With the aim of shifting from the model of two crops of rice/vegetables to the shrimp-rice model according to the planning of MD and Kien Giang (now An Giang) province for the period 2021-2030 and the vision to 2050 approved by the Prime Minister, it is necessary to

invest in an irrigation system for water source regulation and saline and freshwater separation in the project area. Also, these works don't interfere with the LXQ irrigation system's operational procedure, whose main task is to drain floodwaters into the West Sea. The procedure was approved by the MARD (now the Ministry of Agriculture and Environment) under Decision No. 3829/ QD-BNN-TCTL dated September 22, 2021. Based on the area's existing irrigation and canal systems, 3 infrastructure development options were proposed and evaluated, as indicated in *Table 51, Figure 63*, and *Figure 65*.

Table 51: Proposed infrastructure options for livelihood model transition in the project area

No.	Option 1 – Full dike	Option 2 – Semi dike	Option 3 – Combination of full and semi dike	Note
1	T5-1 sluice	T5-1 sluice	T5-1 sluice	
2	T5-2 sluice	T5-2 sluice	T5-2 sluice	
3	VR-1 sluice	K3-1 sluice	K3-1 sluice	
4	VR-2 sluice	K3-2 sluice	K3-2 sluice	
5	Kenh Ba sluice	K3-3 sluice	K3-3 sluice	
6	Kenh Sau sluice	K3-4 sluice	K3-4 sluice	
7	Kenh Chin sluice	K3-5 sluice	K3-5 sluice	
8		K3-6 sluice	K3-6 sluice	
9		K3-7 sluice	K3-7 sluice	
10		T6-1 sluice	T6-1 sluice	
11		T6-2 sluice	T6-2 sluice	
12		T6-3 sluice	T6-3 sluice	
13		T6-4 sluice	T6-4 sluice	
14		T6-5 sluice	T6-5 sluice	
15		T6-6 sluice	T6-6 sluice	
16		K9-1 sluice	K9-1 sluice	
17		K9-2 sluice	K9-2 sluice	
18		K9-3 sluice	K9-3 sluice	
19		K9-4 sluice	K9-4 sluice	
20		K9-5 sluice	K9-5 sluice	
21		K9-6 sluice	K9-6 sluice	
22		VR-1 sluice	VR-1 sluice	
23		VR-2 sluice	VR-2 sluice	
24			Kenh Ba sluice	Sluices are located between NH80 and canal No.200
25			Kenh Sau sluice	
26			Kenh Chin sluice	

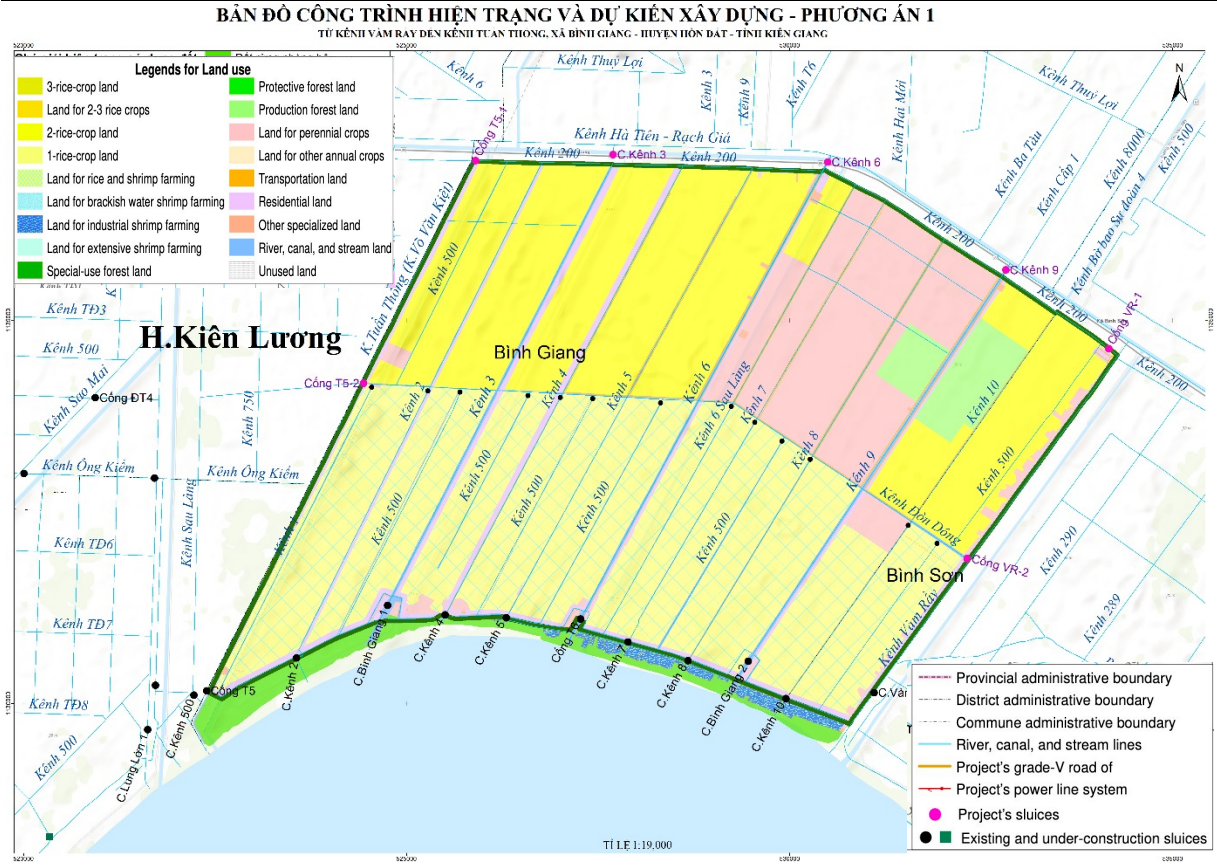


Figure 63: Project layout map according to option 1

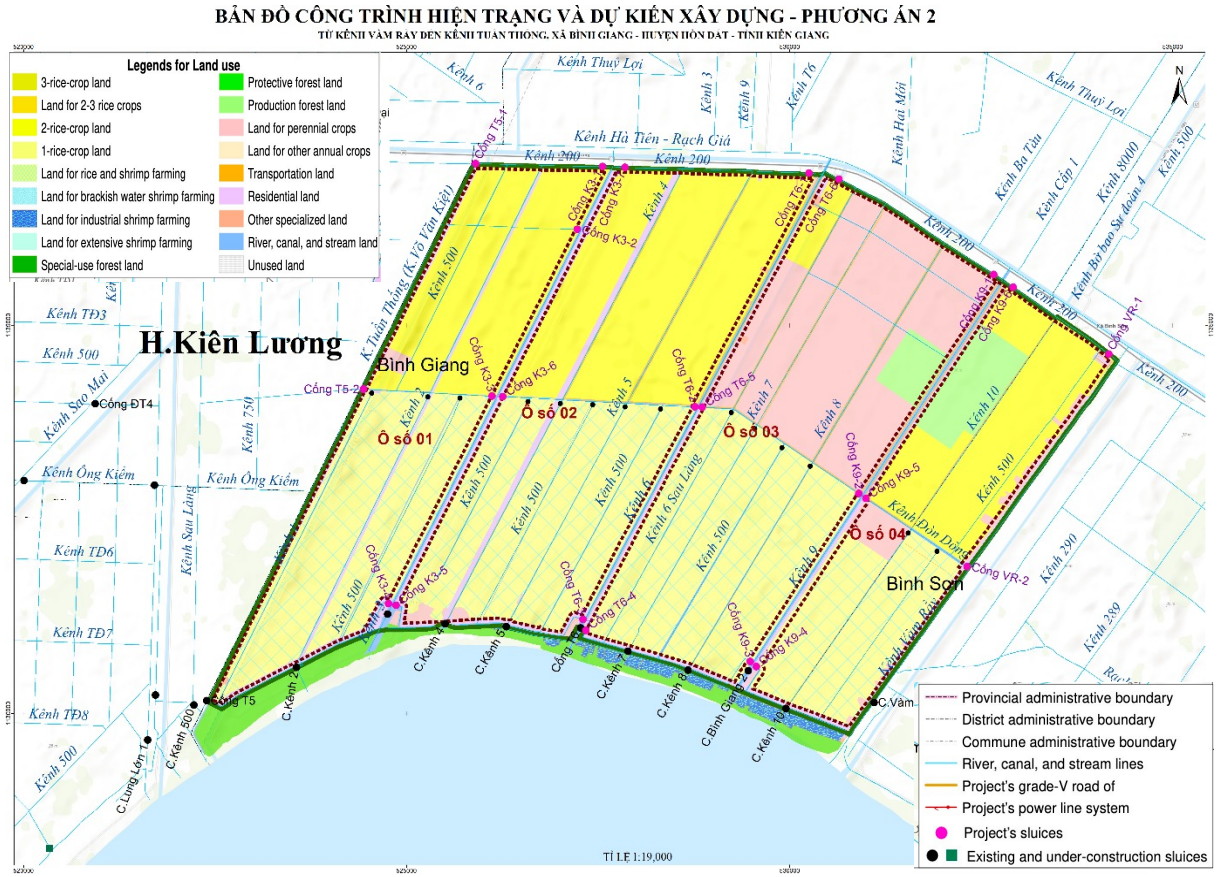


Figure 64: Project layout map according to option 2

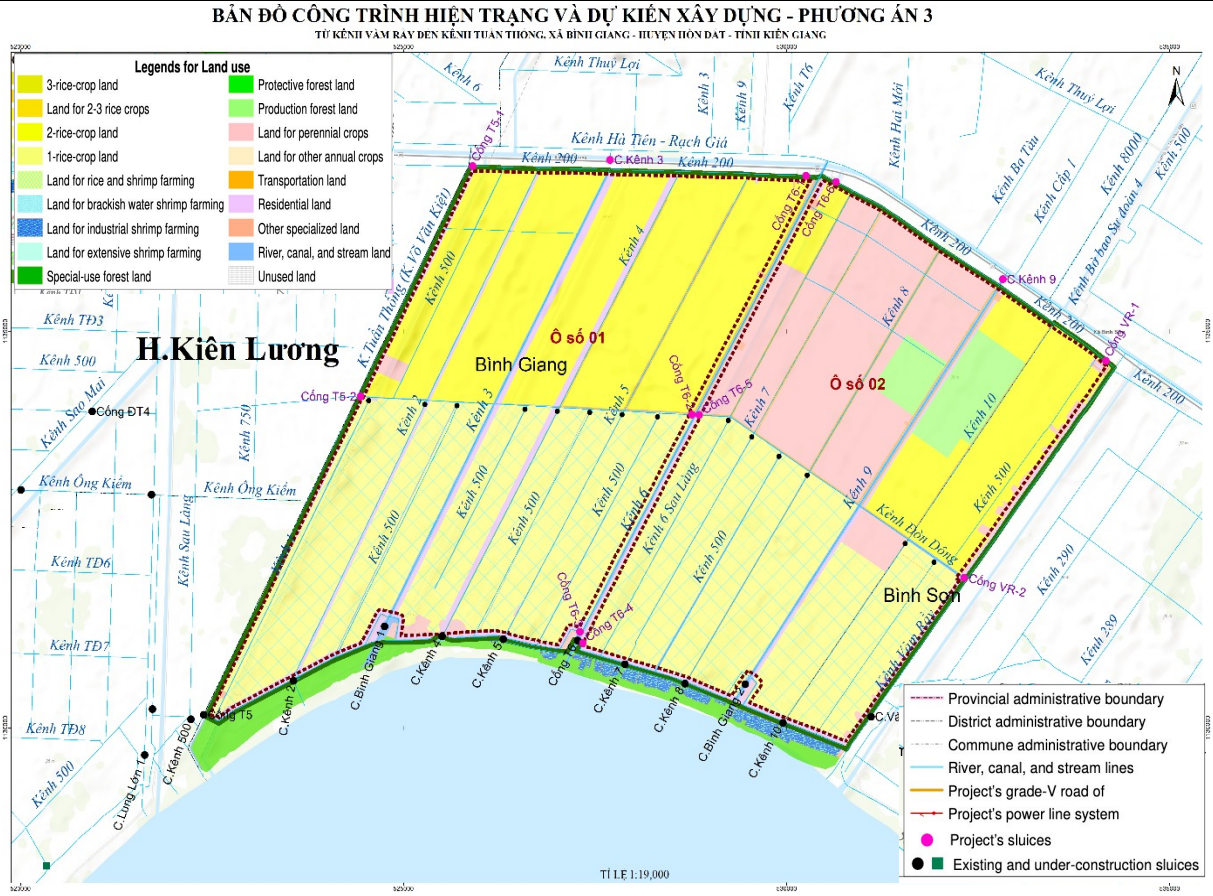


Figure 65: Project layout map according to option 3

278. The results of analyzing the advantages and disadvantages of the options presented in *Table 37* show that Option 2 has a larger budget than Option 1 and is smaller than Option 3. However, the construction system under Option 2 will be consistent with the gradual transformation of production in the direction of converting production in small areas according to the adaptation of the people in the area. On the other hand, the production area following the shrimp-rice model is sandwiched between canals that are both responsible for supplying fresh water and draining floods, so it does not affect the flood drainage of the TGLX irrigation system, and can conveniently collect water. sweet during the aquaculture season to dilute and reduce salinity in shrimp ponds during the dry season when salinity in the area is higher than 25g/L. Furthermore, Option 2 is the option with less impact on environmental and social issues compared to the remaining options. Therefore, option 2 was selected.

Table 52: Pros and cons of proposed options

No	Options	Pros	Cons
1	Opt.1 – Full dike	- The quantity of sluices to be constructed is lower than that of Options 2 and 3, resulting in a construction cost below 110 billion VND. - Good saline/fresh water supply ability, meeting the water need for the shrimp-rice model. - Enables the proactive transition of the entire production area of the project area to the shrimp-rice model, in alignment with the planning for the	- It is required to transition broad areas of production at the same time. This is a difficult task. As a result, some farmers will be able to produce while others will keep their lands fallow. This will have an impact on their production activities. - At the end of the aquaculture season and the start of the flood season (from July to August), all the sluices in the project are operated to let flood water out when there are moderate or small

No	Options	Pros	Cons
		MD and Kien Giang (now An Giang) province from 2021 to 2030, as well as the long-term vision until 2050.	floods. This will affect the aquaculture production in the project area. - Between NH80 and Canal 200, sluices for flood drainage canals No. 3, 6, and 9 will be built. The area is currently very crowded. Building the sluices requires small land acquisition costs and has impacts on local people
2	Opt 2 – Semi dike	- Facilitates the proactive transition of the livelihood model in small areas, while avoiding any impact on places where the farmers are not yet prepared to shift their livelihood model, particularly in Don Dong canal to NH 80. - Does not affect the flood drainage of the area. At the beginning of the flood season, when it is not necessary to operate all the sluices to drain floodwater, the project sluices can still be kept closed to allow people to collect shrimp before the floodwater is drained. Therefore, the flood drainage canals can continue to function in draining floodwater without causing any impact on the aquaculture region. - Easy to take fresh water to lower salinity in aquaculture ponds thanks to freshwater canals alternating with aquaculture areas. - Sluices in the BT2-TS group (Kenh Hai, Kenh Tu, Kenh Nam, Kenh Bay, Kenh Tam, Kenh Muoi) supply enough saline water for the aquaculture area.	- When saline water is required, the sluices for separating saline and freshwater must be closed to prevent saltwater intrusion into freshwater areas. As a result, the areas around these sluices may encounter stagnant water, making it difficult to take saline water, particularly in the serving area of canal 200. Additional small pumping stations should be installed to assist in pumping saline water and pushing freshwater back towards the sluices to address this issue.
3	Opt. 3 – Combination of semi and full dike	- Contains all the advantages of Opt 2. - Actively supply saline water to farming areas, especially the area close to Canal 200.	- Address the disadvantages of opt 1. - However, 3 additional culverts are required on canals No. 3, 6, and 9. Because 3 large canals drain floodwater, the 3 sluices must be big. This results in a budget that is 150 billion VND greater than Option 1. - The sluices will be built on the main drainage canals (Canal No. 3, 6, 9) and located between NH 80 and Canal 200. This area currently has a dense population, so it has a significant impact on the residents' lives, and the cost of land acquisition is higher compared to other remaining options.

3.2.1.2. Options of sluice structure

279. The hydraulic calculation results suggest that for the scale of the sluices, which includes one gate with a width of 5.5-8m, the proposed structural forms for consideration are as follows:

- Opt 1: The sluice structure is composed of single-piece pillars and bottom beams that are rigidly connected via a pile foundation system made of reinforced concrete.
- Opt 2: The sluice structure consists of distinct pillars and bottom beams that are flexibly connected.

280. Based on a comparison of the pros and cons of each option, the scope of application, natural conditions, and construction tasks of the sluices, Option 1 is selected. Details can be found in *Table 53* and *Table 54*.

Table 53: Descriptions of 2 options for sluice structure

TT	Proposed options	
	Opt.1 (hard structure)	**Opt.2 (Soft structure)**
1	**Structure**	
	Reinforced concrete pillars and bottom beams in a single piece	Distinct pillars and bottom beams made of reinforced concrete
2	**Load-bearing structure**	
	- The applied force is distributed over both the pillar and the bottom beam. - Because the applied pressure at the bottom of the foundation is small, the hard structure is stronger when subjected to external pressures.	- The pillar is the primary load-bearing structure, while the bottom beam is simply affected by the load itself. - The soft structure is less stable due to the huge pressure on the foundation of the pillar.
	Because the bottom beam is a load-bearing structure (mostly bending moment), it must be thick enough to increase load-bearing reinforcement, especially for apertures larger than 20m.	Because the bottom beam bears its weight, the bending moment is negligible, reducing the need for load-bearing reinforcement.
3	**Pillar bonding and bottom plate (bottom beam)**	
	- Hard connection. - Minimizing seepage through the bottom. - Eliminating subsidence between the two pillars, ensuring the valve gate's safe operation.	- Soft connetion in form of joints or abutments. - Seepage occurs when the connection fails. - When there is a subsidence between the two pillars, it is not safe to operate the valve gate.
4	**Foundation treatment**	
	- The entire range of pillars and bottom beams is subject to inspection and treatment for load-bearing foundations. - The sluice pressure placed on the foundation's bottom is small. The foundation is simple to treat. - A small number of piles are needed.	- The pillar bottom is the scope of inspection and treatment of load-bearing foundation, and the bottom of the sluice cavity is to check with the load itself. - The sluice pressure placed on the foundation's bottom is high. The pillar foundation is hard to treat.
5	**Construction conditions**	

TT	Proposed options	
	Opt.1 (hard structure)	**Opt.2 (Soft structure)**
	Requiring a large construction site and high construction cost for working with coffer dams	Requiring a small construction site, low construction cost for working with steelworks
	Requiring extensive experiences in construction activities, quality control supervision	Requiring low experiences in construction activities, quality control supervision
	The volume required for simultaneous building is big and rigid.	The volume required for simultaneous construction is small and flexible.
6	**Main applications in design**	
	Suitable for sluices with aperture of from 30 to 50m.	Suitable for sluices with aperture of lower than 20m.
	Requiring extensive experiences in design	Requiring low experiences in design.
	Safety in the design, management and operation of sluice gates.	The two pillars are prone to subsidence, so the joints must be strong enough to allow the luice gates to work and keep the pillars from subsidence.
7	**Investment cost**	
	The cost of investment will be high for sluices with aperture larger than 20 m.	Feasible investment cost.

Table 54: Results for option assessment of sluice structure

Structures / Criteria	Joined chamber	Separate chamber	Soft connection with joints	Soft connection with abutments
(1)	(2)	(3)	(4)	(5)
Total investment cots	+/-	+/-	+	+
Application for sluice with aperture larger than 20m	+	+	++	++
Foundation treatment	++	+	+/-	+/-
Safety in sluice gate operation	++	++	+/-	+/-
Reliability	+	+	+/-	+/-
Design and construction control	+	+	+/-	+/-
Comparison results	+(7)	+(6)	+(3)	+(3)

Note: ++ very good; + good; +/- quite good; - bad; -- very bad

3.2.2. Options for the connecting road

281. The following are 2 options for the connection point from the Binh Giang 1 road to NH80:

- Opt 1 (at the end of the approach ramp of Binh Giang 1 bridge) at Km169+236 NH 80, about 78m from the Binh Giang 1 bridge abutment towards Rach Gia city (Figure 22).
- Opt 2 (about 140 far from the approach ramp of Binh Giang 1 bridge): at Km169+133 of NH80, about 181m from the Binh Giang 1 bridge abutment towards Rach Gia City (Figure 23).



Figure 66: Connecting at the end of the approach ramp of Binh Giang 1 bridge (Opt 1)

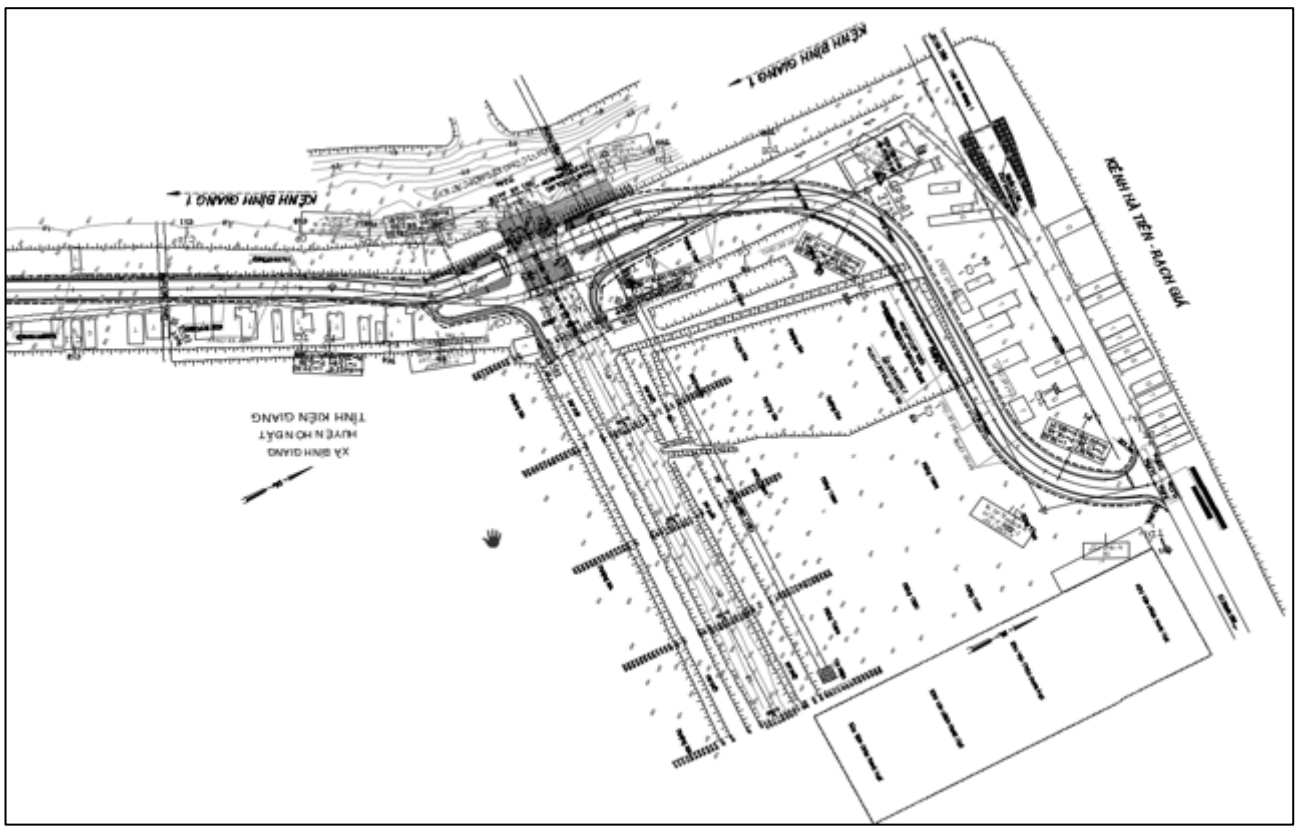


Figure 67: Connecting at 140m from the approach ramp of Binh Giang 1 bridge (Opt 2)

282. After weighing the pros and cons of each option, Option 2 is chosen as the best way to connect the Binh Giang 1 road to NH 80 (*Table 55*).

Table 55: Pros and cons of two options to connect the connecting road to NH80

No.	Opt 1 (at the end of the approach ramp of Binh Giang bridge 1)	Opt 2 (about 180m from the approach ramp of Binh Giang bridge 1)
1	***Technical aspect***	
-	Ensure the technical elements of the intersection	Ensure the technical elements of the intersection
2	***Traffic safety aspect***	
-	Because the connection point is situated at the end of the approach ramp of the Binh Giang 1 bridge, where vehicles are traveling downhill, it is difficult to ensure traffic safety, especially at night.	Risks to traffic safety are minimal due to the connection point being approximately 180 m from the bridge approach ramp
-	It is necessary to arrange speed restriction signs, traffic safety warning signs both on NH 80 and the Binh Giang 1 road	It is necessary to arrange speed restriction signs, traffic safety warning signs both on NH 80 and Binh Giang 1 road
3	***Economic aspect***	
-	Since the intersection is approximately 95 m in length, its construction and land acquisition costs are 2 times lower than that those of Opt 2.	Since the intersection is approximately 200 m in length, its construction and land acquisition costs are roughly double those of Opt 1.
4	***Environmental and social aspect***	
	Opt 2 has greater land use and psychological and life-altering effects than opt 1.	Opt 2 has greater land use and psychological and life-altering effects than opt 1.
5	***Conclude***	
	Do not select	Selected

CHAPTER 4. ASSESSMENT OF SOCIAL AND ENVIRONMENTAL IMPACTS AND RISKS OF THE PROJECT

4.1. POSITIVE IMPACTS

283. The project's benefits are long-term rather than short-term. If successful, the project should not be limited to increasing the number of aquaculture farmers and service providers for shrimp farming activities, but should also contribute to the national sustainable fishery development, specifically:

- The project items assist An Giang province in resolving its urgent problems, such as preventing saline intrusion in coastal areas and regulating water for stable cultivation, etc. This contributes to adapting to climate change, protecting and improving people's lives, and creating a sustainable development environment for the locality.
- The 23 sluices of the project, together with existing sluices, will improve the ability to control salinity, and tides, adapt to climate change, and sea level rise, and separate salty and freshwater boundaries. The project will also ensure flood drainage, acid sulfate washing for the LXQ, provide salt/fresh water, delineate the freshwater-saline water interface in the restructuring area, and regulate water sources for agriculture, fisheries, daily life, and rural environmental sanitation during the dry season. Furthermore, the project promotes rural development and socioeconomic integration by regulating water use demand for shrimp farming and contributing to disease control for an area of 5,500 ha of aquaculture, effectively changing the structure of agricultural land to the south of NH 80.
- The project roads that connect NH 80 to the West Sea dike will make it easier for farmers to transport breeds, food, equipment, shrimp, and other seafood outputs. The production costs for the residents will decrease as they no longer need to rely on manual or semi-automatic vehicles. This will contribute to the enhancement of seafood quality by reducing transportation time.

- The project's medium and low-voltage power system will contribute to addressing the longstanding issue of electricity shortages in the aquaculture area. Shrimp farmers will use electric-powered machines and equipment for shrimp farming, which is both efficient and economical, while also reducing environmental pollution from diesel use (a common practice when facing power shortages). The aquaculture production costs will decrease by not using diesel fuel, leading to increased income and improved livelihoods for the farmers.
- When the project is finished, the shrimp farming area is expected to shift to an industrial and semi-industrial farming model with better extended agricultural procedures. This change is projected to boost shrimp output, improving the livelihoods of the local community.
- In addition to the direct impacts on shrimp farming development, the project is expected to attract investments from private enterprises for upgrading and constructing new infrastructure for industrial shrimp farming facilities.
- Farmers will be able to access aquaculture facilities with enhanced sanitary and environmental conditions, which reduces occupational health risks, improves the quality and value of shrimp production, and reduces shrimp losses due to shorter transportation.
- Improved waste management in shrimp farms will allow for less wastewater and sediment discharge into water bodies. As a result, in the long run, the project should help to improve the water quality in the area.
- By implementing Integrated Pest Management (IPM) and Good Agriculture Practices (GAP), as well as introducing bio-security practices and disease-free seeds, ponds can be rendered less susceptible to pests and diseases. This would result in a decreased reliance on antibiotics and chemicals in aquaculture, safeguarding the environment, mitigating losses caused by disease outbreaks, improving food security, and enhancing occupational health and safety (OHS) for farming-based laborers.
- Improved quality of shrimp seed and increased productivity of shrimp farming areas will help farmers expand their shrimp farming by adapting to the challenges of rising sea levels.
- Enhanced productivity of shrimp farming areas and improved quality of shrimp seed will enable farmers to expand their shrimp farming operations in response to challenges of sea level rising (SLR).
- Bio-security, good nutrition, and a reasonable cost are the primary elements for exporting shrimps internationally with good international competition.
- The project would also generate environmental and social benefits through a variety of other mechanisms. These include (i) beneficiaries, local communities, and authorities becoming more aware of and concerned about environmental and social issues; and (ii) more PPMU staff and aquaculture extension staff of the Department of Agriculture and Environment being trained in environmental and social screening. This helps with bringing up environmental and social problems during the planning and execution of the project.

4.2. TYPES AND SCALES OF POTENTIAL NEGATIVE IMPACTS AND RISKS OF THE PROJECT

284. For each project component, a variety of technical investigations and surveys were conducted to identify environmental and social impacts and risks that the project might pose to surrounding environmental and social characteristics. Potential impacts and risks are assessed

according to the project phases including pre-construction, construction, and operation. Impacts and risks from accidents or unforeseen circumstances are also identified.

285. The nature of each type of impact or risk will depend on the nature, extent, and location of activities undertaken and the duration of these activities. Construction camps are semi-permanent and must be removed after construction phase. Types and scales of the project's potential negative impacts and risks are summarized in *Table 56*.

Table 56: Types and scales of negative E&S impacts and risks due to the project implementation

Work items	Physical elements			Biological elements		Social elements						Others						Note
	Air emission, noise, vibration	Waste water generation	Solid waste generation	Terrestrial ecosystems	Aquatic ecosystem	Land acquisition, resettlement	EMs	PCR	Labor influx, improper access, hard-working conditions, health and safety of workers and locals,	Water supply	Fishing	Local flooding, local traffic	Land subsidence, Soil erosion	Public assets	UXOs	Raw material supply	Land use change	
1. New construction of 23 sluices, B=8 to 10m Acquired land: 6.71 ha, 36 households will be affected, of which 8 households will be relocated Construction time: 24 months Sensitive receptors within a 300m radius from the sluices: see *Table 48*.																		
Preparation	L	L	L	N	L	M	L	L	N	N	N	N	N	N	M	N	N	Small and medium scale works with small and medium impacts
Construction	M	M	M	N	M	L	L	L	M	L	L	M	L	L	N	L	N	
Operation	L	L	L	L	L	N	N	L	N	L	N	L	L	N	N	N	L	
2. Road construction Construction scope Length= 7.03km, located on the East bank of Binh Giang 1 canal to the NH80. Acquired land is 8.76 ha and 21 affected households, in which 4 households will be relocated. Construction time: 18 months Sensitive receptors: agricultural land, the Cultural house of Ranh Hat Hamlet, and some households living at the beginning of the road near NH80																		
Preparation	L	L	L	N	N	L	L	L	N	N	N	N	N	N	M	N	N	Small and medium scale works with small and medium impacts
Construction	M	M	L	N	L	L	L	L	M	L	N	L	L	N	N	L	N	
Operation	L	L	N	N	L	N	N	L	N	N	N	L	N	N	N	N	L	

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Work items	Physical elements			Biological elements		Social elements						Others						Note
	Air emission, noise, vibration	Waste water generation	Solid waste generation	Terrestrial ecosystems	Aquatic ecosystem	Land acquisition, resettlement	EMs	PCR	Labor influx, improper access, hard-working conditions, health and safety of workers and locals,	Water supply	Fishing	Local flooding, local traffic	Land subsidence, Soil erosion	Public assets	UXOs	Raw material supply	Land use change	
3. Installation of power lines (21.54 km of medium-voltage lines, 3.64 km of low-voltage lines, and 30 transformer stations), Construction time: 10 months Acquired land is vacant land along the corridor of canals, which is managed by the state Sensitive receptors: no receptors located within 300m																		
Preparation	L	L	N	N	N	N	M	N	N	N	N	N	N	N	M	N	N	Small scale works with small impacts and risks
Construction	L	L	L	L	N	N	N	N	N	N	N	M	M	N	N	N	N	
Operation	L	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	L	
4. Upgradation of 18 sluices Acquired land: No land is required because this activity only focuses on the replacement of old gates powered by tides with hydraulic valve gate. Construction time: 6 months Sensitive receptors: no receptors located within 300m.																		
Preparation	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Small-scale works with small impacts and risks
Construction	L	N	N	N	N	N	N	N	N	L	N	N	N	N	N	N	N	
Operation	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	L	
Notes: (1) The following criteria are used to assess the level of impacts and risks: None (N) – No impacts; Low (L) – Small work, small impacts, localized, reversible, temporary; Medium (M) – Small works in sensitive areas, medium-scale with medium impacts, reversible, able to be mitigated and managed, localized, temporary; High (H) – Medium-scale works in small sensitive areas, large-scale works with significant impacts (social and/or environmental), many of which are irreversible and require compensation. Both M and H require monitoring and implementation of mitigation measures as well as an appropriate institutional capacity in terms of safety. (2) Most impacts and risks of small and medium-scale works are localized and temporary and can be mitigated through the application of technical solutions and good construction management practices with strict supervision, inspection, and consultation with the local community.																		

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4.3. NEGATIVE IMPACTS AND RISKS DURING PRE-CONSTRUCTION PHASE

4.3.1. Impacts by Land Acquisition

286. The area of land permanently used by the project is approximately 15.46 hectares. However, the land managed by the 2CPCs accounts for up to 12.6 hectares (water surface, current roads, canal banks, etc.), accounting for 82%, while the land managed and used by the local people is only 2.77 hectares (0.33ha of argicultural land, and 0.65ha of land for planting trees), making up 17.9% (*Table 57*). There is no forest land to be acquired for the project.

287. The project will impacts on 22 houses with a total area of 1,363.48m^2 (mostly temporary, with one category 4 house), various auxiliary structures (such as fences, yards, mooring areas, and drilled wells), and approximately 93,097 trees of various types, including fruit and landscape trees. Details are in *Table 58*, *Table 59* and *Table 83*.

Table 57: Permanent land acquisition of the project

No.	Descriptions	Area (m^2)
1.	**The system of 23 sluices**	***67,007***
1.1	Surface water land (land for canals):	20,682
1.2	Terrestrial land (land along canal banks)	
1.2.1	*Managed by state*	*26,141*
1.2.2	*Managed by households*	*17,949*
1.3	Agricultural land (rice cultivation land)	2,236
2	**The road**	**87,648**
2.1	Agricultural land (rice cultivation land)	1,075
2.2	Land for roads managed by state	12,267
2.3	Land for road protection corridors managed by state	67,799
2.4	Land for gardens	6,508
	Total	**154,655**

Source: Inventory of losses in January and February 2024.

288. The project will have an impact on 22 houses with a total area of 1,363.48m^2. Most houses are temporary houses (21) and only one house is catagory 4 houses (see Table 58)

289. Detailed information related to permanent and temporary land acquisition, including areas, types of land, houses, structures, trees, etc., are presented in the Project's RP. Furthermore, the final PAH figures will be determined by the Detailed Measurement Survey (DMS) during the RP's implementation.

290. The following are the impacts of land acquisition:

4.3.1.1. Impact on relocated households

291. Within the land acquisition area for the project, 12 households need to be relocated, including 8HHs for the new sluices and 4HHs for the road. The DHs will experience psychological repercussions as well as changes in community interactions. The displaced

households require time to adapt to their new surroundings, including access to new services such as health care, markets, and schools. When individuals move to a new neighborhood, they will gradually form new social connections. However, the 8HHs in the construction area of the new sluices had constructed the affected houses on the canal banks or the state land. These houses are temporary. Furthermore, there are no infrastructures or residents in the vicinity. It is challenging for the HHs to access the health care system, schools, and markets. Additionally, the houses displaced by the road construction are located in the Binh Giang 1 residential area, designated as the project's resettlement area. Consequently, if these DHs choose the resettlement option in the project's designated resettlement site, the impacts of relocation will be negligible.

292. The findings of field surveys and community consultations in the project area reveal that households desire the project to be implemented. They believe that once the project is completed, they will benefit from its infrastructure, particularly the project road. Furthermore, interviews with AHs by land acquisition for the project show that they are completely supportive of the project's implementation and are willing to hand over their land for the project when they are relocated to a new place. Because they know that the road will provide enormous benefits.

293. According to the project's RP, environmental and social due diligence has been conducted for the Binh Giang 1 residential line served for the DHs of the project. The result of the due diligence shows that the line which was built in 2002 by the province budget. It is currently located along Binh Giang 1 road, which will be upgraded as part of the project. It consists of 395 land lots, of which 43 lots have been allocated to individuals and organization for settlement, leaving 352 vacant lots that can be allocated to displaced households of the project. It has access complete infrastructure including electricity, water, and drainage, as well as health stations, markets, and schools within a short distance of 1-2 km. It means that their living conditions will improve significantly, particularly for the DHs of the new sluices, because the majority of their affected houses are temporary structures built on canal banks and other state-managed lands, with poor living conditions and limited access to health care, markets, and schools.

294. *As a result, the impact is rated as moderate, short-term, and can be mitigated due to the following: (i) the small number of DHs (12 HHs) and their generally poor living conditions, particularly for the DHs of the sluices; (ii) the relocated houses are temporary and constructed on state land or the bank of canals; (iii) the DHs will receive a variety of support, including transportation, rental, and self-relocation assistance; (iv) they will be arranged for relocation at the existing resettlement site with adequate infrastructure (if they desire); and (v) the resettlement plan (RP) has been prepared for the project.*

4.3.1.2. Impact on livelihood

295. There are 57 project affected household (PAH)s with 229 people by land acquisition of the project. They are affected types of loss such as agricultural land, structures, trees and crops. Only 1 vulnerable household (those with a physical or mental disability), 7 ethnic minority HHs and 12 displaced household (DP)s area found among the 57 AHs.

296. The loss of agricultural land has a direct impact on the income and indirectly reduces the living conditions of the affected households. However, the argicultural land will be acquired very small, including 0.33ha of agricultural land for the 23 sluices and 0.65ha of land for

planting trees the road for the road. Also, the project has no severe impact on any household, meaning that no households will lose 20% or more and vulnerable losing 10% or more of their agricultural production land.

297. Futhermore, because the area where the 23 sluices and the road are to be built is rural areas, no business is available, no business activities will be affected by land acquisition.

298. As a result, the impact on livelihood is determined to be "small", short-term and can be mitigated by cash compensation and livelihood restoration program outlined in the project's RP.

4.3.1.3. Changes in land use

299. The project's footprint of the 23 sluices and the road will change the local land use structure, affecting income sources and livelihoods of the affected households. However, the impact of the project is assessed to be "LOW" due to the following reasons: (i) the amount of agricultural and residential land acquired for the project is low; (ii) the completion of the road will increase the land value; (iii) improved accessibility will facilitate local economic growth; and (iv) the project's land use are planned. *The project's positve impacts outweigh the negative ones and futhermore, these negative impacts can be mitigated through the RP of the project.*

4.3.1.4. Impacts on public assets and cultural heritages

300. At the time of the preparation of resettlement plan (RP), no cultural-historical assets have been identified in the project area where land may be required. However, some public infrastructure, such as electric poles, telecommunications, and television cable lines may be potentially affected by the project. Once the detailed engineering design has been approved, a Detailed Measurement Survey (DMS) will be carried out to determine the potential impacts on the items in further detail. However, the project owner shall notify the affected households of the relocation time 2 weeks in advance and shall request contractors set up new infrastructures before moving the currents ones so the impacts will be small and short-term and mitigable.

301. *Comments for impacts due to land acquisition: the impact of land acquisition is assesed as small and can be mitigated due to the following reasons: (i) The area of land to be acquired from the people is 2.77 hectares and scattered across two communes, so the number of affected households is small (57 households, including 12 displaced households), and the area affected per household is small; (ii) The affected land is mainly adjacent to canal banks, with only 0.33 hectares of rice cultivation land affected; (iii) For the 12 displaced households, the affected houses are temporary structures built on canals or on land managed by the state, with relatively low living conditions. These households will be resettled at the Binh Giang 1 residential area, where the infrastructure is good, and access to healthcare, education, and markets is easy, within a radius of 1-2 kilometers. Consultation results with the displaced households show that all of them agreed to resettle in this area; and (iv) all affected households support the implementation of the project and will benefit from the project's components, especially the road. Additionally, the project's RP has been developed to ensure that the affected households will be compensated and supported to restore their livelihoods to at least the same or better level than before the project.*

4.3.2. Safety Risk Related to Unexploded Ordnances (UXOs)

302. Vietnam in general and the project area in particular experienced civil wars that concluded in 1975. Despite the land having been utilized for the past four decades following the conclusion of the war, there is still a possibility that certain unexploded ordnances (UXOs) remain underground. The UXOs could potentially cause harm to workers, and damage to project and nearby households' structures if it is disturbed by construction activities such as site clearance, ground leveling, and excavation. Most of project works are required to implement the clearance of UXOs by licensed units, except for the 18 upgraded sluices which already was cleared in the previous projects. The new sluices will have more risks of UXO than the rest given that the excavation activities may be executed to the depth of 5m on agricultural fields and canal beds.

303. If UXOs are not cleared, they might pose a risk during the construction process, affecting workers, locals, and adjacent infrastructure. According to a consultation with the military chief of An Giang province, there have been no cases of UXOs discovered or causalities due to UXOs in the entire commmunes in the last ten years. *Therefore the risk is moderate and long-term if it happens in the construction areas of the project works, with the exception of improving the 18 sluices. However, it can be mitigated because clearing work will be completed thoroughly before construction begins, and construction activities should be limited to UXO-free zones.*

4.4. NEGATIVE IMPACTS AND RISKS DURING CONSTRUCTION PHASE

304. Based on the project scope, scale, and construction methods mentioned in Chapter 1 and current natural and social circumstances of the project area mentioned in Chapter 2, the negative impacts during project construction are evaluated and separated into generic and specific impacts in the following sections:

4.4.1. Generic Impacts

4.4.1.1. Impacts on ambient air quality

305. During the construction of the project, the sources of air pollution include:

- Dust and air emission from demolitions.
- Dust and air emissions generated during transportation of construction materials.
- Dust and air emission from excavation.
- Dust from concrete mixing.
- Noise and vibration.

a) Dust and air emmision generation from demolition

306. Dust and emmision generation to air can occur during the site clearance (e.g. the demolition of houses, other structures on land, trees, etc.), which will be conducted in scattered areas of two communes over a period of one to three months, contingent upon the area and quantity of site clearance. Only 2 structural components require the demolition, including the construction of the 23 sluices and the road.

307. The demolition of houses, other structures and trees on the affected land can generate dust and air emissions affecting the ambient air environment and living conditions of the households adjacent to the project area.

308. Land acquisition will impact a total of 22 houses, including 12 houses will be fully affected, while the remaining houses will be affected by their auxilaries, such as fences, yards, mooring areas, and drilled wells (*Table 58* and *Table 59*). In addition, about 93,097 trees of all kinds will be demolited by the project, including fruit trees and landscape trees. Demolition work mainly targets walls, auxiliary structures, and solidified constructions.

Table 58: Type of the affected houses of the project

No.	Affected houses	Number of affected houses (items)	Number of fully affected houses (items)	Affected area (m^2)
1	**The system of 23 sluices**	**8**	**8**	**664.94**
1.1	Houses with corrugated iron roofs and brick walls (level 4)	2	2	237.35
1.2	Houses with corrugated iron roofs and corrugated iron walls (temporary houses)	5	5	365.92
1.3	Corrugated iron huts (temporary houses)	1	1	61.67
2	**The road**	**14**	**4**	**340.8**
2.1	Corrugated iron roof houses (temporary houses)	2	2	36
2.2	Corrugated iron huts (temporary houses)	11	2	289.2
2.3	Houses with corrugated iron roofs and brick walls (level 4)	1		15.6
	Total	**22**	**12**	**1,022.68**

Source: Inventory of losses from January to February 2024.

Table 59: Summary of impacts on other structures on land of the project

No.	Descriptions	Unit	Affected volume		
			The system of 23 sluices	The road	Total
1	B40 steel fences	m^2	42	0	42
2	Mooring areas	m^2	40	0	40
3	Tree fences	m^2	60	0	60
4	Yards	m^2	217	0	217
5	Drilled wells	item	1	13	14
6	Bridges	item	1	0	1

Source: Inventory of losses from January to February 2024.

309. Approximately 102.8 tons of debris will be generated from the demolition of impacted structures on the project site (*Table 60*). After demolition, the brick and concrete structure will be repurposed to backfill the roads. Other demolished components, such as steel, wood, metal roofs, and fiber cement sheets, will be reused by affected households to build their homes, with the wood being used as fuel.

Table 60: Summary of demolition volume of affected structures on land of the proeject

No.	Affected structures	Affected area (m^2)	Affected volume (m^3)	Density (ton/m^3)	Dismolished amount (ton)
1	Level-4 houses	1,022.68	51.1	1.2	61.4
2	Mooring areas	40	4.0	0.5	2.0
3	B40 fence	42	0.4	0.8	0.3
4	Cement yard	217	21.7	1.8	39.1
	Total	**1,321.7**	**77.3**	**4.3**	**102.8**

310. The WHO's 2003 rapid assessment guideline states that dust emissions during land clearance and demolition range from 0.1 to 1 g per m³. The project entails a calculated demolition volume of 77.3m³ (see *Table 61*) with an estimated duration of 30 days and a daily work schedule of 8 hours. The dust generated from demolition activities will be very small, ranging from 0.01-0.11 g/h (Table 61). In addition, cutting trees will generate no dust. However, the demolition will be carried out in 2 project communes throughout a month. It will not be done all at once, but rather in intervals scattered across the three years of the project's construction for various components. Dust mainly affects the workers who are presence at the site during demolition and local people around the sites. However, the impact is small, short-term, and localized within the construction sites of the traffic routes due to the following reasons: (i) Only temporary structures need to be demolished, and each structure requires 1-2 workers and 1-2 types of demolition equipment for 1-2 days; (ii) the demolition is carried out in sparsely populated places; (iii) the demolition takes place throughout 2 communes. In addition, the impact can be minimized by applying appropriate mitigation measures outlined in *Chapter 5*.

Table 61: Dust emissions generated during the demolition of structures on the project sites

Activity	Demolition volume (m^3)	Dust emission factor (g/m^3)	Total generated dust (g)	Dust load (g/h)
Demolition of structures on land	77.3	0.1 - 1	7.72-77.2	0.01-0.11

311. The affected crops are mainly fruit trees and perennials. Therefore, chainsaws powered by gasoline engines will be used. According to the project's RP, a total of 93,097 trees of all kinds will be cut down. About 5 workers will be needed to run 5 chainsaws, working over a period of 30 days. The estimated fuel consumption rate is 60 trees per liter of gasoline. The amount of fuel required for tree cutting activities is presented in *Table 62*.

Table 62: Amount of fuel needed for tree cutting

Demolition equipment	Gasoline consumption rate	Total Fuel Consumption	
		liters/day	kg/day
Gasoline-powered hand saws	60 trees/1 liter of gasoline	77.60	62.05

312. Based on the amount of fuel and the emission factor established by the WHO, the estimate of the maximum load in the tree cutting process exhaust is presented *Table 63*.

Table 63: Dust and air emission due to the demolition

Pollutants	Emission coefficients (kg/kg of fuel)*	Load of pollutants (kg/h)	Concentration (mg/m^3)	QCVN 05:2023/BTNMT (mg/m^3)
Dust	0.0043	0.0242	0.0026	0.3
SO_2	0.004	0.0226	0.0024	0.35
NO_X	0.055	0.3101	0.0327	0.254
CO	0.028	0.1579	0.0166	30
VOC	0.012	0.0677	0.0071	--

Source: (*) WHO, 2013

Note:

- S: sulfur content in gasoline < 0.05% (according to Petrolimex)
- Load (kg/h) = (pollution coefficient (kg/kg of fuel) × amount of fuel (kg))/number of days (days)/8h.
- Concentration (mg/m^3) = (load (kg/h) × 10^6)/calculated volume (m^3)
- Calculated volume: V= ground clearance area × calculated height = 27700 m^2× 10 m =2,770,000m^3

313. From the calculated results, the concentration of air emission caused by the tree-cutting is within the allowable limits according to QCVN 05:2023/BTNMT. In addition, the demolition will occur in sparsely populated areas. *Therefore, the impact is negligible, short-term (only and localized within the land acquisition area.*

314. Comments: *The impacts of dust and air emissions resulting from demolition are assessed as minor, as the quantity of structures and trees to be demolished is limited. This activity disseminated across the sparse regions of the two communes during a brief period of approximately 30 days. The project owner shall request the contractors to implement the mitigating measures outlined in Chapter 5*.

b) Dust and air emissions from construction material transportation

315. As stated above, boats will be used to transfer the construction materials for the project. According to *Table 64*, the total volume of building materials needed to build a sluice is about 215,625 tons. To transport all of the materials, 1,078 trips are necessary (estimated for a boat with a load capacity of 200 tons). The building process is estimated to take 6-24 months, resulting in a daily need for 2.36 trips, with the highest demand for road construction (1.47 trips/day) and the lowest for power lines (0.04 trips/day), see *Table 64*.

Table 64: Number of trips to transport construction materials for the project

No.	Project items	Total volume of materials needed (tons)	Construction time (months)	Total of trips	
				For the whole construction time (trips)	For a day (trips/day)
1	23 sluices	66,487	24	332	0.53
2	18 sluice upgradation	9,984	6	50	0.32
3	Connecting road	137,212	18	686	1.47
4	Power lines	1,942	10	10	0.04
	Total	**215,625**		**1,078**	**2.36**

316. The materials are sourced from shops in Hon Dat town and Kien Luong district (formerly), on average, transported 3-30 km every trip to the construction site (*Figure 20*). Using the emission coefficients for diesel-powered boats shown in *Table 65*, the amount of

emissions generated by transporting building materials with a distance of 30km for a trip is shown in *Table 66*.

317. Dust and air emissions from transporting materials along water routes will affect air quality, water quality, and aquatic ecosystems, as well as the households living along the transportation routes (*Table 67*).

Table 65: Emission coefficients for diesel-powered boats

Parameters	**Dust**	**SO_2**	**NO_x**	**CO**	**VOC**
Emission coefficient (kg/1.000km)	6.8	136S	90.7	0.036	4.1

Source: WHO, 1993.

Note: S – the percentage of sulfua in diesel, accounts for 0.25%.

Table 66: Load of pollutants due to transportation of construction materials for the project (kg/day)

Descriptions	**Dust**	**SO_2**	**NO_x**	**CO**	**VOC**
Air pollution load for the 23 new sluices	0.0456	0.0022	0.0003	0.000069	0.0456
Air pollution load for the 18 upgraded sluices	0.0011	0.0001	0.0151	0.000007	0.0007
Air pollution load for Binh Giang 1 road	0.0018	0.0001	0.0237	0.000011	0.0011
Air pollution load for the power lines	0.0020	0.0001	0.0264	0.000012	0.0012

318. *Comments: The impacts are small and short-term due to: (i) the transportation routes pass through rural areas with low population; (ii) the total daily number of trips is negligible (2.36); (iii) the materials are covered during transportation; and (iv) the transportation activity is only conducted during the construction phase, which means that the impacts are limited to the construction period (approximately 6-18 months). In addition, the impacts can be mitigated by measures specified in in Chapter 5.*

Table 67: Impact evaluation of construction material transportation

Location of impact	**Impact Duration**	**Impact Receptor**	**Impact level**	**Remarks**
Transportation routes from Rach Gia – Ha Tien canal to the construction sites: - Rach Gia – Ha Tien canal - Canal 200 - T3-Tuan Thong canal - Don Dong canal	24 months (During transportation time)	- Air, water quality, aquatic life on the canals using for transporting materials, especially nearby households. - People living the transportation routes, especially households living near the sluice T6-1	- Small - Short-term - Mitigable by measures in Chapter 5	- The transportation routes go through rural areas with few people - The materials are covered while they are being moved - Moving construction materials adds about 1 boat a day to the transporation canals

c) Dust and air emissions from excavation

319. During construction, excavation activities will be carried out to remove organic matter from the topsoil layer and dig soil for the foundation pits of the sluices and holes for the power lines. This will involve the use of construction equipment and tools such as excavators, drilling machines, and hammers, etc. These operations have the potential to generate dust and air

pollutants, which can have a negative impact on the health of the community and workers, as well as the air quality in and around the construction sites.

320. According to the project's FS report, the total soil excavation and filling volume of the project is 309,726 m^3, mainly from the sluices and the connecting road (*Table 68*).

Table 68: Volume of soil excavation and filling of the project

No.	Project items	Total volume of soil excavation and filling (m^3)
1	23 new sluices	282.762
2	18 upgraded sluices	0
3	Binh Giang 1 road	25.698,5
4	Power lines	1.266,37
	Total	**309,726.47**

321. According to the Environmental Assessment Sourcebook of the World Bank (Volume II, Sectoral Guidelines, Environment, World Bank, Washington D.C., 8/1991), the level of dust dispersion from soil excavation activities is determined based on by the emission coefficient (E) as follows:

$$E = k \times 0{,}0016 \times (U/2{,}2)^{1{,}4}/(M/2)^{1{,}3}, \quad \text{kg/ton.}$$

Among them:

E: Pollution factor (kg/ton)

k: Average grain structure value (0.35)

U: Average wind speed in construction area (3 m/sec)

M: Average soil moisture (20%).

$$\text{Thus } E = 0.35x\ 0.0016x \left(\frac{3.6}{2.2}\right)^{1.4} / \left(\frac{0.2}{2}\right)^{1.3} = \mathbf{0.0188} \text{ kg of dust/ton of soil}$$

322. The volume of dust generated from soil excavation and filling is calculated by the following formula:

$$W = E \times Q \times d$$

In which:

W: Amount of dust (kg);

E: Pollution factor (kg of dust/ton);

Q: Volume of soil excavation and filling (m^3);

d: soil density (d = 1.5 ton/m^3).

Table 69: Load of dust in the area due to soil excavation and filling activities for the project

No.	Project items	Total amount of dust generated (kg)	Daily load of dust (kg/day)	Surface dust emission coefficient (g/m^2/day)	Average dust concentration for 1hour at 10m high (mg/m^3)	QCVN 05:2023/ BTNMT (mg/m^3)
1	23 new sluices	7973.9	110.7	0.02	0.09	**0.30**
2	18 upgraded sluices	-	-	-	-	

3	Binh Giang 1 road	724.7	10.1	0.03	0.14	
4	Power lines	35.7	0.5	0.01	0.05	
	Total	**8734.3**	**121.3**			

Note:

- Total dust load (kg) = E x Q x d (with excavation volume calculated from Table 65);
- Load (kg/day) = Total dust load (kg)/ excavation time (day). The estimated excavation and earthwork construction time is 3 months
- Surface dust emission coefficient = Load (kg/day)/Area of construction area (m^2).
- Average dust concentration in 1 hour (mg/m^3) = Load (kg/day) /24 hours/Intended impact volume (m^3). Specifically, the affected area of up to a height of 10 meters is used to estimate the intended impact volume.

323. **The construction of 23 sluices**: The total volume of soil excavation and filling for 23 sluices is **282,762** m^3 and the time for soil excavation and filling activities is estimated to be about 18 months. As such, the total and daily dust loads are shown in *Table 69*. However, excavation and filling activities take place within the canals, where the moisture content is very high (about 30-40%). As a result, the real amount of dust generated is around half of the projected value. Furthermore, the sluices will be positioned at 23 various locations within both Binh Giang and Binh Son communes, which are rural areas with very few residents. Only, 3 sluices have the closest house within 10m (see *Figure 68* and *Figure 69*): T5-1 (2 house), T6-1 (20 houses), and T6-6 (2 houses); 3 sluices have the nearest house within 20m: K9-6 (1house), K3-7 (2 houses), and T6-4 (1 house); and 3 sluices have the nearest house within 30m: K9-1 (1 house), K3-5 (1house), and T6-3 (1house). Furthermore, the air quality in this region remains good. *Affected objects are residents and water, air, and soil within a radius of 50m from the construction sites and the scale of impact is small, short term, and ended when the sluice construction is completed. In addition, the project owner will request the contractors to implement mitigation measures for the impacts as described in Chapter 4.*

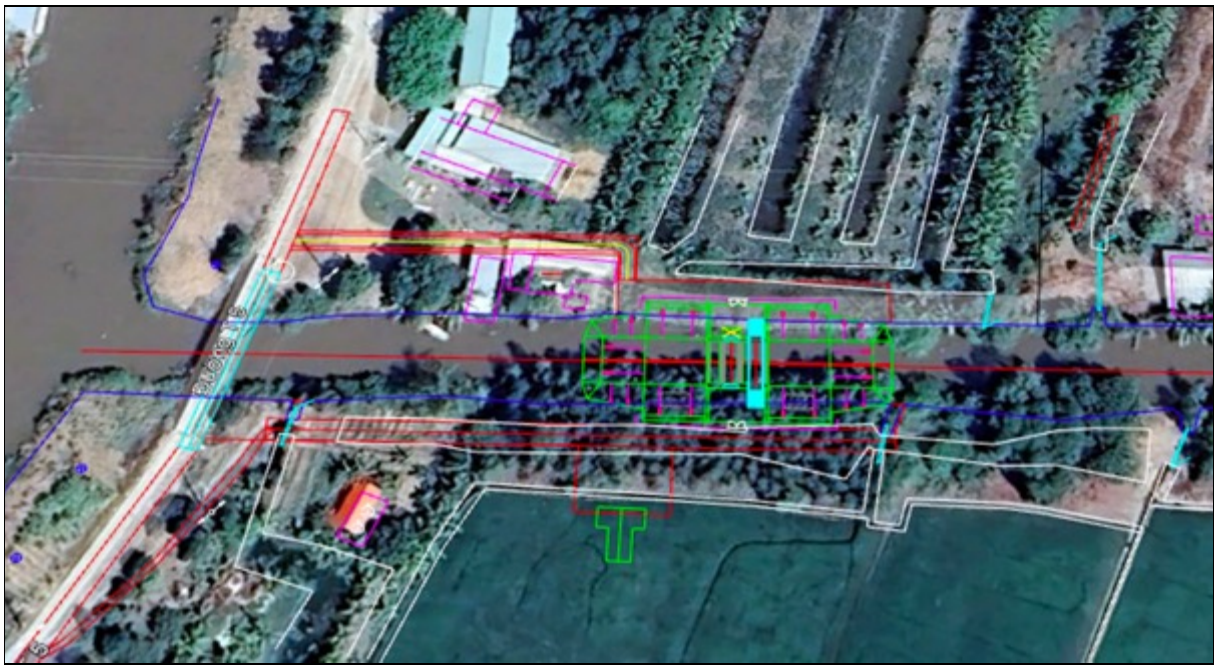




Figure 68: The two houses next to the construction area of T5-1 sluice



Figure 69: The residential area close to the construction area of T6-1 sluice

324. **The road construction**: The amount of excavation required for the road is 25,698.5m^3, and the excavation duration is 3 months. The amount of dust generated per day is 10.1 kg/day (see *Table 69*). 74 households are living along the road. The majority of the road is thinly populated, except for the segment from NH80 to Canal 200, which has approximately 20 homes (*Figure 70*). As a result, the dust from the road building will affect the health and daily lives of people who live in that area (74 households in the Binh Giang 1 residential area) and work on the site (about 30 workers). The amount of dust generated is minimal, the air quality in the area remains good, and the road will be built in a successive construction method, with each segment measuring 500 meters in length. In addition, the project owner will require that the contractor implement mitigation measures, particularly in the area between NH80 and Canal 200. *As a result, this impact is considered minor, localised, occur in the excavation time of 3 months and will cease upon completion of excavation work and can be mitigated by measures in Chapter 5.*

325. **The installation of power lines**: The soil excavation and filling required for the power lines is on a relatively minor scale, amounting to 1,266.37m^3 for bout 550 poles. This mainly serves the placement of electricity poles and digging each pole take 1-2 days with amount of

soil excavation of 2-3m^3. The dust emissions resulting from the electrical lines are minimal, totaling approximately 0.001 kg per day for each pole. *Affected objects of the impact are construction workers and the impact is neglible, localised and can be mitigated because (i) the lines are installed along canals, which are sparsely populated; (ii) happen near the electric pole installation sites, and last about 1-2 days.*

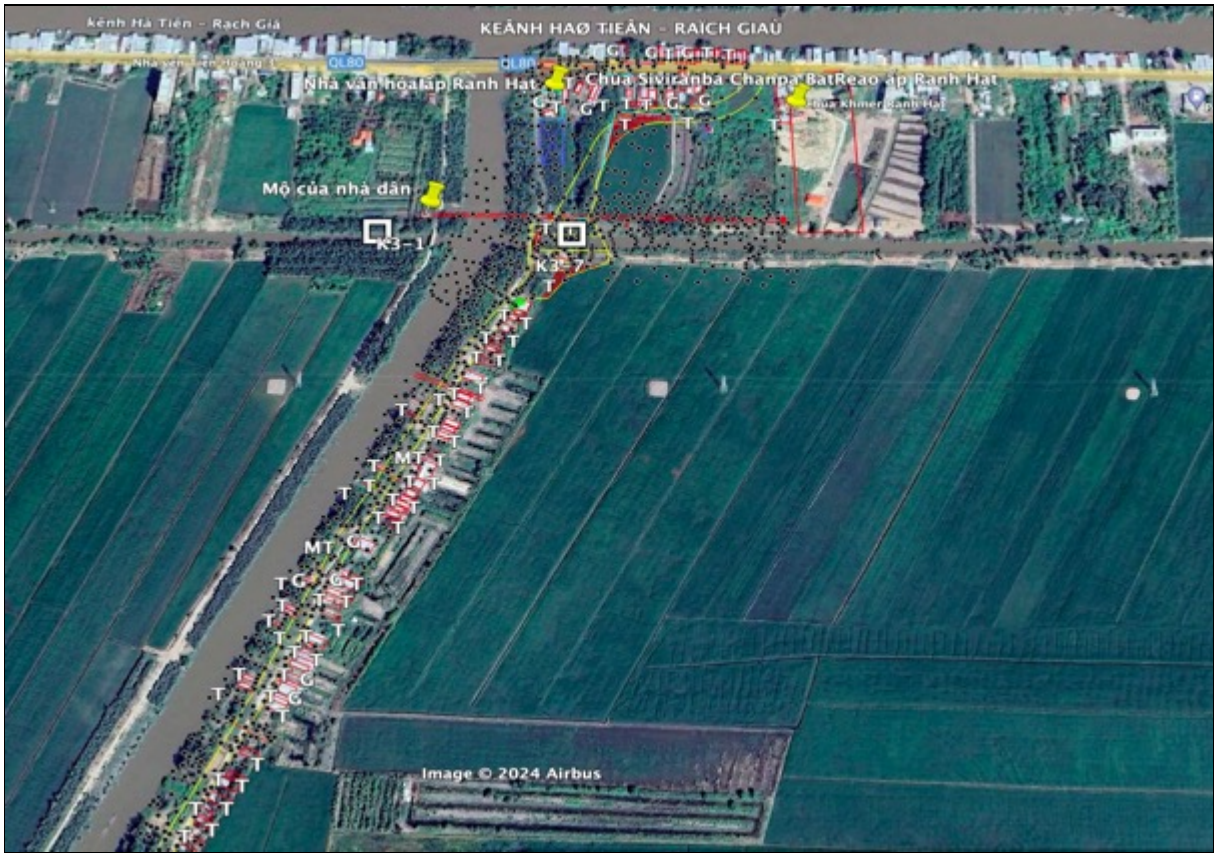


Figure 70: Households living along the construction area of the road section from NH80 to Canal 200

326. Impact evaluation of dust and air emissions due to excavation activities is summarised in *Table 70*.

327. *Comments*: *The impacts of dust and air emissions caused by excavation of the project are small, localized and short term due to: (i) the excavation will be carried out in the agricultural area with low population; (ii) the excavation will be short (about couple of days to 6 months) and spread over 2 communes of Binh Giang and Binh Son; (iii) all impacts will be mitigated by measures in Chapter 5.*

Table 70: Impact evaluation of dust and air emissions due to excavation activities

Location of impact	**Impact Duration**	**Impact Receptor**	**Impact level**	**Remarks**
Construction sites of the 23 sluices	6 months for earth works	- Construction workers (10 people/site) - 30 households living within 30m from the construction sites: T5-1 (1house), T6-1 (20 houses), T6-6 (2 houses), K9-6 (1house), K3-7 (2 houses), T6-4 (1 house), K9-1 (1 house), K3-5 (1house), T6-3 (1house)	- Low - Short term - Local - Mitigable	All impacts are mitigated by measures in Chapter 5

Location of impact	Impact Duration	Impact Receptor	Impact level	Remarks
Construction sites of the road	3 months for earth works	- Construction workers (10 people/site) - People living along the road - Binh Giang 1 canal - Gardens and rice fields of the residents along the road - Ranh Hat Hamlet Cultural House	- Low - Short term - Local - Mitigable	Low density of population along 7.03 km of the road, except for the segment from NH80 to Canal 200, which has approximately 20 homes
Construction sites of the power lines	1-2 days for each pole	Construction workers	Neglible Localised Mitigable	The poles are located along canals
Construction sites of the sluice gate improvement	No earth works	No receptors		

d) Dust from concrete mixing

328. **New sluice construction and sluice improvement**: The total concrete volume for newly built sluices and upgraded sluices is 98,027m^3. According to the rapid assessment guideline of WHO, the dust emission from concrete mixing ranges from 0.5 to 5g/m^3. Therefore, the total amount of dust generated is approximately 4,9 to 49kg. However, 500L mixers will be utilized for concrete mixing, which takes place on the construction site, hence, dust will only disperse within a radius of 5-10m from the mixing station. Affected objects are the plant operators and households within 10m from the construction (1 house in sluice T5-1, 20 houses in sluice T6-1, and 2 houses in sluice T6-6) because they are exposed to dust regularly. The impact is small, short-term, and mitigatable due to the following: (i) the number of constructors working on a station is approximately 1-2 peoples, and the construction sites are located in sparsely populated areas; (ii) the stations are situated at the end of the wind direction; (iii) workers will be equiped with personal protective equipment (PPE); and (iv) contractors are required to implement mitigation measures to minize the impact, particularly when constructing the T6-1 sluice.

329. **The road construction**: The total volume of concrete used for the road construction is quite high, about 34,522m^3. According to the rapid assessment guideline of WHO in , the dust emission from concrete mixing ranges from 0.5 to 5g/m^3. Therefore, the total amount of dust generated is approximately 1.72 to 17.2 kg. However, the impact of this action is concentrated and immediate at the concrete mixing site. Affected objects of the impact are concrete mixing workers and residents living within 10m from the mixing plants. The impact on residents is small, localised, mitigable because (i) it lasts only on 1-2 construction days before moving to a new location; (ii) localised at the mixing plant of a road section, especially from NH80 to Canal 200; and (iii) can be mitigated by measures in Chapter 5. The impact on concrete mixing workers is medium, short-term and mitigatble, because (i) only 1-2 workers at the mixing plant, (ii) mixing concrete happens about 18 months of construction; and (iii) workers are provided with PPE and trained Occupational health and safety (OHS) before commencing.

330. **The installation of power lines**: The concrete volume used for the electrical system is approximately 2,070m^3. According to the rapid assessment guideline of WHO, the dust emission from concrete mixing ranges from 0.5 to 5g/m^3. Therefore, the amount of dust

generated from concrete mixing ranges from 1.03-10.3kg and only appears at the concrete column erection site for 1 house before moving to a new pole. Affected objects are only workers because the poles are located along canal banks. The impact is small, long-term, and mitigatable due to the following: (i) the number of constructors working on a station is approximately 1-2 peoples, and the construction sites are located in sparsely populated areas; (ii) the stations are situated at the end of the wind direction; and (iii) workers will be equiped with PPE.

331. *Comments: The impact of concrete mixing is small, short-term, and mitigatable due to the following: (i) the number of constructors working on a station is approximately 1-2 peoples, and the construction sites are located in sparsely populated areas; (ii) the stations are situated at the end of the wind direction; (iii) workers will be equiped with personal protective equipment (PPE); and (iv) contractors are required to implement mitigation measures to minize the impact in Chapter 5.*

e) Noise and vibration

e.1). Noise

332. Noise urging construction is usually generated by (i) transportation vehicles; and (ii) construction equipment and tools. However, the noise level gradually decreases with distance and can be determined by the following formula:

$$\Delta L = 20\lg (r_2/r_1)1 + a \text{ (dB)}$$

Where:

ΔL: reduction of noise at distance r_2 compared with source r_1;

distance for noise source normally considered as r_1= 8 m;

a: noise absorption of area

333. **Transportation of construction materials**: As mentioned above, boats of 200 tons will be used to deliver the construction materials. Noise from the boat is 80 to 100 dBA. The noise attenuation from the boat is 60.5 dBA at distance of 50m from the boat and 52.5dBA at the distance of 20m from the boat. The primary axis canals for transportation include the Rach Gia-Ha Tien (RG-HT) canal, the Rach Soi-Long Xuyen canal, and flood drainage canals. So, the residents along the canals are prone to the impact from noise. The noise from transport boats is relatively significant, but their impact has a directional pattern (in the direction of movement), and the length of the impact at a point on the transport route is very short, only around 1-2 minutes. Also, there are few people living along the transportation routes, except some households living near the transportation route to the construction site of sluice T6-1.

334. **Construction of the 23 sluices**: As mentioned in *Table 16*, at least 13 construction equipment an tools will be used for the 23 sluices. The maximum noise level at different distances due to their operation is presented in *Table 71*. Noise levels at 20m from noise sources are lower than Vietnamese requirements during daytime but higher than that during night-time, while the IFC 2007 guideline value will only be achieved at 50m.

Table 71: Noise levels of some types of vehicles and construction equipment for the 23 sluices

No.	Construction equipment and machinery	Noise levels 1m from source (dBA)		Noise levels 20m from source (dBA)	Noise levels 50m from source (dBA)
		Range	Average		

1	Bulldozer		93	67.0	59.0
2	Digger	80-93	86.5	60.5	52.5
3	Truck	82-94	88	62.0	54.0
4	Boat	80-100	86	60.5	52.5
5	Concrete mixer	75-88	81.5	55.5	47.5
6	Air compressor	75-87	81	55.5	47.5
7	Roller	72 – 74	73	47.0	39.0
8	Front-hoe excavator	72 – 84	78	52.0	44.0
9	Tractor	77 – 96	86.5	69.0	60.0
10	Road paver	87 – 88.5	87.7	60.5	52.5
11	Movable crane	76 – 87	81.5	55.5	47.5
12	Power generator	72 – 82.5	77.2	49.0	40.5
13	Pile driver	95 – 106	100.5	82.4	65.6
QCVN 26/2010/BTNMT[9] applying for normal areas: 6 AM to 9 PM is 70 dBA; from 9 PM to 6 AM is 55 dBA					
IFC Guideline (2007) applying to the daytime level in residential, institutional, and educational facilities is 55dBA					
Ministry of Health (MOH) standard: Noise at the production area is 85 dBA for 8 hours of noise exposure					

Source: Mackernize, 1985.

335. Furthermore, noise levels at construction sites are typically generated by at least two types of machinery operating at the same time. However, because the number of equipment mobilized at the same time will be limited, the calculated noise levels during the construction phase are shown in *Figure 71* and *Figure 72*. The largest noise source is pile driving. Noise levels at a distance of 100 m from this source are lower than the national standard.

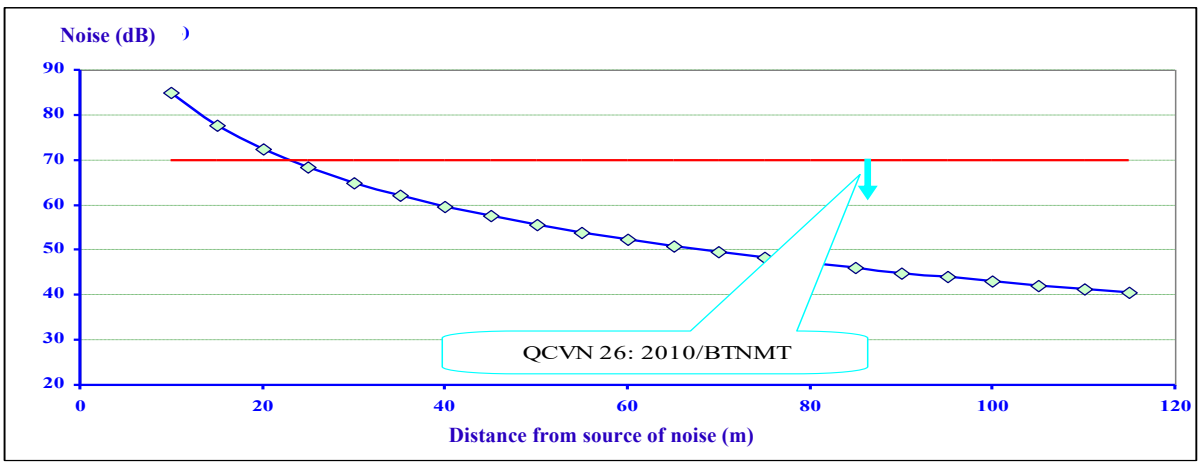


Figure 71: Noise attenuation caused by concrete mixer over distance

336. Affected objects of the noise generated by sluice construction machinery and tools are similar to those impacted by dust emissions from earthworks, as indicated. People who are exposed to 85dBA of noise for an extended amount of time will experience exhaustion and

[9]QCVN 26:2010/BTNMT – National technical regulation on noise.

negative feelings, and if the noise exceeds 90 dBA, their hearing will be damaged. The noise might have an indirect impact on leisure activities such as walking, exercising, singing, and dancing. However, the noise impact at the construction sites is low because it affects only construction workers and some households living within 50m from the sluices, including the sluice T5-1 (1 house), the sluice T6-1 (20 houses), and the sluice T6-6 (2 houses), the sluice K9-6 (1house), the sluice K3-7 (2 houses), the sluice T6-4 (1 house), the sluice K9-1 (1 house), the sluice K3-5 (1house), and the sluice T6-3 (1house). Also, all vehicles and equipment will be checked on a regular basis, and noise can be minimized by PPE and noise protection devices.

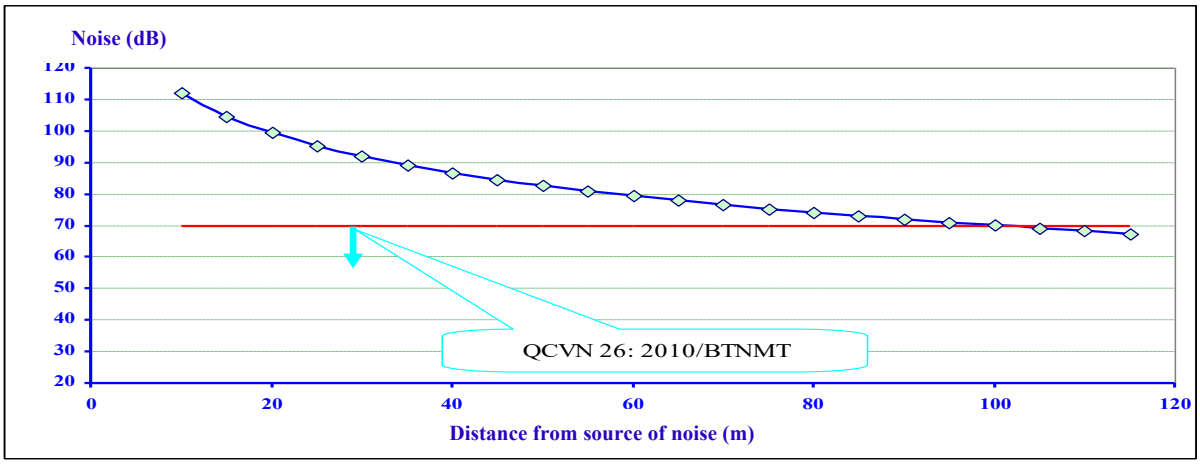


Figure 72: Noise attenuation caused by pile driving over a distance

337. **Construction of the road**: As mentioned in *Table 16*, at least 14 construction equipment an tools will be used for the road. Standard equipment noise levels are listed in *Table 72*.

Table 72: Noise levels of some types of vehicles and construction equipment for the road

No.	Construction equipment and machinery	Noise levels 1m from source (dBA)		Noise levels 20m from source (dBA)	Noise levels 50m from source (dBA)
		Range	Average		
1	Bulldozer		93	67.0	59.0
2	Digger	80-93	86.5	60.5	52.5
3	Truck	82-94	88	62.0	54.0
4	Boat	75-88	81.5	55.5	47.5
5	Concrete mixer	75-87	81	55.5	47.5
6	Air compressor	72 – 74	73	47.0	39.0
7	Roller	72 – 84	78	52.0	44.0
8	Front-hoe excavator	77 – 96	86.5	69.0	60.0
9	Tractor	87 – 88.5	87.7	60.5	52.5
10	Road paver	76 – 87	81.5	55.5	47.5
11	Movable crane	72 – 82.5	77.2	49.0	40.5
12	Power generator	95 – 106	100.5	82.4	65.6
13	Concrete compactor	74-88	79	52	39
14	Hammer	80-93	85	68	59

QCVN 26/2010/BTNMT[10] for normal areas: 6 AM to 9 PM is 70 dBA; from 9 PM to 6 AM is 55 dBA
IFC Guideline (2007) applying to the daytime level in residential, institutional, and educational facilities is 55dBA
Ministry of Health (MOH) standard: Noise at the production area is 85 dBA for 8 hours of noise exposure

338. Noise from the construction of the road is expected to exceed existing noise levels and exceed the maximum noise levels allowed in particular areas such as residential areas which are found along the alignment as well as sensitive receptors that are located less than 100 m from the row of way of the road, including the residential cluster from NH 80 to Canal 200, the users of the Cultural house of Ranh Hat hamlet and Siviranba Chanpa Pagoda. However, the impacts of noise are considered *low negative impacts* because (i) residents only live at the section from NH80 to Canal 200 and the amount of construction workers is low (about 10 workers a site); (ii) the impacts happen in very short time, intermittent and localised; (iii) contractors shall be strict compliance with mitigation measures during the construction phase in Chapter 5.

339. **Improvement of the 18 sluices**: the number of equipment and tools for the improvement of the sluices is small, including bulldozers, boats, movable cranes, power generators and pile drivers. However, there are no houses and sensitive receptors within 100m from the sluices and the construction time is very short (6 months). So, the impact is negligible and short-term and can be mitigated.

340. **Installation of the power lines:** like the sluice upgradation, the number of equipment and tools for the installation of power lines is small, such as bulldozers, diggers, concrete mixers, concrete compactors and hammers and the equipment and tools will mainly be used in the pole erection. Therefore, the impacts is negligible because (i) the construction time is very short (about 1-2 days for a pole); (ii) the number of tools and equipment is very limited; and (iii) the construction areas are along canals with small number of people living nearby.

341. *Comments: Impacts from noise is small due to (i) it happens only in the construction time (about 1-2 days to 6-18 months depending on the project item); (ii) the number of construction workers and residents nearby the site are small; (iii) PPE will be provided to workers; and (iv) contractors shall be strict compliance with mitigation measures during the construction phase in Chapter 5.*

e.2). Vibration

342. Most vibrations on construction sites come from heavy machinery like bulldozers, excavators, rollers, etc., used for tasks like leveling, compacting, etc. Building damage and disruption potential are usually the two main considerations when evaluating ground-borne vibration.

343. According to the Transit Noise and Vibration Impact Assessment study (US, Federal Transit Administration, 2006), which details the vibration levels of vehicles, machinery, and equipment, the following formula is used to predict the amount of vibration decreasing with distance:

$$L = L_0 – 10\lg (r/r_0) – 8.7a (r – r_0) (dB)$$

Where:

[10]QCVN 26:2010/BTNMT – National technical regulation on noise.

- L: vibration in dB at a distance "r" meters away from the source;
- Lo: vibration in dB measured at a distance "r_0" meters from the source. Vibration at a distance of r_0=10 m is generally acknowledged as source vibration.
- a: the intrinsic vibration reduction coefficient on clay ground of about 0.5.

344. *Table 73* summarizes the estimated vibration levels of heavy equipment and machineray caused by the project.

Table 73: The vibration at source and reduction over distance of heavy equipment and machinery of the project

No	Equipment	Vibration Source r_o=10m		Vibration Level							
				r=12m		r=14m		r=16m		r=18m	
		L_{aeq} dB	L_{veq} mm/s	L_{aeq} dB	L_{veq} mm/s	L_{aeq} dB	L_{veq} mm/s	L_{aeq} dB	L_{veq} mm/s	L_{aeq} dB	L_{veq} mm/s
1	Excavator	80	1.72	70.5	0.58	61.1	0.2	51.9	0.07	42.6	0.02
2	Bulldozer	79	1.53	69.5	0.51	60.1	0.17	50.9	0.06	41.6	0.02
3	Pile driver	104	16.35	93.5	5.13	83.1	2.35	74.9	0.86	65.6	0.30
4	Roller	84	2.17	72.5	0.73	63.1	0.25	53.9	0.08	44.6	0.03
5	Air compressor	82	1.93	71.5	0.65	62.1	0.22	52.9	0.08	43.6	0.03
	QCVN 27:2010/BTNMT11	75.0									

Source: U.S. Environmental Protection Committee Vibration from construction equipment and construction machinery, NJID, 300.1, 31 – 12 – 197

345. **Construction of the road**: The main noise-generating equipment due to the road construction, includes excavators, pull dozers, air compressors, and rollers. Based on Table 1, at a distance of 12 meters from the vibration source, the vibration level meets the permissible standard. Within a 12-meter radius of the vibration source, about 74 houses are affected, mostly concentrated in the section from NH80 to Canal 200. Survey results show that those houses are temporary structures with corrugated iron roofs, so they may be significantly affected by vibrations. *However, the vibration impact is considered moderate for the following reasons: (i) the road construction will use the rolling method, which takes 7 days for each 100-meter segment; (ii) the machinery and equipment will operate intermittently and for short periods of time; (iii) the road constructors will implement the vibration mitigation measures outlined in Chapter 5; (iv) the quality of houses will be assessed and recorded in their current condition before construction begins, and any damages will be compensated.*

346. **Construction of the 23 sluices**: The pile drivers are the source of the most vibration in the sluice construction. The safe distance for withstanding significant vibrations from the pile drivers is around 16 meters. Nevertheless, some local residences and structures are situated within 16 meters of the sluice building sites, including T5-1 (two houses and Kenh T5 bridge), T6-6 (two houses), K9-6 (one house), K3-7 (two houses), and T6-4 (one house). Some of them are temporary structures with corrugated iron roofs (*Figure 73*), so they will be significantly affected by vibrations. This is a concern that the project owner needs to address to ensure the safety of the residents' houses. The impact is moderate but intermittent, short-term, and can be mitigated by implementing effective engineering solutions and construction management

[11] QCVN 27:2010/BTNMT – National technical regulation on vibration.

practices, as well as in close consultation with the local community, inspection, and supervision and the quality of houses and structures will be assessed and recorded in their current condition before construction begins, and any damages will be compensated.



Figure 73: Typical houses near the project sluices

347. **Upgradation of the 18 sluices**: The new gates will be craned into their existing positions. Furthermore, there are no houses, constructions, or people living with 100m these sluices. Therefore, there is a negligible impact due to the upgrade.

348. **Power line installation**: mainly light equipment and small concrete mixers are used to install the poles. It takes about only 2-3 days for installing a pole. The installation takes place along the canal banks. As a result, the vibration from the pole installation is negligible.

349. *Comments: There will be minimal to medium vibration impacts due to the following reasons: (i) the construction time is short; (ii) vibration only occurs during construction and within 20m of the source; (iii) the houses and structures that could be affected are only there for a short period of time; and (iv) these impacts can be reduced through the use of effective engineering solutions and construction management practices, in close consultation with the local community, inspection, and supervision. Before construction starts, the houses and structures will be evaluated and recorded in their current condition, and any damages will be compensated for.*

4.4.1.2. Impacts on water quality

a) Impacts of wastewater generation

350. The project construction generates wastewater from multiple sources, including (i) workers' wastewater; (ii) rainwater runoff; (iii) construction wastewater from boats used for transporting construction materials and from cleaning machinery.

a.1). Workers' wastewater

351. According to TCXDVN 33:2006, a worker uses 60 lits of water each day, and 80% of that amount is discharged into the environment. As mentioned in *Table 18*, during the peak period, there are a total of 210 individuals present at the sites. However, only 10 people visit the sites briefly for supervisory purposes, while the remaining 200 workers are divided into 24 groups and actively working at the sites. Therefore, wastewater generation only account for 200 workers.

352. At a site, the maximum number of workers is 10 (for sluice construction, and road construction) and 5 (for power lines, and sluice gate upgrades). As a result, the total amount of wastewater discharged into the environment from a site is 0.24-0.69m^3/day, while the total amount of wastewater discharged by all sites is 9.36m^3/day (*Table 74*). The per capita load of pollutants in domestic wastewater according to the World Health Organization (WHO) is presented in *Table 75*.

Table 74: Amount of wastewater (m^3/day) of project workers

No.	Components	Number of workers (people)	Volume of wastewater at a construction site	Volume of wastewater of each component
1.	23 new sluices	13 groups x 10 people/group	0.48	6.24
2.	Binh Giang 1 road	3 groups x 10 people/group	0.24	1.44
3.	Power lines	4 groups x 5 people/group	0.24	0.48
4.	18 upgraded sluices	4 groups x 5 people/group	0.24	1.2
	Total		**1.44**	**9.36**

Table 75: Pollutant load in wastewater of each person

No.	Pollutants	Pollution coefficient WHO* (g/person.day)
1	BOD_5	45 - 54
2	COD	72 - 102
3	Total suspended solids	70 - 145
4	Oil and grease	10 - 30
5	Total N	6 - 12
6	Ammonia	2.4 - 4.8
7	Total	0.8 - 4.0

Source: (*) Rapid Environmental Assessment, WHO, 1995

353. *Table 77* calculates the load of pollutants in domestic wastewater at construction sites, using the WHO's pollution coefficient.

Table 76: Pollutant load (kg/day) in wastewater of workers at construction sites

No.	Pollutants	At a construction site of the power lines or sluice upgradation	At a construction site of a sluice or a road section
1	BOD_5	0.225-0.27	0.675-0.81
2	COD	0.375-0.51	1.13-1.53
3	Total suspended solids	0.35-0.725	1.05-2.18
4	Oil and grease	0.05-0.15	0.15-0.45
5	Total N	0.03-0.06	0.09-0.18
6	Ammonia	0.012-0.024	0.04-0.07
7	Total P	0.004-0.02	0.012-0.06

Source: (*) Rapid Environmental Assessment, WHO, 1995

354. Domestic wastewater consists of suspended particles, oil and grease, organic matter (BOD_5 and COD), nutrients (nitrogen, phosphorus), and microorganisms. The average concentration of pollutants in domestic wastewater before passing through septic tanks or similar structures is significantly higher than the standards allowed for discharge into the environment (QCVN 14:2008/BTNMT column B), see details in *Table 77*. The high concentrations of nitrogen and phosphorus in wastewater can lead to eutrophication, promoting the growth of certain algae in water. This, in turn, reduces the concentration of dissolved oxygen in water, affecting water quality, soil quality, and aquatic organisms in water of canals No.200, No.2, Don Dong, Binh Giang 1, Tuan Thong, etc. and soil near the construction sites in hamlets of Giong Ke, Ranh Hat, Ranh Bon (Binh Giang commune) and Vam Ray and Thuan An (Binh Son commune), especially at the discharge point of the wastewater. Furthermore, wastewater has a high concentration of germs and microorganisms that can induce gastrointestinal disorders like diarrhea, dysentery, food poisoning, and jaundice in construction workers.

355. If not properly treated, this issue can be a major cause of pollution, directly impacting the living environment of workers and nearby residents. It can also contribute to disease outbreaks and have a direct impact on the quality of groundwater and surface water.

Table 77: Concentration of pollutants in domestic wastewater

No.	Pollutants	Unit	Untreated concentration	QCVN 14:2008/BTNMT column B (k=1.2)
1	BOD_5	mg/L	563 - 675	60
2	COD	mg/L	900 - 1,275	-
3	Total suspended solids	mg/L	875 - 1,813	120
4	Oil and grease	mg/L	125 - 375	24
5	Total N	mg/L	75 - 150	-
6	Ammonia	mg/L	30 - 60	12
7	Total	mg/L	10 - 50	11
8	Coliform	MPN/100mL	106,000 – 109,000	6,000

Source: Hoang Hue, 2002

356. **23 sluices construction**: The number of workers on each camp is small, with a maximum of 10-15people (10 people for sluices and 5 people for nearby power lines or sluice upgrades),

equivalent to 4-6 households. Surface water areas prone to this risk are: Don Dong canal, canal 200, K3-Tuan Thong canal, the canal along the sea dike. However, the direct impact due to domestic wastewater is considered to be LOW because: (i) the volume of domestic wastewater generated at each camp is small; (ii) the project will prioritize the use of local non-skilled workers, as well as arrange for 3-compartment septic tanks at camps; (iii) the impact is localized, only in camp area and cease after construction; construction time is short (24 months); and (iv) the impact can be minimized by applying appropriate management and technical measures.

357. **Road construction**: Many rice fields and fruit orchards line the road's construction area (*Figure 54* and *Figure 55*). Although there are only approximately 10 workers at each construction site for the road, discharging domestic wastewater directly into fruit orchards and rice fields would limit their productivity or death. The project owner should pay a lot of attention to this concern during the road construction. However, the impact of workers' wastewater is small, localized, short-term, and ends after construction because (i) local non-skilled labor will be hired for the project; (ii) 3-compartment septic tanks at will be arranged at camps; (iii) the rolling method with a section of 100m will be used for the road; and (iv) the impact can be minimized by applying appropriate management and technical measures.

358. Comments: *Workers' wastewater has a small, localized, short-term impact that ends after construction. This is due to several factors, including: (i) a small workforce (210 people at peak and 5-10 people at a site) and the use of local, unskilled labor (up to 50% of total workers); (ii) 3-compartment septic tanks will be installed at camps, and only houses with septic tanks in the area will be utilized for the project; (iii) the road and power lines will be constructed using the rolling method; and (iv) the impact can be minimized by implementing the appropriate management and technical measures outlined in Chapter 5*.

a.2). Rainwater runoff

359. The nature of rainwater is considered clean. According to WHO, the concentrations of pollutants in rainwater are N: 0.5–1.5 mg/L; P: 0.004–0.03 mg/L; COD: 10–20 mg/L; and TSS: 10–20 mg/L. Rainwater passing through the construction sites could introduce pollutants to the surface water environment. Runoff of materials, sand, and rock into water is expected to be the main source of pollution and would increase water turbidity, and inundation, affecting water supply for domestic use, houses, and gardens of residents. Additionally, acid-sulfate soil areas can pose a risk of acid-sulfate contamination during excavation. When it rains, acid sulfate significantly affects the water environment.

360. According to the analysis results of soil samples taken in the project area, the soil is slightly to severely contaminated with acid sulfate (see *Appendix 3*). Since there is a lot of digging going on at the sluice building site, there is a chance that the soil will change from potential acid sulfate soil to active acid sulfate soil, which could affect the water sources in the canals at the start of the rainy season.

361. The amount of runoff from a construction site is calculated via the following formula:

$$W_0 = S \times M/1000$$

Where: - W_0: runoff water volume (m^3)

- S: surface area (m^2). Most of these are material warehouses and construction yards and only about 20% are vacant land.

- M: Maximum rainfall amount (mm), for the sluices construction area M=50mm

362. **Constructing 23 sluices**: The surface area of the construction site of the sluices ranges from approximately 460-3,327m^2, with an average of about 2,000m^2. Accordingly, with the highest daily rainfall of 50mm/day, the volume of rainwater overflowing at the fluctuating sluices is between 23-202 m^3/day and averaging at 100 m^3/day/sluice (*Table 78*). Rainwater runoff will carry along dust, dirt, and grease on the ground of the construction site, flowing into the surrounding canals, increasing the turbidity of surface water sources in the area. Due to the high permeability of the soil in the early rains, only 40–60% of the water flows into the canals; the remainder is absorbed by the soil, resulting in a volume of water flowing into the canals of approximately 40-60 m^3 per rain event.

Table 78: Sluice construction site area and amount of rainwater runoff

No.	Name of the sluices	Construction site area (m^2)	Highest amount of rainwater at risk of being washed into the environment (m^3)
1	T5-1	1168	58
2	T5-2	1244	62
3	K3--1	611	31
4	K3-2	1650	82
5	K3-3	1365	68
6	K3-4	581	29
7	K3-5	2565	128
8	K3-6	4034	202
9	K3-7	3733	187
10	T6-1	620	31
11	T6-2	3337	167
12	T6-3	3213	161
13	T6-4	1470	74
14	T6-5	3092	155
15	T6-6	1916	96
16	K9-1	3002	150
17	K9-2	3462	173
18	K9-3	3079	154
19	K9-4	3337	167
20	K9-5	802	40
21	K9-6	900	45
22	VR1	685	34
23	VR2	460	23
	Total		

363. In reality, the impact of rainwater runoff on the receiving water at the construction site is often negligible. Experience with the construction of similar sluices in the area has shown that with good construction site management, including preventing the spread of waste oil on the

construction surface and forming sediment traps and settling ponds, the impact of turbidity caused by rainwater runoff is limited to a range of about 100-200 meters. However, the contractors shall implement mitigation measures for acid sulfate exposure.

364. **Road construction**: The road width is 9m and each segment is 100m long. Therefore, the amount of rainwater overflowing for each 100m section is $W_0 = 9 \times 100 \times 50/1,000 = 45m^3$. If there is sand and oil on the construction site surface, rainwater will wash these materials into fields, gardens, and houses, affecting (i) people's access to their houses and fields, causing inconvenience, particularly for those living at the start of NHH80; (ii) plant productivity or death; (iii) water quality of the receiving body. However, the current road is a poor-quality dirt road that is frequently muddy during the rainy season (*Figure 74*), making it difficult for people to travel, and the population in this area is small. As a result, this impact is rated as low, localized, and short-term, and can be mitigated through the mitigation measures in Chapter 5.

365. **Installation of power lines**: The construction area of the power line is only for placing poles, accounting for approximately 5,000 m^2. The amount of rainwater overflowing at one point of power line construction is $1.2m^3$ (*Figure 75*). The power line routes are built along canals, so rainwater can bring sand, and garbage infiltrating into these canals, affecting their water quality and aquatic ecosystems. However, the construction area is quite small, and this impact can be controlled through the measures presented in *Chapter 5*.



Figure 74: The current situation of Binh Giang 1 road

366. *Comments: Aside from direct impacts on water quality, the project's rainwater runoff has indirect impacts on (i) freshwater ecosystems, such as fish kill, invertebrates, benthic fauna, flora, habitat degradation, and loss of ecosystem services; and (ii) water treatment and health-related costs: polluted water is the most serious health risk, and it continues to threaten both*

quality of life and public health. Water quality degradation can also increase the cost of water treatment; (iii) economic activities such as agriculture, fishery, and breeding; and (iv) aesthetic, cultural, and spiritual qualities, resulting in losses in tourism activities. The indirect impacts are rated as LOW, short-term (during 2 years of project construction), localized and can be mitigated due to the following: (i) the affected canals have been subjected to human activities such as domestic wastewater discharge, improper solid waste management, agricultural and aquacultural activities, etc. for long period of time, resulting in a low biodiversity in their ecosystems; (ii) there is only one water taking point for the Binh Giang 1 water supply plant on Canal 200, and the distance to the T6-1 sluice is 200m; (iii) the direct impact on the water quality is minimal; and the project area has not yet become a well-known destination for tourists; and (iv) mitigations measures for the impact are proposed in Chapter 5.



Figure 75: Typical power pole of the project

a.3). Construction wastewater

367. Construction wastewater includes wastewater from shipping construction materials, washing materials, and operating and maintaining construction equipment and machinery.

368. **Wastewater from construction material shipping**: 200-ton barges are used to ship materials for the construction of project components. As such, there are roughly 2.36 trips per day to supply materials to building sites, resulting in an average wastewater volume of 2m^3 per day. The wastewater contains oil, grease, suspended solids, organic matter, nutrients (N, P), and microorganisms. If not treated and directly discharged into the water source of the transportation canals (Rach Gia-Ha Tien, canal 200, etc.), it can cause water pollution and impact aquatic life of the affected canals. However, the project owner will require material

suppliers to collect and treat this wastewater. Therefore, the impacts are low, happen during the transportation period and can be mitigated.

369. **Concrete washing wastewater**: The concrete mixer should be cleaned after each work shift. This water is primarily composed of cement particles and sand that remain in the rotating drum. The amount of water required to clean the mixer is small, around 30-50 liters/mixer/time and there is a shift per day at each construction site, equivalent to 30-50L/day/site. If this wastewater is discharged directly into surrounding canals, it may have a minor impact on the canals' aquatic ecosystem. Because the amount of wastewater is minimal and the composition is free of pollutants, this waste source can be poured directly into the bare ground of the construction site, particularly into acid sulfate soil, which will neutralize alum in the soil and reduce the negative impact of acid sulfate soil on the water environment. Therefore, the direct impacts caused by construction wastewater are assessed as low and can be mitigated by measures in Chapter 5.

370. **Wastewater from maintenance and cleaning construction equipment**: This form of wastewater contains organic compounds, oil, grease, and suspended particles. The amount of water needed for various tasks on the construction site is heavily influenced by how the construction equipment operates. Experiences in previous projects show that each sluice construction area and road section generated about 0.5m^3 for maintenance and 0.75m^3 for cleaning. Therefore, the wastewater volume was showed in *Table 79*. To avoid direct impacts on neighboring water bodies, wastewater from maintenance locations will be collected and treated. For wastewater from routine machinery cleaning that is not oil-contaminated, it will be treated by passing it through sedimentation tanks to remove all sediments, such as soil and sand, before being discharged into the environment. For wastewater from equipment maintenance that is oil-contaminated, it will be treated by passing it through an oil and grease separator before being discharged. The oil and grease will be collected into containers and treated as hazardous waste.

371. *Comments: the direct impact of construction wastewater is low because (i) the amount of this wastewater is small, generated scatterly; (ii) the impact occurs on the construction time (6-24 months); and (iii) the contractors shall collect and sign contracts with relevant unit to treat the wastewater.*

Table 79: Pollutants generated from operation and maintenance of the construction equipment and machinery

Source of wastewater	Volume (m^3/day)	Concentration of pollutants (mg/L)		
		COD	Oil and grease	SS
1. **The system of 23 sluices**				
- From maintenance	6.5	10-15	-	25-40
- From cleaning	9.75	20-32	0.4-0.8	60-80
2. **The road**				
- From maintenance	1.5	10-15	-	25-40
- From cleaning	2.25	20-32	0.4-0.8	60-80
3. **The power lines**				
- From maintenance	0.2	10-15	-	25-40

- From cleaning	0.2	20-32	0.4-0.8	60-80
4. **The upgradation of 18 sluices**				
- From maintenance	0			
- From cleaning	0			
QCVN 08:2023/BTNMT (column A)		≤10	n/a	≤25
QCVN 08:2023/BTNMT (column B)		≤15	n/a	≤100

b) Impacts on groundwater

372. Digging holes for power poles and soil excavation for Binh Giang 1 road and sluices may have an influence on groundwater aquifers. As stated in Section 2.1.2.6.b, the depth of groundwater in the project area extends from 80 to 100 meters, however digging activities only take place at 1.5 meters for the power poles and maximum 15m for sluices. *Therefore, the impact on groundwater is negligible.*

4.4.1.3. Impacts of solid waste generation

373. Solid waste is generated during construction, which includes (i) workers' domestic waste, (ii) construction waste, and (iii) hazardous waste.

a) Workers' waste

374. Workers' garbage is primarily made up of styrofoam boxes, plastic bags, vegetables, plastic tubers, fruits, and leftovers, etc. from their everyday activities on the building site and in camps. According to the MONRE (2019), the amount of solid waste generated by each worker is 0.4kg/day. Therefore, given that there are around 5-10 workers assigned to each site, the daily solid waste of construction workers per site is approximately from 2 to 4 kg. The total amount of garbage from construction groups in one day is around 70 kg (*Table 80*).

375. With 2-4kg of domestic waste at a building site (equal to the waste of 2-3 houses) and a construction time of around 2-3 days to 15 months. Approximately 60% of domestic waste is organic and easily biodegradable. Soil, water, and air quality can be negatively impacted by the breakdown of organic waste if appropriate collection and disposal methods are not put in place throughout the construction phase. Water turbidity, water flow, and sedimentation can all be affected by this. Additionally, it creates conditions for the development of disease-causing microorganisms, posing a risk of disease transmission and affecting the health of workers and residents.

376. Comments: *As mentioned earlier, there are 2 landfills in the project area. Therefore, the project owner/contractor will enter into a contract with the legal entity of Binh Giang commune landfill and Binh Son commune landfill to collect and treat the waste in compliance with current regulations at a minimum of 3 times per week. For construction sites where current collection vehicles cannot reach, the project owner/contractor will arrange for their workers to transport the waste to the nearest collection transfer point for proper collection and treatment. So, the impacts are neglible and do not cause any significant impacts on community and worker's health.*

Table 80: Solid waste of workers

No.	Components	Number of workers (persons)	Amount of garbage at a construction site (kg/day)	Total amount of solid waste for each component (kg/day)
1.	23 new sluices	13 groups x 10 people/group	4	42
2.	Binh Giang 1 road	3 groups x 10 people/group	4	12
3.	Power lines	4 groups x 5 people/group	2	8
4.	18 upgraded sluices	4 group x 5 people/group	2	8
	Total		**12**	**70**

b) Construction waste

377. Construction solid waste generated mainly consists of demolition waste, other waste types such as cement bags and discarded formworks.

378. **Demolition of trees and structures on land**: the biomass generated from the vegetation release due to the demolition activity includes various crops in the project area, mainly shrubs, and some timber species. The calculated biomass is based on the experimental biomass coefficient of 1 hectare of Ogawa and Kato's ground cover type, as shown in *Table 81*.

Table 81: Biomass of 1 hectare of vegetation

No.	Descriptions	Biomass (ton/ha)					
		Trunks	Branches	Leaves	Roots	Grass under the forest canopy	Total
1	Restored forest	9.7	2.7	0.5	0.1	2.0	15.0
2	Plantation	30.0	5.0	1.0	5.0		41.0
3	Medium primary forest	60.0	8.0	1.2	5.4	2.0	76.6
4	Poor primary forest	31.4	10.0	1.6	5.2	1.0	49.3
5	Medium bamboo plantation	12.0			2.4		14.4
6	Annual trees			6.0	1.5		7.5
	Total	**143.1**	**25.7**	**10.3**	**19.6**	**5.0**	**203.7**

Source: Ogawa và Kato, 1978

379. Thus, the biomass generated from the vegetation clearing for annual crops is 7.5 tons/ha. However, the vegetation in the project's land acquisition area is mainly shrubs and a few timber trees. Therefore, the estimated biomass accounts for about 30% of the annual trees, equivalent to 2.25 tons/ha. According to the project's resettlement plan, the total permanent land acquisition area for the project is 15.46ha (mostly for the sluices and connecting roads), which includes vacant land and public land within the transportation and hydraulic works corridors. Hence, the biomass is primarily generated from land acquisition for other lands (residential, and agricultural land). The total area of the remaining land use types (excluding transportation and hydraulic works) is 2.5 ha. Therefore, the estimated biomass is: 2.25 tons/ha × 2.5 ha ≈ 5.6 tons. Consultation with local people showed that most of the demolition waste materials are suitable as fill materials and the affected households can produce wood fuel from the trees and compost from the rest of the waste vegetation materials and remaining wastes of demolition will be sold and no waste materials left in the construction sites.

380. **Other types of construction waste**: In addition to demolition waste, construction solid waste generated consists of scattered soil, sand, cement bags and discarded formworks, as follows:

- Cement bags: On average, each sluice uses 2,800 m^3 of concrete, which equates to the use of 28,000 cement bags. As a result, 20,000–26,000 cement bags are released into the environment. Decomposition of these bags can be a multi-decade process. When discharged into the environment, particularly into canals or production areas, they can negatively impact on the canals and nearby gardens.
- Discarded formworks: At the moment, most builders are using iron or plastic formworks and very few are using wooden ones. All iron or plastic formworks are collected because they can be sold. Wooden workforms can also be reused as wood; however, if they are discarded in the environment (thrown into canals or buried in the ground), they have a negative impact on the canals and nearby gardens.

381. Comments: *The impact level of construction waste is evaluated as low, localized, and manageable, as the majority of construction waste is reused and the remaining waste is collected, transported, and treated by appropriate entities*.

c) Hazardous waste

382. During the construction phase, hazardous waste is generated from the operation of construction machines and equipment. Hazardous waste includes wasted oil, oily rags, chemical containers (diesel oil, gasoline, etc.), and welding rods. Furthermore, on-site repair of construction machinery and equipment might result in waste oil, empty oil containers, oil-contaminated rags, etc. These are examples of hazardous waste that must be collected, stored, and disposed of in compliance with regulations. The volume of hazardous waste is contingent upon the number of equipment and machinery, as well as the volume of materials, including:

- The amount of wasted oil and grease generated in the project area depends on the number of vehicles and construction equipment and tools on the construction site; the frequency of lubricant changes and machinery maintenance; the amount of lubricating oil discharged during each lubricant change/maintenance. The waste is not generated daily; it only occurs when construction machinery breaks down unexpectedly. According to the findings of the research on recycling waste lubricants into liquid fuel conducted by the Military Science and Technology Research Center - Ministry of National Defense, the amount of wasted oil discharged from a change of oil is 7 liters per item. Therefore, the amount of waste oil and grease of each project components is estimated as follows (*Table 82*):
  - **Construction of 23 sluices**: At each building site, certain oil-powered equipment and tools such as barges, tugboats, excavators, bulldozers, cranes, etc. will be used, totaling roughly 5 items. Depending on the operating intensity of the equipment, the average oil change and machinery maintenance cycle lasts about 6 months. Thus, each sluice construction site produces 55 kg of hazardous waste per quarter.
  - **Upgradation of 18 sluices:** the construction time is short, only about 3 months, so most of the equipment does not need maintenance or engine oil changes.
  - **Road construction:** In fact, the main equipment and tools include bulldozers and road rollers that need maintenance and periodic oil changes with about 3 items of equipment

at each construction site. Thus, each quarter the amount of hazardous waste on a road construction site is 31kg.

- **Waste from welding rods**: A construction site generates waste from welding rods that are utilized to construct steel structures. It is estimated that the percentage of welding rods with an excessive portion is equivalent to 5-7% of the weight of the welding rods, which is approximately 3-5 kg for a sluice. Despite the fact that the weld rods are rarely used and are used discontinuously, the waste will be collected and transported to the regulated hazardous waste site in accordance with the current regulations.

Table 82: Estimated volume of hazardous waste at each project construction site

No.	Descriptions	State	At a sluice construction site (kg/quarter)	At a road construction site (kg/quarter)
1	Wasted oil and grease	Liquid	35	21
2	Oily rags	solid	10	5
3	Used chemical (oil) drums/containers	solid	10	5
	Total		**55**	**31**

- **Other hazardous waste types** are generated during the construction process, including used light bulbs, batteries, etc. It is estimated that the amount of this waste at each construction site is around 2 kg/month. Without appropriate management measures, these types of waste can have negative effects on the soil, water, and air environment. Moreover, residual grease in containers can seep into the soil, causing soil pollution.

383. If hazardous waste is not properly collected, it will have two main impacts. Firstly, the oil and grease will seep into the water, directly affecting aquatic species in canals within the project area such as canal 200, Don Dong canal, T3-Tuan Thong canal, and the canal along the sea dike. This will hinder the growth of aquatic plants and animals, and may even cause their death. Secondly, the heavy metal elements present in the waste will contaminate the food chain, posing a serious threat to human health.

384. Comments*: The volume of hazardous waste generated on each site is minimal, localised and only occurs during the construction phase. Hazardous material will be collected, managed, and disposed of in line with applicable legislation. This direct impact is estimated to be LOW in the shortterm and can be minimized with suitable management and treatment measures in Chapter 5.*

4.4.1.4. Impacts on ecological environment

385. Site clearance, dredging, and construction activities are likely to have negative effects on both local terrestrial and aquatic ecosystems, as follows:

a) Impacts on terrestrial ecosystems

386. The effects are most likely to occur during site clearance, when existing trees and vegetation covers within construction sites must be removed. According to the RP of the project, there are 93,097 trees of all kinds of households affected by the project, including fruit

trees and landscape trees, see *Table 83*. Also, it is necessary to remove the current vegetation covers. Besides, the clearance of the site for the 23 sluices and the road will certainly result in the removal of certain trees that have been wildly planted along the canal banks, including bamboo, eucalyptus, banana, and guava, etc.

387. In addition to the effects on terrestrial flora, the removal of trees and vegetation in conjunction with construction activities, such as excavation and the operation of construction equipment and machinary, will affect the local terrestrial fauna in the project area, including the loss of habitat and feeding areas. The local terrestrial fauna, which is impacted by the project's implementation, includes mammals (mice, cow), reptiles (snake, lizard), birds (sparrow, stork) in agricultural or livestock areas (pig, poultry, duck), and pets (dog, cat) in residential areas.

Table 83: Summary of impacts on trees and crops

No.	Descriptions	Quantity (trees)		
		The system of 23 sluices	The road	Total
1	Jackfruit	53	60	113
2	Coconut	193	65	258
3	Mango	15	88	103
4	Guava	1	350	351
5	Banana	79	808	887
6	Custard apple	5	50	55
7	Soursop	2	0	2
8	Apricot blossom	54	250	304
9	Malayan bazan	3	35	38
10	Melaleuca	2203	83,520	85,723
11	Pineapple	280	4,000	4,280
12	Cassava	20	0	20
13	Noni	15	0	15
14	Canary Cheesewood	1	0	1
15	Papaya	5	0	5
16	Rose	8	0	8
18	Eucalyptus	882	0	882
19	Cynometra ramilflora (Lụa)	4	0	4
20	Sapodilla	8	0	8
21	Longan	2	0	2
22	Grapefruit	2	0	2
23	Plum	1	0	1
25	Cashew	2	0	2
26	Paperflower	2	0	2
27	Palmyra Palm	1	0	1
28	Black locust	4	0	4
29	Bamboo	4	0	4
30	Wood trees	2	0	2
31	Kumquat	20	0	20

	Total	**3,871**	**89,226**	**93,097**

Source: Inventory of losses from January to February 2024.

388. Site surveys indicate that due to its extensive use for agricultural and residential purposes, the terrestrial flora of the project area is limited to shrubs, grasses, and common trees and the fauna also is quite poor, consisting primarily of domesticated livestock and poultry that are raised by households in their gardens, such as chicken, ducks, pigs, and cows, etc. In addition, consultation with the Department of Agriculture and Environment and the local community has determined that there are no endangered species or species that require protection within the project's area. *For the aforementioned factors, the impact on the terrestrial ecology is considered low and can be mitigated by measures in Chapter 5.*

b) Impacts on aquatic ecosystems

389. Sluice construction activities mostly happen within the canal along the sea dike, Don Dong canal, K3-Tuan Thong canal canal 200. According to design, in order to construct the sluices, the use of a floating platform on which a crane is placed for reinforced concrete pile driving and sluice gate foundation treatment at the piers in flow of the canals are unavoidable causing increased turbidity. Phytoplankton production is directly dependent on light penetration into the water column. Increased water turbidity results in a decrease in light penetration, which is likely to affect phytoplankton adversely. Unlike zooplankton and phytoplankton, which live in watery environments and drift with water movements and each water resource will have its zooplankton and phytoplankton, zoobenthos moves very low, especially *Polychaete* and *Mollusca*. So they will die-off when the environment changes dramatically exceeding their tolerance and new zoobenthos will be formed to adapt to new living conditions.

390. *However, construction of the sluices gates into two to three batches in steel coffer dams. When the construction activities are carried out in the next batch, water is diverted to the area where the construction is completed in the previous batch to ensure drainage and supply flow and will be localised in space and time and therefore aquatic life, even zoobenthos can recolonize from 3 months[12] to 2 years[13] after the construction phase and impact on the aquatic life will be low.*

4.4.1.5. Impacts on local traffic

a) Impact on waterway transportation

391. As mentioned in Chapter 2, one of the project area's assets is its dense network of rivers and canals, which facilitates water transportation. The major canal system, which includes primary and secondary canals, makes water transportation easier. As a result, delivering building materials for the project via canals is feasible given the current conditions of the project area.

392. As of now, the road system in the project area is capable of accommodating two-wheeled and four-wheeled vehicles with a load capacity of less than 2.5 tons. As a result, the residents'

[12] Bolam,S.G., Schratzberger, M. and Whomersley, P. (2006). Macro- and meiofaunal recolonization of dredged material used for habitat enhancement: Temporal patterns in community development. Mar. Pollut. Bull. 52: 1746-1755

[13] Stronkhorst, J., Ariese, F., van Hattum, B., Postma, J.F., de Kluijver, M., Den Besten, P.J., Bergman, M.J.N., Daan, R., Murk, A.J. and Vethaak, A.D. (2003). Environmental impact and recovery at two dumping sites for dredged material in the North Sea. Environ. Pollut. 124: 17-31.

daily travel is primarily conducted via roads, with minimal use of waterways. Almost no external vessels are present in the secondary canals where the project sluices are all constructed. Futhermore, the transportation of materials for production and construction of local people in the region is conducted via waterways, as the road system is not appropriate for vehicles with a load capacity exceeding 2.5 tons. Through the secondary canals, traders will navigate their boats during the harvest season to buy agricultural outputs while locals utilize boats to transfer machinery and equipment to the fields for production. Hence, the construction of the sluice will affect the navigation of boats within these canals.

393. According to site surveys and community consultations, the number of boats moving on the canals in the project area is low on off-season days, with only a few boats (about 2-3 boats) traveling on the canal each day (*Figure 76*), particularly at the beginning of the Vam Ray canal, which is currently silted up and thus has no boat traffic. However, during the rice or shrimp harvesting days, the boat density will rise to approximately 10 boats each day. The daily increase of 2.36 trips and the cumulative increase of 1,078 trips over the construction period will pose a small challenge to the environment and waterway traffic operations. Additionally, the project owner will require the construction material suppliers to implement measures to ensure water transportation safety, especially during the period of residents' agricultural harvests.

394. Besides, there is a bridge (Kenh T5 bridge) located approximately 50 meters from the T5-1 sluice construction site (*Figure 77*). This is a concrete bridge, with a width of 3 meters and a length of about 20 meters. Carelessness during the sluice construction activities could lead to damage to this bridge. If such an incident occurs, it will affect the travel and health of local residents.

395. *However, the impact is moderate and can be controlled because (i) there are densely canal network in the project area and in case of bridge failure, there are numerous alternatives for local movement; and (ii) contractors will apply measures to manage the impact as described in Chapter 5.*



Figure 76: Boats moving on the canals for transporting construction materials of the project



Figure 77: Current status of Kenh T5 bridge

b) Impacts on local road traffic

396. As stated in Section 2.4.1.2, the internal road system in the area is limited. Impacts of the project construction on the local road traffic are assessed below:

397. **Sluices**: The project's sluices, which include 23 new sluices and 18 upgraded sluices, are not situated on road transportation routes. Consequently, the construction and enhancement of these sluices will not have an impact on the road traffic of the project area.

398. **The road:** the impact is presented in Section 4.4.2.3.

399. **The power lines**: installing power lines, particularly the erection of poles, will have an impact on the movement of residents. However, most of the power lines will be located in sparse area with very few people. Only there are some households living in the power lines along the Binh Giang 1 road and along Don Dong canal, including:

- **For the power lines running along the project road (Binh Giang 1 road)**: This road, which is quite wide and has shoulders, will be constructed as part of the project. Consequently, the installation of poles along this road will have a negligible effect on the flow of traffic along the road.
- **For the power lines running along the road along the Don Dong canal:** the road width is only approximately 2.5 to 3.5 meters. Consequently, the road will be temporarily closed to guarantee the safety of residents during the installation of poles. This will have an impact on the travel of residents.

400. Comments: *Nevertheless, this effect is assess to be minor, happens in a short-term (about 1hour for erecting electric poles), and manageable due to the followings: (i) Erecting poles usually takes about 15-60 minutes; (ii) The traffic density on this road is low (about 2-5*

vehicles/hour); (ii) Residents can travel when the pole is being placed into the hole under the guidance of the constructors; and (iv) The construction schedule and alternative routes will be announced to residents 15 days before construction begins.

4.4.1.6. Risks of local flooding

401. The excavation, earthwork, and leveling activities have the potential to impede water drainage. Simultaneously, precipitation within the construction site has the potential to result in local inundation of the site. If proper arrangements are not made for temporary drainage on the construction sites of the road, it will result in local flooding. The road construction locations are prone to local inundation. This will have adverse effects on the health and working performance of workers, as well as on the surrounding population. Additionally, it will cause damage to the construction works. The prolonged local flooding will (i) have direct and indirect impacts on living conditions, production activities, and travel for people and workers; (ii) result in the loss of beautiful landscapes, poor environmental sanitation, and potential sources of communicable diseases; and (iii) cause damage to ongoing construction items.

402. *However, the impact mainly occurs during the rainy season (May to November). The impact is rated to be low because (i) the majority of the road will be built during the dry season; (ii) the road is located in an area with no history of flooding; (iii) rainwater can drain quickly because the road is close to the Binh Giang 1 canal; and (iv) the impact can be reduced by popular technical mitigation measures such as pumping and temporary drainage, as proposed in Chapter 5.*

4.4.1.7. Risks of land subsidence and bank erosion during heavy rains

403. There is a risk of land subsidence and erosion at sluice abutments, bridge piers, and along access roads during the sluice construction. Such land subsidence and erosion could damage the property of contractors and local residents of Binh Giang and Binh Son communes, who live near the construction sites of 23 sluices. More seriously, they could pose safety risks to workers and local residents. However, the risk is assessed to be low because (i) the access roads to the sluices are suitable for the existing transportation system and align with the current plannings; (ii) the maximum longitudinal and transverse slopes of the bridge are 5-6% and 2%, respectively. The design elevations of the access roads through residential areas are optimally chosen based on the elevations of existing structures and comply with the hydrological control elevations of drainage works, approximately 30-50 cm; (iii) the foundation where the bridges are placed is reinforced with concrete columns; and (iv) the road surface is paved with asphalt concrete, crushed stone base, with Eyc ≥140Mpa, design axle load P=10T, meeting the standards for allowable elastic deflection, surface shear standards, tensile strength, and flexural testing standards for monolithic material layers.

404. *However, the risk can be controlled and mitigated by adhering to strict construction measures, which will be proposed in Chapter 5.*

4.4.1.8. Risks from raw material supply

405. The building of the sluices and the road will require a large amount of materials (soil and sand) for backfilling. The project material sources are detailed in section 1.3.6. It is specified that materials including soil, sand and stone for construction must be obtained from the licensed mines; cement, iron and steel from An Giang or other provinces. However, some contractors

may not comply and choose the cheaper material supplies from the illegal sources, resulting in the following risks and impacts: (i) Material supply conditions and properties are not meet the standards, resulting in lower construction quality; (ii) The supply quantity is not assured, which has an impact on the project items' implementation progress; (iii) Illegal exploitation of construction materials does not guarantee environmental conditions; and (iv) Potential risks include labor accidents due to inadequate PPEs and traffic accidents during raw material delivery if the chosen route is not suited for the project.

406. The indirect risks are rated as LOW, short-term and can be mitigated by the following: (i) All raw materials used for the project must be sourced from licensed mines; (ii) Experimental conditions on construction geology are conducted prior to construction; (iii) The risks are short-term, only occur during the construction period; and (iv) mitigation measures are proposed in Chapter 5.

4.4.1.9. Impacts on social aspects

a) Impacts and risks due to labor influx

407. During the peak period, it is expected that 24 construction teams will be formed, each with 5-10 workers per team but 16 camps will be set up. Workers who will work on the road and the power lines will rent local people's houses or move to nearby camps. The main social problems are listed as follows:

a.1). Risks of social conflicts

408. Risks of social conflict related to labor influx include:

- Potential conflict between workers and local communities due to differences in habits, customs, culture, lifestyle, employment and income. In densely populated construction areas, such as those for the construction of the sluices and road, this impact is expected to be higher than that of power lines,
- The influx of labor can lead to social disorders and give rise to social issues such as gambling, drug, and prostitution. In addition, negative effects of untreated and uncollected wastewater from worker camps building the sluices and road include bad smell and poor local residents' health. This can cause workers to clash with residents of the area. Besides, labor influx could increase the risk of Gender Based Violence (GBV) and sexual exploitation and abuse (SEA) Sexual Harassment (SH).
- Conflicts arise between local residents and contractors when waste and emissions, including dust, solid waste, hazardous waste, and wasted rock and soil, are discharged directly into the residents' rice fields and gardens, or when rainwater runoff sweeps away waste into their gardens during road construction.

409. Comments: *The project will be implemented in a rural area that lacks public services and health systems. As a result, the potential social conflict risks will be medium, localised because: (i) there are 16 workers camps and the camps will be located in agricultural areas; (ii) An Giang has experience managing workers from different provinces; and (iii) local people are familiar with the movement of the influx of workers, and local authorities have experience managing immigrant labor. The risks are short-term, happen during construction and can be mitigated by measures in Chapter 5.*

a.2). Influx of additional population ("followers")

410. Workers from neighboring provinces or commues of An Giang province who come to work on the project may bring their families, adding to the load on the project communes' social and service systems and promoting migration. *However, the risks will be low because workers will be participating in the construction process for 6 months to 18 months, and contractors will be encouraged to hire local labor.*

a.3). Local inflation of prices

411. For the project to be carried out, a certain number of workers and experts will need to be sent to the sites. The mobilized workers could raise various personal needs (food, clothing, housing, etc.), resulting in the risk of local price inflation. However, the risks will be low for the following reasons: i) the construction sites are dispersed across two communes in the Hon Dat district; ii) only a small number of workers (approximately 210 workers during the period of highest demand) will be mobilized to the sites; iii) workers will only spend a brief period on the sites (6 to 18 months); and iv) An Giang province is the most active province in the Mekong Delta, and supply may significantly exceed worker demands.

a.4). Increase of illicit behavior and crime

412. The risk of illegal behavior and crime will be a result of labor influx. Workers' mobilization may cause social disturbance, illicit behaviors, and crimes due to disparities in income, working, customs, etc. Furthermore, there is a risk that the workers will engage in social evils such as gambling or prostitution. However, the risks are rated as low because the number of migrant workers is small and many workers from neighboring provinces have already arrived to work in the fishery sector in the province. Locals are familiar with the flow of migrant workers, and local authorities have experience managing immigrant labor.

e.4). Increase in burden and competition for public service provision

413. The project activities will increase demand for water, power, and solid waste disposal, all of which are managed by the public sector. However, the project's electricity consumption will not be concentrated in a single site, and it will be met by connecting to the national grid via the 220/110 kV station, as well as investing in the installation of power lines. Regarding solid waste treatment for the project, the current service of the solid waste collection does not cover all the project area, so contractors will transport it to the nearest transfer points for the URENCO to transport for final disposal to mitigate impacts due to the generation of solid waste of the project. *Therefore, the competition for public service provision of the project will be low.*

a.5). Increased pressure on accommodations and rents

414. Previous project experiences have demonstrated that project communes can only accommodate a certain number of migrant workers without putting pressure on housing and rent. Project contractors will establish worker camps, rent out local houses to workers in the project communes, or prioritize mobilizing local workers to reduce demand for worker housing. *As a result, the impact is low and end when the construction is completed.*

a.6). Sexual exploitation and abuse/sexual harassment

415. Since all activities of the project will take place in rural areas, where contractors and local authorities have easy control over sexual exploitation and abuse (SEA) and harassment (SH), the risk assessment indicates that this is not a significant concern. Besides, mitigation measures for the risks are included in the ESMP and code of conduct (CoC) for contractors.

a.7). Increased risk of communicable diseases and burden on local health services

416. Because of the poor living conditions, the disease transmission will have a negative impact on both workers and local inhabitants. It will cause eye and skin diseases, and respiration diseases. Local healthcare systems get overcrowded as a result of this. This risk is assessed as moderate because (i) local workers will be prioritized for the project; (ii) PPE will be provided to all project workers; and (iii) training on OHS will be provided to project workers before they work for the project. This risk will be end when the construction is finished.

b) Impacts due to improper access

417. The construction of the new road will require the use of a portion of the existing road as construction sites, as it will be conducted on the current road surface. The sites require fencing for safety reasons because they are in front of people's houses. This fencing system will impede access of local people. The impact will cease after the road construction is finished, and an alternate route will be established throughout the construction period.

418. *The impact is considered low because: (i) the successive construction method will be used for the road; (ii) the impact occurs over a short period of time (about 2-3 months for each household); and (iii) the road is strongly supported by locals, and when it is operational, their movement will improve.*

c) Impacts on fishing activities

419. The results of on-site surveys and community consultations indicate that there is almost no aquaculture or fishing activity on the canals where the sluice will be built. If there are any, they are merely recreational activities rather than the residents' livelihoods. *Therefore, the construction activities of the sluices will not impact fishing activities in the area.*

4.4.1.10.Labor violence and hard-working conditions

a) Labor violence and hard-working conditions

420. Types of Project Workers

- **Direct workers** are those who are directly employed by the project management unit. They are staff of the An Giang PPMU and consultants hired by the PPMU to work on the project. In the framework of the project, the PPMU is responsible for the management and supervision of the overall implementation of the project, including contractors' construction work. Direct workers are staff (permanent or term) who are directly employed by the PPMU. Given that the PPMU is unlikely to have sufficient expertise to manage the entire project, it will require assistance from experts in certain technical areas (project management and coordination, financial management, procurement, construction, assessment and management of E&S risks and impacts, independent E&S monitoring, among others). Labor requirements are calculated from the start of the project through its end.
- **Contracted workers** are those who are employed or engaged by third parties to perform work in relation to core functions of the project, regardless of location. An Giang PPMU will hire numerous contractors to carry out various types of project work, including technical design consultants, construction supervision consultant (CSC), and civil works construction. The amount of manpower required for these activities varies according to the size of each

activity. The timing of labor requirements will fluctuate depending on the project stages. In general, the construction will last about 6 months to 2 years.

- Primary Supply Workers: The construction work will require primary supplies essential for the functions of the works, such as sand, soil, etc.. Where the contractors will source such materials directly from primary suppliers on an ongoing basis, the workers engaged by such primary suppliers are deemed "primary supply workers", as defined in ESS2.
- Community Workers: The project will not engage community workers as defined under the ESS2 as a community contribution to the project. Community members who may be engaged by the project contractors will be categorized and managed as "contracted workers".

421. **Direct government workers**. Other than the above-mentioned project workers, stakeholders working on the project will include government civil servants from relevant departments and agencies of An Giang province, such as Department of Finance (DOF), Department of Home Affairs (DOHA), Department of Construction (DOC), Department of Agriculture and Environment, District Land Fund Development Centers (DLFDC), district Site Clearance and Compensation Councils (DSCCCs), and provincial, district, commune People's Committees (PC). They will be subjected to the terms and conditions of their current public sector employment, which are governed by the Labor Code, the Public Employees Law, and the Civil Servants Law. There will be no legal transfer of their employment to the project. The ESS2 will not apply to government civil servants. However, if they visit the project sites, they must adhere to E&S risk management regulations[14].

422. Totaling, the project will mobilize approximately 326 people within its timeline.

423. Labor disputes are common in the infrastructure construction field in Viet Nam. Demand for limited employment opportunities; labor wage rates and payment delays; disagreement over working conditions; and health and safety concerns in the workplace are all potential causes of labor disputes. Additionally, employers such as contractors/subcontractors may retaliate against employees who demand better working conditions, raise concerns about unsafe or unhealthy work environments, or voice any grievances. These kinds of circumstances may result in labor unrest.

424. This risk is assessed to be medium bbecause (i) the impacts are localized within the construction site and scattered in 2 communes; (ii) short construction period from 6- 24 months; (iii) workers are provided with PPE and reasonable construction time; (iv) mitigation measures for these risks have been provided in the ESCOPs and workers will be trained on labor safety, traffic safety, sanitation before starting any civil works. However, to implement the project's policy on fair labor treatment in accordance with ESS2, the project has prepared the LMP that also outlines a labor GRM. Besides, project contractors/subcontractors will be required to provide information about employment to their laborers while negotiating to reach an agreement on labor terms and conditions prior to signing labor contracts. Monitoring compliance with the labor contract terms and conditions and strictly enforcing the GRM for laborers will be effective mitigation measures for resolving labor conflicts during the implementation of the project.

[14] ESS2 applies in part to government workers, through the provision of paragraphs 17 to 20 (Protecting the Work Force) and paragraphs 24 to 30 (Occupational Health and Safety).

b) Use of child labor, school dropout and forced labor

425. Based on the project characteristics, some unskilled labor will be mobilized. In this case, the child laborers can be used for tasks that do not require high qualifications (according to Vietnam's regulations, a child is under 15 years old). Due to limited knowledge, children can suffer from labor abuse that affects their psychology, health, and ability to learn. Child labor may cause school dropouts for working and earn money. However, *the impact is assessed to be minor as* (i) The experiences with the WB-financed and state budget projects show no cases of child labor or forced labor have been recorded in Kien Giang (now An Giang) province; (ii) the WB and the Government of Viet Nam have strong and comprehensive policies/requirements to protect children from child labor and other abuse; (iii) According to the socio-economic survey results, no case of child labor use or forced labor was recorded in the project area; (vi) The contractors have to commit not to hiring child labor for the project-related jobs and this commitment shall be one of the required conditions in bidding and contractual documents; and (v) The project owner will coordinate with local authorities and related units to strictly control the contractor's labor use.

c) Gender based violence (GBV)

426. The concentration of 5-10 workers at a construction site, with approximately 75% men and 25% women, has the potential to cause social disturbance. This may affect women who are directly employed on the construction site, as well as those who reside in the adjacent area and their families during construction.

427. According to previous similar projects, unmarried women may face a disadvantage in getting married or becoming single mothers. Meanwhile, married women can be influenced by the happiness of their families. Furthermore, they may be infected with communicable diseases, such as HIV/AIDS and syphilis, which can have an impact on the next generation.

428. Within this project, the impact occurs only during the construction phase, which lasts from 6 to 18 months. The impact is considered minor for the following reasons: (i) The socio-economic survey results indicate that no negative impacts on women have been observed in the project area; (ii) The number of women workers is small because local workers are given priority by contractors; (iii) Training programs and information disclosure will provide workers with information about social diseases and prevention methods; and (iv) Regulations and penalties will be established to address any violations by workers at the construction site; and (v) Contractors will closely collaborate with local authorities to manage the number of workers at the construction sites.

4.4.1.11. Community and worker health and safety

a) Waterway incidents

429. Because almost all the materials will be transported by water, accidents can occur due to boats colliding during the travel to the work sites. These incidents can cause serious impacts on the environment, especially on the water quality, such as increasing turbidity by stirring the bed on contact or through oil spills from engine damage. The emergencies have moderate negative impact because there likely is a low frequency of occurrence. *However, if an accident happens during the construction phase it could create a significant impact on habitat, people, and*

properties and this impact are long term. Therefore, an appropriate rapid-response plan is needed to ensure the management of emergencies.

b) Labor accidents

430. The construction of the project's structural items will generate occupational heath and safety (OHS) risks for project workers, including:

- **Health risks**. Health risks due to working in a pollution environment with high dust concentration are caused by the construction activities of site clearance and demolishing of old structures, soil excavations, leveling, machine operation, and transportation.
- **Accidents due to structure collapse**. Excavation and demolishing activities can cause damage of nearby existing structure foundations leading to the structure collapse and causing serious injuries to workers.
- **Accidents due to falling in water**. Workers may fall in water and cause serious injuries during dredging, pilling, or constructing sluices and bridges due to dizzying or/and strong wind, waves, or/and careless working without compliance with working safety.
- **Accidents due to falling from high levels**. Workers may fall from a high-level due to incorrectly installed scaffolding, uninsured ladders, and unprotected steel bars during construction of operational houses, sluices, bridges, electric systems, etc. This leads to labor accidents.
- **Falling objects**: Workers working below a house/power tower being constructed may be hit by hard objects falling from a high-level causing injury.
- **Electrical shock:** Workers may be exposed to live electricity during testing transmission lines, and substations and using power for soldering. Electrical shock can cause serious injuries or fatalities.
- **Accidence due to iron cut/ soldering**. Workers cutting irons and soldering without using proper PPE (e.g. protective glasses) may suffer from eye accidents with serious injuries even blinding.
- **Accidents due to fire and explosion.** Welding workers can generate fire-catching flammable materials nearby, especially fuels and gases leading to a fire or explosion causing serious effects on workers and communities.
- **Accidents due to heavy equipment**. Several working sites may gather many workers and heavy machines (e. g cranes for sluice construction and upgradation) working in a narrow space for different works. Moving heavy equipment may hit workers working nearby causing injuries. In addition, the construction activities involving heavy types of machinery will be quite noisy. Loud, repetitive, and excessive noise causes long-term hearing problems, such as deafness. Noise can also be a dangerous distraction and may distract the worker from the task at hand, which can cause accidents.
- **Health risks on disease infection**. Contamination can occur during disease outbreaks if proper hygiene practices are not followed regularly (frequent and proper hand hygiene and wearing masks to serve as barriers to human-to-human transmission of the virus).
- **Occupational disease**. Workers working under conditions with noise generated from heavy machines (e.g. Power operators) can suffer from occupational diseases such as deafness.

- **Inadequate facilities:** Lavatory facilities (toilets and washing areas) are sometimes inadequate for personal hygiene when a number of people work on construction sites. Adequate supplies of clean drinking water, clean eating areas, and a safe working environment need to be provided to ensure the occupational health and safety of the workers.
- **Lack of awareness of occupational health and safety requirements:** In conjunction with other facility controls and safety systems, personal protective equipment (PPE) protects workers against workplace hazards. However, there is often a lack of the use of PPE and safe work practices on construction sites in Viet Nam. Furthermore, materials for handwashing and hygiene, as well as masks, are frequently unavailable at work sites. As a result, in some cases, workers' eyes, heads, necks, ears, hands, arms, feet, legs, ears, lungs, and even the entire body may be injured due to a lack of appropriate PPE.

431. The above-mentioned OHS risks will mainly have been rated low to moderate because (i) the risks are localized within construction sites; (ii) the risks will primarily stem from the construction activities that will occur in a short time; (iii) workers will be provided with PPE and first aid stations; and (iv) mitigation measures for these risks will be in place, as specified in the ESMP and C-ESMPs. Standard Operation Procedures (SOPs) will be developed for workers to follow during the construction period and the SOPs include an evacuation plan in case of hazards (e.g., earthquake, fire, extreme weather events, and accidents). Workers will be trained in labor safety, traffic safety, and sanitation practices prior to the start of construction. Furthermore, during the operation phase, all operation units will develop and implement operational and maintenance (O&E) procedures for sluices, connecting roads, and low and medium-voltage lines.

c) Risk of fire, explosion and leakage of fuel

432. Emergencies of fire and explosion could be incurred through fuel storage and unsafe use of electrical equipment. The consequences are extremely adverse and could cause injuries, disabilities, and loss of life. The reasons for fire and explosion are (i) unsafe or inappropriate firefighting systems and management at fuel storage areas on construction sites; (ii) electric generators supplying energy for machinery, the equipment could cause electrical incidents resulting in fires; (iii) use of heating equipment could cause fire or occupational accidents such as burns. *The emergencies are a moderate to substaintial negative impact and when the the risk happens, it cause long term affec*ts. Because these emergencies could occur at any time thus it requires a specific emergency preparedness and response plan to be in place at the construction site as well as appropriate equipment to minimize the probability of these emergencies as proposed in Chapter 5.

d) Risk of security forces

433. It is expected that the project contractors will either retain or contract workers to provide security to protect their staff and properties during the construction process. In Bank-financed projects, it is common practice for the contractor to employ one or two individuals to provide security for the construction materials and equipment, particularly during nighttime. So far, there have been no reported incidents. *Therefore, the risk posed by this security arrangement to those within and outside the project site is assessed as small and only occurs during the construction phase*. To mitigate the risk, the contractor will be required to implement proper procedures for recruiting and maintaining the security force at the site.

e) Risks of community's health and safety

434. Numerous construction activities may cause risks of health and safety for communities in the project area, including:

- Demolition of houses and structures on land cause accident risks for local people as well as for project workers
- Labor accident, fire, explosion, short circuit and electric shock posed by the construction activities will also affect the safety of the community.
- Inadequate lighting and fencing of construction sites inside of construction sites can be dangerous for pedestrians and vehicles especially during the night time.
- Increasing of traffic due to boats and vehicles movements to construction sites may cause inconvenience for local population as well.
- Road construction activities limit household access.
- Untimely and inefficient disposal of solid waste and improper sanitary conditions generated by the construction workers at construction sites and workers' camps may cause pollution of the surrounding environment. This creates conditions for development of flies and mosquitoes and possible outbreaks of diseases such as diarrhea, dengue fever, etc. affecting the health of the local community.
- The transportation of raw materials and wastes will contribute to increase traffic flow on canals and roads. Also, noise from construction activities will also pose health and safety risks to local people.
- Risks of outsiders entering the construction sites: Illegal entry of local people into the construction area to play or pick up construction materials will cause safety risks, possibly endangering lives (especially children) and loss of project materials. Therefore, construction sites will be covered and posted with warning signs to prevent unauthorized access.

435. The impact level is assessed small to moderate as: (i) the impacts are localized in each construction area; (ii) construction period is short from 6-18 months; (iii) the number of workers is from 5-10 workers each site; moreover, local workers will be prioritized by the Contractor; (iv) workers will be train on labor safety, traffic safety, sanitation; (v) warning signs and fences will be installed in construction sites; and (iv) these impacts can be minimized through ESCOPs.

4.4.1.12.Impacts on physical cultural resources (PCR)s

436. Construction activities may affect religious and cultural structures such as pagodas or temples by dust, noise, and vibration, disturbing traffic or access to these works, or cause visual impacts or nuisance if construction materials and wastes are loaded improperly. Loud noise may also affect religious procedures.

437. There are no important historical and cultural sites identified in the project construction sites. There are two sites, Siviranba Chanpa Pagoda located about 240m to sluice K3-7 and Temple of Vam Ray Lady located about 200m to sluice VR1. The sites are used regularly, particularly when offerings are made every 15th day, on the first day of the lunar month, and

during festival days. No direct impacts on the temples are expected, but there may be indirect impacts (noise) on people visiting them.

438. In addition, the project involves considerable excavation. Therefore, there are chances that some artifacts may be exposed during construction.

439. Comments: There is likely *small negative impact* on Siviranba Chanpa Pagoda and Temple of Vam Ray Lady. To mitigate potential noise impacts, equipment with low noise signatures will be used, work activities will avoid days of worship, and if necessary, noise barriers will be installed. No adverse impacts on other historical and cultural heritage features are expected during the construction phase of the project. However, during execution of the works, the construction there might be chances that some historical and cultural objects or remains might be found. The process for addressing these cases is presented under the Chance Find Procedures presented in *Chapter 5*.

4.4.2. Specific Impacts

4.4.2.1. Impact on domestic water supply

440. Currently, within the project area, there are 2 water supply stations, including one in Binh Giang commune and one in Binh Son commune that use surface water for domestic purposes (*Table 48*). Furthermore, the Binh Giang water intake point of this station is located on Canal 200 and is approximately 200 meters away from the construction site of sluice T6-1 (*Figure 49*) while the intake point of Binh Son plant is 310m from sluice VR-1 (*Figure 50*). The 2 plants supply water for a total of 534 households. However, the water flow in this area is only one way, from large canals (where there are two water intake points) into smaller canals (where the two sluices are being built) therefore the possibility of turbidity or pollutants moving from the sluice building sites to the two water intake sites is extremely low (see *Figure 78* and *Figure 79*). Futhermore, all activities of on-water construction activities will be implemented in coffer dams (*Figure 81*). The likelihood of increasing TSS and turbidity only happens where the coffer dam is installed (only 1 days) and it will occur durng the low tide. *Therefore, the project will insignificantly affect the domestic water supply and the impact will be shorterm (during the construction time). The impact will be mitigated because the project owner will require the constructors to implement mitigation measures in Chapter 5*.



Figure 78: Current water flow direction in the construction area of sluice VR-1 and the water intake point of Binh Giang plant

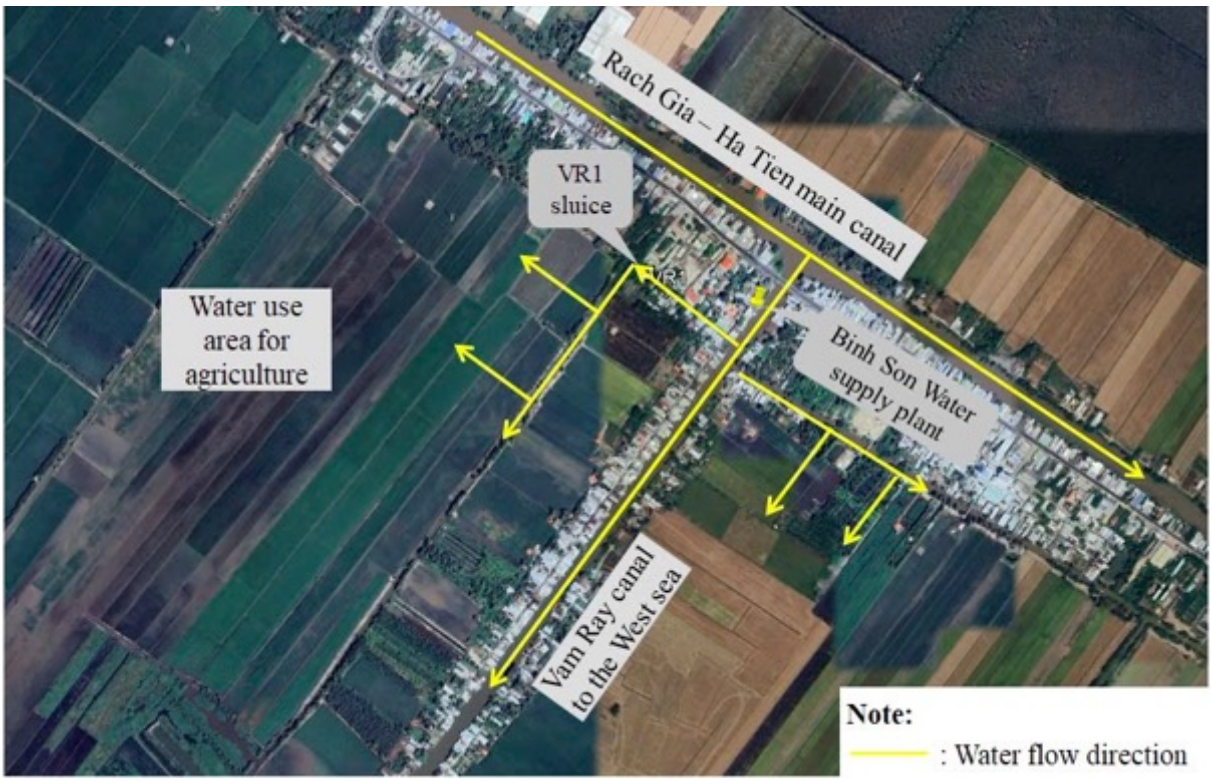


Figure 79: Current water flow direction in the construction area of sluice T6-1and the water intake point of Binh Son plant

4.4.2.2. Impacts on livelihoods

a) Impacts on rice cultivation

441. **Sluice construction**: The canals where the project's sluices are primarily located provide freshwater for two rice crops. Therefore, construction activities that narrow the flow and increase turbidity and other pollutants will affect the water supply for rice production. For rice cultivation, the most significant water requirement is during field preparation and the first week after sowing. Thus, contractors need to carry out sluice construction activities between the two cropping seasons as well as during the period from the 25th day after sowing to the end of the rice season.

442. **Road construction**: There are numerous rice fields and fruit orchards with total area of 195ha along the Binh Giang 1 road (105 ha only using water from Binh Giang 1 canal and 90ha using both water from Binh Giang 1 canal and Canal 500, see *Figure 80*) and 36 culverts to take water from the Binh Giang 1 canal. The construction of the road will affect these culverts and the impact occurs during maximum 2 dry seasons (from April to November) in when the residents in Giong Ke hamlet, Binh Giang commune need to take water for their rice fields. However, the Project Owner will have a plan to rebuild these culverts before starting the construction of the road and constractors need to prepare specific construction plans to ensure that residents can still access water to meet their production needs during the dry season. Therefore, the impact is assessed as minor and end when the construction of the 36 new culverts are completed.

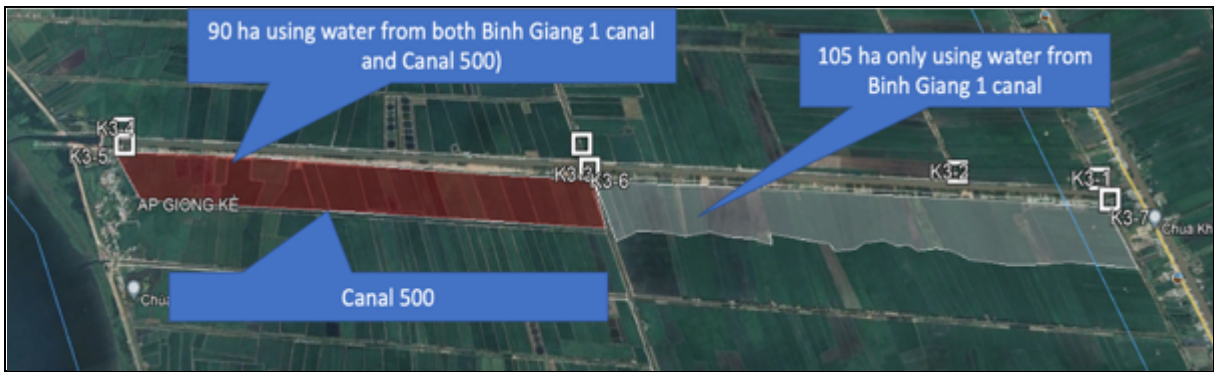


Figure 80: Area of paddy fields and fruit trees along the Binh Giang 1 road

b) Impacts on shirmp farming

443. **Sluice construction:** During the dry season, residents in the region from Don Dong canal to the sea, particularly between T5-K3 canal, engage in shrimp farming on rice land. The construction of the K3-4, K3-5, and T6-3 sluices will occur in that region. However, these sluices are positioned at the end of the water supply sources for shrimp aquaculture. As a result, the sluice building is predicted to have a minor impact on 30 ha of shrimp farming in Binh Giang commune within 6 months. The impact is limited to the sluice construction area and has no effect on water intake, drainage, or the shrimp farming environment of the whole region. Besides, Contractors shall apply mitigation measures for the impact as in mentioned in Chapter 5.

444. **Sluice improvement**: The current sluice gates will be replaced with new ones to guarantee adequate water supply and drainage for the region. The duration of the replacement period is relatively short, typically lasting around 1-2 months. After the installation of the new

sluice gates, the construction unit will remove the existing sluice gates and begin utilizing the new ones. Currently, only 2 out of 18 upraded sluices (Kenh Hai, and Kenh Nam sluices) are operated for shrimp farming. In a shrimp crops, the sluices are opened 3 times, including: 30 days in April, 15 days in June and 15 days in July. For the rest of the time, the sluices will be closed to prevent saltwater intrusion or to drain water from the fields to the sea. As such, the contractor can proactively choose the timing of sluice gate replacement to avoid impacting the shrimp farming activities of the local residents. Therefore, the impact on shrimp farming is minimal (only happen during the upgradation of the Kenh Hai sluice and Kenh Nam sluice) and 30ha in Binh Giang commune, and short-term (30 days).

4.4.2.3. Impacts on water traffic

a) Impacts due on-water construction

445. Construction activities will take place within the steel coffer dams on the beds of the canals of Don Dong, No.200, No. 2, and the horizontal canal (*Figure 81*). This operation will partially narrow the width of these canals. Additionally, concentrating a large number of vehicles and equipment on the canals of to support construction will significantly impact waterway traffic. This leads to the limitation of the speed of vehicles passing through the canals during the construction period and these vehicles having to travel by other rivers and canals at certain times. Furthermore, it causes to collision risks between local people's boats and project construction boats and completed parts of the sluices, especially during nighttime.

446. The investigation results show that: (i) the project area is not a waterway route; (ii) on the canals Don Dong, No.200, No. 2, and the horizontal canal where sluices will be built, the majority of vessels are small boats weighing around 50 tons (*Figure 76*), primarily used for transporting materials and agricultural products; and (iii) the density of boat traffic is low, averaging only 5-10 boats per day, but increases during periods when materials and outputs must be transported for production or harvest seasons. The canals' current width ranges from 10 to 22 meters (*Figure 82*), and this width allows for boat traffic on the other half. As a result, the impact on the waterway in the canals will occur is small and short-term (during sluice foundation building, which generally takes about a month). Also, the project owner shall request that contractors not plan sluice foundation treatment during peak periods.



Figure 81: Coffer dams for sluice construction

447. Furthermore, the construction timeline and alternative canal routes will be consulted with communities and released 15 days before construction begins, allowing people to plan their journey accordingly. In addition, the contractors will install signage and deploy traffic management workers to the construction sites. As a result, the impacts *are assessed to be moderate*.

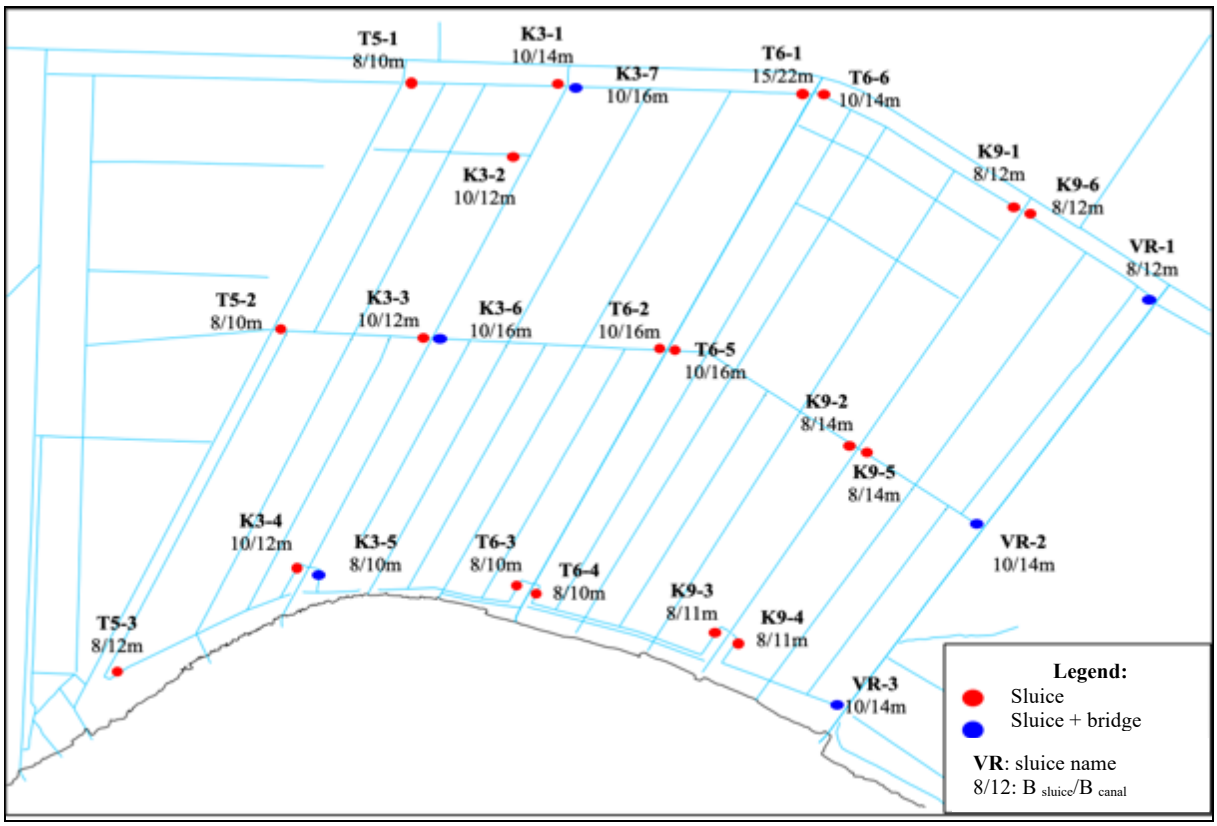


Figure 82: Canal widths in the sluice construction areas

b) Impacts on the movement and house access of local people due to the road construction

448. The project road is now a dirt road with around 74 houses residing along it, as previously stated. However, the majority of these residents are primarily clustered within a radius of around 800 meters from NH80. They so usually travel from the direction of NH 80 inward rather than across the whole length of this road. During construction, the current road will be excavated for the new road. Consequently, the absence of alternate routes for people currently living along the road and road users in Binh Giang commune will have a substantial effect on their travel due to road construction. Currently, the non-built-up area of the land strip on the eastern side of the Binh Giang 1 canal (in Binh Giang commune) is approximately 50 meters in width, whereas the reqquired width for road construction, which includes its protection corridor, is only 12 meters. As a result, the contractor has the option to utilize the remaining width to establish a alternative route for residents during road construction. As a result, the impact of road construction on the mobility of residents is negligible, temporary, and manageable due to the following: (i) The current road is narrow and of poor quality (*Figure 43*), which makes it inconvenient for residents in Binh Giang commune to travel; (ii) A temporary road will be established during construction to ensure continuous travel along the entire route; (iii) The construction period is short, lasting approximately 18 months; and (iv) Once the new road is completed, residents' travel will be significantly improved.

4.4.2.4. Impacts by the relocation of infrastructure

449. Some public infrastructure, such as electric poles, telecommunications, and television cable lines may be potentially relocated by construction of the road. The owners of the affected infrastructures, such as the Hon Dat power company for electricity lines and the former Hon Dat branches of FPT, Viettel, and VNPT companies for internet cable lines, will implement the infrastructure relocation. The quality of living conditions, the performance of work and study, and the level of annoyance experienced by the residents will be adversely affected by the temporary disruption of the infrastructure.

450. However, the effects of these temporary disruptions are minimal due to their short duration, such as a maximum of 2-3 hours for power supply and one hour for internet access. The owners of the affected infrastructure have extensive experience in relocating similar projects within Kien Giang (now An Giang) Province. This issue is a common occurrence in infrastructure projects in Viet Nam, and the Kien Giang (now An Giang) PPMU has successfully collaborated with infrastructure owners in previous WB-financed projects (ICRSL, CRSD, WB6, etc.) in recent years.

4.4.2.5. Site-specific impacts and risks

a) Impacts on ethnic minorities (EM)

451. The survey results obtained during the project preparation phase indicated the presence of about 126 EM households in the project area. EMs will have long-term benefits through investment in the components of the project. However, they can also be negatively affected by environmental impacts and risks, as follows:

- Common construction-related impacts and risks: These include increased levels of dust, gas emissions, noise, vibration, loss of vegetation cover and trees, waste and wastewater generation, water quality reduction affecting aquatic lives, soil erosion sedimentation, and localized flooding risks.
- Presence of migrant workers: During construction time, many workers will come and stay in the project area. This may cause social difficulties, affecting local security and health, especially young EM people.

452. Scale and magnitude of the impacts on EM is higher than that of Kinh people. Therefore, specific policies and action plans to minimize the potential impact of land acquisition and resettlement will be addressed through the project RP. In addition, an Ethnic Minority Development Plan (EMDP) has been prepared for the project. The EMDP will help to assist the devlopment of the EMs in the project area.

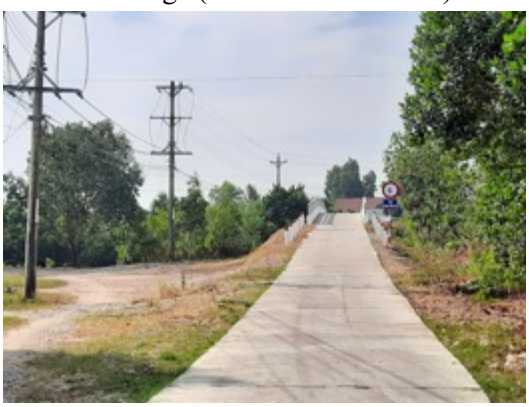
b) Sluice construction and upgradation

453. Impacts on sensitive receptors due to sluice construction are presented in *Table 84*.

Table 84: Impacts on sensitive objects in the sluice construction areas

No.	Sensitive Areas	Impacts and risks
1	**Sluice T5-1**	
1.1	Branch Kenh Mot - Giong Ke Secondary School (100m from the sluice)	– Type of impacts and risks: (i) impacts of dust, air, noise and vibration pollution;

No.	Sensitive Areas	Impacts and risks
		(ii) risk of traffic accidents; and (iii) school student distraction. – Affected objects: school students (272 people) and teachers (40 people), parents of school students (about 270 people) – Duration: 6 months. – Frequency: school hours and travel time (from 6:30 to 12:00 and from 13:00 to 17:00) from Mondays to Fridays. – Level of impacts: small, short term and mitigable because (i) the school is quite far from the construction site (100m); (ii) only 20% students and teachers passing through the construction site; (iii) the impacts and risks only happen in short of time; and (iv) mitigation measures will be applied to mitigate the impacts and risks in *Chapter 5*.
2	**Sluice T6-1**	
2.1	Binh Giang CPC (160m from the sluice) 	– Type of impacts and risks: (i) Impacts of dust, air, noise and vibration pollution; (ii) Impacts on people's access to the Committe; and (iii) Risks of traffic accidents. – Affected objects: 70-90 peole – Duration: 6 months. – Frequency: 7h00-11h30 and 13h00-17h00 from Mondays to Fridays, and 7h00-11h30 for Saturdays. – Level of impacts: negligible, short term and can be mitigated because (i) the school is quite far from the construction site (160m); (ii) only 20% people passing through the construction site to the PPC; (iii) the impacts and risks only happen in short of time; and (iv) mitigation measures will be applied to mitigate the impacts and risks in *Chapter 5*.
2.2	Binh Giang Secondary School (360m from the sluice) 	– Type of impacts and risks: (i) impacts of dust, air, noise and vibration pollution; (ii) risk of traffic accidents; and (iii) school student distraction. – Affected objects: school students (450 people) and teachers (50 people), parents of school students (about 250 people) – Duration: 6 months. – Frequency: school hours and travel time (from 6:30 to 12:00 and from 13:00 to 17:00) from Mondays to Fridays.

No.	Sensitive Areas	Impacts and risks
		– Level of impacts: negligible, short term and can be mitigated because (i) the school is quite far from the construction site (360m); (ii0 only 10% students and teachers passing through the construction site; (iii) the impacts and risks only happen in short of time; and (iv) mitigation measures will be applied to mitigate the impacts and risks in *Chapter 5*.
2.3	Two houses (1-5m from the sluice) 	– Type of impacts and risks: (i) Impacts of dust, air, noise and vibration pollution; (ii) Risk of traffic accidents; (iii) Impacts on structure of the houses; and (iv) Conflict with project workers. – Affected objects: 2 households – Duration: 6 months – Frequency: 8h00 to 17h00 – Level of impacts: moderate, short term and can be mitigated because the houses are quite close to the construction site. However, the impacts and risks happen in short time and can be mitigated by measure outlined in *Chapter 5*.
2.4	Kenh T5 bridge (56m from the sluice) 	– Type of impacts and risks: (i) Risk of collapse; and (ii) Impacts of movement of bridge users – Affected objects: bridge-users with 20-30 vehicles, equivalent to 20-60 people. – Duration: 6 months – Frequency: 8h00 to 17h00 – Level of impacts: moderate, short-term but mitigable. The impacts and risks occur short time and can be mitigated by measure outlined in *Chapter 5*.
3	**Sluice T6-4**	
3.1	Binh Giang Primary School - Vam Bien branch (200m away from the sluice) 	– Type of impacts and risks: (i) impacts of dust, air, noise and vibration pollution; (ii) risk of traffic accidents; and (iii) school student distraction. – Affected objects: school students (470 people) and teachers (50 people), parents of school students (about 250 people) – Duration: 6 months. – Frequency: school hours and travel time (from 6:30 to 12:00 and from 13:00 to 17:00) from Mondays to Fridays. – Level of impacts: negligible, short term and can be mitigated because (i) the

No.	Sensitive Areas	Impacts and risks
		school is quite far from the construction site (200m); (ii) only 10% students and teachers passing through the construction site; (iii) the impacts and risks only happen in short of time; and (iv) and mitigation measures will be applied to mitigate the impacts and risks in Chapter 5.
4	**Sluice T6-5**	
4.1	Pig farm (90m from the sluice) 	– Type of impacts and risks (i) Impacts of air, noise and vibration pollution; and (ii) Risk of traffic accidents. – Affected objects: 100 pigs and 2-3 workers of the farm – Duration: 6 months – Frequency: 8h00 to 17h00 – Level of impacts: small, short-term, mitigable because (i) the farm is quite far from the sluice; (ii) number of worker and pigs are small; (iii) a wall is available to separate the farm and the construction site; and (iv) the impacts and risks only happen in short of time. In addition, the impacts and risk are mitigable by measures in *Chapter 5*
4.2	The residential area (10m from the sluice)	– Type of impacts and risks (i) Noise pollution caused by ships transporting construction materials; and (ii) Impacts of air, noise and vibration pollution due to construction equipment and machinary for the project. – Affected objects: 20 households – Duration: 24 months – Frequency: about 3-5 minutes (due to noise from transportation) and from 8h00 -17h00 (from construction activities) – Impact level: from negligible to moderate, short-term and mitigable due to (i) construction time is short; (ii) small number of affected pepple; (iii) the impacts and risks only happen in short of time; and (iv) minimized by measures in *Chapter 5*.
5	**Sluice K3-7**	
5.1	Siviranba Chanpa Pagoda (240m from the sluice)	– Type of impacts and risks: (i) impacts of dust, air, noise and vibration pollution;

No.	Sensitive Areas	Impacts and risks
		(ii) risk of traffic accidents; and (iii) visitors distraction. – Affected objects: school students (272 people) and teachers (40 people), parents of school students (about 270 people) – Duration: 6 months. – Frequency: school hours and travel time (from 6:30 – 12:00 and 13:00 to 17:00) from Mondays to Fridays. – Level of impacts: small, short term, and can be mitigated due to (i) the school is quite far from the construction site (100m); (ii) only 20% students and teachers passing through the construction site; (iii) the impacts and risks only happen in short of time; and (iv) mitigation measures will be applied to mitigate the impacts and risks in *Chapter 5*.
5.2	Ranh Hat Hamlet cultural house (160m from the sluice) 	– Type of impacts and risks (i) Impacts on access to the Cultural House during local holidays; and (ii) Risk of traffic accidents between people and construction vehicles – Affected objects: 70 people – Duration: about 2-3 hours – Frequency: 3 times per month – Level of impacts: small, intermittent, short-term and mitigable due to (i) meetings usually take place in the evening; (ii) the house is quite far from the sluice; and (iii) about 20% people passing througth the site to the house.
6	**Sluice VR-1**	
6.1	Binh Son Primary School (about 100m away from the sluice 	– Type of impacts and risks: (i) impacts of dust, air, noise and vibration pollution; (ii) risk of traffic accidents; and (iii) school student distraction. – Affected objects: school students (470 people) and teachers (50 people), parents of school students (about 250 people) – Duration: 6 months. – Frequency: school hours and travel time (from 6:30 to 12:00 and from 13:00 to 17:00) from Mondays to Fridays. – Level of impacts: small, short term and can be mitigated because (i) the school is quite far from the construction site (100m); (ii) only 10% students and teachers passing through the

No.	Sensitive Areas	Impacts and risks
		construction site; and (iii) mitigation measures will be applied to mitigate the impacts and risks in *Chapter 5*.
6.2	Binh Son Secondary School - High School (about 100m away from the sluice) 	– Type of impacts and risks: (i) impacts of dust, air, noise and vibration pollution; (ii) risk of traffic accidents; and (iii) school student distraction. – Type of impacts and risks: (i) impacts of dust, air, noise and vibration pollution; (ii) risk of traffic accidents; and (iii) school student distraction. – Affected objects: school students (650 people) and teachers (50 people), parents of school students (about 200 people) – Duration: 6 months. – Frequency: school hours and travel time (from 6:30 to 12:00 and from 13:00 to 17:00) from Mondays to Fridays. – Level of impacts: small, short term and can be mitigated because (i) the school is quite far from the construction site (100m); (ii) only 10% students and teachers passing through the construction site; and (iii) mitigation measures will be applied to mitigate the impacts and risks in *Chapter 5*.
6.3	Binh Son Commune Health Center (about 150m far from the sluice) 	– Type of impacts and risks: (i) Impacts of air, noise and vibration pollution; and (ii) Risk of traffic accidents – Affected objects: 30 people, including patients, their relatives and center staff – Duration: 8h00-17h00 – Frequency: 6 months – Level of impacts: small, short term and can be mitigated because (i) the center is quite far from the construction site (150m); (ii) only 10% people passing through the construction site to the center ;and (iii) mitigation measures will be applied to mitigate the impacts and risks in *Chapter 5*.
6.4	Temple of the Lady of Vam Ray (about 150m away from the sluice)	– Type of impacts and risks: (i) Impacts of air, noise and vibration pollution; (ii) and risk of traffic accidents for people going to temples on full moon days, first days and major Buddhist holidays – Affected objects: About 10 visitors for normal days and 100 visitors for holidays – Duration: 6 months.

No.	Sensitive Areas	Impacts and risks
		– Frequency: 7h00-16h00 for normal days and 6h00-19h00 for Buddish holidays. – Level of impacts: negligible, short term and can be mitigated because (i) the temple is quite far from the construction site (150m); (ii) only 10% students and teachers passing through the construction site; (iii) mitigation measures will be applied to mitigate the impacts and risks in *Chapter 5*.

c) Road and power lines construction

454. Impacts on sensitive receptors due to road and power lines construction are presented in *Table 85*.

Table 85: Impacts on sensitive objects in the road and power line construction area

No.	Sensitive Areas	Impacts and risks
1	Residential cluster from NH 80 to Canal 200	– Type of impacts and risks (i) Impacts on dust, noise, and vibration pollution; (ii) Limit access to houses and other properties; (iii) Impacts on house quality due to vibration; (iv) Risk of local flooding; and (iv) Risk of traffic accidents – Affected objects: 74 households – Duration: 12 months – Frequency: daily, from 8h00 to 17h00 – Impact level: small to moderate, short-term and mitigable due to (i) rolling method will be applied for the road; (ii) short construction time (12 months); (iii) the road is close to Binh Giang 1 canal leading to quick drainage; (iv) having space for the temporary road; (v) mitigation measure will be applied as mentioned in Chapter 5
2	Ranh Hat Hamlet Cultural House	– Type of impacts and risks: (i) Impacts on dust, noise, and vibration pollution; and (ii) Risk of traffic accidents – Affected objects: 70 people – Duration: 12 months – Frequency: 3 times per month. – Impact level: small, short-term and mitigable due to (i) rolling method will be applied for the road; (ii) short construction time (12 months); (iii) the road is close to Binh Giang 1 canal leading to quick drainage; (iv) having space for the temporary road; (v) mitigation measure will applied in *Chapter 5*.
3	Fruit orchards along the route	– Type of impacts and risks (i) Impacts on the growth of trees of death due to wastewater and solid waste of workers and other construction activities, and rainwater runoff containing pollutants; (ii) Limit access to gardens – Affected objects: gardens along the route – Duration: 12 months – Frequency: rainy days – Impact level: small, short-term and mitigable due to (i) rolling method will be applied for the road; (ii) short construction time (12 months); (iii) the road is close to Binh Giang 1 canal leading to quick drainage; (iv) having space for the temporary road; (v) small construction workers (3 teams with 10 workers per team); and (iv) mitigation measure will applied in *Chapter 5*.

4.5. IMPACTS AND RISKS IN THE OPERATION PHASE

4.5.1. Generic impacts

4.5.1.1. Dust and Exhausted Gases

455. Once the connecting road and bridges are operational, the traffic flow rate will experience a significant increase. As a result, the ambient air in the residential areas near these items will be impacted by the dust and gas emissions from the traffic on the road and bridges.

456. Therefore, it is assed to be "small" to the air quality and people living along the road and near the bridges because (i) the air quality in the area is quite good and has no sign of pollution; (ii) tree lines along the road planted in the project will help reduce the air pollution; (iii) people's awareness on limiting use of fossil fuels (petrol, oil, etc.) is raising, biogasoline (E5) and electric bikes are used more popular recently; (iv) the road and bridges will be cleaned periodically by a professional and experienced unit under the management of the province; (v) traffic and warning signs are established suitably for characteristics of each area; and (vi) there are few people living along the road and bridges. However, the impact is long term (during the life span of the road and bridges).

4.5.1.2. Noise and Vibration

a) Noise and vibration from vehicles

457. The flow of vehicles will cause noise and vibrations on the road and bridges (*Table 84*), affecting the living conditions of the adjacent residents. According to *Table 87*, noise levels at 20m from the source are within the acceptable limits of QCVN 26:2010/BTNMT (between 6 a.m. and 9 p.m.). As a result of the low population density in the project area, the impact of noise on residents is assessed as low but it happen in a long term (during the life span of the road and bridges).

Table 86: Noise levels of some vehicles

No.	Type of vehicles	Noise level (dBA)
1	4-seat cars	77
1	4-stroke motorbikes	70
2	2-stroke motorbikes	73

Table 87: Maximum noise level from the distance to the source

No.	Type of vehicles	Noise from the distance to the source (dBA)				
		10m	20m	50m	100m	200m
1	4-seat cars	60.5	54.5	46.5	40.5	34.5
2	4-stroke motorbikes	53.5	47.5	39.5	33.5	27.5
3	2-stroke motorbikes	56.5	50.5	42.5	36.5	30.5
QCVN 26:2010/BTNMT (6h-21h)		**70**				

b) Noise of the transformers

458. Operating transformers of power lines generate mainly noise, about 75dB. However, the noise level is small and has a negligible, intermittent and long term impact on people and surrounding areas because few peole living near the tranformers and the transformer station operates intermittently based on water supply needs of the locals.

4.5.1.3. Domestic Wastewater and Solid Wastes

459. Experiences from similar projects in Kien Giang (now An Giang) province, the operation and maintenance of each sluice generates 1kg/month of oily rags. Therefore, the operation and maintenance of the 41 sluices (23 newly built sluices and 18 improved sluices) may generate oily rags with a maximum volume of approximately 41 kg/month and almost no domestic waste of any type.

460. The hazardous waste will have two primary effects if it is not collected correctly. First and foremost, the oil and grease will make their way into the water, thereby directly affecting aquatic species in the canals where the maintenance is conducted, including Canal 200, Don Dong canal, Tuan Thong canal, the canal along the sea dike. This has the potential to cause the death of aquatic animals and vegetation, as well as impede their growth. Secondly, the existence of heavy metal elements in the waste will result in the contamination of the food chain, which poses a significant threat to human health.

461. However, the waste will be collected, transported and treated by relevant units. *Therefore, the impacts is negligible and only occurring during the maintenance time and can be managed easily*.

4.5.1.4. Increase in traffic accidents

462. When the bridges and the connecting road are in use, road safety is an essential concern due to an increase in the number of vehicles on the road. Accidents, injuries, or deaths that happen because of actions on the road, at the project sites. The environment, living organisms and human health are at risk in the event of an accidental leak involving oil, fuel, or any number of other dangerous compounds. However, this risk is minimal since the number of vehicles will only increase by approximately 20% compared to the pre-project levels. n addition, before the operation, the Division of Water Resources and the Transportation Agency will develop an Emergency Contingency Plan that will address situations involving people, probable spills of oil, diesel, and hazardous materials and their cleanup, medical evacuation, etc. This helps to reduce risk and accidents while also allowing for quick and professional response in the event of an accident. Efforts have been made throughout the design of the project to incorporate all road safety infrastructure (lights, signs, etc.) to reduce road safety risks.

4.5.1.5. Damage to traffic roads on the bridges over the sluices

463. The causes of these incidents can be the following: (i) Quality of construction work does not meet technical requirements; (ii) Maintenance and protection of the road and bridges and are not well carried out; (iii) Due to direct impacts of extreme hydrometeorological such as large rainstorm, heavy flooding combined with storm, etc.

464. When the incident occurs, it will have a significant impact on the lives of those who use the road and bridges, as well as the locals who live nearby. In addition, the road and bridges

will be damaged. However, the impact is small because (i) the CSC and PPMU will carefully inspect the road and bridges during construction; (ii) the operation units will maintain the road and bridges on a regular basis; (iii) local authorities will raise awareness of the protection of the bridges and roads; and (iv) repairs will be carried out immediately following the incident.

4.5.2. Site-specific impacts

4.5.2.1. Site-specific impacts due to the operation of the road

a) Impacts on water drainage

465. Water drainage: Currently, most of the households along the connecting road are at the same level as the current road. Once the road is constructed, the road surface will be elevated about 20-30cm higher than the ground level of the houses. This will affect access to the houses as well as drainage and local flooding during heavy rains. However, drainage culverts will be installed along the road, and since there are fields behind the houses, water can drain into the fields or drainage culverts. Therefore, this impact is considered minor.

b) Risk of the road damages

466. The causes of the risk can be the following: (i) Quality of construction work does not meet technical requirements; (ii) Maintenance and protection of the road are not well carried out; (iii) Due to direct impacts of extreme hydrometeorological such as large rainstorm, heavy flooding combined with storm, etc.

467. When the incident occurs, it will have a significant impact on the lives of those who use the road, as well as the locals who live nearby. In addition, the road will be damaged. However, the impact is small because (i) the CSC and PPMU will carefully inspect the road during construction; (ii) the operation units will maintain the road a regular basis; (iii) local authorities will raise awareness of the protection of the road; and (iv) repairs will be carried out immediately following the incident.

4.5.2.2. Site-specific impacts due to operation of the power lines

468. **Impacts due to electromagnetic field**: The power line's high-voltage conductors will generate electromagnetic fields, resulting in power outages, air pollution, noise, and an impact on electronic equipment and human health in the project area. Interference and signal disruption can impact the functionality of transmission devices, wireless equipment, and radios. Individuals residing within the electromagnetic field zone may encounter impacts on their nervous and circulatory systems, which can potentially lead to the development of both chronic and acute hazardous diseases. However, the impact is small and short term because (i) the standard of electromagnetic field will strictly follow during the installation and the operation of the power lines and (ii) the operation unit will be maintance the power lines on a regular basis.

4.5.2.3. Site-specific impacts due to operation of the sluices

a) Degradation of Surface Water Quality

469. **Impacts due to the transition from the rice to rice-shrimp model**: In the rice-shrimp farming system, in the dry season, when the canal water is saline, it is used for shrimp farming.

When the rainy season brings fresh water, it is used for rice cultivation. After one shrimp crop is harvested, a rice crop is planted. The organic waste from the bottom of the field after the shrimp harvest makes the field more fertile, allowing farmers to apply only a small amount of fertilizer to meet the crop's needs. Moreover, to prevent negative impacts on the shrimp, farmers apply integrated disease prevention measures, reducing the use of pesticides by 70-80%. Conversely, when shrimp farming follows a rice crop, the pond bottom has undergone mineralization, reducing harmful substances and preventing shrimp farming areas from deteriorating due to long-term salinity in the soil. This process also helps eliminate pathogens in the field, stabilizes the environment, reduces the need for chemicals and medicines in shrimp farming, cuts production costs, and increases profits [*Directorate of Fisheries, 2015*][15]. *In addition, farmers will have access to training and demonstration models that will help them reduce their chemical usage and manage water quality during farming. So, instead of getting worse, the water quality will get better.*

b) Impacts of saline and/or brackish water on construction works

470. Given that the 23 sluices will be built at the canals which are impacted by salinity, saline/brackish water will impact construction materials. This results in the structures' corrosion, which in turn reduces their lifespan and impacts the water intake for production. *The impact is negligible since salt-tolerant construction materials are chosen in the design stage of the project.*

c) Damage to sluice gates

471. As analyzed above, risks and incidents that may arise are the concerns of the project. Risks and incidents happening during operation are mainly derived from subjective causes; sometimes there are objective reasons. The reasons that might lead to risks and incidents are: (i) Technical quality of the works is not guaranteed from the beginning; (ii) Operation of these sluice gates does not follow the regulations; (iii) Regular maintenance activities do not comply with regulations; (iv) People lacking awareness of the protection of the works.

472. Damage incidents to sluice gates are among the most serious incidents in terms of the environment and may cause adverse impacts on the ecosystem and socio-economic activities in the area affected by the incident. If a sluicegate is damaged, freshwater will quickly enter into shrimp ponds, leading to severe consequences, including shrimp death. Therefore, the impacts is moderate and short term because (i) the CSC and PPMU will carefully inspect the sluices during construction; (ii) the operation units will maintain the sluices a regular basis; (iii) local authorities will raise awareness of the protection of the sluice; and (iv) repairs will be carried out immediately following the incident.

d) Increase in water use conflict

473. Constructing sluices will promote aquaculture development. Aquaculture can use a huge quantity of water for production while discharging its wastes causing water polluted, which leads to a shortage of water for other users. This will become more serious under effects of the climate change with an increased temperature and sea level rise. Impacts are assessed below:

[15] https://tongcucthuysan.gov.vn/vi-vn/nu%C3%B4i-tr%E1%BB%93ng-th%E1%BB%A7y-s%E1%BA%A3n/-nu%C3%B4i-th%E1%BB%A7y-s%E1%BA%A3n/doc-tin/004148/2018-04-05/hieu-qua-va-giai-phap-phat-trien-ben-vung-mo-hinh-nuoi-tom-lua

d.1). Impacts on freshwater supply for agricultural production

475. The completion of the project will lead to a shift from 2-rice-crop to shrimp-rice. During the dry season with high salinity, aquaculture is practiced, while rice cultivation takes place during the rainy season. However, in the region, there is a period of flood drainage (September and October), so farmers start rice cultivation in November, concluding it by February. In April, when salinity increases, farmers commence shrimp farming, concluding the shrimp farming season by the end of August. Therefore, from early November of the previous year to the end of February of the following year, farmers need fresh water for rice cultivation. In March, fresh water is drained and saltwater is taken for aquaculture.

476. According to the simulation results, the total flow through the freshwater supply canals (Tuan Thong, Vam Ray, No. 3, No. 6, No. 9) is 3 to 4 times greater than the region's freshwater demand. The water level in the area steadily declines from 1.1m (November) to 0.2m (March) throughout the period when freshwater is required for the Winter-Spring rice crop (November of the previous year to early March of the following year). Farmers can readily deliver water to their fields at this water level.

477. As a result, if finished, the project will ensure a fresh water supply for rice production during the transition from the 2-rice-crop model to the shrimp-rice model, even in years of low water availability, the impact will be negligible and end when the entire 5,500ha of rice land is transformed to shrimp-rice model.

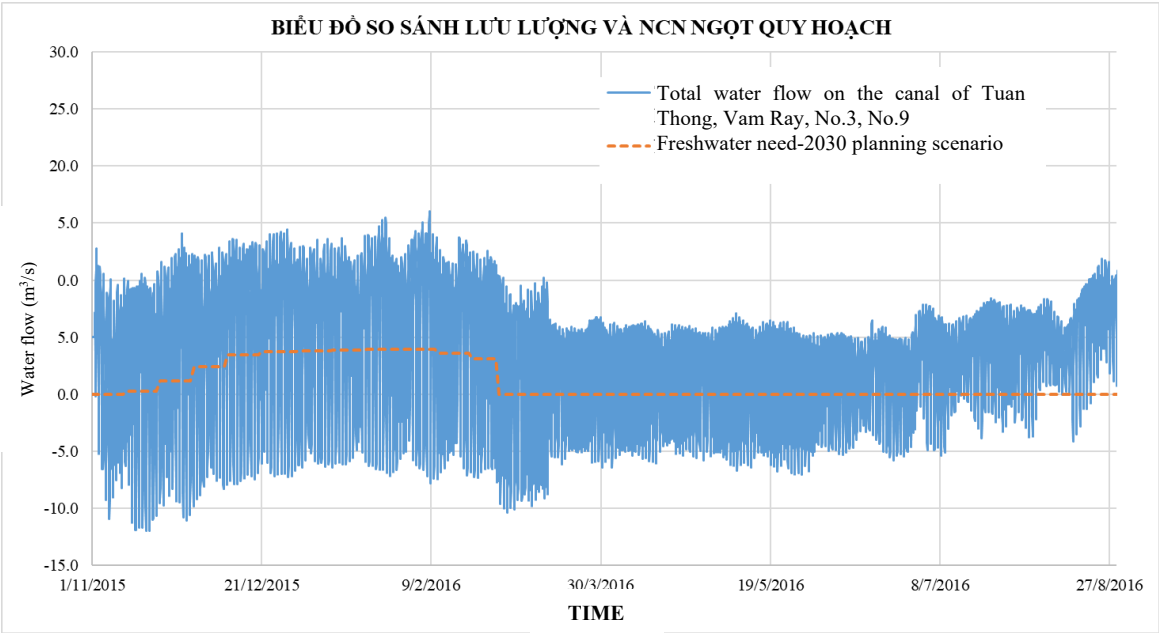


Figure 83: Comparision of the total freshwater flow through the canals of Tuan Thong, Vam Ray, No.3, No.6, and No. 9 with the total freshwater demand using the low water hydrological year 2015-2016 – Scenario planning

d.2). Impacts on saline/brackish water supply for shrimp season in the transitioned model

478. When the project is finished, the production model north of the Don Dong Canal will shift to a shrimp-rice model. As previously indicated, from March 15 to August 31, irrigation works in the project area will be run as follows to supply saline water for aquaculture in both the south and north of Don Dong canal:

- The sluices of Kenh Hai, Kenh Bon, Kenh Nam, Kenh Bay, Kenh Tam, and Kenh Muoi: are open to supply saline/brackish water for the project area.

- Sluices for flood water drainage, including Kenh Nam (Tuan Thong), Kenh Ba, Kenh Sau, Kenh Chin, and Vam Ray: operated by the operational procedure of the LXQ irrigation system (closed when Chau Doc station's water level lower than 2.5m and open when Chau Doc station's water level higher than 2.5m).
- Existing sluices that separate saline and freshwater along Don Dong canal: open to supply saline/brackish water.
- Sluices that separate saline and freshwater along the canals of Tuan Thong (Vo Van Kiet canal), No.3, No.6, No.9, and Vam Ray: are closed to prevent salinity intrusion for the desalination area.

479. The following is the calculation results of the ability to supply saline/brackish water when the project is finished up to 2030 using hydrological data from the low water year (year 2016):

- Salinity: The salt concentration in the project area is between 18 and 22 g/L (*Figure 84*) at the start of the shrimp crop, which is adequate for shrimp release. The salinity in April ranges between 20 and 30g/L, and with this salinity, water is required to dilute before providing shrimp. A network of alternating freshwater canals in the area, including the Vam Ray canal, Tuan Thong canal, Canal 3, and Canal 6, makes it simple to obtain fresh water for shirmp salinity reduction. The salinity of the canals reduces from June to August due to a lot of rainwater, ranging from 2 to 10 g/L (*Figure 85*). As a result, care should be taken to drain rainwater from fields to maintain salt in the pond for shrimp growth.
- Water level: The water level in the north of Don Dong canal is as high as the water level in the south of Don Dong canal and depends mainly on West Sea tides. In years of low water levels, such as 2016, the water level during low tides is very low, therefore the period for taking saline water is approximately 10 to 11 hours per day in both the north and south of the Don Dong canal (Figure 86).
- Saline water flow: A comparison between the inflow of saline/brackish water through sluices (such as Kenh Hai, Kenh Tu + Kenh Nam, Kenh Bay + Kenh Tam, and Kenh Muoi) and the demand for such water reveals that the inflow of saline/brackish water through the sluices is significantly greater than the demand for salty/brackish water of their serving (*Figure 87* to *Figure 90*).

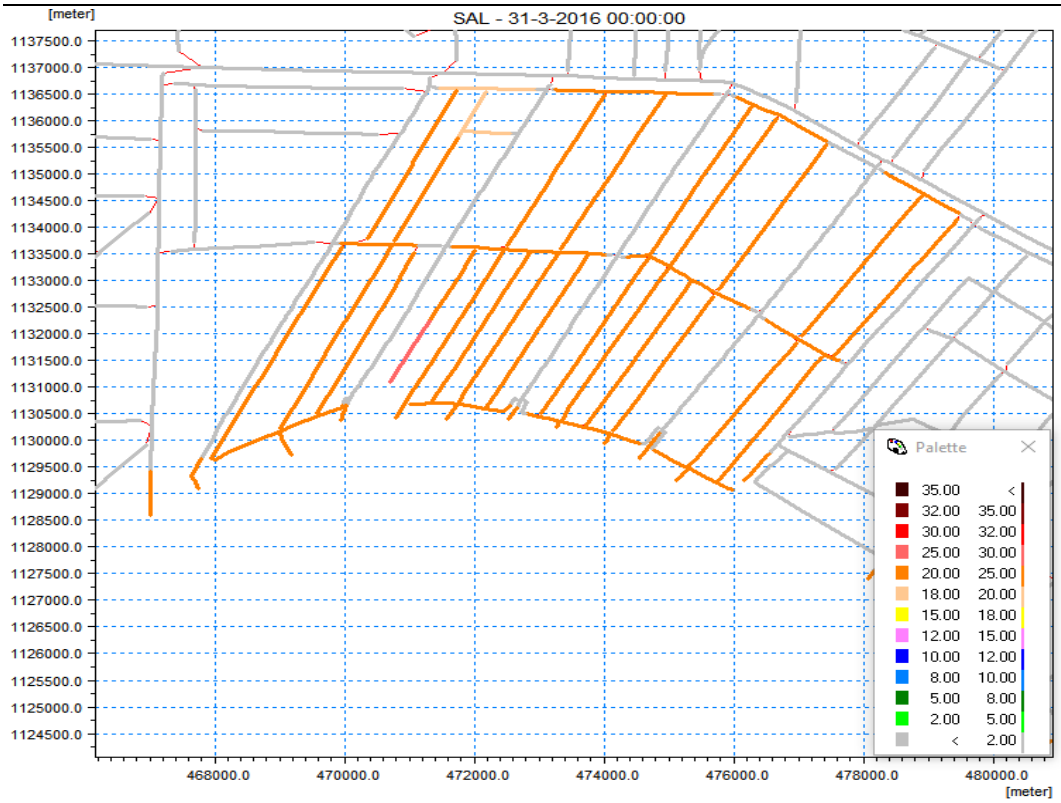


Figure 84: Distribution of salinity at the beginning of the shrimp season - planned in 2030

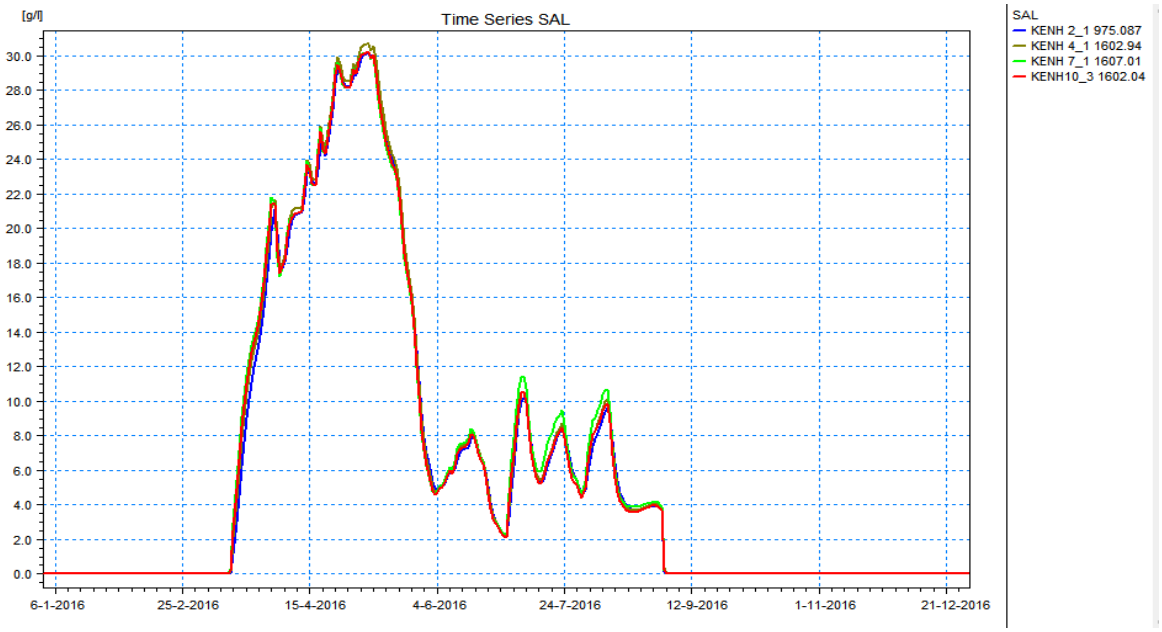


Figure 85: Salinity of canals in the north Don Dong canal in 2030

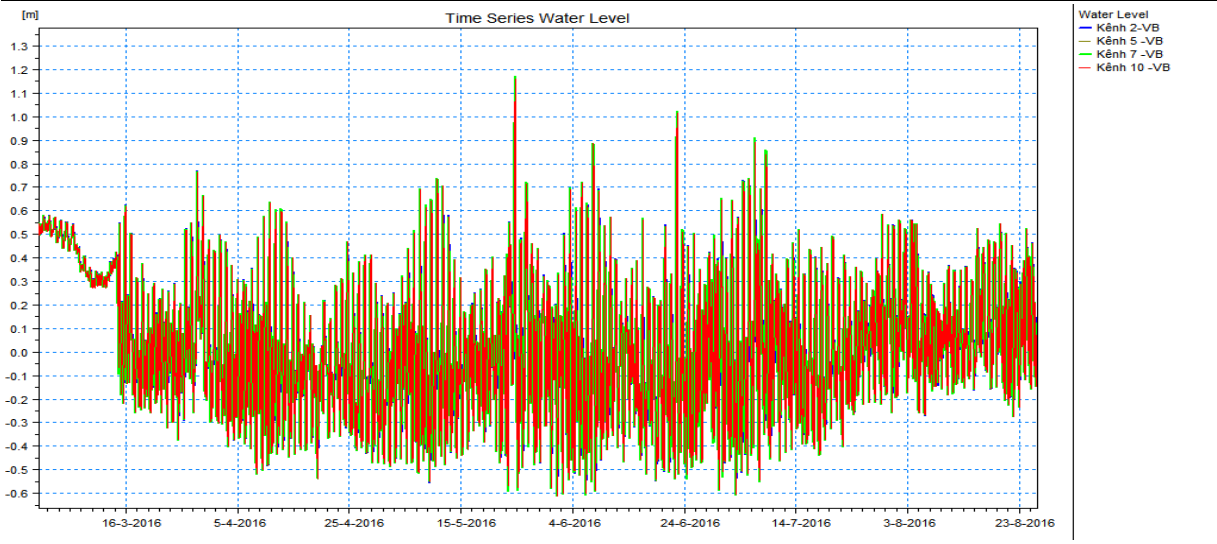


Figure 86: Water level of canals in the north Don Dong canal in 2030

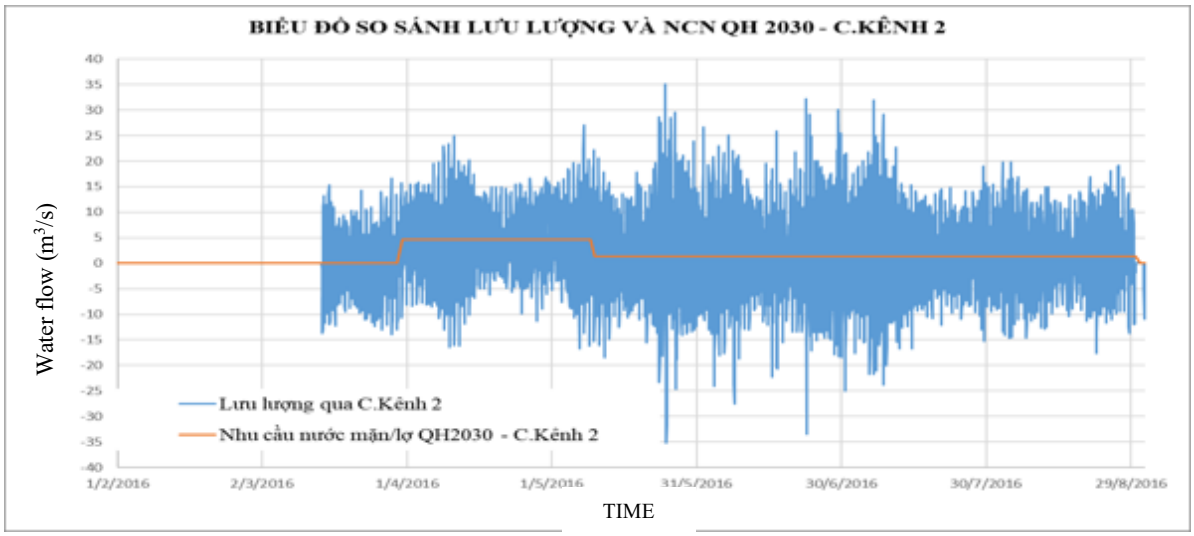


Figure 87: Comparision of the water flow through Kenh Hai sluice and salt/brackish water demand in its serving area in 2030

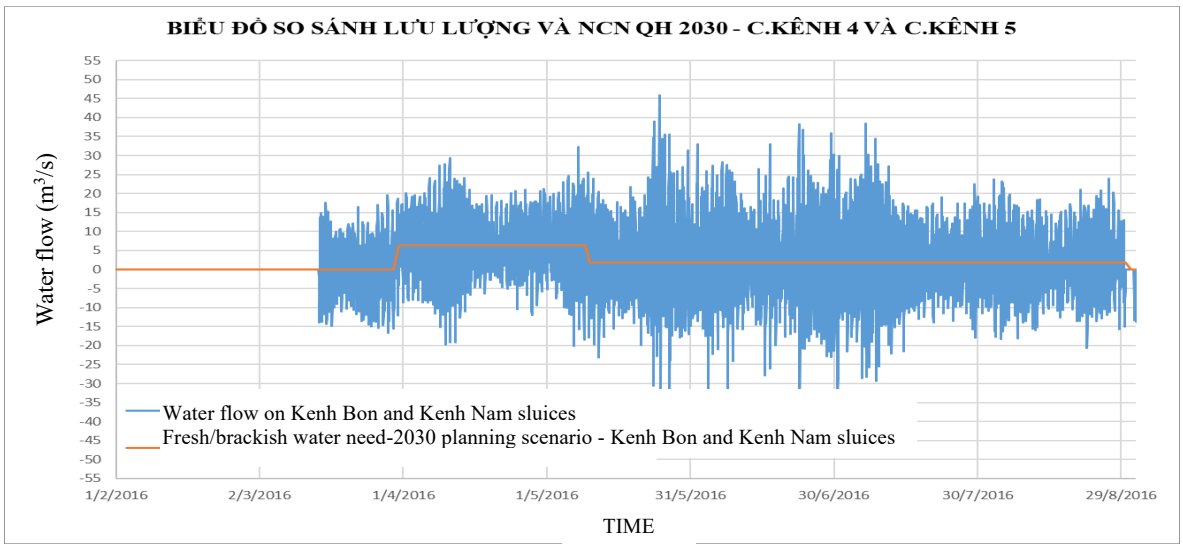


Figure 88: Comparision of the water flow through Kenh Bon and Kenh Nam sluices and salt/brackish water demand in their serving area in 2030

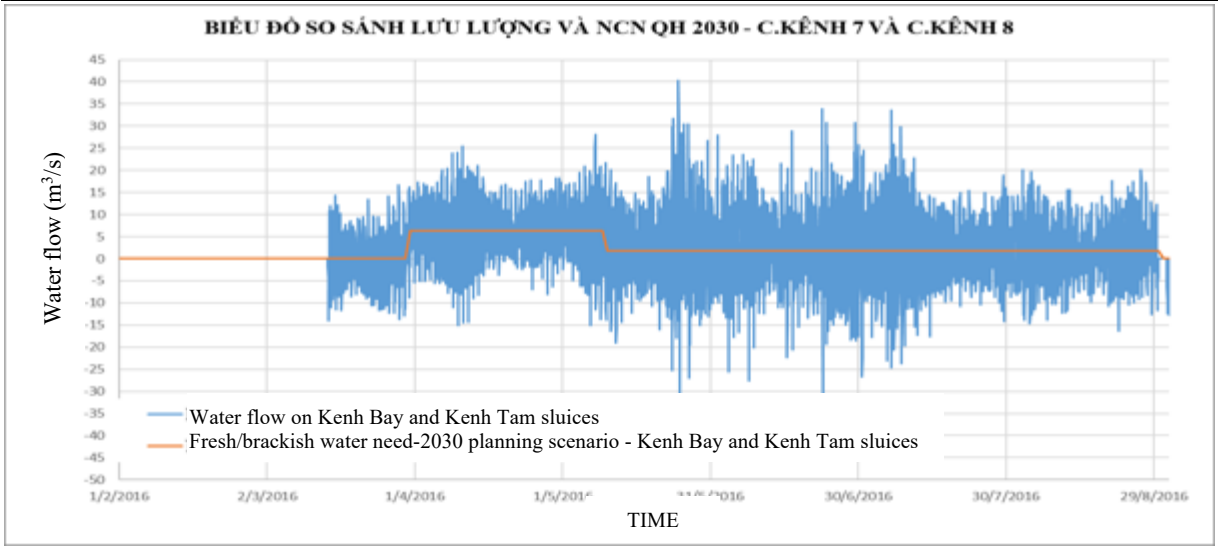


Figure 89: Comparision of the water flow through Kenh Bay and Kenh Tam sluices and salt/brackish water demand in their serving area in 2030

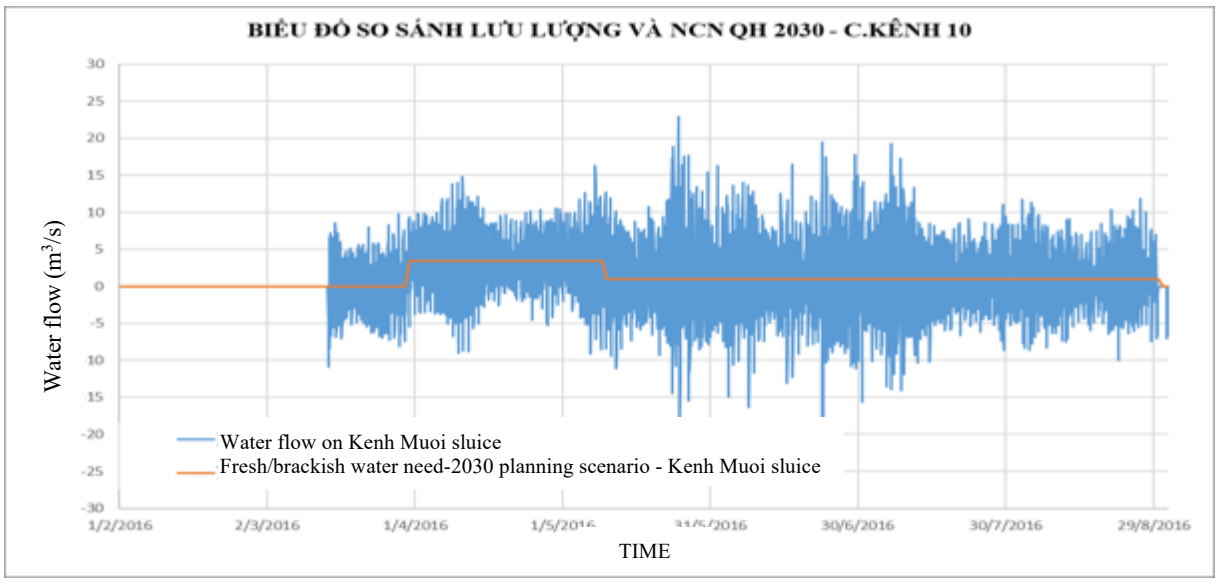


Figure 90: Comparision of the water flow through Kenh Muoi sluice and salt/brackish water demand in its serving area in 2030

480. Thus, saline or brackish water supply for aquaculture in the project area during the dry season will be ensured upon completion of the project. However, precipitation may fall during shrimp crop; in such cases, the project operation unit shall direct farmers to drain rainwater from the fields to maintain sufficient salinity in the pond for shrimp growth. Therefore, the impact is small and occurs from March 15 to August 31.

e) Impacts on aquatic life

e.1). Impacts on biodiversity

481. For most projects of sluice gate construction, given that alteration of water quality and water flow regime due to the closing of sluice in a long time would result in significant impacts on aquatic creatures (changing from freshwater to saline/brackish water and from open to closed ecological systems).

482. Currently, the project area is a freshwater ecology, and the predominant fish species in the region are freshwater fish. When the sluices are constructed, the area becomes a brackish

and freshwater ecology, creating favorable conditions for the development of both brackish and saltwater species. *Therefore, the impact on biodiversity is considered positive and long term*.

e.2). Temporary blockage of fish passage

483. When closing the sluice gates, fish can not traverse from the main rivers or the West Sea to the project area and vice versa. However, sluice gates will be closed in a short time so the impact on fish passage is low.

484. Given that turbulence appears, and ebb flow velocities exceed the maximum sustainable swimming capacities of aquatic species can obstruct the smooth passage of them through the gate. These velocities can be easily calculated from empirical formulae using estimates of the mean length and weight of sampled fish immigrating during the ebb flow period[16]:

$$\text{Max Outflow Velocity} < U_{ms} = \frac{L\,(n\,(1.1\,(W)^{-0.14})}{100}$$

Where: U_{ms} = maximum sustainable swimming speed; L = mean length of migrating fish; W = mean weight of migrating fish; n = constant = 3.

485. Using this formula, the optimistic velocity for aquatic species from the main rivers (migrate into the project area should be: (i) from 0.2 to 0.30 m/s for small-sized shrimp and fish; (ii) from 0.4 to 0.6 m/s for medium-sized fish (sizes 6 to 25 cm); (iv) from 0.6 to 1.2 m/s for large-sized fish (size over 25 cm); and (v) above 1.2 m/s, fish can not migrate from the main rivers into the project area.

486. Calculated velocities of the sluices with proposed dimensions show that velocities fluctuate from 0.15 - 1.2m/s even though maximum velocities at the 23 sluice gates are always lower than 1.2m/s. This means that the operation of 23 sluice gates will ensure the smooth passage of fish from the main rivers into the project area. *Therefore, operation of the sluices will not impact on fish passage.*

f) Impacts on waterway where the sluices are built

487. The canals where the sluices to be built are not designated as waterways, hence there are no special waterway requirements in place. However, there are still a few local boats moving agricultural and aquatic products along the canals, particularly during harvest season. As a result, the sluices' smaller size than those of the largest boats, as well as their closure, will have an impact on local people's movements.

488. As mentioned Section 4.4.3.2, on the canals Don Dong, No.200, No. 2, and the horizontal canal where sluices will be built, the majority of vessels are small boats weighing around 50 tons (*Figure 76*), primarily used for transporting agricultural materials and products. However, the density of boat traffic is low, averaging only 5-10 boats per day, but increases during periods when materials and outputs must be transported for production or harvest seasons. Although the amount is not large, these canals are also utilized for conveying shrimp farming materials and products. In order to provide water for shrimp farming, the sluices will be closed once they are operational. Closing the sluices will impact waterway of the local people.

489. *However, the impact is small and short term (during the sluice closing) and can be mitigated because (i) the selected sluice dimensions are the greatest in the area; (ii) the*

[16] Fisheries Assessment and Data Collection Methodologies, MRAG Ltd, April 2003

operational procedures for the sluices and alternative canal routes will be consulted with locals; (iii) local people and authorities will be informed at least two weeks before they are put into action; (iv) the canals where the sluices are constructed are primarily used during the rice season but the sluices only close during shrimp season; and (v) when the sluice gates are closed, there are multiple options for boat transportation within the project area (*Figure 91*).



Figure 91: A drawbridge "carrying" boats and ships over sluices and dams

g) Impacts on flood drainage

490. The LXQ irrigation system, in addition to the task of directing water, storing fresh water, and regulating saltwater intrusion, also has the task of draining floods for 498,141 hectares. This project area belongs to the LXQ irrigation system, so it is also responsible for draining rain/flood water. Therefore, operating 23 sluices of the project will likely impact the flood drainage ability of the region. Mathematical modeling is used to evaluate this impact.

491. The rainy season in the project area starts in May and lasts until the end of November. The flood season on the Hau River starts in June and ends at the end of November. Thus, rain/flood drainage needs to be considered from May until the end of November.

492. According to measured data of the big flood year 2011 at Chau Doc station, from January to July the water level at Chau Doc station is always less than 2m. Since the end of July, the water level at the station exceeded 2m. By early August, the water level rose to 2.3m and continued to rise rapidly to over 2.5m and peaked at 4.27m on October 12, 2011. Then the water level tended to decrease and by the end of November, the water level dropped to 2.4m and tended to decrease quickly *(Figure 92*). Hence, in the event of big floods (comparable to the 2011 flood, with a rainfall frequency of P10% at Rach Gia station and rainfall at other stations matching the 2011 data), the LXQ irrigation system will operate as follows:

- From the beginning of May to the end of July:
  - During this period, the water level at Chau Doc station is less than 2.5m, so the flood control sluices of the LXQ are closed to keep fresh water.
  - The sluices that separate saline and fresh water in the project area are close to prevent salinity intrusion in the freshwater production area.
  - The saltwater intake sluices in the project area are open to supply saltwater for aquaculture.
- In August:

- During this period, the water level at Chau Doc station is higher than 2.5m, so the flood control sluices of the LXQ are sealed in one direction to drain flood water.
- The sluices that separate saline and fresh water in the project area are close to prevent salinity intrusion into the freshwater production area.
- The saltwater intake sluices in the project area are open to supply saltwater for aquaculture. If there is a risk of flooding due to heavy rain, these sluices will be sealed in one direction to drain flood water. Once the water has been drained, the sluices will be open freely.

- From September to the end of November:
  - During this period, the water level at Chau Doc station is higher than 2.5m, so the flood control sluices of the LXQ are sealed in one direction to drain flood water.
  - The sluices that separate saline and fresh water in the project area are open freely to drain flood water.
  - The saltwater intake sluices in the project area are sealed in one direction to drain flood water.
  - If freshwater is required in a specific area during this time, the adjacent sluices will be closed to facilitate the supply of freshwater. Once the freshwater requirements are fulfilled, the sluices will be closed in one direction to facilitate the drainage of flood water.

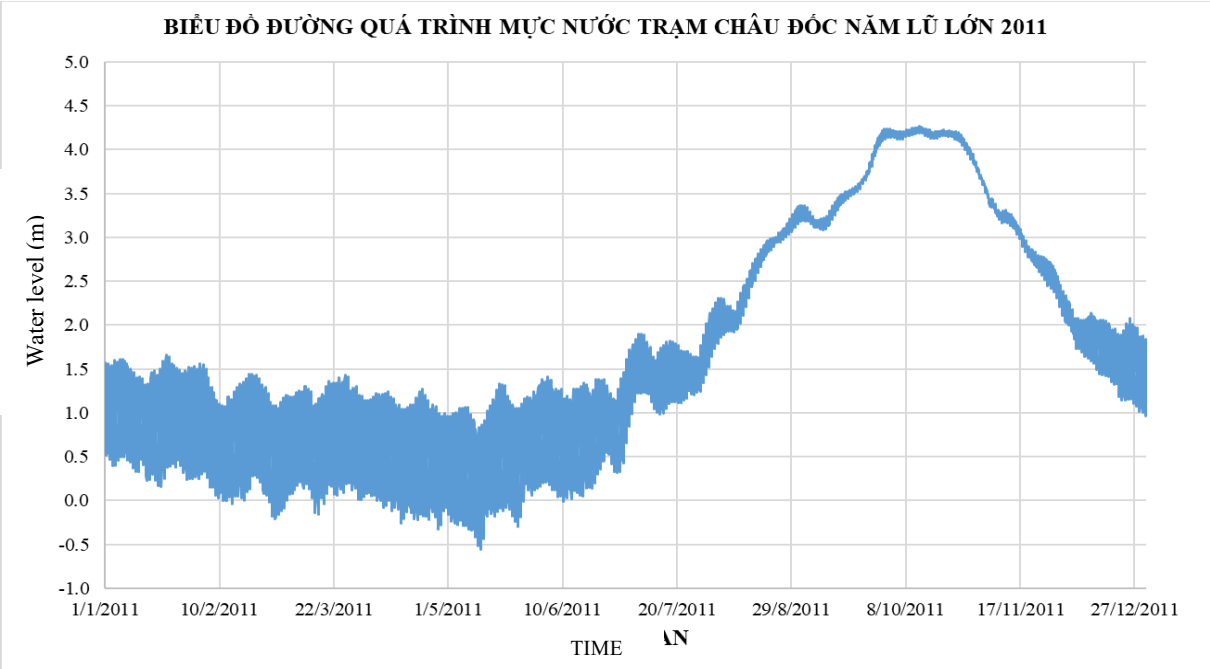


Figure 92: Water level measured at Chau Doc station in the big flood year of 2011

493. Simulation results of the floodwater drainage process in the project area with Hau River flood corresponding to the big flood year of 2011 and precipitation at the Rach Gia station with a 10% frequency; other areas with precipitation corresponding to the year of 2011 (see *Figure 20* to *Figure 26*):

- From June to the end of July, as the flood flow on the Hau River increases, the water level at the Chau Doc station remains below 2.5 m, while precipitation in the LXQ also experiences an upward trend. To maintain freshwater for the LXQ's production, the flood control sluices remain closed during this period. Consequently, the water level in the LXQ

region experienced a substantial increase, particularly in the drainage canals situated within the project area (including Tuan Thong, No. 3, No. 6, No. 9, and Vam Ray canals). The water level on these canals, in particular, reaches 1.30m by the end of July. The water level on the canals delivering brackish/saline water for aquaculture, on the other hand, is not high, with the highest water level reaching just +0.76m. Because sluices for brackish/saline water supply, such as those at Kenh Hai, Kenh Bon, Kenh Nam, Kenh Bay, Kenh Tam, and Kenh Muoi, operate freely in both directions, the water level in the aquaculture area is determined solely by the West Sea tide and local rainfall, rather than the upstream flood.

- From August to the end of November: Because the water level at Chau Doc station is more than 2.5m, the LXQ flood control sluices open one way to drain floodwater. The sluices for taking water for aquaculture remain open until the end of August, and they are closed in one direction to drain flood water from September. The water level in the project area at that time varies only between -0.2 and 0.9m. Thus, even in a big flood year like 2011, with a rain frequency of 10%, the LXQ's flood drainage capacity is still met after the project is completed.

494. *Furthermore, the project area is arranged in the form of a semi-dike between flood drainage canals, so they will not have an impact on the flood drainage canals and sluices of the LXQ in general, or the project area in particular.*

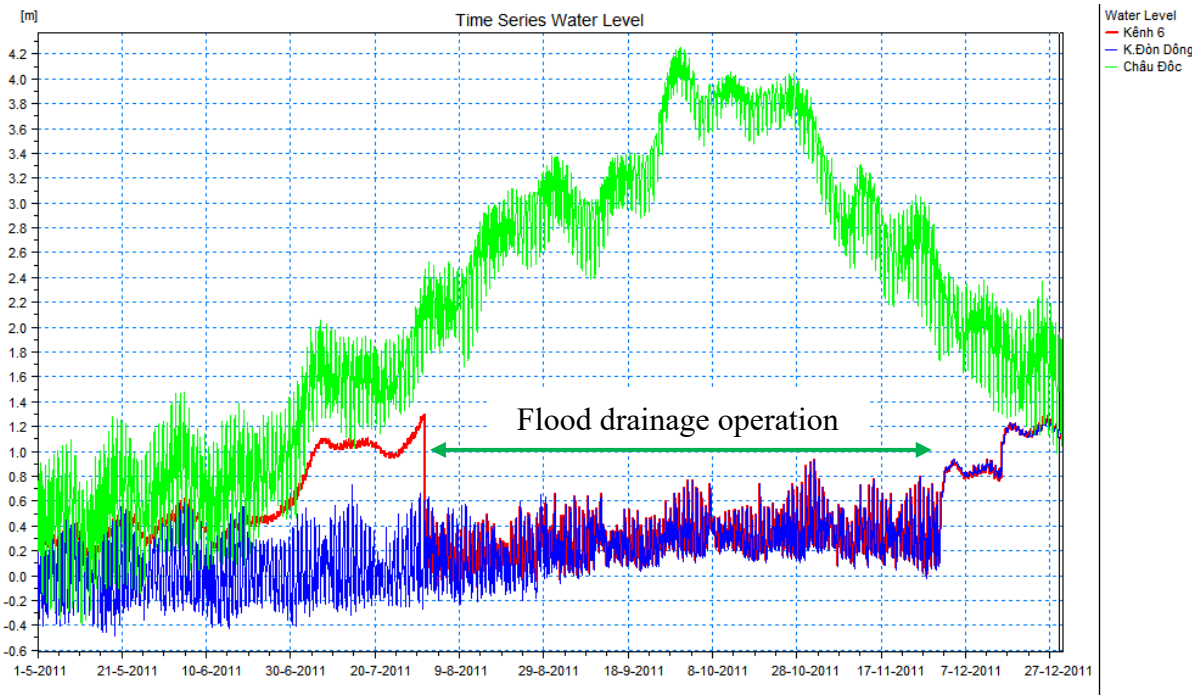


Figure 93: Simulation results of the water levels on some canals in the project area during the rainy season of a big flood year

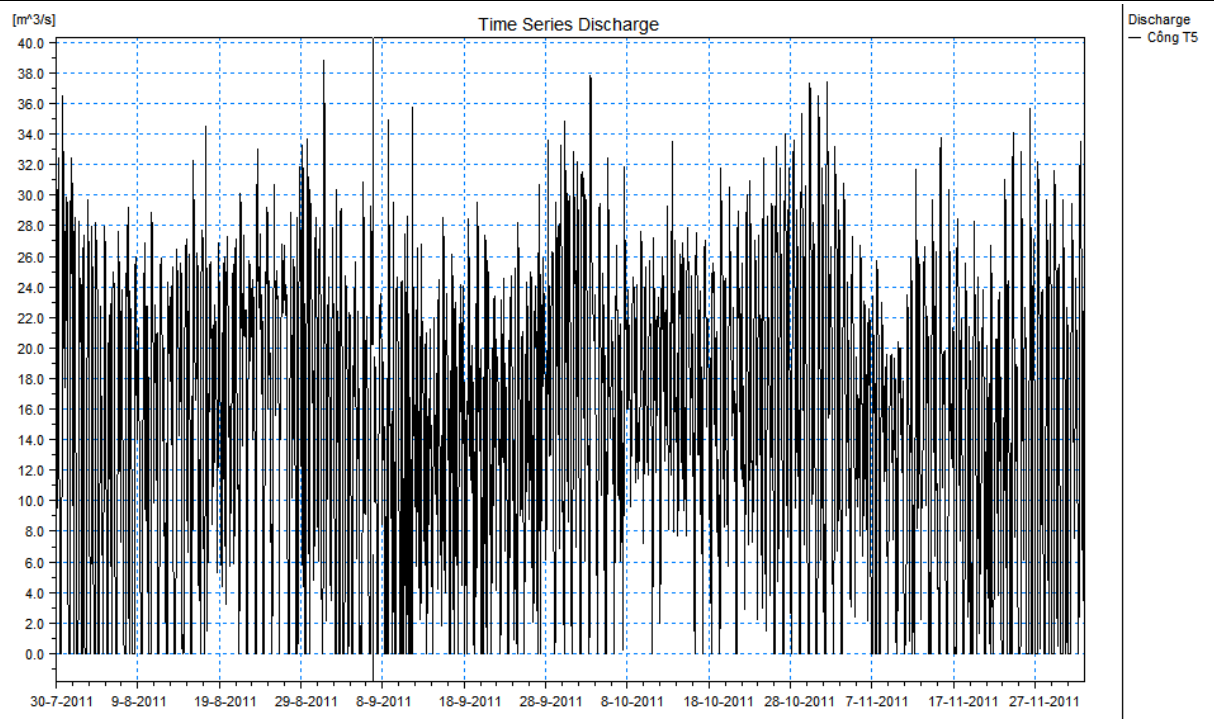


Figure 94: Water flow fluctuation of T5 sluice during flood drainage in the big flood year of 2011

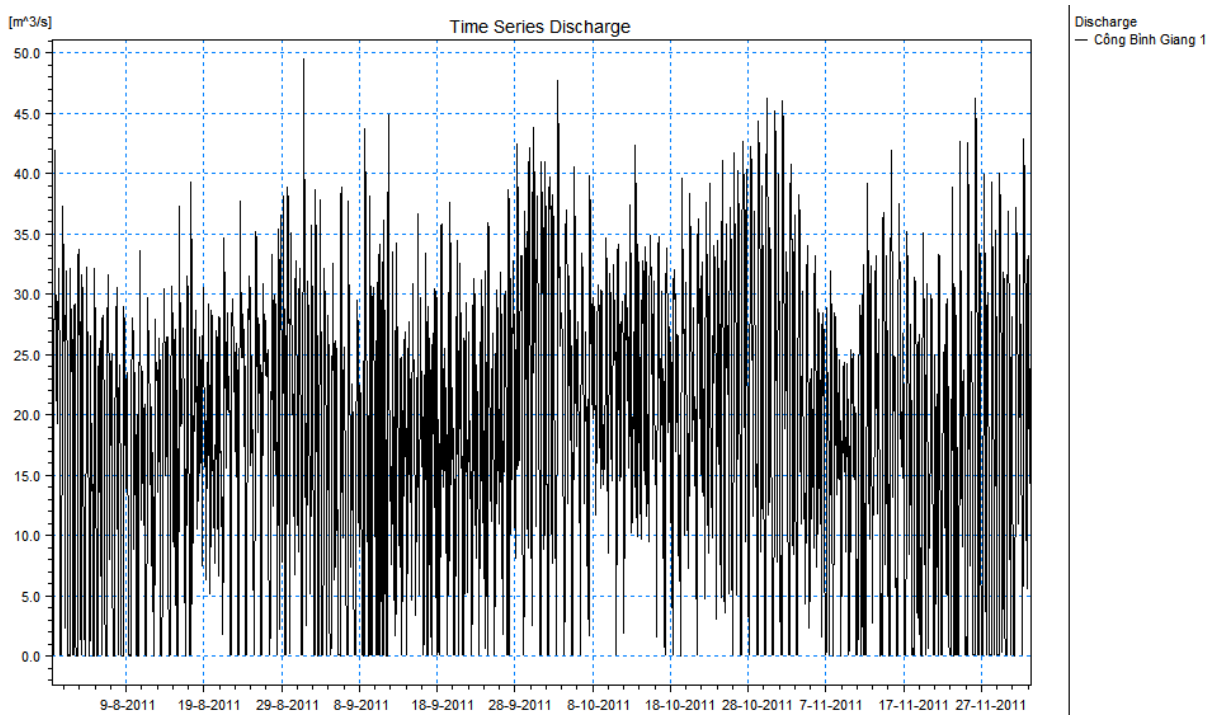


Figure 95: Water flow fluctuation of Binh Giang 1 sluice during flood drainage in the big flood year of 2011

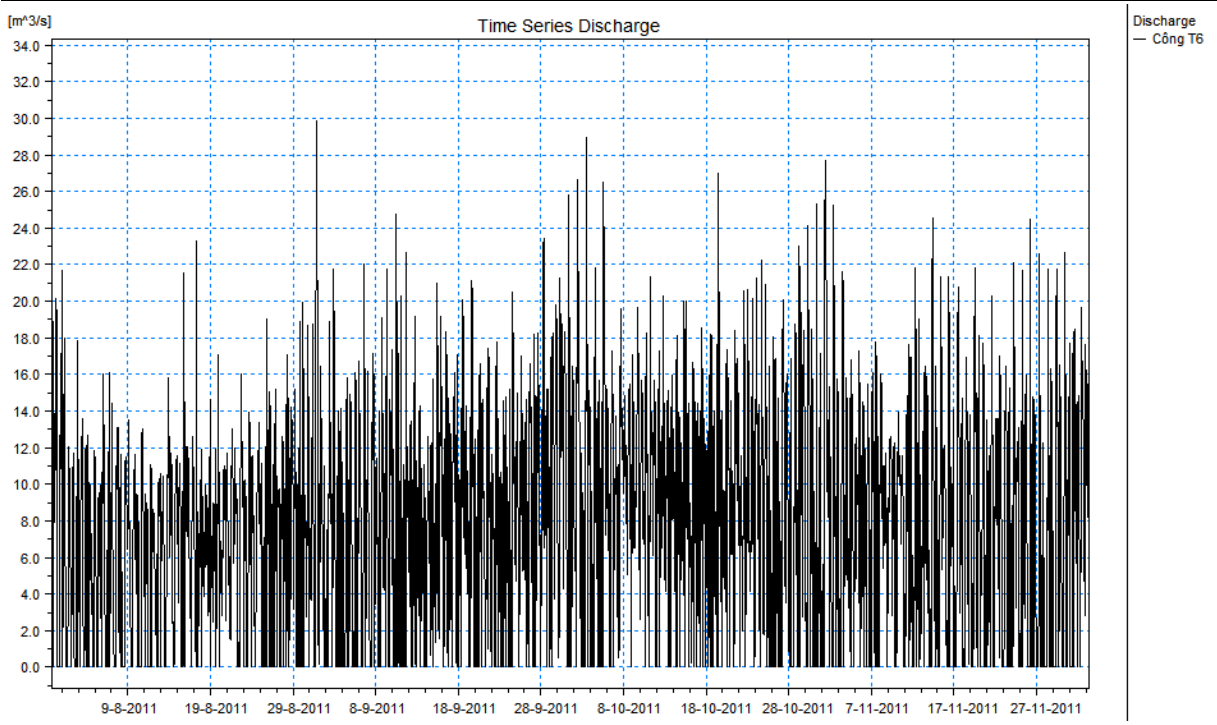


Figure 96: Water flow fluctuation of T6 sluice during flood drainage in the big flood year of 2011

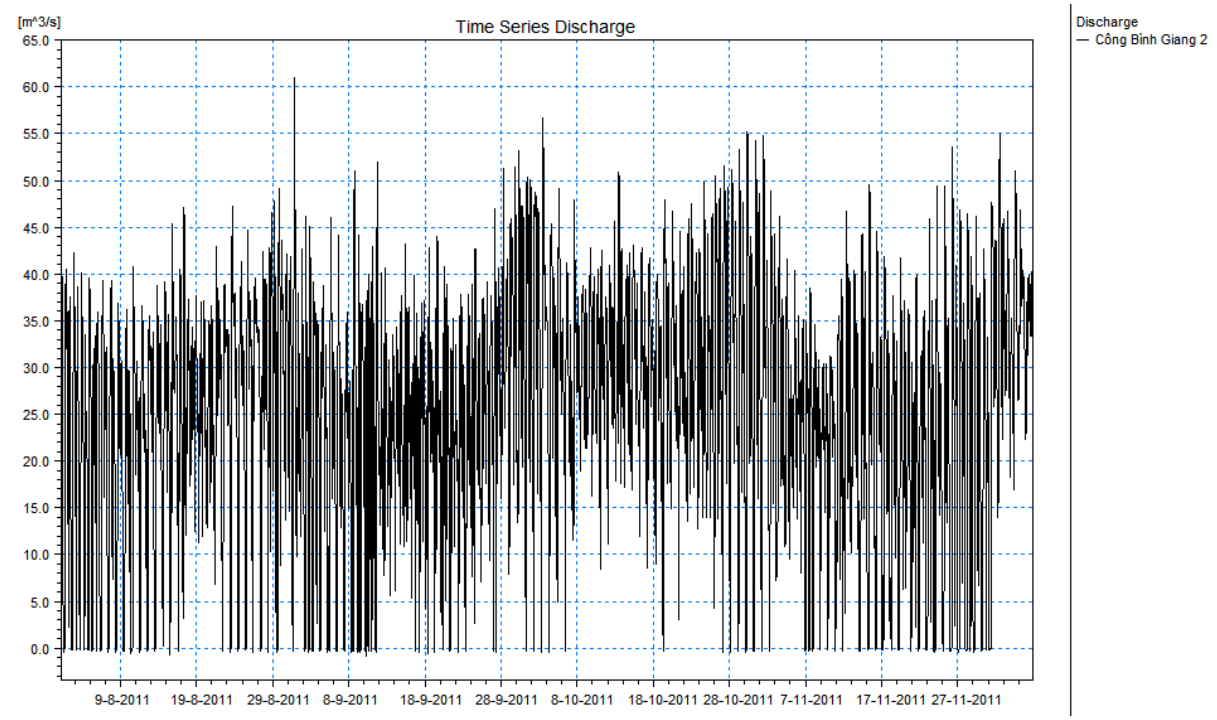


Figure 97: Water flow fluctuation of Binh Giang 2 sluice during flood drainage in the big flood year of 2011

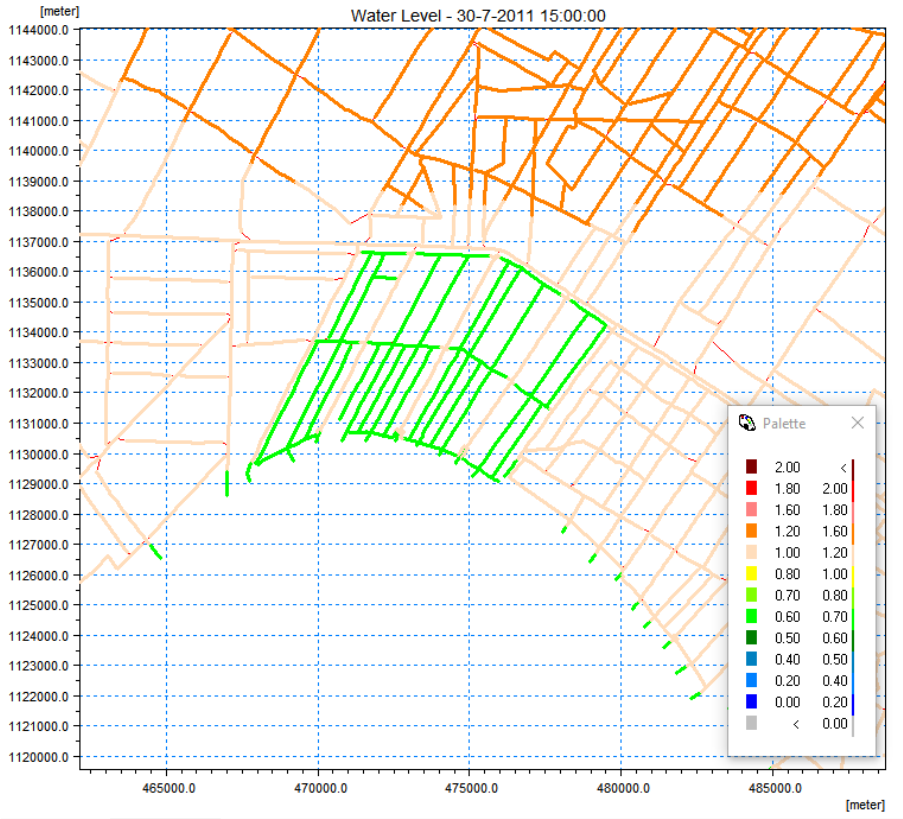


Figure 98: Distribution of the highest water level in the project area during the beginning of the rainy season (from May to the end of July) in the big flood year 2011

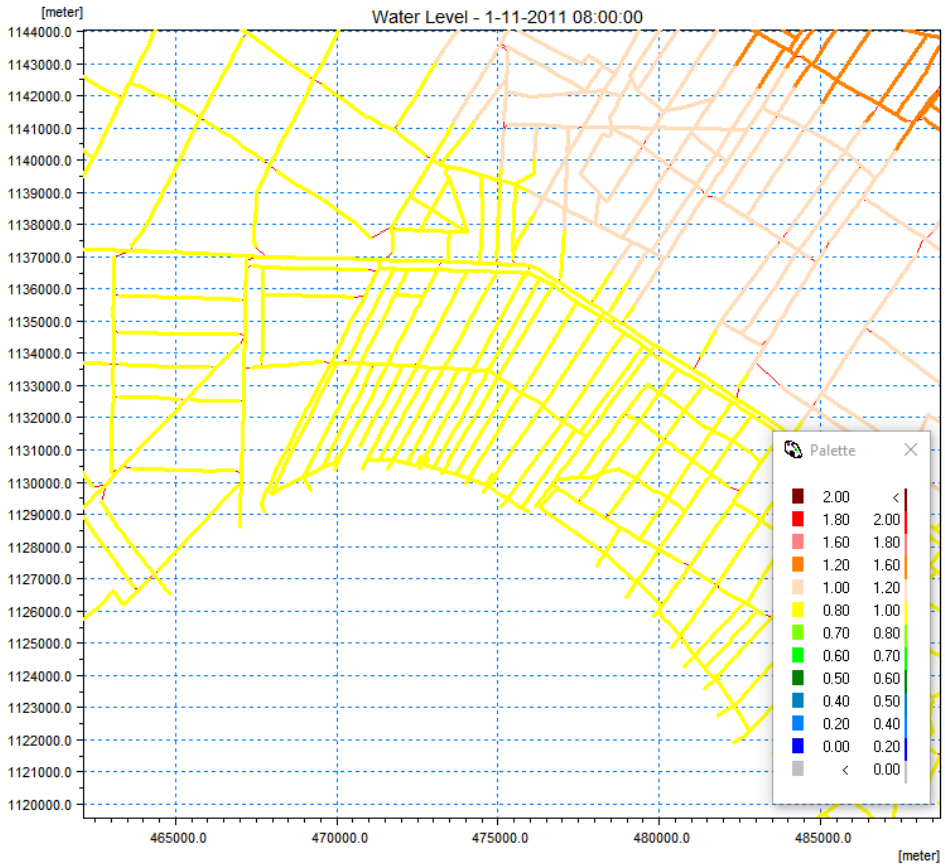


Figure 99: Distribution of the highest water level in the project area during peak flooding (from August to the end of November) in the big flood year 2011

h) Canalbank Erosion

495. The construction of a sluice, which reduces the width of the canal, may result in erosion occurring both upstream and downstream. This phenomenon arises when the narrowing of a canal or river surpasses 50% of its cross-section, according to construction experience with comparable sluices in the MD. To mitigate this, it is advisable to design sluices with water passage areas that fall within the range of 50% to 80%. For this project, the sluice passages were narrowed within this range (*Figure 82*). *As a result, the risk of erosion is assessed to be low and is mitigated via upstream and downstream reinforcement measures in Chapter 5.*

i) Risk due to the failure of livelihood models adversely impacting welfare of beneficiary households

496. As discussed above alien and artificial species may be released into the environment from the model of raising engineered species provided by fishery research centers. The released alien and engineered species can interact with wild aquatic species not only affecting aquatic biodiversity but also potentially causing diseases to wild aquatic animals. Although the measures are proposed to address such risk mentioned in *Chapter 5*, failure of the livelihood models of applying such engineered species for farming may occur due to flooding, damage of sluices, or discharge of wastewater from such models into open water sources during cultivation and after harvesting. Once pathogens transmitting through water supply system, a disease outbreak will be unavoidable in a wide area of cultivation in which cultivators have used the same water sources for farming. Removal of pathogens out of a water source is impossible within a short time, which can disrupt the livelihood activities of the communities where the livelihood model is applied. To prevent such risk, the livelihood model of nursing or farming-engineered shrimp should be planned in separate areas and using confined water sources. In case an incident occurs, sterilization of the whole water source can be applied to clean the pathogen to prevent it from a wide transmission.

j) Farmers' resistance to adapting to livelihood models

497. It is noted that most shrimp farming activities are implemented by small-scale households (about 2,650 households). The investment for infrastructures and farming technology for shrimp farming is different depending on such households' capacities and financial sources. As a result, farmers who have raised or planned to farm shrimp in the project-planned area of aquaculture may refuse to apply the livelihood models because probably their capacities will not meet the requirements, or they have not found the confirmed benefits brought from the livelihood models. *This can also result in a risk of disease outbreak due to uncontrol of sources of seed, water quality as well as farming technology and waste treatment during farming.*

498. The experience of shifting from two rice crops per year to a rice-shrimp rotation in the former districts of An Minh and An Bien in the province of Kien Giang (now An Giang) reveals that farmers, especially those from lower socioeconomic backgrounds, were initially terrified of shrimp farming due to the widespread belief that it posed significant economic risks. However, within a short time, the shrimp-rice paradigm revealed its benefits. Along with attempts to share the model's success, farming techniques, and local solutions to assist locate markets, the people in these places bravely accepted the shift, which has now been nearly ten years. As a result, these solutions will be implemented throughout the project area, and the shift to this model will most likely be joyfully welcomed by the people, just as it was in An Minh

and An Bien. *Therefore, the impacts will be small, short-term, and mitigable by measures in Chapter 5*.

k) Risk of soil salinization

499. The agricultural land adjacent to shrimp farms may face risks of salinization due to the saline water for the shrimp farm can permeate through its banks to affect the freshwater sources and land that have been used for crops and trees. The communities may also face to water contamination and be exposed to water-borne diseases, insect-borne diseases and downing possibly resulting from expanding aquaculture farming. However, shrimp farmers will be requested to embank their shrimp ponds higher than their neighbor's fields to (i) form a physical division between agriculture and aquaculture; (ii) appropriately discharge wastewater into the receiving waters. In addition, the project owner will conduct consultation meetings about the transition plan of rice cultivation farmers to avoid conflicts of interest when agricultural land is transferred to aquaculture production. *Therefore, the risk is small and can be mitigated by measures in Chapter 5.*

500. The construction of sluices, power lines, and road promotes the transition of livelihood models from rice cultivation to shrimp-rice integrated. The transition will not change land use purposes. If the transition occurs, salinization of the sediment will occur. This will impact productivity of rice of the next crop. However, shrimp farmers will be trained on how to leach the salinity after the shrimp crop in accordance to TCVN 9167:2012 - Hydraulic structure - Saline soil - Saline leaching process. Furthermore, the project area is located near the Hau River, so there is the possibility of having an abundant source of fresh water to wash away the salinity. *Therefore, the impact is small and can be mitigated by measures in Chapter 5*.

4.6. CUMULATIVE IMPACTS

501. This section discusses the cumulative impacts of the project. In this regard, the cumulative impact under consideration is defined as two or more individual effects that, when considered together, are considerable or which compound or increase other environmental impacts. The cumulative impact from several projects results from the incremental impacts of the proposed project when added to other closely related, and reasonably foreseeable, future projects. The impacts that do not result in part from the project will not be discussed.

502. However, in the project area, there is no on-going project or planned project that cause cumulative impacts with this project.

4.7. INDUCED IMPACTS

503. The induced impacts can be considered as project activities that occur as driving forces for other activities to be developed or implemented, or that create environmental and social change trends in the project area such as changing land use status, promoting climate change mitigation, or lowering public healthcare costs, etc.

504. **Economic and social development**: The construction of sluices, power lines, and road promotes the economic and social aspects in the project area, such as:

- The sluice system: In addition to improving control over salinity and tides, existing sluices, along with the 23 sluices in the project, will make it easier to deal with climate change, rising sea levels, and the division of freshwater from saltwater. Furthermore, they will be

responsible for flushing acid sulfate, ensuring flood drainage in the LXQ region, and supplying fresh and salt water to the restructuring production zone, as well as dividing the area into freshwater and saltwater zones. In addition, during the dry season, they will control the flow of water so that it may be used for residential purposes, agricultural and aquaculture purposes, rural sanitation, and to encourage agricultural and aquaculture development as well as socioeconomic integration. Aside from that, they will govern the use of water for shrimp farming and aid in disease management across 5,500 hectares of aquaculture, which will significantly alter the agricultural land layout south of NH 80.

- The project road connecting NH80 with the West Sea dike will form a transportation route, facilitating the movement of seed stock, feed, equipment, as well as the exchange and trade of shrimp and other seafood products for aquaculture farmers in Binh Giang and Binh Son communes. Production costs for the farmers will decrease as they no longer need to rely on manual or semi-mechanical transportation (currently, most transportation is done by boats and canoes from irrigation canals or by basic vehicles such as tricycles, small trucks, and motorbikes on dirt roads along canal banks to collection points near NH 80 or the West Sea dike). The transportation time for shrimp and other seafood products will be shortened, contributing to improved seafood quality.
- The medium and low-voltage electricity systems will help solve the long-standing issue of electricity shortages in the aquaculture area in Binh Giang and Binh Son communes. Shrimp farmers will be able to use electric-powered machines and equipment, which are both efficient and economical, and will reduce pollution in farming environments caused by oil and grease when using diesel-powered equipment (due to the lack of electricity for production). Aquaculture production costs will decrease as diesel fuel is no longer needed, leading to increased income and improved livelihoods for aquaculture farmers.
- Changes land use:
  - When the project is completed, 52 hectares of rice farming land will be converted to a shrimp-rice farming model, according to the FS report of the project. This model is deemed more effective commercially, socially, and environmentally, hence improving people's livelihoods. The transition will not change land use purposes.
  - The construction of the road promotes economic and social development along its route, which also contributes to the conversion of land use purposes. *However, the areas along the road have been planned for residential areas. So there is no significant impact but long term and can be mitigated by measures in Chapter 5.*

505. **Social impacts on vulnerable people**. According to surveyed data, there are 2,650 households in the project area (only calculated for 5,500ha of the project area), including 553 EM households and 2,097 Kinh households. The project is projected to benefit 2,650HHs. However, the poor (190 HHs) and EM (553HHs) may be left behind in terms of income generation because raising shrimp under semi-intensive, intensive, and super-intensive models requires large budgets, good experience, and capacity to capture the transferred high technology, while the poor and EM often lack such resources. *However, the EMDP has been developed to address impacts of the project on EMs. Besides, the poor HHs will be supported by non-strutural activities of the project and agricultural and fishery extension policies and social policies of the province. Therefore, the impacts will be small, long term and can be mitigated.*

506. In addition, to mitigate the damage caused by climate change and sea level rise, the province of Kien Giang (now An Giang) has reviewed and supplemented the provincial socio-economic development plans with adaptation strategies for each sector and agency in the province. The project components were developed per the plans.

4.8. GREENHOUSE GAS EMISSIONS

507. During the construction, the project will generate mostly greenhouse gas (GHG) emissions by using fossil fuels. The most common fossil fuel used for construction equipment in Vietnam is Diesel Oil (DO). The GHG emissions from the burning of diesel on construction equipment are calculated in *Table 88* using the estimated diesel fuel demand and the 2014 Emission Factors for Greenhouse Gas Inventories from the United States Environmental Protection Agency (EPA)[17]. Furthermore, as stated in the Greenhouse Gas Inventories, it is customary to express *greenhouse* gas emissions in terms of the carbon dioxide equivalent (CO_2e) unit. To convert gases into CO_2e, their global warming potential (GWP) is multiplied by the gases. The emission factors calculated for the project (*Table 88*) have not been converted to carbon dioxide equivalents (CO_2e). To do so, multiply the emissions by the corresponding GWP listed in *Table 89*. The total GHG emission during 3 years of construction for the project is estimated as minor equivalent to 87.03 COeq (tons).

Table 88: CO_2, N_2O and CH_4 emission for diesel-used vehicles and equipment

Project items	DO demand		Emission factors*(kg/gallon)			GHG emission (kg)		
	Liter	Gallon	CO_2	CH_4	N_2O	CO_2	CH_4	N_2O
Construction of 23 sluices	3,216	849	10.96	0.44	0.09	9,305	374	76
Construction of the road	2,549	673	10.96	0.44	0.09	7,375	296	61
Upgradation of the 18 sluices	368	97	10.96	0.44	0.09	1,065	43	9
Installation of the power lines	632	167	10.96	0.44	0.09	1,829	73	15
Total volume	6,765	1,786				**19,574**	**786**	**161**

Source: (*)The Emission Factors for Greenhouse Gas Inventories in 2014 (EPA).

Table 89: Global warming potential and corresponding CO_2e of N_2O and CH_4

No.	Gases	100-year GWP	CO_2e (ton)
1	CH_4	30	23.57
2	N_2O	273	43.88
3	CO_2		19.57
	Total		**87.03**

508. During operation, GHGs will be generated as a result of the utilization of fossil fuels, such as diesel fuel, gasoline, and biodiesel, by vehicles that travel on the 7.03 km project road. The calculation of GHGs is technically challenging due to the diverse types of fuels used and the number and varieties of vehicles on the road. Nevertheless, it is estimated to be small due to the fact that the road is a rural one that is serviced for motorbikes, small cars, and light trucks,

[17] https://www.epa.gov/sites/production/files/2015-07/documents/emission-factors_2014.pdf

which are small vehicles that utilize a significantly lower volume of fossil fuel than medium and large vehicles. In addition, solar power will be used for lightening duringRe the operation of the project road.

4.9. DETAILS AND RELIABILITY OF THE ABOVE ASSESSMENTS

4.9.1. Assessment of Reliability of Methods Applied in the ESIA

- Statistical and comparative methods: In completing the ESIA, the environment team has taken many observations, and done data collection in the project corridor. Those data have been updated and include time series of years. Therefore, such methods could give reliable and accurate results.
- Field observation, measurement and sampling, sample analysis in the laboratory, and social survey are methods used in this ESIA. Personnel who are trained, experienced, and have worked with such techniques for years, conducted the evaluations. The data from such methods could ensure accuracy and reliability about environmental quality.
- Environmental rapid assessment method: the application follows the guideline of WHO in quantifying pollutants that depends on pollutant coefficients. This method could quickly give outputs that are used for other assessments.
- Integrated analysis and assessment methods: this method was used to synthesize environmental impacts caused by the project. Based on the projected impacts, mitigation measures were proposed. Although these methods are subjective assessments it is still reliable if it is done by environmental experts who are experienced with those impacts. The impacts will be assessed depending on the realities of local contexts as well as project designs before proposed mitigation measures that should be appropriate and feasible.
- The characteristics of impacts were identified according to the experiences of experts, secondary data as well as quantification of impacts that are caused by project activities. The impacts were quantified through secondary sources, including emission coefficients from reliable sources such as Assessment of Sources of Air, Water and Land Pollution by WHO (1993), and Environmental Impact Assessment by Larry W. Canter (1997).
- Determining the spatial scale and time scale of impacts that included expert consultation and analyzing the current characteristics of the system in terms of scale, scope, and construction plans in consideration of local climate conditions, infrastructures, as well as environmental management regulations.
- Impact assessments considered the spatial and temporal scale of impacts as well as the sensitivity of recipients. The actual experiences are very important in assessing the impacts and proposed mitigation measures. It requires an understanding of local social and environmental context as well as local environmental regulations.

4.9.2. Reliability of the Assessment

- All impact assessments were conducted by experienced experts as well as useful tools that give reliable and accurate results. Impact type and impact scope were assessed for different phases of project implementation so that they reflect reality. Therefore, the project owner has committed to mitigate negative impacts as well as pollution control, which are detailed in later sections.

- The quantifying pollution is assessed based on the fuel consumption and emission norms documents. For example, the application of emission norms of vehicle WHO 1993; or calculation of noise level applied guideline of Pham Ngoc Dang 1997.
- The assessments were analyzed by experts who have experience in practices and scientific research as well as participate in many ESIAs therefore their opinions or analyses and solutions are determined.

CHAPTER 5. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

509. Based on the negative impacts and risks discussed in Chapter 4, this Chapter presents the Environmental and social management plan (ESMP) for the project. This ESMP covers the following sections:

a. Mitigation measures proposed for FS and detailed design, pre-construction, construction, and operation phases along with implementation responsibilities for each investment item;

b. Compliance monitoring and environmental quality monitoring program;

c. E&S compliance framework;

d. Capacity building and training programs;

e. Cost estimates;

f. Grievance redress mechanism (GRM);

g. Subplans include the Labor management procedures (LMP) and stakeholder engagement plan (SEP), see details in the annexes.

510. In addition, the Resettlement Plan (RP) is also closely related to this ESMP and cross-referenced in the ESIA/ESMP.

5.1. MITIGATION MEASURES FOR IMPACTS AND RISKS OF THE PROJECT

5.1.1. General principles

511. This section identifies mitigation measures for the project impacts and risks during the pre-construction, construction (including measures integrated into detailed technical design, site clearance, ground leveling, construction, and restoration), and operation phases.

512. This section focuses on prosing appropriate mitigation measures to prevent, avoid, or mitigate the negative impacts and risks on human and natural environment in the project area of influence.

513. Based on the negative impacts and risks identified and analyzed in Chapter 4, the mitigation measures have been proposed for three phases of project implementation i.e. pre-construction, construction, and operation. A hierarchy approach has been adopted during the development of mitigation measures:

- Anticipate and avoid risks and impacts;
- Where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels;
- Once risks and impacts have been minimized or reduced, mitigated, where significant residual impacts remain, compensate for or offset them, where technically and financially feasible.

514. Given that most of the key impacts and risks will occur due to structural components and transportation of construction materials and waste, labor influx, many of the potential negative impacts and risks on the physical, biological, and social environment could be mitigated through a set of general measures that are typically applied to most of the construction projects to

minimize impacts such as noise, dust, water, waste, etc. Since there are specific impacts, this also addresses the measures both during the construction and operation phases.

5.1.2. Measures to be integrated into the feasibility study and detailed design

515. Project design including detailed design could produce long-term opportunities to cause negative impacts and risks on natural and socio-economic environments if environmental factors are not adequately considered. Typically, adverse impacts relating to project design include land acquisition and resettlement, encroachment on the ecosystem, visual impacts (i.e. landscape disfiguration), localized flooding, and other risks. Some of these impacts have been mitigated by careful surveys, calculations, and consultations with local governments in the conduct of the preliminary design. Key measures implemented at the preliminary design stage to minimize the project's social and environmental impacts and risks included the following:

516. For all works: During the detailed engineering and preparation of bid documents, the PPMU and detailed design consultants shall update and include relevant generic measures (specified in Tables 5.1 of the ESIA) and site-specific mitigation measures (as specified in Table 5.2 of ESIA) to reflect the measures in the form of "Incidentals to work items" or "specifications and bill of quantities" in case of works contracts.

517. For sluices:

- The aperture of the sluices has been calculated to maintain a specific flow velocity within the sluices to facilitate the movement of aquatic species from the main rivers into the project's area. In particular, the ideal flow velocities vary according to the following criteria: 0.2 to 0.30 m/s for small shrimps and prawns; 0.4 to 0.6 m/s for larger shrimps and small fish (sizes 2-6cm); 0.6 to 0.8 m/s for medium-sized fish (sizes 6-25cm); and 0.6 to 1.1 m/s for large fish (greater than 25cm). The fish are carried away by the water current when the velocity surpasses 1.1 m/s. When the velocity exceeds 1.1 m/s, the fish will be swept away by the water flow.
- The power source for illumination at the sluice's traffic/work bridges and management houses has a minimum capacity of 100W and is used largely at night. Solar energy is thus proposed as a means of providing illumination at the sluices. This is a renewable energy source, emits no carbon emissions, and contributes to environmental protection.
- Salt-tolerant construction materials will be used for the construction of the 23 sluices and the improvement of the 18 sluices.

518. For the connecting road:

- The selected route is the one that minimally impacts houses and structures and requires the least relocation of residents.
- Similarly, the power source for illumination on the road has a minimum capacity of 100W and is used largely at night. Solar energy is thus proposed as a means of providing illumination on the road. This is a renewable energy source, emits no carbon emissions, and contributes to environmental protection.

5.1.3. Measures for the pre-construction phase

519. Summary of mitigation measures for E&S impacts and risks during the pre-construction phase are summarized in *Table 90*.

Table 90: Mitigation measures for E&S impacts and risks during the pre-construction phase

No.	E&S impacts and risks	Mitigation measures	Responsibility	Supervision
1	Impacts of land acquisition and resettlement	- Implement the approved RP under its provision	An Giang PPMU, Binh Giang an Binh Son CPCs	IMC
1.1	Impacts on displaced households	- Land acquisition and resettlement will be compliance with the RP, which will be prepared to establish the resettlement principles, eligibility requirements for compensation, valuation methods, describe the legal and institutional framework, organizational arrangements, mechanisms, and community consultation and participation, and grievance redress mechanism to be applied to the project during the project implementation. The RP will be prepared and submitted to the WB for approval before construction activities will be started. - The RP will be prepared in compliance with the ESS5 and the Vietnam's laws and regulations. The basic guiding principles of the WB's resettlement policy are: (i) Involuntary resettlement should be avoided where feasible, or minimized after exploring all viable alternatives in project design; and (ii) Where resettlement cannot be avoided, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the people affected by the Project to share in benefits. PAPs should be meaningful consulted and should have opportunities to participate in planning and implementing resettlement programs. - FPIC will be applied during consultation meetings and land acquisition where Khmer households are affected.	An Giang PPMU, Binh Giang an Binh Son CPCs	IMC
1.2	Impacts on livelihood	- Rehabilitation measures will be provided to all PAPs engaged in farming in the project area prior to the cutoff date. These measures will be adequate to enable them to either maintain or enhance their living standards, income earning, and production capacity to the same as their pre-project conditions.	An Giang PPMU, Binh Giang an Binh Son CPCs	IMC

		- Households that cultivate crops and trees on the affected land will receive compensation at full replacement cost, regardless of the legal status of the land. Compensation must be provided for the transportation cost and the actual damage incurred during the transportation and replanting of trees that have not yet been harvested but can be relocated to a different location. - PAPs will receive compensation in cash at replacement cost for livestock, including aquatic livestock. The transportation cost and the damage caused by the transportation must be compensated in the event that the aquatic livestock can be relocated to another location. - In addition, the livelihood restoration program is essential for assisting severely affected households and vulnerable households in restoring or improving their income and living standard to a level that is equivalent to or superior to that of pre-project levels. In addition to financial assistance, vocational training is also offered to AHs.		
1.3	Land use changes	- Only placing the project items in the approved land use for the project. - Improving people knowledge on socioeconomic development opportunity and risks related to social issues.	An Giang PPMU, Binh Giang an Binh Son CPCs	IMC
1.4	Impacts on public structures	- Notify the affected households of the relocation time 2 weeks in advance - Set up new infrastructures before moving the currents ones	An Giang PPMU, Binh Giang an Binh Son CPCs	IMC
2	UXO will be able to affect the health and safety of workers, staff, and local people	The project owner has allocated a budget of 840,963,034 VND for the clearance of UXOs across all construction areas, including 23 new sluices and the road, covering approximately 2.16 ha of underwater area and 13.59 ha on land. A qualified military agency will be contracted to carry out UXO clearance at these construction sites. The detailed plan for removal of UXOs should be disclosed and informed to local people, and workers in the affected area promptly before UXO clearance starts.	An Giang PPMU, contracted competent military unit	- IMC - An Giang PPMU

		The contractor only commence construction after receiving confirmation that the construction area has been cleared of UXO and is deemed safe.		

5.1.4. Measures for the construction phase

520. Below are the mitigation measures to be implemented during the construction phase of the project and presented by category:

- Mitigation measures for generic impacts and risks are presented in the Environmental and Social Codes of Practices (ESCOPs).
- Site-specific mitigation measures to address site-specific potential impacts and risks.

521. Each bid package's bidding documents and construction contracts will include the ESCOPs as well as site-specific mitigation measures that are compatible with the package. They will be supervised by the CSC and the IMC.

522. The contractors will be required to prepare a site-specific environmental and social management plan (C-ESMP) and submit it to the CSC, An Giang PPMU, and the Bank for review and approval at least two weeks prior to construction commencement. The C-ESMP will be prepared to meet the mitigation requirements described below.

5.1.4.1. Mitigation measures for generic impacts and risks

523. Generic impacts and risks defined in *Chapter 4* are mitigated through measures identified in the ESCOPs, including:

1. Impacts on ambient air quality including dust, air emission, noise and vibration generation;
2. Impacts on water quality;
3. Impacts of solid waste generation including construction, domestic and hazardous waste
4. Impacts on ecological environment;
5. Impacts on local traffic;
6. Risks of local flooding;
7. Risks of land subsidence and bank erosion during heavy rains
8. Risks from raw material supply;
9. Impacts on social aspects;
10. Labor violence and hard-working conditions;
11. Community and worker health and safety;
12. Chance find procedures;
13. Communication community.

Table 91: ESCOPs during the project site clearance and construction

E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
1. Impacts on ambient air quality including dust, air emission, noise and vibration	**Dust generation:** – The Contractor is responsible for compliance with relevant Vietnamese legislation with respect to ambient air quality. – During demolition: • Demolition equipment should have minimal dust generation • Dust masks should be used where dust levels are excessive – During transporation: • Only transport the material on the designated transportation route. • Material loads shall be suitably covered and secured during transportation to prevent the scattering of soil, sand, materials, or dust. • Transportation boats must undergo a regular emissions check and get certified named: "Certificate of conformity from inspection of quality, technical safety and environmental protection" following Decision No. 35/2005/QD-BGTVT – During construction (including concrete mixing): • The Contractor shall ensure that the generation of dust is minimized and is not perceived as a nuisance by local residents and shall implement a dust control plan to maintain a safe working environment and minimize disturbances for surrounding residential areas/dwellings. • Concrete mixing plants should be placed at the end of the wind direction and far from residential areas. • The Contractor shall implement dust suppression measures (e.g. use water spraying vehicles to water roads, covering of material stockpiles, etc.) as required.	– QCVN 05: 2023/BTNMT: National technical regulation on ambient air quality – QCVN 6438-2018: Road vehicles-maximum permitted emission limits of exhaust gas. – Circular No. 55/ 2014/TT-BGTVT for the inspection of quality on technical safety and environmental protection for imported motor vehicles. – Circular No. 16/2022/TT_BGTVT on amendments to some articles of Circulars on inspection and registration. – QCVN 26:2010/ BTNMT: National technical regulation on noise – QCVN 27:2010/ BTNMT: National	During construction phase	– Contractors	– An Giang PPMU – CSC – IESMC

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	• Exposed soil and material stockpiles shall be protected against wind erosion and the location of stockpiles shall take into consideration the prevailing wind directions and locations of sensitive receptors. • Dust masks should be used where dust levels are excessive. **Air emissions from demolition of the structures on land, transportation of construction materials, concrete mixing and other construction activities:** – Do not use boats, barges, and vehicles that are outdated, and ensure that they have all necessary registration documents, in compliance with the regulations. – All vehicles must comply with Vietnamese regulations controlling allowable emission limits of exhaust gases. – Vehicles in Vietnam must undergo a regular emissions check and get certified named: "Certificate of conformity from inspection of quality, technical safety and environmental protection" following Decision No. 35/2005/QD-BGTVT. – All construction machinery and equipment used for the project must check regularly during construction time. – There should strictly be no burning of solid wastes or construction materials (e.g. wood, rubber, oil-based rag, emptied cement bags, paper, plastic, bitumen, etc.) on site. **Noise and vibration generation from all activities of the construction phase** – The timing of construction works will be limited during day-time (6 am – 6 pm), no works during night time without official permission of the PPMU and CSC. – In case of construction works during night-time, the timing and location of the works must be sent to adjacent sensitive receptors such as medical facilities and residential areas in advance and appropriate sound barriers will be built at these receptors to reduce the noise intensity.	technical regulation on vibration – QCVN 24/2016/BYT - National technical regulation on noise - permissible exposure levels of noise in the workplace			

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	– Measures to reduce noise to acceptable levels should be implemented, including: • Selecting equipment with lower sound power levels • Installing silencers for fans • Installing suitable mufflers on engine exhausts and compressor components • Installing acoustic enclosures for equipment casing radiating noise • Installing acoustic barriers without gaps and with a continuous minimum surface density of 10 kg/m^2 in order to minimize the transmission of sound through the barrier • Barriers should be located as close to the source or to the receptor location to be effective • Installing vibration isolation for mechanical equipment • Limiting the hours of operation for specific pieces of equipment or operations, especially mobile sources operating through community areas • Re-locating noise sources to less sensitive areas to take advantage of distance and shielding • Siting permanent facilities away from community areas if possible • Taking advantage of the natural topography as a noise buffer during facility design • Reducing project traffic routing through community areas wherever possible – Developing a mechanism to record and respond to complaints – The Contractors are responsible for signing contracts with appropriate insurance companies to compensate for the damages causing by their works.				
2. Impacts on water quality	**Workers' wastewater:** – Consider hiring local workers to reduce wastewater generation on site.	– QCVN 08:2023/ BTNMT: National	During construction phase	– Contractors	– An Giang PPMU – CSC

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	– One portable toilet must be arranged at each construction site. The toilet is a septic tank with 2 compartments and dimensions (LxBxH) of 135x270x260cm for construction workers. This module has (i) Composite materials; (ii) toilet, mirror, sink, and faucet; (iii) ventilation fans and energy-saving lights; (iv) urinal (optional) and squat toilet (optional); and (v) 1500-L waste and 1050-L water storage tanks. Wastewater from the toilets is collected once a week. – Wastewater from kitchens, showers, sinks shall be discharged into a local sewerage system. – Only rent local people's house with a septic tank for construction workers. – At completion of construction works, wastewater collection tanks and septic tanks shall be safely disposed of or effectively sealed off. – Wastewater and ballast water for construction material transportation boats will be collected and treated by the boat owners to meet QCVN 17:2011/BGTVT and QCVN 10:2018/BGTVT. They are not allowed to be discharged directly into the canals. – On construction barges and tugboats, there must be sanitary facilities for workers, ensuring proper hygiene conditions during the dredging process. Waste should be brought ashore for treatment in accordance with regulations. Domestic wastewater (from sanitation facilities) on each vessel must be stored in composite tanks with secure lids that can be easily opened for inspection and cleaning **Rainwater runoff** – Focus construction activities during the dry season to minimize the impact of runoff from rainwater. – Avoid carrying out excavation and backfilling in rainy weather. – Maintain vehicles and replace oil at designated workshops only. Do not perform these activities at sites. – Maintain vehicles and equipment, including oil replacement or lubrication, at designated areas only. Ensure that no chemicals, petrol, oil, or grease are	Technical Standard on surface water – QCVN 09:2023/ BTNMT: National Technical Standard on underground water quality – QCVN 14:2008/ BTNMT: National technical regulation on domestic wastewater – QCVN 40: 2011/ BTNMT: National technical regulation on industrial wastewater – TCVN 7222: 2002			– IESMC

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	leaked into the soil, drains or water sources. Use trays to hold rags and materials used in maintenance. Collect and dispose wastes in accordance with hazardous waste management requirements. - Store used and unused oil and petrol on impermeable grounds covered with roofs, with warning (flammable and danger) signs, and contained within surrounding fences for easy control and collection in case of leakage. Locate oil and petrol storage areas at least 25m from any ponds, lakes, rivers, and streams. Restrict accessibility to these temporary storages to only authorized persons. - All areas contaminated with oil should be carefully covered, avoiding contact with rainwater. - Collect and keep used/waste oil and materials polluted with oil/chemicals in containers, store in safe places (on impermeable grounds, roofed, fenced and with warning signs) for regular collection by licensed dealers. - On the construction site, containers of oil, lubricants, and hazardous waste must be placed on sealed surfaces that are impermeable, preventing stormwater from overflowing from the outside, with sun and rain shelters covering the entire area for storing hazardous substances, ensuring no spillage into the environment. - In areas with acid sulfate soil (pH < 3.5), lime powder will be used to to raise the pH to above 5. Spread lime powder along the embankments surrounding the soil storage of the sluice construction areas to reduce the impact of acid sulfate runoff during rainfall (if any). - Collect and transport materials and wastes generated during excavation and backfilling materials to as soon as possible. - Regularly inspect the excavation material storage areas, especially before the rainy season, to assess and implement preventive measures against damages caused by runoff, soil erosion, sedimentation, and acid sulfate leachage (if any). Additionally, the construction sites will be restored upon project completion.				

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	Construction wastewater: - The Contractors are responsible for controlling surface water quality when discharging it out of construction sites, in accordance with QCVN 08:2023/BTNMT and QCVN 14:2008/BTNMT; - For wastewater from routine machinery cleaning that is not oil-contaminated, it will be treated by passing it through sedimentation tanks to remove all sediments, such as soil and sand, before being discharged into the environment. For wastewater from equipment maintenance that is oil-contaminated, it will be treated by passing it through an oil and grease separator before being discharged. The oil and grease will be collected into containers and treated as hazardous waste - Provide sedimentation pits and ditches at big construction sites. - Wastewater and ballast water for construction material transportation boats will be collected and treated by the boat owners to meet QCVN 17:2011/BGTVT and QCVN 10:2018/BGTVT. They are not allowed to be discharged directly into the canals. - The contractors must be responsible for compliance with the relevant Vietnamese regulations on wastewater discharges into surroundings. **Impacts on groundwater:** - Only digging the electrical poles, sluice foundations and road bed to the designated deep of the project				
3. **Impacts of solid waste generation**	**Workers' solid waste:** - Consider hiring local workers to reduce solid waste generation on site. - Each construction site is equipped with 3 waste bins, each with a capacity of 80 liters, to store domestic waste. Specifically, one bin is designated for food waste, one for recyclable refuse, and one for residual waste. Each bin is labeled with the name of the waste.	- Circular No. 02/2022/TT-BTNMT - QCVN 07:2009/BTNMT: National Technical regulation on hazardous waste thresholds	During construction phase	- Contractors	- An Giang PPMU - CSC - IESMC

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	– Recyclables (sellable waste), such as plastic bottles, glass, scrap paper, plastic bags, etc. will be collected and sold to the informal sector on a regular basis. – Sign a contract with the legal entity of the district to collect and treat the residual waste (unsellable waste) in compliance with current regulations at a minimum of 3 times per week. For construction sites where current collection vehicles cannot reach, the project owner/contractor will arrange for their workers to transport the waste to the nearest collection transfer point for proper collection and treatment. **Construction solid waste:** – Before construction, a solid waste control procedure (storage, provision of bins, site clean-up schedule, bin clean-out schedule, etc.) must be prepared by Contractors and it must be carefully followed during construction activities. – Before construction, all necessary waste disposal permits or licenses must be obtained. – Measures shall be taken to reduce the potential for litter and negligent behavior with regard to the disposal of all refuse. At all places of work, the Contractor shall provide litter bins, containers and refuse collection facilities. – Trees and vegetation within the land acquisition area of the project will be collected by local residents for sale and personal use. However, some underbrush and tree branches may not be cleared by the residents; the contractors will be responsible for cleaning up the remaining vegetation and transporting it to the designated landfill in former Hon Dat District before starting construction. – Excavated soil from the sluices is dried up and reused for backfilling the construction ground, 2 banks of the sluice. Besides, excavated soil is reused for the slopes of the road. – Solid waste may be temporarily stored on site in 240-L waste bins in a designated area approved by the CSC and relevant local authorities prior to				

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	collection and disposal through a licensed waste collector, for example, Hon Dat URENCO. - Waste storage containers shall be covered, tip-proof, weatherproof and scavenger proof. - No burning, on-site burying or dumping of solid waste shall occur. - Recyclable materials such as wooden plates for trench works, steel, scaffolding material, site holding, packaging material, etc. shall be stored on 240-L waste bins and collected and separated onsite from other waste sources for reuse, for use as fill, or for sale. - If not removed off site, solid waste or construction debris shall be disposed of only at sites identified and approved by the CSC and included in the solid waste plan. Under no circumstances shall the contractor dispose of any material in environmentally sensitive areas, such as in areas of natural habitat or in watercourses. **Hazardous waste generation** - Fuels and chemicals must be safely stored in areas with impermeable ground with roofs and surrounding banks, equipped with safety warning signs located at least 20m from the camps and at the end of prevailing winds; - Collect, store, and transported for treatment all hazardous wastes (road asphalt, waste oil and grease, organic solvents, chemicals, oil paints, etc.) in accordance with Circular No. 02/2022/TT-BTNMT on management of hazardous waste. - Collect and temporarily store used oil and grease separately in specialized containers and place in safe and fire-free areas with impermeable floors roofs, at a safe distance from fire sources. Sign contracts with for oil and grease to be delivered to suppliers/ manufacturers - Do not use unapproved toxic materials, including paint containing lead, asbestos, etc.; - The removal of asbestos-containing materials or other toxic substances shall be performed and disposed of by specially trained and certified workers.				

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	– Used oil and grease shall be removed from site and sold to an approved used oil recycling company. – Do not perform any maintenance (change of oil and filter) of construction machinery and equipment outside the designated area. – Used oil, lubricants, cleaning materials, etc. from the maintenance of vehicles and machinery shall be collected in holding tanks and removed from site by n approved specialized oil recycling company for disposal. – Used oil or oil-contaminated materials that could potentially contain PCBs shall be securely stored to avoid any leakage or affecting workers. – Unused or rejected tar or bituminous products shall be returned to the supplier's production plant. – Relevant agencies shall be promptly informed of any accidental spill or incident – Store chemicals appropriately and with appropriate labelling – Appropriate communication and training programs should be put in place to prepare workers to recognize and respond to workplace chemical hazards – Report all incidences of oil spills immediately and prevent any risks of oil spills – Prepare and initiate a remedial action following any spill or incident. In this case, the contractor shall provide a report explaining the reasons for the spill or incident, remedial action taken, consequences/damage from the spill, and proposed corrective actions. – In the event that accidental leakage or spillage of diesel/chemicals/chemical wastes takes place, the following response procedures shall be followed immediately by the Contractor(s): • The person who has identified the leakage/spillage shall immediately check if anyone is injured and shall then inform the Contractor(s), Supervision Engineer and PPMU;				

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	• The Contractor(s) shall ensure any injured persons are treated and assess what has spilled/ leaked; • Should the accidents/incidents generate serious environmental pollution (e.g. spillage/leakage of toxic or chemicals, large scale spillage / leakage, or spillage/leakage into the nearby water bodies, the Contractor shall immediately inform the PPMU; • In such cases, the Contractor(s) shall take immediate action to stop the spillage/leakage and divert the spilled/leaked liquid to nearby non-sensitive areas; • The Contractor(s) shall arrange maintenance staff with appropriate protective clothing to clean up the chemicals/chemical waste. This may be achieved through soaking with sawdust (if the quantity of spillage/leakage is sand bags (if the quantity is large); and/or using a shovel to remove the topsoil (if the spillage/leakage occurs on bare ground); and • Depending on the nature and extent of the chemical spill, evacuation of the activity site may be necessary; • Spilled chemicals must not be flushed to local surface drainage systems. Instead, sawdust or sandbags used for clean-up and removed contaminated soil shall be disposed of by following the procedures for chemical waste handling and disposal already described; • The Contractor(s) shall prepare a report on the incident detailing the accident, clean up actions taken, any pollution problems and suggested measures to prevent similar accidents from happening again in future. The incident report shall then be submitted to the Supervision Engineer and PPMU for review and keep in the records. The incident report shall also be submitted to Department of Agriculture and Environment, if required.				

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
4. **Impacts on ecological environment**	**Terrestrial ecosystems:** – Avoid disturbances and damage to the existing vegetation and green trees outside of construction boundary. – Do not load materials and wastes at places having vegetation cover. Load them on barren land instead; – If trees can be replanted somewhere, move them instead of cutting the trees down; – If any invasive species are found during construction phase, burn them before disposed of to prevent them from regrowing at disposal site; – Chemicals must not be used to clear vegetation; – Minimize the areas disturbed, especially in locations having trees or vegetation; Determine areas to be undisturbed for protection during construction. – Do not remove or damage the vegetation without direct instructions. – Do not hurt, trap, feed or harm any animal - including birds, frogs, snakes, etc. – Do not cut trees outside the approved construction area for any reason. – Do not buy any wildlife for food; – Birds and animals must not be kept in cages in camps. – No collection of firewood. – Do not burn litter that damages vegetation. – Limit disturbances to areas with construction operations, especially in locations covered with green trees or vegetation. – Do not gather materials and wastes at places covered with vegetation or with green trees, but on vacant land instead. – Trees cannot be cut down unless explicitly authorized in the vegetation clearing plan.	– Law on Environment Protection No. 72/2020/QH14		–	–

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	– When needed, temporary protective fencing will be erected to efficiently protect the preserved trees before commencement of any works within the site. – The Contractor shall ensure that no hunting, trapping, shooting, poisoning of fauna takes place. **Aquatic ecosystems** – On-water construction activities will be carried out within coffer dams and in batching method. – Littering any form of waste into water bodies is prohibited. – Before completing on-water construction, the contractor must clean up the site and restore the environment to its original state by: (i) removing all unused materials from the construction area; (ii) dismantling and relocating all machinery, equipment, buoys, temporary structures, and workstations used during construction.				
5. Impacts on local traffic	**Impacts on waterway transportation**: – The Contractors is responsible for preparing a construction traffic management plan prior to starting construction that will be reviewed by CSC, approved by the PPMU and sent to the Department of Transportation for consultation. – Significant increases in number of vehicle trips must be covered in a construction plan previously approved. Routing, especially of heavy vehicles, needs to take into account sensitive sites such as schools, hospitals, and markets. – Conduct consultation meetings with and inform of local authorities and people about alternate canals during construction of the sluices. – Carefully cover materials on boats to prevent materials from dropping along the routes. – Avoid material transportation for construction during rush hours. – Ensure adequate lighting for construction boats at night time.	– Law on Traffic and Transportation No. 23/2008/QH12 – Law on Construction No. 72/2020/QH14 – Law on Inland Waterway Transportation No. 23/2011/QH11 – Circular No. No. 10/2021/TT-BXD on the regulation of construction safety	During construction phase	– Contractors	– An Giang PPMU – CSC – IESMC

E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	– Install and maintain sign boards, fences, signal lights to direct traffic to ensure traffic safety when conducting construction activities on the canal beds. **Impacts on local roads** – Install and maintain sign boards, fences, signal lights to direct traffic to ensure traffic safety. – Ensure adequate lighting at night time; – Only use vehicles with valid registration. – Arrange and provide separate passageway with safe and easy access for pedestrian and for people with disability and mobility issues especially the areas in proximity of schools, including easy wheel chair access and hand rail. Make staff available any time for helping people with disability if needed. – Set up traffic and maintain instruction signs and warnings to secure safety for people and means of transport during construction. – Put speed limit signs at a distance of 200m from the construction site. – Collect spilt soils and materials at the construction site each day to avoid slippery incidents for vehicles. – Water the roads to prevent dust, limit the speed of traveling trucks, do not allow flared horns, and do not dispose the waste and wastewater onto areas near the existing residential areas. – Installation of lighting at night must be done at all construction sites, if necessary, to ensure safe traffic diversion.				
6. **Risks of local flooding**	– Periodically and thoroughly remove soils, stones and wastes from drainage sewers and ditches inside and around the construction site. – Neatly gather materials and wastes so as to limit them being swept away by stormwater.	– TCVN 4447:2012: Earth works - Construction, check and acceptance – Decree No. 10/2021/TT-BXD on	During construction phase	– Contractors	– An Giang PPMU – CSC – IESMC

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	– Carry out ground levelling and rolling after discarding materials at disposal sites. Install supports to protect the walls where excavation is deeper than 2 m. – Check the existing drains within and surrounding the construction sites, improve before levelling to ensure rainwater can be drained properly; – Load construction material and wastes at least 10m from any existing drainage ditches or water sources to minimize materials from entering the channels which may lead to sedimentation and blockage; – Clean up the existing drains regularly.	regulation of construction safety – QCVN 08:2023/ BTNMT - National technical regulation on surface water quality – QCVN 07:2009/BTNMT – QCVN 43:2012/BTNMT			
7. **Risks of land subsidence and bank erosion during heavy rains**	– Limit disturbances to construction areas, especially in locations currently with green trees or vegetation; – Use larsen sheet piles for building prop walls when excavation is performed to a depth of 2.5m and more; – Reinforce weak slopes and protect them with sandbags when there are high risks of erosion and landslides or in case of visible gully erosion. – Shorten the drainage path of the water held in the soil by the use of prefabricated vertical drains to create shorter drainage pathways for groundwater. – Strictly avoid disturbance or damages to the existing vegetation and trees.	– TCVN 4447:2012: Earthwork - construction scope – Circular No. 10/ 2021/TT-BXD – QCVN 08:2023/ BTNMT - National technical regulation on surface water quality	During construction phase	– Contractors	– An Giang PPMU – CSC – IESMC
8. **Risks from raw material supply**	– The main suppliers must produce a license to exploit and transport materials. – Materials must be tested before construction. – Do not purchase materials from suppliers that do not have an approval environmental license. – Ensure raw material suppliers adhere to project-approved transportation routes.	– Law No. 60/2010/QH12 on Mineral Law	During construction phase	– Contractors	– An Giang PPMU – CSC – IESMC

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
9. **Impacts on social aspects**	**Labor influx** – Conduct temporary residence for migrant workers with local authorities; – Inform the community of commencement date 02 weeks in advance. – Limit construction activities at night. – If construction at night is unavoidable orinterruption to service supply (water and power cut-off), the community must be informed at least 02 days in advance and the information will be repeated 1 day. – Use local labors to implement simple jobs. – Training on environmental sanitation,safety and health of workers before assigning jobs. – Migrant workers must beintroduced with custom, traditions in the area to avoid community conflicts. – Prepare conducts codes and request workers to comply with: (i) the use of PPE during working period; (ii) only smoke in regulated areas – The following activities will be banned: • Storing and using weapons and poisons. • Cutting trees outside the construction area, burning fire, burning waste andplants after clearing (except for invasive plants, but there must be agreed by the Environmental Specialist of the CSC and PPMU). • Using alcohol in working period. • Fighting. • Participating in gambling and social evils such as drugs, and prostitution. • Littering waste. • Operate vehicles, motorbike and construction means without tasks assigned. • Maintenance of vehicles, construction machines and equipment outside the permitted area. **Improper access:**		During construction phase	– Contractors	– An Giang PPMU – CSC – IESMC

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	– Inform the community about construction time and schedule through informalpublic consultation or any local people meetings and notice board; – Provide safe and easy access to the household putting clean and strong thick woodpanels or steel plates over the open ditches to all disturbed households. – Place sign boards near construction sites to direct and guidance movement for allhouseholds who are living along these under construction roads; – Reinstate access to affected households upon completion of the project items and road surface at the sections need to be excavated by construction activities. **Fishing activities:** – Inform the community of the construction schedule at least two weeks before the construction				
10. **Labor violence and hard-working conditions**	**Labor violence and hard-working conditions** – The contractor will have documented policies and procedures related to his performance related to national labor law No.45/2019/QH14 dated 20 November 2019. – The contractor will inform workers of their rights under the national labor and employment law. – The contractor will make all policies clear and understandable to all workers – If there is a collective bargaining agreement, the contractor will respect its terms. – The contractor will provide reasonable working conditions and terms of employment, at a minimum complying with the national labor law – The contractor will comply with national law that recognizes workers' rights to form and to join workers' organizations. – Worker representatives will be given access to management. – Worker organizations are expected to fairly represent the workforce	– Labor law No.45/ 2019/QH14 dated 20 November 2019 – Decree No: 05/2015/ ND-CP – Decree No. 04/ 2017/TT-BXD on regulation of construction safety – TCVN 5308-91: Technical regulation on safety in construction.	During construction phase	– Contractors	– An Giang PPMU – CSC – IESMC

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	– The contractor will establish a transparent process for workers to express concerns and file grievances, including anonymous complaints. – The contractor will ensure that there will be no retaliation or discrimination against those that express grievances. – Management will treat the grievances seriously and take prompt, appropriate action. – Any grievance mechanism will not replace other channels as defined by law or collective bargaining agreements. **Child labor, school dropout and forced labor** – The minimum age of project workers eligible for any jobs provided by the Project (including construction works) is 18. – The contractor shall not employ child labor and forced labor, which consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labor, such as indentured labor, bonded labor or similar labor-contracting arrangements. – To prevent the participation of underage workers, all contracts must integrate the provisions on worker's age commitment, including penalties for non-compliance. The contractor shall maintain a list of contracted workers with their age. **GBV** – Jobs under the project will be based on the gender equality and will have no discrimination for any gender-related employment, recruitment, conditions for recruitment (including jobs, salary and benefits), termination and access to training courses. – In order to address the risk of excluding vulnerable groups (such as women and people with disabilities) from employment opportunities, the Contractors are required to recruit such groups as part of unskilled employees.				

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	– Contractors will be required to comply with the National Law on gender equality in the workplace, which includes adequate and appropriate maternity and nursing leave; and restrooms and toilets must be separate from men and women. – Contractors will also be requested to address potential sexual exploitation or harassment issues in recruiting or keeping skilled or unskilled female workers for supporting the project.				
11. Community and workers' health and safety	**Waterway incidents** – Fence of excavation pits and open channels and make off with luminous cordon and warning signs. – Provide sufficient lighting when carry out construction at night. – Limit the speed of transport means to 20km/h within 200m from the construction site so as to minimize noise. – Keep noise-generating machines and vehicles at such suitable distances that noise transmitted to residential areas will not be higher than 70dBA. – Where workers need to enter and work within two meters of an unprotected water's edge in a fixed structure (e.g. canal bank), a risk assessment must be developed or reviewed and all the identified controls must be implemented prior to commencing the work. The following controls need to be considered when developing the risk assessment: • Installation of temporary barriers or edge protection where reasonably practicable. • Use of a fall restraint system set up by Competent person where reasonably practicable. • Maintaining visual sight by a second person. • Wearing a lifejacket. • An easily accessible floatation device for rescue e.g. life floats, life ring or throw bag with retriever rope. **Labor accidents**	– Law No. 55/2024/ QH15 on fire and rescue. – Law No. 84/2015/. QH13 on Occupational Safety and Health. – Circular No. 10/2021/TT-BXD on construction safety – TCVN 5308-91: Technical regulation on safety in construction – QCVN 18:2014/BXD: Technical regulation on safety in construction	During construction phase	– Contractors	– An Giang PPMU – CSC – IESMC

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	– Provide training in ESHS to workers for raising their awareness of infectious diseases especially HIV/AIDS within 2 weeks prior to the commencement of packages for construction items lasting at least 6 months. – Provide training in first-aid skill and first-aid kit to workers and site engineer – Regularly exam worker's health to ensure occupational health – Provide workers with PPE such as masks, gloves, helmets, shoes/boots, goggles, safety belt, etc. and enforce wearing during working especially working at heights and in dangerous areas. – Limit or avoid working in extreme weather conditions, e.g. too hot, heavy rain, strong wind, and dense fog. – Provide sufficient lighting when carrying out construction activities at night. – Locate noise-generating sources and concrete mixing plants far enough from and downwind of residential areas and camps. – Provide the camps with sufficient supplies of clean water, power, and sanitary facilities. There must be at least one toilet compartment for every 25 workers, with separate toilets for males and females. Workers' beds must be provided with mosquito nets so as to prevent dengue fever. Temporary tents will be unacceptable. – Clean camps, kitchens, baths, and toilets and sanitize regularly, and keep good sanitation. Provide dustbins and collect wastes daily from the camps. Clear drainage ditches around the camps periodically. – Stop all construction activities during rains and storms, or upon accidents or serious incidents. – Contractor to ensure compliance with the requirements and procedures of the project Labor Management Procedure (LMP). **Risk of fire, explosion and leakage of fuel** – Store fuels and chemicals in areas with impermeable ground, roofs, surrounding banks, and warning signs at least 50 m far from and downwind of residential areas and the camps.				

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	– Provide training in fire-fighting to workers and fire-extinguishers for the camps. – Prepare an emergency plan for chemical/fuel spill incident risk before construction begins. – Safely install power lines at offices and in construction sites and do not lay connectors on the ground or water surface. Electric wires must be with plugs. Place outdoor electric panels in protection cabinets. – Provision of proper eye protection such as welder goggles and/or a full-face eye shield for all personnel involved in, or assisting, welding operations. Additional methods may include the use of welding barrier screens around the specific workstation (a solid piece of light metal, canvas, or plywood designed to block welding light from others). Devices to extract and remove noxious fumes at the source may also be required. – Special hot work and fire prevention precautions and Standard Operating Procedures (SOPs) should be implemented if welding or hot cutting is undertaken outside established welding work stations, including 'Hot Work Permits, stand-by fire extinguishers, stand-by fire watch, and maintaining the fire watch for up to one hour after welding or hot cutting has terminated. Special procedures are required for hot work on tanks or vessels that have contained flammable materials **Risk of security forces** – The contractor will be required to seek to ensure a proper procedure for recruiting and maintaining the security force at site **Risks of community's health and safety** – The Contractor will have to conform to regulations in Law No. 55/2024/ QH15 on fire and rescue; Law No. 84/2015/QH13 on Occupational Safety and Health and Circular No. 03/2019/TT-BXD by the Ministry of Construction on safety in construction.				

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	– The Project owner and contractor are to cooperate closely with the local government in performing effective community sanitation in case of epidemic symptoms breaking out in the area. – The Project owner and contractor are to cooperate with local authorities in preventing and fighting against social evils. – Do not disturb or cause trouble to community – Use static compacting when the road base is constructed near areas with many households and weak temporary works to restrict vibration. – The Project will cooperate with the local health agency in developing and implementing plans for control of diseases among workers.				
12. **Impacts on PCR**	**Impacts on PCRs:** – Equipment with low noise signatures will be used. – Construction activities will avoid days of worship, and if necessary, noise barriers will be installed. **Chance find procedures** If the Contractor discovers archeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction, the Contractor shall: – Stop the construction activities in the area of the chance find; – Delineate the discovered site or area; – Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities, or the Department of Culture, Sport and Tourism takes over; – Notify the Construction Supervision Consultant who in turn will notify responsible local or national authorities in charge of the Cultural Property of Viet Nam (within 24 hours or less); – Relevant local or national authorities would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures.	– Law on Cultural Heritage (2002) – Law on Cultural Heritage (2009) for supplementary and reformation – Decree No. 98/2010/ND-CP for supplementary and reformation	During construction phase	– Contractors	– An Giang PPMU – CSC – IESMC

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	This would require a preliminary evaluation of the findings to be performed. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values; - Decisions on how to handle the finding shall be taken by the responsible authorities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance) conservation, preservation, restoration and salvage; - If the cultural sites and/or relics are of high value and site preservation is recommended by the professionals and required by the cultural relics authority, the Project's Owner will need to make necessary design changes to accommodate the request and preserve the site; - Decisions concerning the management of the finding shall be communicated in writing by relevant authorities; - Construction works could resume only after permission is granted from the responsible local authorities concerning safeguard of the heritage.				
13. **Communication community**	- Maintain open communications with the local government and concerned communities; the contractor shall coordinate with local authorities (leaders of local wards or communes, leader of villages) for agreed schedules of construction activities at areas nearby sensitive places or at sensitive times (e.g., religious festival days). - Copies in Vietnamese of this ESCOPs and of other relevant environmental safeguard documents shall be made available to local communities and to workers at the site. - Reduced playground space, loss of playing fields and car parking: The loss of amenities during the construction process is often an unavoidable source of inconvenience to users in sensitive areas. However, early consultation with those affected, provides the opportunity to investigate and implement alternatives.	- Law on Environment Protection No. 72/2020/ QH14 - Decree No. 144/2021/ ND-CP on administrative penalization security and society issues	During construction phase	- Contractors	- An Giang PPMU - CSC - IESMC

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	– Disseminate Project information to affected parties (for example local authority, enterprises and affected households, etc.) through community meetings before construction commencement. – Provide a community relations contact from whom interested parties can receive information on site activities, Project status and Project implementation results. – Provide all information, especially technical findings, in a language that is understandable to the general public and in a form of useful to interested citizens and elected officials through the preparation of fact sheets and news release, when major findings become available during Project implementation phase. – Monitor community concerns and information requirements as the Project progresses. – Respond to telephone inquiries and written correspondence in a timely and accurate manner. – Inform local residents about construction and work schedules, interruption of services, traffic detour routes and provisional bus routes, blasting and demolition, as appropriate. – Limit construction activities at night. When necessary ensure that night work is carefully scheduled and the community is properly informed so they can take necessary measures. – At least five days in advance of any service interruption (including water, electricity, telephone, bus routes) the community must be advised through postings at the Project site, at bus stops, and in affected homes/businesses. – Provide technical documents and drawings to local authority and community, especially a sketch of the construction area and the ESMP of the construction site. – Notification boards shall be erected at all construction sites providing information about the Project, as well as contact information about the site managers, environmental staffs, health and safety staffs, telephone numbers				

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E&S issues	Mitigation measures	Vietnam code/ regulation	Implementation time	Responsibility	Supervision
	and other contact information so that any affected people can have the channel to voice their concerns and suggestions				

5.1.4.2. Measures for specific impacts and risks

524. Measures for specific impacts and risks of the project during construction are demonstrated in *Table 92*.

Table 92: Mitigation measures for specific impacts and risks during the project construction

No.	Sensitive receptors or activities	Mitigation measures	Viet Nam code/ regulation	Implementation time	Responsibility	Supervision
1	Impact on domestic water supply	- Notify of the construction plan, avoiding construction during peak water-taking periods for residents' production. - All construction activities on water canal will happen in coffer dams. - Place floating buoys around the construction site for convenient collection of solid waste and debris falling into the water, especially in the construction area of sluice T6-1 and sluice VR-1.	- Law on inland waterway traffic No. 48/2014/QH13 - QCVN 08:2023/BTNMT - Circular No. 02/2022/TT-BTNMT	During construction phase	Contractors	- An Giang PPMU - CSC - IMC
2	Impacts on livelihoods	**Impacts on rice cultivation** Priority will be given to the construction of culverts to be demolished with the following technical specifications: - Centrifugal concrete culvert with a diameter D=0.6m and a length of 20m. - Load capacity H30-XB80. - The culvert is placed on a reinforced culvert pad with melaleuca piles arranged at a density of 16 piles/m^2 **Impacts on shirmp farming** - Conduct consultation meeting with local authorities and farmers about construction plan and farming seasons.	- Construction Law No. 50/2014/QH13. - Law on water resources No. 28/2023/QH15	During construction phase	Contractors	- An Giang PPMU - CSC - IMC

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		- Prevent construction activities during the peak period for the purpose of obtaining water for shrimp cultivation. - Notify residents of the construction plan 2 weeks before starting construction.				
3	Impacts on water traffic	**Impacts due to on-water construction** - Wastewater, solid waste, and spoil should be controlled to avoid pollution of surface water sources. - This construction method includes steel sheet pile coffer dam - Notify residents of the construction plan and alternative canals to facilitate local people's travel arrangements. - Arranging a speedboat to regulate, control, and guide waterway traffic to avoid oil and hazardous spills. - Put the floating pontoon-surrounded rigs to facilitate the collection of solid waste, floating objects accidentally falling flow - Arrange 2 different kinds of trash on each floating rig for containing oil rags and other solid waste types **Impacts on the movement and house access of local people** - Construction on a rolling basis, each section 100m, construction on half the width of the road - Set up an alternative route for local movement - Arrange traffic regulation officers and traffic signs.	- Law on inland waterway traffic No. 48/2014/QH13 - QCVN 08:2023/BTNMT - Circular No. 02/2022/TT-BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC

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		- Do not construct during peak times, do not construct at nighttime				
4	Impacts by the relocation of infrastructure	- Planned and unplanned interruptions to water, power, internet services: The Contractor must undertake prior consultation and contingency planning with local authorities about the consequences of a particular service failure or disconnection. - Coordinate with relevant utility providers to establish appropriate construction schedules. - Provide information to affected households on working schedules as well as planned disruptions (at least 5 days in advance). - The contractor should ensure alternative water supply to affected residents in the event of disruptions lasting more than one day. - Any damages to existing utility systems of cable shall be reported to authorities and repaired as soon as possible.	Law on Environmental Protection No. 72/2020/QH14	During construction phase	- Contractor - EVN in Binh Giang and Binh Son commune; - Communication companies (FPT, Viettel, VNPT);	- Kien Giang (now An Giang) PPMU - CSC - IMC
5	**Site-specific impacts and risks**					
5.1	*Sluice T5-1*					
5.1.1	Branch Kenh Mot - Giong Ke Secondary School (100m from the sluice) 	- Pay attention to preventing dust, noise, and vibration pollution during construction near the school. - Ensure traffic safety (installing barriers, and warning signs) around the construction site.	- QCVN 05:2023/BTNMT - QCVN 19: 2009/BTNMT - QCVN 08:2023/ BTNMT - QCVN 26:2010/BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC

			- QCVN 27:2010/BTNMT			
5.1.2	Resident's houses 	- Pay attention to preventing dust, noise, and vibration pollution during construction. - Ensure traffic safety (installing barriers, and warning signs) around the construction site. - Compensate for damage if the houses are broken due to construction activities.	- QCVN 05:2023/BTNMT - QCVN 19: 2009/BTNMT - QCVN 08:2023/ BTNMT - QCVN 26:2010/BTNMT - QCVN 27:2010/BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC
5.1.3	Kenh T5 bridge 	- Pay attention to preventing vibration during construction - Compensate for damage if the bridge is broken due to construction activities.	- QCVN 05:2023/BTNMT - QCVN 19: 2009/BTNMT - QCVN 08:2023/BTNMT - QCVN 26:2010/BTNMT - QCVN 27:2010/BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC
5.2	**Sluice T6-1**					
5.2.1	Binh Giang CPC (160m from the sluice) 	- Pay attention to preventing dust, noise, and vibration pollution during construction near the CPC. - Ensure traffic safety (installing barriers, and warning signs) around the construction site.	- QCVN 05:2023/BTNMT - QCVN 19: 2009/BTNMT - QCVN 08:2023/BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC

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			- QCVN 26:2010/BTNMT - QCVN 27:2010/BTNMT			
5.2.2	Binh Giang Secondary School (360m from the sluice) 	- Pay attention to preventing dust, noise, and vibration pollution during construction near the school. - Ensure traffic safety (installing barriers, and warning signs) around the construction site.	- QCVN 05:2023/BTNMT - QCVN 19: 2009/BTNMT - QCVN 08:2023/BTNMT - QCVN 26:2010/BTNMT - QCVN 27:2010/BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC
5.3	**Sluice T6-4**					
5.3.1	Binh Giang Primary School - Vam Bien branch (200m away from the sluice) 	- Pay attention to preventing dust, noise, and vibration pollution during construction near the school. - Ensure traffic safety (installing barriers, and warning signs) around the construction site.	- QCVN 05:2023/BTNMT - QCVN 19: 2009/BTNMT - QCVN 08:2023/BTNMT - QCVN 26:2010/BTNMT - QCVN 27:2010/BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC
5.4	**Sluice T6-5**					
5.4.1	Pig farm (90m from the sluice)	- Pay attention to preventing dust, noise, and vibration pollution during construction near the farm.	- QCVN 05:2023/BTNMT - QCVN 19: 2009/BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC

		- Ensure traffic safety (installing barriers, and warning signs) around the construction site.	- QCVN 08:2023/BTNMT - QCVN 26:2010/BTNMT - QCVN 27:2010/BTNMT			- IMC
5.4.2	The residential area (10m from the sluice)	- Pay attention to preventing dust, noise, and vibration pollution during construction near the residential area. - Ensure traffic safety (installing barriers, and warning signs) around the construction site. - Organize good drainage to avoid rainwater overflowing from the construction site into people's gardens.	- QCVN 05:2023/BTNMT - QCVN 19: 2009/BTNMT - QCVN 08:2023/BTNMT - QCVN 26:2010/BTNMT - QCVN 27:2010/BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC
5.5	**Sluice K3-1**					
5.5.1	The grave (50m away from the sluice)	Pay attention to prevent vibration when constructing near the grave		During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC
5.6	**Sluice K9-1**					
5.6.1	The grave (90m away from the sluice)	Pay attention to prevent vibration when constructing near the grave		During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC
5.7	**Sluice K3-7**					

5.7.1	Siviranba Chanpa Pagoda (240m from the sluice) 	It should be paid attention to prevent dust, and noise (if necessary, noise barriers will be installed) during construction, especially every 15th day, on the first day of the lunar month, and during festival days	- QCVN 05:2023/BTNMT - QCVN 19: 2009/BTNMT - QCVN 08:2023/BTNMT - QCVN 26:2010/BTNMT - QCVN 27:2010/BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC
5.7.2	Ranh Hat Hamlet cultural house (160m from the sluice)	It should be paid attention to prevent dust, and noise (if necessary, noise barriers will be installed) during construction, especially on holidays	- QCVN 05:2023/BTNMT - QCVN 19: 2009/BTNMT - QCVN 08:2023/BTNMT - QCVN 26:2010/BTNMT - QCVN 27:2010/BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC
5.8	**Sluice VR-1**					
5.8.1	Binh Son Primary School (about 100m away from the sluice)	- Pay attention to preventing dust, noise, and vibration pollution during construction near the residential area. - Ensure traffic safety (installing barriers, and warning signs) around the construction site.	- QCVN 05:2023/BTNMT - QCVN 19: 2009/BTNMT - QCVN 08:2023/BTNMT - QCVN 26:2010/BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC

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			- QCVN 27:2010/BTNMT			
5.8.2	Binh Son Secondary School - High School (about 100m away from the sluice) 	- Pay attention to preventing dust, noise, and vibration pollution during construction near the residential area. - Ensure traffic safety (installing barriers, and warning signs) around the construction site.	- QCVN 05:2023/BTNMT - QCVN 19: 2009/BTNMT - QCVN 08:2023/BTNMT - QCVN 26:2010/BTNMT - QCVN 27:2010/BTNMT	During construction ph ase	contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC
5.8.3	Binh Son Commune Health Center (about 150m far from the sluice) 	- Pay attention to preventing dust, noise, and vibration pollution during construction near the center. - Ensure traffic safety (installing barriers, and warning signs) around the construction site. -	- QCVN 05:2023/BTNMT - QCVN 19: 2009/BTNMT - QCVN 08:2023/BTNMT - QCVN 26:2010/BTNMT - QCVN 27:2010/BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC -
5.8.4	Temple of the Lady of Vam Ray (about 150m away from the sluice)	It should be paid attention to prevent dust, and noise (if necessary, noise barriers will be installed) during construction, especially every 15th day, on	- QCVN 05:2023/BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU

		the first day of the lunar month, and during festival days	- QCVN 19: 2009/BTNMT - QCVN 08:2023/BTNMT - QCVN 26:2010/BTNMT - QCVN 27:2010/BTNMT			- CSC - IMC -
5.9	Residential cluster between NH80 and canal 200	- Pay attention to preventing dust, noise, and vibration pollution during construction near the residential area. - Ensure traffic safety (installing barriers, and warning signs) around the construction site. - Implement good drainage to avoid rainwater overflowing from the construction site into people's houses	- Road Traffic Law No. 23/2008/QH12 - QCVN 05:2023/BTNMT - QCVN 19: 2009/BTNMT - QCVN 08:2023/BTNMT - QCVN 26:2010/BTNMT - QCVN 27:2010/BTNMT - Circular No. 02/2022/TT-BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC
5.10	Ranh Hat hamlet cultural house	- It should be paid attention to prevent dust, and noise (if necessary, noise barriers will be installed) during construction, especially on holidays - Implement good drainage to avoid rainwater overflowing from the construction site into the house	- Road Traffic Law No. 23/2008/QH12 - QCVN 05:2023/BTNMT - QCVN 19: 2009/BTNMT - QCVN 08:2023/BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC

			- QCVN 26:2010/BTNMT - QCVN 27:2010/BTNMT - Circular No. 02/2022/TT-BTNMT			
5.11	Garden along the road	- Manage wastewater and solid waste from workers and construction activities well - Implement good drainage to avoid rainwater overflowing from the construction site into people's gardens	- QCVN 08:2023/BTNMT - Circular No. 02/2022/TT-BTNMT	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC
6	Impacts on EMs	Implement the approved contents of the ethnic minority development plan of the project: - Free Prior Informed Consent must be obtained during consultation meetings and land acquisition from Khmer households. - Training for contractors on cultural characteristics of construction regulations and behaviors of workers with EM people. - Social evils prevention methods for EM communities (especially EM women) shall be provided by training (in combination with public consultations) or/and loudspeakers to ensure their protection against these diseases. - EM community's awareness on the project, project policies will be raised at public consultations to ensure that they engage in the project. - Employment opportunities will be created for EMs during construction	- ESS7	During construction phase	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC

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5.1.5. Measures for the operation phase

5.1.5.1. Generic impacts

525. *Table 93* presents the mitigation measures for generic impacts during the operation phase for the project.

Table 93: Mitigation measures for the generic impacts during the operation phase

E&S issues	Mitigation measures	Responsibility	Supervision
1. Dust and Exhausted Gases	- Regularly clean sand and soil on the road and bridges to reduce dust generation; - Spraying water, washing the road and bridges at least once a day in the dry season to minimize dust swept from the surface of bridges/roads; - Transportation vehicles must be covered to avoid material dropping on the road and bridges; - Vehicles must be registered to meet the requirements issued by the State; - Plant and maintain trees on both road sides to prevent dust from spreading into people's houses along the road	- Operation units - Local goverment	Kien Giang (now An Giang) province
2. Noise	**Noise from vehicles:** - Training and raising the awareness of the road and bridge's users. - To arrange suitable speed limit signs in the crowed area. - To arrange signs to prohibit honking when passing sensitive areas as if. - Plant and maintain trees on both road sides to prevent noise from spreading into people's houses along the road **Noise from transformer stations**: - Choosing low-noise transformers - Regular maintenance of the transformer station	- Operation units - Local goverment	Kien Giang (now An Giang) province
3. Domestic wastewater and solid wastes	- Provide sanitation toilets with septic tanks at every managememt houses of the sluices. - Provide adequate garbage bins at every managememt houses of the sluices - Allocate staffs to empty and replace full bins and haul garbage from the bins - All domestic solid waste will be collected, transported and treated by URENCO - For hazardous waste will be managed by the current regulations of the Government of Vietnam	- Operation units - Local goverment	Kien Giang (now An Giang) DAE
4. Increase in traffic accidents	- Regularly checking and maintaining equipment and sluice gate system to minimize unexpected incidents. - Placing signs, signals or using siren to announce the opening time of the sluice gates to avoid	- Operation units - Local goverment	Kien Giang (now An Giang) province

	causing accidents for the vehicles on the canals of Don Dong, T3-Tuan Thong, 200 and the canal along the sea dike - Before operation, the operation units and transportation agency will prepare an Emergency Contingency Plan to include emergencies involving people, potential spills of oil, diesel and hazardous materials and their clean-up, medical evacuation, etc. The objective will be to minimize risk and accidents and to respond quickly and competently should an accident occur and effort has been made during design of the subproject to incorporate all road safety infrastructures (light, signs, etc.) to reduce road safety risks.		
5. Land use change	- Improving people knowledge on socio- economic development opportunity and risks related to social issues. - Coordinate with local authorities in management, migration and use of land on 02 sides of the road. - Propagandize, raise awareness of people living near the Project area about the sense of keeping environmental sanitation, ecological landscapes and protection of the project items.	Local government	Kien Giang (now An Giang) PPC
6. Damage due to traffic roads on the bridges over the sluices	- Carefully inspect the road and bridges during construction; - Maintain the road and bridges on a regular basis; - Local authorities will raise awareness of the protection of the bridges and roads; and - Repairs will be carried out immediately following the incident.	- Operation units - Local goverment	Kien Giang (now An Giang) PPC

5.1.5.2. Specific impacts

526. *Table 94* presents the mitigation measures for specific impacts during the operation phase for the project.

Table 94: Mitigation measures for specific impacts during the operation phase

E&S issues	Mitigation measures	Responsibility	Supervision
1. **Due to operation of the road**			
a) Impacts on water drainage	- Supplement horizontal sewers with sizes suitable for the intensity of rain and the flow of stormwater over the Project area, if necessary. - Regularly check the areas at risk of flooding to design additional horizontal sewers (if necessary). - Consult with local authorities and local authorities in the areas at risk of flooding in order to take measures to supplement sewers in time. - Clear the flow at the places at risks of flooding before, during and after the rainy/storm season. Regularly carry out maintenance of the road.	Local government and traffic authorities	Department of Construction of Kien Giang (now An Giang) province

E&S issues	Mitigation measures	Responsibility	Supervision
b) Riks of the road damages	- Regularly carry out maintenance of the road. - Before operation, the operation units and transportation agency will prepare an Emergency Contingency Plan to include emergencies involving people, potential spills of oil, diesel and hazardous materials and their clean-up, medical evacuation, etc. The objective will be to minimize risk and accidents and to respond quickly and competently should an accident occur and effort has been made during design of the project to incorporate all road safety infrastructures (light, signs, etc.) to reduce road safety risks.	Operation units Local government and traffic authoritie	Department of Transport of Kien Giang (now An Giang) province
2. **Due to operation of the power lines**			
a) Impacts due to electromagnetic field	- The standard of electromagnetic field will strictly follow during the installation and the operation of the power lines and - The power lines will be maintained on a regular basis. - Follow the regulations on fire and rescue of Law No. 55/2024/QH15 on fire and Occupational Safety and Health under Law No. 84/2015QH13 on Occupational Safety and Health.	- Operation units	Kien Giang (now An Giang) DAE
3. **Due to operation of the sluices**			
a) Degradation of surface water quality	- Engage a consultant to establish an operations scheme (for approval) for regulating salinity and limiting salt intrusion into agricultural areas. - Closely consult with local authorities and people on development of operational regulation of the 23 sluices and early inform on the closing time of the 23 sluice gates for local. - Conduct water/ecology monitoring at the monitoring sites to provide baseline data prior to sluice gate operations, no later than 1 month before completion of construction. - Communicate, raise local awareness of environmental protection, especially water quality in canals. - Collect packages, excessive foods during the argicultural and aquacultural production; prohibit littering in surrounding area or water sources - Radically collect and prevent domestic wastewater of local people from flowing into surrounding canals. - Measures can be taken in pond systems to mitigate impacts on water quality (i) reduce the amount of contamination of the effluent; (ii) prevent pond effluent from entering surrounding water bodies;	Operation Units	Kien Giang (now An Giang) DAE

E&S issues	Mitigation measures	Responsibility	Supervision
	and (iii) treat the effluent before its release into the receiving waters to reduce contaminant levels, including: • **Feed:** (i) Ensure that pellet feed has a minimum amount of "fines" or feed dust. Fines are not consumed and add to the nutrient load in the water; (ii) Match the pellet size to the species' life-cycle stage (e.g. smaller pellets should be fed to fry or juvenile animals to reduce the unconsumed fraction); (iii) Regularly monitor feed uptake to determine whether it is being consumed and adjust feeding rates accordingly. Feed may be wasted due to overfeeding or not feeding at the right time of day; (iv) Where feasible, use floating or extruded feed pellets as they allow for observation during feeding time; (v) Store feed in cool, dry facilities and ideally for no longer than 30 days to avoid reduction in vitamin contents. Moldy feed should never be used as it may cause disease; (vi) Spread feed as evenly as possible throughout the culture system, ensuring that as many animals as possible have access to the feed. Some species are highly territorial, and uneaten feed adds to the nutrient load; (vii) Feed several times a day, especially when animals are young, allowing better access to food, better feed conversion ratios and less waste; (viii) Halt feeding at a suitable interval before harvest to eliminate the presence of food and / or fecal material in the animal's gut; and (ix) During harvesting, contain and disinfect blood water and effluent to reduce the risk of disease spread and to contain effluent matter. • **Suspended solids:** (i) Avoid discharging waters from ponds while they are being harvested with nets as this will add to the suspended solids in the effluent drainage; (ii) If feasible, use partial draining techniques to empty ponds that have been harvested. The last 10–15 percent of pond water contains the highest quantities of dissolved nutrients, suspended solids, and organic matter. After harvest, hold the remaining water in the pond for a number of days before discharge, or transfer to a separate treatment facility. • **Fertilizers**: (i) Plan the rate and mode of application of fertilizers to maximize utilization and prevent over-application, taking into account predicted consumption rates; (ii) Increase the efficiency of application and dispersion through such practices as dilution of liquid fertilizers or solution of granulated fertilizers prior to application. Other options include the use of powdered fertilizers or the		

E&S issues	Mitigation measures	Responsibility	Supervision
	placement of powdered fertilizer bags in shallow water to allow solution and dispersion; (iii) Consider the use of time-released fertilizer in which resin coated granules release nutrients into the pond water, with the rate of release corresponding to water temperature and movement; (iv) Avoid the use of fertilizers containing ammonia or ammonium in water with pH of 8 or above to avoid the formation of toxic unionized ammonia (NH_3); (v) Depending on the system (e.g. freshwater aquaculture), grow organic fertilizer (e.g. natural grass) in the pond basin after harvest; (vi) Initiate pond fertilization only in static ponds with no pond water overflow that can impact downstream waters and watersheds; and (vii) Conduct pond fertilization to avoid or minimize consequences of potential runoff due to floods or heavy rain and avoid application to overflowing ponds. • Chemicals and antibiotics: (i) Design the pond depth to reduce the need for chemical control of aquatic weeds and reduce thermal stratification; (ii) Do not use antifoulants to treat cages and pens. The chemically active substances used in antifouling agents are very poisonous and highly stable in an aquatic environment. Clean nets manually or in a net washing machine. The toxic agro-chemicals in Annex 1 of Circular No. 26/2018/BNNPTNT of MARD (now the MAE) dated 15 November 2018 are absolutely banned for use in aquaculture; and list of drugs presented in Annex 3 of Circular No. 15/2009/BNN is just restricted for use in aquaculture. • Prevention of effluent from entering surrounding water system: (i) Reuse water from harvested ponds by pumping it into adjacent ponds to help complement their primary productivity, provided that the level of BOD is controlled; This process is called "bloom seeding," and requires careful timing of harvests; and (ii) Consider the hydrology of the region in the design of the pond system and ensure that the pond embankments are high enough to contain the pond water and prevent loss of effluent during periods of increased rainfall and potential flooding. • **Process Wastewater Treatment:** Techniques for treating industrial process wastewater in aquaculture sector include grease traps, skimmers or oil water separators for separation of floatable solids; flow and load equalization; sedimentation for suspended solids reduction using clarifiers or settling ponds; biological treatment, typically aerobic treatment, for		

E&S issues	Mitigation measures	Responsibility	Supervision
	reduction of soluble organic matter (BOD); biological nutrient removal for reduction in nitrogen and phosphorus; chlorination of effluent when disinfection is required; dewatering and disposal of residuals; in some instances composting or land application of wastewater treatment residuals of acceptable quality may be possible. Additional engineering controls may be required (i) for removal of residual feed supplements, chemicals, antibiotics, etc. which may pass through the wastewater treatment system, and (ii) to contain and neutralize nuisance odors. For sea water applications, unit operations for wastewater treatment may have to be suitably adapted to the relatively high salinity of the water. **Solid waste management:** (i) Provide dustbins to collect domestic solid waste separately from hazardous wastes (chemical bags, containers) at farming sites. Organic wastes can be disposed to landfills for treatment, while hazardous wastes could be backed to the producers for reusing or recycling; and (ii) Sludge generated from shrimp ponds after harvesting should be disposed to landfills or used as raw materials for producing composts for agricultural production if possible.		
b) Impacts of saline and/or brackish water on the sluices	Salt-tolerant construction materials are chosen in the design stage of the sluice	PPMU	Kien Giang (now An Giang) DAE
c) Damage to sluice gates	- Regularly checking and maintaining equipment and sluice gate system to minimize unexpected incidents. - Placing signs, signals or using siren to announce the opening time of the sluice gates to avoid causing accidents for the vehicles on the canals of Don Dong, T3-Tuan Thong, 200 and the canal along the sea dike - Before operation, the operation units and transportation agency will prepare an Emergency Contingency Plan to include emergencies involving people, potential spills of oil, diesel and hazardous materials and their clean-up, medical evacuation, etc. The objective will be to minimize risk and accidents and to respond quickly and competently should an accident occur and effort has been made during design of the project to incorporate all road safety infrastructures (light, signs, etc.) to reduce road safety risks. - Timely covering and shielding plants with earth bags and closing the sluice gate to prevent saltwater from entering the fields.	Operation Units	Kien Giang (now An Giang) DAE

E&S issues	Mitigation measures	Responsibility	Supervision
	- Timely mobilization of equipment and rescue teams to the scene to embank and reinforce the damaged section. - Placing signs, signals or using siren to announce the opening time of the sluice gate to avoid causing accidents for the vehicles - Promptly repairing or replacing malfunctioning valve gate.		
d) Increase in water use conflict	- To mitigate the potential impacts on water use conflicts, during project preparation, a specific plan will be prepared and finalized in consultation with local communities to ensure that the designing and operation of irrigation and drainage systems and sluices are acceptable to local authorities and communities. - Engage a consultant to establish an operations scheme (for approval) for regulating salinity and limiting salt intrusion into agricultural areas. - Direct farmers to drain rainwater from the fields to maintain sufficient salinity in the pond for shrimp growth during rains. - Reuse water from harvested ponds by pumping it into adjacent ponds to help complement their primary productivity, provided that the level of BOD is controlled; This process is called "bloom seeding," and requires careful timing of harvests; Consider the hydrology of the region in the design of the pond system and ensure that the pond embankments are high enough to contain the pond water and prevent loss of effluent during periods of increased rainfall and potential flooding.	Operation Units	Kien Giang (now An Giang) DAE
e) Impacts on aquatic life	**Impacts on biodiversity and temporary blockage of fish passage** - The aperture of the sluices has been calculated to maintain a specific flow velocity within the sluices to facilitate the movement of aquatic species from the main rivers into the project's area. In particular, the ideal flow velocities vary according to the following criteria: 0.2 to 0.30 m/s for small shrimps and prawns; 0.4 to 0.6 m/s for larger shrimps and small fish (sizes 2-6cm); 0.6 to 0.8 m/s for medium-sized fish (sizes 6-25cm); and 0.6 to 1.1 m/s for large fish (greater than 25cm). The fish are carried away by the water current when the velocity surpasses 1.1 m/s. When the velocity exceeds 1.1 m/s, the fish will be swept away by the water flow. - Division of Water Resources of Kien Giang (now An Giang) province will conduct aquatic life monitoring program every 3 months for at least 2 years after construction is completed to observe the potential impacts (positive and negative) of the	Operation Units	Kien Giang (now An Giang) DAE

E&S issues	Mitigation measures	Responsibility	Supervision
	sluice operations. Results will be made publicly accessible. Division of Water Resources of Kien Giang (now An Giang) province will maintain close consultation with local authorities and communities regarding the closing and opening of sluice gates as part of overall sluice gate management and operation. - The sluices will be opened most of time.		
f) Impacts on waterway where the sluices are built	- The sluices will be opened most of time - Develop a plan to optimize time of sluice gate closures and consult with local authorities and people. - Notify local people and authorities regarding sluice gate operation (opening and closing times).	- Local government and traffic authorities - Division of Water Resources of Kien Giang (now An Giang) Province	Kien Giang (now An Giang) DAE
g) Impacts on flood drainage	- The sluices will be opened most of time - Develop a plan to optimize time of sluice gate closures and consult with local authorities and people. - Notify local people and authorities regarding sluice gate operation (opening and closing times).	- Local government and traffic authorities - Division of Water Resources of Kien Giang (now An Giang) Province	Kien Giang (now An Giang) DAE
h) Canal bank erosion	- Reinforcing both upstream and downstream sluices with the following details: • Reinforcement length: Varies for each sluice, with the river side being 10-30m and the field side being 10-30m. • Canal slope reinforcement: Reinforced with a 30cm thick stone mat over a layer of filter fabric. • Canal bottom reinforcement: Reinforced with a 50cm thick stone gabion over a layer of filter fabric. - Regular dredging in the sluice area is conducted to minimize sedimentation at the sluice location. - The management unit must ensure the budget for maintenance of the project items - Conduct periodic maintenance on the banks where the sluices are located at least once a year, especially prior to rainy season.	Division of Water Resources of Kien Giang (now An Giang) Province	Kien Giang (now An Giang) DAE
i) Risk that failure of livelihood models	- Establish a demonstration model of livelihood by raising engineered species in the fishery research center;	- Operation units	- Kien Giang (now An

E&S issues	Mitigation measures	Responsibility	Supervision
adversely impacting welfare of beneficiary households	- FPIC will be applied for all consulations with EMs. - Conduct a training workshop on the successful model of livelihood for farmers; - Plan a separate area of nursing and raising such species with confined water sources to supply for the model activities. - As semi-intensive and intensive shrimp farming models require large budgets, good experience and capacity to capture the transferred high technology, while the poor and EM often lack such resources, demonstrated models of the extensive shrimp farms, ecological shrimp farming in mangrove forests or combined raising shrimp in rice field need to be developed where the land funds are available to support the poor and EM in accessing the successful models for application. In addition, the poor and EM are potential to be left behind the development in case they have no aquaculture land available or just a very small land area in the planned shrimp farming. In this context, the project/subprojects should support in improving their capacity on shrimp farming, while establishing a collective shrimp farming for them to participate in so that they can share the benefits gained from the project investment. - Training to raise awareness of the EM community on shrimp farming and agricultural production. The activity contributes to agricultural growth, economic restructuring, poverty reduction, improvement of EM lives especially for landless and land poor households. - Training to raise awareness of the community on climate change and adaption to changes in water resources, ecological and social. - Livelihood Development Training: this is an important activity for household for economic development. The training courses aim to members (as EM households) to determine/ analyze new livelihood ideas to be developed into a viable plan, as an output of the training, which will help them get a loan the subproject for a job that they plan to do. - Develop livelihood models, with the participation of organizations, social organizations, coordinate the selection of models site, support technical guidance, implementation, monitoring and replicable results; - Establish a collective shrimp farming for them to participate in so that they can share the benefits gained from the project investment	- Local government	Giang) DAE - Kien Giang (now An Giang) PPC

E&S issues	Mitigation measures	Responsibility	Supervision
j) Farmers' resistance to adapting to livelihood models	- Establish a demonstration livelihood model of semi-intensive or intensive shrimp farming applying the modern technology transferred by the project; - Conduct a workshop for sharing the successful model of shrimp farming; - Establish an interest group who are capable of investing the required infrastructures and application of modern technology for shrimp farming.	Division of Water Resources of Kien Giang (now An Giang) Province	Kien Giang (now An Giang) DAE
k) Risk of land salinization	- Ensure that the embankments around brackish water pond systems are high enough to form a physical division between agriculture and aquaculture. - Ensure that the saline / brackish water discharges are appropriately treated and disposed of (e.g. through use of discharge canals) for the receiving waters. - Ensure that appropriate consultation will be held at the community level duringproject preparation to avoid conflicts of interest when agricultural land is transferred to aquaculture production. - Conduct training on trained on how to leach the salinity after the shrimp crop in accordance to TCVN 9167:2012 - Hydraulic structure - Saline soil - Saline leaching process	Division of Water Resources of Kien Giang (now An Giang) Province	Kien Giang (now An Giang) DAE

5.1.6. Measures for the impacts of climate changes

527. *Table 95* presents the mitigation measures for the impacts of climate changes of the project.

Table 95: Mitigation measures for the impacts of climate changes of the project

E&S issues	Mitigation measures	Responsibility	Supervision
GHG emission during construction	- Encourage contractors to use fuel-efficient equipment, machinery and vehicles. - Encourage contractors to use biofuels during construction	Contractors	- Kien Giang (now An Giang) PPMU - CSC - IMC
GHG emission during operation	- Using solar energy in the operation of some project components also contribute to climate change adaptation. When using solar energy, the project will reduce approximately 105 tons of CO_2 emissions, including •Using solar lights: (234 lights along the Binh Giang 1 road + 16 sluices with work bridges x 1 light + 7 sluices with traffic bridges x 3	PPMU and operation units	Kien Giang (now An Giang) DAE

	lights) x 100W x 12h x 365 days x 0.7221 tons of CO_2/MWh (according to Document No. 1278/BĐKH-TTBVTOD dated December 31, 2022 of the Department of Climate Change - MONRE) = 86 tons of CO_2. • Using solar panels on the roof: 4 houses x 3kW x 6h x 365 days x 0.7221 tons of CO_2/MWh = 19 tons of CO_2 - Encourage road-users to use biofuels for their vehicles - Encourage road-users to use fuel-efficient vehicles		

5.1.7. Measures for the induced impacts

528. The mitigation measures for the induced impacts of the project are proposed in *Table 96*.

Table 96: Mitigation measures for the induced impacts of the project

E&S issues	Mitigation measures	Responsibility	Supervision
1. Economic and social development	- Planning and subdivision of functional areas on both roadsides. - Work with local authorities to disclose information about infrastructure planning in residential areas to avoid encroaching road corridor. - Communicate with people on policies and planning of the provinces and cities, avoiding investment in land that cause disturbance to the community. - Assign signs, speed limit signs that are. - Design wastewater and waste collection system after residential and functional areas are formed. - Improving people knowledge on socioeconomic development opportunity and risks related to social issues. - Coordinate with local authorities in management, migration and use of land on 02 sides of the road. - Propagandize, raise awareness of people living near the project area about the sense of keeping environmental sanitation, ecological landscapes and protection of works.	- Operation units - Local government	- Operation units - Local government
2. Social impacts on vulnerable people	- Establish a demonstration model of livelihood by raising engineered species in the fishery research center; - Conduct a training workshop on the successful model of livelihood for farmers;	- Operation units - Local government	- Operation units - Local government

	- Plan a separate area of nursing and raising such species with confined water sources to supply for the model activities. - As semi-intensive and intensive shrimp farming models require large budgets, good experience and capacity to capture the transferred high technology, while the poor and EM often lack such resources, demonstrated models of the extensive shrimp farms, ecological shrimp farming in mangrove forests or combined raising shrimp in rice field need to be developed where the land funds are available to support the poor and EM in accessing the successful models for application. In addition, the poor and EM are potential to be left behind the development in case they have no aquaculture land available or just a very small land area in the planned shrimp farming. In this context, the project/subprojects should support in improving their capacity on shrimp farming, while establishing a collective shrimp farming for them to participate in so that they can share the benefits gained from the project investment. - Training to raise awareness of the EM community on shrimp farming and agricultural production. The activity contributes to agricultural growth, economic restructuring, poverty reduction, improvement of EM lives especially for landless and land poor households. - Training to raise awareness of the community on climate change and adaption to changes in water resources, ecological and social. - Livelihood Development Training: this is an important activity for household for economic development. The training courses aim to members (as EM households) to determine/ analyze new livelihood ideas to be developed into a viable plan, as an output of the training, which will help them get a loan the subproject for a job that they plan to do. - Develop livelihood models, with the participation of organizations, social organizations, coordinate the selection of models site, support technical guidance, implementation, monitoring and replicable results; - Establish a collective shrimp farming for them to participate in so that they can share the benefits gained from the project investment		

5.2. ENVIRONMENTAL AND SOCIAL COMMITMENT PLAN

529. The project owner has developed an Environmental and social commitment plan (ESCP). The project ESCP considers the results of the ESIA, the WB's E&S due diligence, and stakeholder engagement. It provides an accurate summary of the material steps and actions to avoid, minimize, reduce, or otherwise mitigate the potential E&S risks and impacts of the project. In addition, it outlines a procedure for the adaptive management of project changes and unforeseen circumstances. It has been agreed upon with the Bank and disclosed locally at the project sites as well as on the WB's external website. It will be included in the project's legal agreement.

530. The Kien Giang (now An Giang) PPMU will diligently implement the measures and actions identified in the ESCP within the specified timeframes and will monitor and report on the status of its implementation in accordance with the ESSs. The PPMU will promptly notify the Bank of any proposed changes to the project's scope, design, implementation, or operation that are likely to result in an adverse change in the project's environmental or social risks or impacts. In that case, the PPMU will conduct additional assessments and stakeholder engagement as appropriate under the ESSs. Based on the findings of such assessments and consultation, the PPMU will propose changes to the ESCP and relevant management tools for the WB's approval. The updated ESCP will be disclosed.

531. The PPMU will monitor the project's E&S performance per the legal agreement, including the ESCP. The extent and mode of monitoring will be proportionate to the nature, E&S risks and impacts, and compliance requirements of the project, and will be agreed upon with the Bank. The PPMU will ensure that adequate institutional arrangements, systems, resources, and personnel are in place for monitoring. Where appropriate and as specified in the ESCP, the PPMU will involve stakeholders and third parties, such as independent experts, local communities, or non-governmental organizations (NGOs), to supplement or verify its monitoring activities. Where other agencies or third parties are in charge of managing specific risks and impacts and implementing mitigation measures, the PPMU will work with them to establish and monitor such mitigation measures. See details in the ESCP.

5.3. ROLES AND RESPONSIBILITIES FOR THE IMPLEMENTATION OF ESMP

5.3.1. Implementation arrangement

532. *Table 97* summarize the roles and responsibilities of the key stakeholders and their relationships during the implementation of the ESMP.

Table 97: Annotation on E&S roles and responsibilities of the project and project

Community/Agencies	Responsibilities
Project Implementing Agency (IA)	– The IA will be responsible for overseeing the Project implementation including ESMF implementation and the environmental performance of contractors. – CPMU, representative of the IA, will be responsible for monitoring the overall Project implementation, including E&S compliance of the Project. CPMU will have the final responsibility for ESMF implementation and E&S performance of the Project during the construction and operational phases.

Community/Agencies	Responsibilities
	– Specifically, the CPMU will: (i) closely coordinate with local authorities in the participation of the community during project preparation and implementation; (ii) monitor and supervise ESMP implementation including incorporation of ESMP into the detailed technical designs and bidding and contractual documents; (iii) ensure that an environmental management system is set up and functions properly; (iv) be in charge of reporting on ESMP implementation to the IA and the World Bank. – To be effective in the implementation process, CPMU will establish an Environmental and Social Unit (ESU) with at least two E&S staff to help with the environmental aspects of the Project.
Environmental and Social Unit (ESU) under PPMU	– The ESU is responsible for monitoring the implementation of the World Bank's environmental E&S policies in all stages and processes of the Project. Specifically, this unit will be responsible for (i) screening projects against eligibility criteria, for the environment and social impacts, policies triggered and instrument/s to be prepared; (ii) reviewing the project ESIA and ESMPs prepared by consultants to ensure the quality of the documents; (iii) helping the PPMU incorporate ESMPs into the detailed technical designs and civil works bidding and contractual documents; (iv) helping PMU incorporate responsibilities for ESMP monitoring and supervision into the TORs, bidding and contractual documents for the CSC and other E&S consultants (SSC, ESC, IESMC, and EMC) as needed; v) providing relevant inputs to the consultant selection process; (v) reviewing reports submitted by the CSC and E&S consultants; (vi) conducting periodic site checks; (vii) advising the PPMU on solutions to environmental issues of the project; and viii) preparing environmental performance section on the progress and review reports to be submitted to the Implementing Agency and the WB.
Construction Supervision Consultant (CSC) and/or Field Engineer	– The CSC will be responsible for routine supervising and monitoring all construction activities and for ensuring that Contractors comply with the requirements of the contracts and the ESCOPs. The CSC will engage a sufficient number of qualified staff (e.g. Environmental Engineers) with adequate knowledge of environmental protection and construction project management to perform the required duties and to supervise the Contractor's performance. – The CSC will also assist the PPMU in reporting and maintaining close coordination with the local community.
Contractor	– Based on the approved environmental specifications (ESCOPs) in the bidding and contractual documents, the Contractor is responsible for establishing a Contractor ESMP (CESMP) for each construction site area, submitting the plan to the PPMU and CSC for review and approval before the commencement of construction. In addition, it is required that the Contractor get all permissions for construction (traffic control and diversion, excavation, labor safety, etc. before civil works) following current regulations. – The Contractor is required to appoint a competent individual as the contractor's on-site Safety and Environment Officer (SEO) who will be responsible for monitoring the contractor's compliance with health and safety requirements, the CESMP requirements, and the environmental specifications (ECOPs). – Take actions to mitigate all potential negative impacts in line with the objective described in the CESMP.

Community/Agencies	Responsibilities
	– Actively communicate with residents and take actions to prevent disturbance during construction. – Ensure that all staff and workers understand the procedure and their tasks in the environmental management program. – Report to the PPMU on any difficulties and their solutions. – Report to local authorities and the PPMU if environmental accidents occur and coordinate with agencies and key stakeholders to resolve these issues.
Independent Environmental and Social Monitoring Consultant (IMC) when required by WB	– IMC will, under the contract scope, provide support to the PPMU to establish and operate an environmental and social management system, offer suggestions for adjusting and building capacity for relevant agencies during project implementation, and monitor the C-ESMP implementation in both construction and operation stages. IMC will also be responsible for supporting the PPMU to prepare monitoring reports on ESMP and other E&S implementations. – The IMC will have extensive knowledge and experience in environmental and social monitoring and auditing to provide independent, objective, and professional advice on the environmental and social performance of the project.
Local community	– Community: According to Vietnamese practice, the community has the right and responsibility to routinely monitor environmental performance during construction to ensure that their rights and safety are adequately protected and that the mitigation measures are effectively implemented by contractors and the CPMU/PPMU. If unexpected problems occur, they will report to the CSC and/or CPMU/PPMU.
Social organizations, NGOs and civil society groups	– These organizations could be a bridge between the PPC/CPC, communities, Contractors, and the CPMU/PPMU by assisting in community monitoring. – Mobilizing communities' participation in the project, providing training to communities, and participating in solving environmental problems, if any.
Province and District People's Committees (PPC/CPCs), DAE	– Oversee implementation of the project under recommendations of the DAE and PPMU to ensure compliance with Government policy and regulations. The DAE is responsible for monitoring compliance with the Government's environmental requirements.

5.3.2. Environmental and social compliance framework

5.3.2.1. Environmental and Social duties of the PPMU/Detailed design consultants

- When preparing TORs for consulting services and construction bidding documents, the PPMU will work closely with consultants/contractors to ensure: (i) contract packaging and cost estimations, including ESMP implementation, the services of independent E&S monitoring, environmental sampling/monitoring and compliance supervision, reporting, etc.; (ii) ESCOPs, as well as site-specific mitigation measures, are incorporated into the bidding documents; (iii) environmental supervision and training are included in the scope of works assigned to the CSC.
- In the FS/detailed design stage, the PPMU shall work closely with the FS consultant and the detailed design engineers to ensure that the greening/landscaping, environmentally friendly solutions, and relevant mitigation measures proposed in the ESIA/ESMP are considered and incorporated into the detailed engineering design as appropriate.

- During the construction phase, the PPMU shall work closely with the CSC to monitor the compliance of contractors and report to relevant authorities and the WB. The PPMU will also direct the CSC and contractors on the actions to be undertaken in the case when issues, incidents, or accidents arise. Besides, PPMU will be responsible for ensuring the effective implementation of the LMP during construction.
- Throughout project implementation, the PPMU will appoint at least one qualified individual as EO and one qualified individual as SO, in which:
  - The EO will oversee environmental issues and monitor standards compliance of the project. The EO will be supported by the IMC, the EOs of the CSC as well as contractors.
  - The SO will oversee and coordinate the social/resettlement aspects of the project.

5.3.2.2. Environmental and Social Duties of the Contractor

533. The contractor firstly shall adhere to minimize the impact that may be a result of the project construction activities and secondly, apply the mitigation measures under ESMP to prevent harm and nuisances on local communities and the environment caused by the impacts in construction and operation stages.

534. Remedial actions that cannot be effectively carried out during construction should be carried out on completion of the works (and before issuance of the acceptance of completion of works)

535. The duties of the Contractor include but not limiting to:

- Compliance with relevant legislative requirements governing the environment, public health and safety;
- Work within the scope of contractual requirements and other tender conditions;
- Organize representatives of the construction team to participate in the joint site inspections undertaken by the Environmental Supervisor (ES) of the CSC;
- Carry out any corrective actions instructed by the Environmental Control Officer (ECO) of the PPMU and ES;
- In case of non-compliance/discrepancies, carry out investigation and submit proposals on mitigation measures, and implement remedial measures to reduce environmental impact;
- Stop construction activities, which generate adverse impacts upon receiving instructions from the ECO and ES. Propose and carry out corrective actions and implement alternative construction methods, if required, to minimize the environmental impacts; Non-compliance by the Contractor will be cause for suspension of works and other penalties until the non-compliance has been resolved to the satisfaction of the ECO and ES.

5.3.2.3. Contractor's Environmental and Social Management Plan (C-ESMP)

536. Following contract signing, each contractor will be required to prepare and submit a C-ESMP, which will be reviewed and cleared for alignment with ESF requirements by the CSC, PPMU, and WB.

537. The C-ESMP aims to provide information for environmental and social management during the project construction on-site to ensure that the contractor and any sub-constructors have minimal environmental impact. It specifies how the contractor will reduce impacts caused

by the construction of the project and documents the contractor' s response to supervision, monitoring, verification, internal audit, and correction or improvement of E&S performance. It must be site-specific and include information on the control measures that will be applied on-site to mitigate any potential E&S impacts of the proposed works/activities.

538. If the proposed works/activities outlined in the C-ESMP are changed or modified over the term of the contract, the contractor will be expected to update the C-ESMP to reflect these changes or modifications. The C-ESMP should comprise the following sections:

- A statement of policy, defining the contractor's E&S policy and an indication of a commitment to the execution of its C-ESMP.
- A brief of the document, including the date of issue; revision status; and list of preparation people with their signature.
- Applicable laws and regulations associated with the requirements in the ESMP and identification of the contractor licenses, permits, and approval associated with the CESMP.
- Details on how the E&S impacts and risks identified in the ESIA will be managed on-site, including (i) the site-specific measures to mitigate impacts during construction; (ii) ECOPs; (iii) the C-ESMP to be developed after the contractor is selected and before construction starts; and (iv) the contractor's dredging management plan and the contractor's vegetation clearance management plan that the contractor is required to develop.
- Details on E&S training for all on-site staff of the contractor (including subcontractors) is required. As a minimum, all contractor staff working at the project sites must: (i) be familiar with and understand the C-ESMP for their works; (ii) be aware of their environmental and social responsibilities and legal obligations on-site; and (iii) receive OHS and emergency response training.
- Specific capabilities, support mechanisms, and resources necessary to satisfactorily implement the C-ESMP. Detailed environmental and social responsibilities of all contractor staff, including subcontractors working on-site with appropriate knowledge, skills, and training for specific tasks shall be identified.

539. The contractor shall be responsible for preparing monthly environmental reports as part of the progress reports required in the bidding document, including any accident and incident reporting, for submission to the project owner. These reports may contain the following information: (i) Implementation of the C-ESMP per the agreed program; (ii) Any difficulties encountered during C-ESMP implementation, as well as recommendations for future solutions; (iii) The number and type of non-compliance, as well as suggested corrective actions; (iv) Reports from subcontractors involved in the C-ESMP implementation, including minutes of meetings and discussions undertaken by the contractor; (v) Minutes of meetings and discussions held by the project owner regarding C-ESMP implementation; and (vi) Implementation of the workers' CoC and OHS management plan, including community safety.

5.3.2.4. Contractor's Safety and Environment Officer (SEO)

540. The contractor shall be required to appoint a competent individual as the Contractor's on-site safety and environment officer (SEO). The SEO must be appropriately trained in environmental management and must possess the skills necessary to transfer environmental management knowledge to all personnel involved in the contract. The SEO will be responsible

for monitoring the contractor's compliance with the ESMP requirements and the environmental specifications. The duties of the SEO shall include but not be limited to the following:

- Carry out environmental site inspections to assess and audit the contractors' site practice, equipment, and work methodologies with respect to pollution control and adequacy of environmental mitigation measures implemented;
- Monitor compliance with environmental protection measures, pollution prevention and control measures, and contractual requirements;
- Monitor the implementation of environmental mitigation measures;
- Prepare audit reports for the environmental monitoring data and site environmental conditions;
- Investigate complaints and recommend any required corrective measures;
- Advise the contractor on environment improvement, awareness, and proactive pollution prevention measures;
- Recommend suitable mitigation measures to the contractor in the case of non-compliance. Carry out additional monitoring of noncompliance instructed by the ECO/ES;
- Inform the contractor and ECO/ES of environmental issues, submit the contractor's ESMP Implementation Plan to the ECO/ES, and relevant authorities, if required;
- Keep detailed records of all site activities that may relate to the environment.

5.3.2.5. Independent Monitoring Consultant (IMC)

541. To minimize the environmental impacts during the construction stage of the Project, the Project owner shall ensure that environmental quality monitoring requirements are established for the project. An IMC appointed by CPMU shall carry out the monitoring.

- IMC will be responsible for carrying out environmental sampling, monitoring and marking reports during all stages of the Project. Environmental quality monitoring will be reported periodically to PPMU (every 06 months in the construction stage and operation stage).
- IMC will also supply specialized assistance to CPMU and ECO in environmental matters.

5.3.2.6. Environmental Supervision during Construction

542. During the construction stage, a qualified CSC reporting to the PPMU shall carry out the environmental supervision. The CSC is responsible for inspecting, and supervising all construction activities to ensure that mitigation measures adopted in the ESMP are properly implemented and that the negative environmental impacts of the Project are minimized. The CSC shall engage a sufficient number of Environmental Supervision Engineers with adequate knowledge of environmental protection and construction project management to perform the required duties and to supervise the Contractor's performance. Specifically, ES will:

- Review and assess on behalf of the PPMU whether the construction design meets the requirements of the mitigation and management measures of the ESMP,
- Supervise site environmental management system of contractors including their performance, experience, and handling of site environmental issues, and provide corrective instructions;

- Review the ESMP implementation by the contractors, verify and confirm environmental supervision procedures, parameters, monitoring locations, equipment, and results;
- Report ESMP implementation status to the PPMU and prepare the environmental supervision statement during the construction stage; and
- Approve invoices or payments.

5.3.2.7. Compliance with Legal and Contractual Requirements

543. The construction activities shall comply not only with contractual environmental protection and pollution control requirements but also with the environmental protection and pollution control laws of Viet Nam.

544. All the works method statements submitted by the Contractor to the ECO for approval shall also be sent to the ES to see whether sufficient environmental protection and pollution control measures have been included.

545. The ES shall also review the progress and program of the works to check that relevant environmental laws have not been violated, and that any potential for violating the laws can be prevented.

546. The Contractor shall copy relevant documents to the SEO and the ES. The document shall at least include the updated work progress report, the updated work measure, and the application letters for different license/permits under the environmental protection laws, and all the valid licenses/permits. The SEO and the ES shall also have access, upon request, to the Site Log-Book.

547. After reviewing the documents, the SEO or the ES shall advise the ECO and the contractor of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the SEO or the ES concludes that the status of the license/permit application and any environmental protection and pollution control preparation works may not comply with the work measure or may result in a potential violation of environmental protection and pollution control requirements, they shall advise the Contractor and the ECO accordingly.

5.3.2.8. Environmental Claims and Penalty System

548. In the compliance framework, if non-compliance with environmental regulations is discovered by ECO/CSC/ES/IMC during the site supervision, 2% values of interim payment of the contractor of this month will be held back. The Contractor will be given a grace period (determined by CSC/ES) to repair the violation. If the Contractor performs the repairs within the grace period (confirmed by CSC/ES), no penalty is incurred, and keeping money will be paid. However, if the Contractor fails to successfully make the necessary repairs within the grace period, the Contractor will pay the cost for a third party to repair the damages (deduction from keeping money).

549. In case IMC/CSC/ES is not detected as non-compliance with the environmental regulations of the contractor, they will be responsible for payment to repair the violation.

5.4. REPORTING

550. The E&S performance will be included in the project progress reports. The PPMU with assistance from the CSC/field engineers will submit the E&S performance of the project to the CPMU monthly. At the project level, the CPMU will prepare an E&S monitoring report twice per year for submission to the WB describing the project progress and compliance with the ESMF and other requirements. The reporting requirement is described in *Table 98*.

Table 98: Reporting Procedures

No	Report prepared by	Submitted to	Frequency of peporting
1	Contractor to the Employer	PPMU, CPMU	Once before construction commences and monthly thereafter
2	Construction Supervision Consultant (CSC)	PPMU, CPMU	Weekly and monthly
4	Community Monitoring	PPMU, CPMU	When the community has any complaint about the project E&S implementation
5	PPMU	CPMU	Monthly
6	CPMU	WB	Every six-month as required in the legal agreement including the ESCP

551. The progress report submitted to the CPMU must include sufficient information on project implementation progress and E&S issues related to ESF implementation. The progress report for the CPMU to be submitted to WB must have adequate information regarding i) preparation and disclosures of the E&S instruments for the project; ii) implementation progress of the ESMP including incorporation of ESCOPs, CoC on SEA, site-specific impact mitigation measures and other ESMP requirements under contractor responsibility in the bidding and contractual documents; iii) monitoring and supervision on implementation performance of contractors, CSC, and PPMU according to ESMP, ESCOPs, and COC on SEA; ESCP implementation and update and iv) any challenges in E&S implementation, solutions, and lessons learned.

5.5. ENVIRONMENTAL MONITORING AND SUPERVISION PROGRAM

5.5.1. Waste generation monitoring

- The content of waste generation monitoring includes the quantity and composition of domestic solid waste and wastewater, construction waste, and wasted oil.
- Monitoring frequency: Every 3 months.
- Implementation period: Starts from the site preparation phase until the end of the construction phase.
- This task is directly carried out by the contractors. The project owner and CSC will monitor the performance of the contractors and report to the Department of Agriculture and Environment after each monitoring period.

5.5.2. Other monitoring

5.5.2.1. During construction phase

- Surface water monitoring:
  - Frequency: Once every 3 months.
  - Monitoring sites: 1 site/sluice x 6 sluices = 6 sites.
  - Monitoring parameters: pH, BOD_5, COD, TSS, DO, Total N, Total P, Total Coliform and Ecoli
  - Applied standards: Table 3 of the QCVN 08:2023/BTNMT - National technical regulations on surface water quality.
- Wastewater monitoring:
  - Frequency: Once every 3 months.
  - Monitoring sites: 6 construction sites.
  - Monitoring parameters: pH, BOD_5, TSS, TDS, H2S, NH4+, NO3-, Oil and grease, Total surfactants, PO_4^{3-}, Coliform.
  - Applied standards: QCVN 14:2008/BTNMT- National technical regulations on wastewater (column A, K=1).
- Sediment monitoring:
  - Frequency: Once every 3 months.
  - Monitoring sites: 1 site/sluice x 6 sluices = 6 sites.
  - Monitoring parameters: pHKCl, Cu, Fe, Mn, Zn, Cd, As.
  - Applied standards: QCVN 43:2017/BTNMT - National technical regulations on sediment quality (saltwater and brackish water sediment).
- Air monitoring:
  - Frequency: Once every 3 months.
  - Monitoring sites: 8 sites (6 sites at sluice construction sites and 2 sites at road construction sites)
  - Monitoring parameters: Noise level, TSP.
  - Applied standards: QCVN 05/2023/BTNMT- National technical regulation on ambient air quality; QCVN 26/2025/BNNMT- National technical regulation on noise.
- Canal bed elevation and erosion monitoring
  - Frequency: Once every 3 months.
  - Monitoring sites: within sluice construction sites
  - Monitoring parameters: elevation and erosion.
  - Comparison requirements: changes over time in the elevation of the canal bed terrain and the evolution of the shoreline of the sluice construction areas.

5.5.2.2. During operation phase

552. Because the project comprises the construction of sluices, roads, and electricity lines, no environmental monitoring stations are set up during its operation. The operating unit will conduct sluice settlement monitoring 4 times a year to take prompt action to prevent damage to project items. Specifically:

- Frequency: Once every 3 months.
- Monitoring sites: within the system of 23 sluices.
- Monitoring parameters: elevation and erosion.

5.6. CAPACITY BUILDING FOR ENVIRONMENTAL AND SOCIAL MANAGEMENT

5.6.1. Current Kien Giang (now An Giang) PPMU's capacity for environmental and social management

553. Kien Giang (now An Giang) PPMU is currently a team with experience in managing and implementing projects using IBRD funds such as Management of Irrigation Systems for Rural Development in the Mekong Delta Project (WB6), the Mekong Delta Integrated Climate Resilience and Sustainable Livelihoods Project (WB9), the Mekong Delta Sustainable Aquaculture Development Project (WB), the Phu Quoc Sustainable Water Management Project (WB), etc. All of these projects have been implemented in Kien Giang (now An Giang) province and managed by the PPMU. They were evaluated by the MARD (now the MAE) and donors as well-executed, scheduled and highly effective projects. Therefore, it can be assessed that the PPMU is capable of organizing and managing the project implementation under the safeguard policies and international practices.

554. However, the PPMU's capacity needs to be improved because existing staff lack experience with projects involving the WB' s new ESF. Furthermore, when the project is built, other environmental and technical personnel will be engaged, some of whom may be unfamiliar with the WB's safeguard policies and ESF. As a result, there is a risk that the resources allocated to addressing environmental and social issues in this project will be insufficient, negatively impacting environmental performance/compliance with the ESSs.

555. Also, although the PPMU attended many WB-organized trainings, an E&S capability assessment completed during project preparation highlighted a need for additional capacity building in specific ESSs throughout project implementation. As part of the ESMP, a capacity-building program will be implemented to address such gaps.

5.6.2. Environmental and Social Capacity Building Program

556. The capacity of PPMU, CSC, and contractors' staff in charge of ESMP implementation and supervision will be enhanced. They must be aware of the project's environmental management goals, methodologies, and practices. Therefore, the project will address the lack of capacities and knowledge in environmental and social management through (i) institutional capacity building and (ii) training in the following ways:

- Institutional strengthening: Some measures will be implemented to increase PPMU's ability to coordinate environmental and social management efforts. A qualified environment and

social staff will be appointed by the PPMU. The staff will be in charge of ESMP coordination, including GRM and coordination of environmental and social impact monitoring, training, reporting, etc. The staff will be strengthened capacity directly by the WB or IMC.

- Training: The project will be applied the WB's new ESF and the WB will provide annual safeguard policy training. As a result, once mobilized, all environmental and social staff of the PPMU, CSC, and contractors will get the necessary training for the application of the new ESF. Other trainings will be also conducted for important stakeholders during the construction phase.

557. *Table 99* summarises the training program on environmental and social management capacity for the project.

Table 99: Project's training program on environmental and social management capacity

1. **Targeted trainees**	**Staff of PPMU's project management unit**
Training course	WB safeguards policies and ESMP implementation
Participants	Staff in charge of environmental issues; environmental managers
Training frequency	Immediately after the project becomes valid, but at least one month prior to the first bid package. The next training will be planned on demand.
Duration	2 days
Content	- WB's policies requirements, implementation procedures, implementation of the approved ESMP, and supervision performance of relevant stakeholders. - Project-related general environmental management including the request from the WB, Department of Agriculture and Environment in collaboration with competent authorities and concerned stakeholders; - Environmental and social monitoring for the project includes: ▪ Requirements of environmental and social monitoring; ▪ Monitoring and implementation of mitigation measures; ▪ Community involvement in environmental and social assessment; ▪ Guiding and monitoring contractors, CSC and community representatives in the implementation of environmental and social monitoring; ▪ Forms used in environmental and social monitoring processes; ▪ Reaction and risk control; ▪ Manner of receiving and submitting forms; ▪ Other issues to be determined.
Responsibility	With the help of the WB, the IMC and PPMU will implement safety policies.
2. **Targeted trainees**	**CSC, contractors, representatives of local authorities (project communes), communities**
Training course	Implementation and supervision of ESMP
Participants	EO and site manager of contractors, EO and civil engineering of CSCs, relevant staffs of local authorizes (if any)
Training frequency	Shortly after awarding contracts to the contractors with updates on demand
Duration	Two-day training for CSC and contractors, and one-day training for others
Content	- Environmental and social impact principals and relevant process.

	– Environmental and social management principles – Overview of the overall environmental and social monitoring; – Requirements of environmental and social monitoring; – The roles and responsibilities of the contractors and CSC; – The content and method of environmental and social monitoring; – Reaction and risk control; – Introducing monitoring forms and instructing on filling out forms and reporting incidents; – Other issues to be determined – Preparing and submitting reports
Responsibility	PPMU, IMC
3. **Targeted trainees**	**Workers**
Training course	ESMP implementation and occupational health and safety training
Participants	Representatives of workers (team leaders) working directly for the project components and all workers on the sites
Training frequency	First time right after construction mobilization on the site, and monthly basic during construction sites
Duration	One day of presentation and one day of on-site presentation
Content	– Brief all requirements stated in the approved ESMP and contractor's ESMP. – Roles and responsibilities of contractors on the site. – Understand about the hazards in operation and how to control them. – Potential health risks. – Warnings to prevent exposure. – Sanitary requirements. – Use PPE. – An appropriate response to extreme operating conditions, accidents, and incidents.
Responsibility	Contractors, PPMU with the assistance of IMC

5.7. ESTIMATED COST FOR ESMP IMPLEMENTATION

5.7.1. Estimated costs for environmental monitoring program

558. During the project implementation, the PPMU will mobilize an IMC to monitor ambient environmental quality. The cost of establishing the ambient environmental quality monitoring program is estimated based on its design in Section 5.5.2 (see *Table 100*).

Table 100: Estimated budget for conducting ambient environmental quality monitoring of the project

No	Type of samples	Unit	Quantity	Unit price (VND)	Total	
					In VND	In USD
1	Air, noise, vibration samples	sample	48	355,299	17,054,352	729
2	Surface water samples	sample	36	2,997,234	107,900,424	4,611
3	Wastewater samples	sample	32	3,567,382	114,156,224	4,878

4	Sediment quality	sample	36	3,471,349	124,968,564	5,341
5	Aquatic life	sample	36	2,103,511	75,726,396	3,236
6	Others				357,694,788	15,286
Subtotal for 1 year					**797,500,748**	34,081
Grand total for 2 year					**1,595,001,496**	**68,162**

5.7.2. Estimated cost for IMC

559. The estimated costs for IMC are detailed in *Table 101* for reference purposes. However, the final costs will be updated in the detailed design phase.

Table 101: Estimated costs for the IMC of the project

No	**Content**	**Unit**	**Quantity**	**Unit price** *(VND)*	**Subtotal** (*VND)*	**Subtotal** (*USD)*
1	Experts' salary	person-month	36	40,000,000	1,440,000,000	60,000
2	Accommodation, expenses for business trip	person-day	96	500,000	48,000,000	2,000
3	Travel expenses	Trip	8	10,000,000	80,000,000	3,333
4	Site visit cost	person-day	96	500,000	48,000,000	2,000
5	Course organization	*see Table 100*			320.000.000	13,333
6	Stationery and communications	Lumpsum	8	10,000,000	80,000,000	3,333
	Total				**2,016,000,000**	**84,000**

5.7.3. Estimated costs for the training program

560. The estimated cost for the training program on environmental and social management capacity is presented in *Table 102*.

Table 102: Estimated cost for training program on environmental and social management capacity of the project

Training Item	Trainee	Unit	Quantity	Price	Total	
				VND	*VND*	*USD*
A. Capacity building programs on safeguard policies (trained by IEMC)						
I. WB safeguards policies and ESMP implementation						
PPMU	Staff in charge of environmental issues; environmental managers	course	2	10,000,000	20,000,000	855
II. Implementation and supervision of ESMP						
Total work items	CSC; Construction engineers, site manager	course	16	10,000,000	160,000,000	6,837
III. Safety and environmental sanitation						
Total work items	Representatives of workers	course	4	5,000,000	20,000,000	3,419
				Sub-total (A)	**200,000,000**	**8,547**
B. HIV /Aids, COVID-19 and GBV training (done by IMC)						
Total work items	Workers, CSC team and Implementation and supervision of ESMP staff	course	6	20,000,000	120,000,000	5,128
				Sub-total (B)	**120,000,000**	**5,128**
				Total: (A)+(B)	**320,000,000**	**13,675**

5.7.4. Total estimated costs for ESMP implementation

561. *Table 103* provides a cost estimate for the implementation of ESMP. The cost will include (i) the cost of implementing mitigation measures by the contractors; (ii) the cost of the IMC; (iii) the cost of environmental quality monitoring; (iv) the cost of safety management for the PPMU, including both technical assistance in implementing safeguard policies and training programs. The costs of implementing mitigation measures during construction will be a part of the construction contracts, while the cost for a contractor's environmental and social management plan (C-ESMP) by the CSC will be provided in construction supervision contracts. The cost of the PPMU operations relating to the ESMP are allocated from the project management budget of the PPMU, including safety training programs, and basic allowances to participants in the monitoring programs. After the project has been completed, the costs of environmental monitoring of the project items will be taken from the operation and maintenance budget.

Table 103: Total cost estimation for ESMP implementation of the project

Content	Construction items (USD)	Funded by
Mitigation during construction	As a part of the contract	WB
Monitoring safety policies during construction	As a part of the cost for CSC	WB
PPMU's units in charge of environmental safety policies	As part of the costs for the PPMU	Counterpart funds
Environmental quality monitoring	68,162	Counterpart funds

Independent environmental monitoring consulting	84,000	Counterpart funds
Capacity building programs on safeguard policies	13,675	Counterpart funds

5.8. GRIEVANCE AND REDRESS MECHANISM (GRM)

5.8.1. Project Grievance Redress Mechanism (GRM)

562. Within the Vietnamese legal framework citizen rights to complain are protected. As part of the overall implementation of the project, a GRM will be established by the PPMU. The GRM will identify procedures, responsible persons, and contact information will be readily accessible to the public, and will handle grievances and resolve them at the lowest level as quickly as possible. The mechanism will provide the framework within which complaints about environmental and social issues can be handled, grievances can be addressed, and disputes can be settled quickly. The GRM will be in place before the project construction commences.

563. During construction, the GRM will be managed by the Contractor under the supervision of the CSC. The Contractor will inform the communities and communes affected by the project about the GRM in place to handle complaints and concerns about the project. This will be done via the information disclosure and consultation process under which the Contractor will communicate with the affected communities and interested authorities regularly: hold meetings at least quarterly, publish a monthly information brochure, place announcements in local media, post notices of upcoming planned activities, and so on.

564. All complaints and corresponding actions undertaken by the Contractor will be recorded in the project safeguard monitoring report. Complaints and claims for damages could be lodged as follows:

- *Verbally:* direct to the CSC and/or the contractor safeguard staff or representative at the project office
- *In writing:* by hand-delivering or posting a written complaint to the address specified
- *By telephone, fax, email*: to the CSC, the contractor safeguard staff or the contractor's representative.

565. On receipt of a complaint, the CSC, contractor safeguard staff, or representative will register the complaint in the Complaints File and maintain a Log of events about it thereafter until its resolution. Immediately after receipt, three copies of the complaint will be made. The original will be kept in the File, one copy will be used by the contractor's safeguard staff, one copy will be forwarded to the CSC, and the third copy to the PPMU within 24 hours of the complaint being made. Information to be recorded in the Complaints Log will include (see suggested form in Annex 5):

- The date and time of the complaint;
- The name, address, and contact details of the complainant;
- A short description of the issue of complaint;
- Actions taken to address the complaint, including persons contacted and findings of each step in the complaint redress process;
- The dates and times when the complainant is contacted during the redress process;

- The final resolution of the complaint;
- The date, time, and manner in which the complainant was informed thereof; and
- The complainant's signature when a resolution has been obtained.

566. Small complaints will be dealt with within one week. Within two weeks (and weekly thereafter), a written reply will be delivered to the complainant (by hand, post, fax, e-mail) indicating the procedures taken and progress to date.

567. The main objective of the GRM will be to resolve an issue as quickly as possible by the simplest means involving as few people as possible, at the lowest possible level. Only when an issue cannot be resolved at the simplest level and/or within 15 days, will other authorities become involved. Such a situation may arise, for example, when damages are claimed and the amount to be paid cannot be resolved or the cause of the damages determined.

5.8.2. Grievance Redress Mechanism for Workers

568. As mentioned above, for this project, the project GRM will be in place to address the concerns of project-affected parties. However, the nature of workers' workplace concerns is typically different, such as demand for employment opportunities; labor wage rates and payment delays; disagreement over working conditions; and health and safety concerns in the workplace. As a result, to meet the requirements of ESS2, a separate GRM will be developed for project workers and outlined in the LMPs.

569. Grievances should be handled objectively, promptly, and in response to the needs and concerns of the aggrieved workers. It should be possible for employees to submit grievances in a variety of ways, including in person, via phone, text message, mail, and email. The grievance should be recorded and acknowledged within a day. Even though the timing for remedy will depend on the nature of the grievance, health, and safety concerns in the workplace and other critical matters should be resolved immediately. When a grievance cannot be resolved within a reasonable timeframe, the worker should be notified in writing so that he or she might consider filing a claim with the state's labor inspection agency (see below for more details). In addition, the mechanism will enable anonymous complaints to be made and addressed. Individuals who submit comments or complaints may request that their identities remain confidential. The mechanism will incur no cost ensure no retribution, and will not prevent access to judicial or administrative remedies.

570. **Concerns of direct workers**: Periodically, Kien Giang (now An Giang) PPMU will organize team meetings to discuss any workplace issues. Direct workers' complaints will be documented along with the PPMU's remedy actions. The summary of grievance cases will be reported to the WB as part of progress reports. If an aggrieved direct worker wishes to escalate his issue or raise his concern anonymously and/or to someone other than his line manager/PPMU, he may do so with relevant provincial authorities (e.g., DOHA).

571. **Concerns of contracted workers**. At the end of each working day, the site manager and the OHS officer (or any other appropriate officer) of contractors will hold a team meeting with all on-site contracted workers to discuss any workplace complaints. Any grievance will be recorded with the contractor's response. The summary of grievance cases will be included in the contractor's periodic report to the PPMU and CSC. When suitable and available, contracted workers should be permitted to use a GRM already in place within their contractor. If the aggrieved workers prefer to escalate their issues or voice their complaints anonymously or to

someone other than their immediate supervisor, they may do so with the PPMU and/or the CSC. Prior to the start of work, contracted workers will be informed of the labor GRM. Contact information for the PPMU and/or the CSC will be provided to contracted workers.

572. **State Inspection on Labor, Sanctions Against Violations of Labour Legislation.** According to the Labour code, the labor inspector is responsible for receiving and resolving employee complaints and denunciations of labor law violations as prescribed by law.

573. **Grievance Handling Procedure.** The section provides different scenarios with responsibilities of grievances relating to the complaint handling linked to labor issues. The key purpose of this exercise is to present the GRM process in an effective and user-friendly manner (*Table 104*).

Table 104: Procedures for Complaint Handling Process

Steps	Complainants	GRM Functions	Timeframe
Community level GRM/mediation: The Affected Person (AP)/workers/complainant (or his/her representatives) may submit his/her complaint in several ways e.g., by written letter, phone, SMS messages, and email to the GRM or raise his/her voice in a public or individual meeting with project staff.			
1	Submission of complaint to the local or community level GRM/mediation	– Conduct public consultations among the affected communities to use grievance services. – Register a grievance in the project logbook and grievance database. – Segregate/sort and process. – Acknowledge and follow up on the grievance. – Verify investigate, and act. – Provide a written response to the complainants.	7- 14 days
Project or Site level GRM: (a) **Project Level GRM:** If resolution at the local/community level is unsuccessful, the Affected Person (AP) can take his or her complaint to project level GRM.			
2	Submission of grievance to the project-level GRM through one of the channels	– Conduct coordinating meetings among complainants/public and appropriate administration levels. – Provide a written response to the complainant.	15 days
(b) **GRM for Workers:** The project workers (all three categories, direct workers, contracted workers, and primary supply workers) can directly register their complaints with the GRM for workers. The members of this GRM will be trained to be capable of addressing grievances by workers, including workplace complaints efficiently and effectively to meet national regulations on labor and World Bank ESS2.			
3	Workers or labor association will submit their grievances to the GRM for Workers through one of the channels	– Refer workers-related complaints to the Workers GRM	7 days
Provincial Level GRM: In case the grievance is not resolved within 10 days of its receipt, or it is unattended, the complainant can approach the provincial level GRM or the court. The grievance will be examined and addressed within 30 days.			
4	Workers, labor associations, or the AP	– Conduct coordinating meetings/ resolution sessions with complainants.	30 days

Steps	Complainants	GRM Functions	Timeframe
	can refer the complaint to the provincial GRM	- Investigate the complaints. - Provide a written response to the complainants.	
Referee Level: If all the above fails, the last recourse is the stipulations in the Labor Code.			

574. Grievances related to Gender Based Violence (GBV). To avoid the risk of stigmatization, exacerbation of mental/psychological harm, and potential reprisal, the GRM shall have a different and sensitive approach to GBV-related cases. The GRM equally applies to workers who experience GBV. Where such a case is reported to the GRM, it should immediately be referred to the appropriate service providers, such as medical and psychological support, emergency accommodation, and any other necessary services. It should also be reported to the safeguard staff of the PPMU who can advise on relevant service providers. Data on GBV cases should not be collected through the GRM unless operators have been trained on the empathetic, non-judgmental, and confidential collection of these complaints. Only the nature of the complaint (what the complainant says in her/his own words) and additional demographic data, such as age and gender, can be collected as usual. More details are referred to the project LMP.

5.8.3. World Bank's Grievance Redress Service (GRS)

575. Communities and individuals who believe that they are adversely affected by a WB-supported project may submit complaints to the existing GRM of the project or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed to address project-related concerns. Project-affected communities and individuals may submit their complaints to the WB's independent Inspection Panel which determines whether harms occurred, or could occur, as a result of WB's non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the WB's attention, and Bank Management has been allowed to respond. For information on how to submit complaints to the WB's corporate GRS, please visit www.worldbank.org/grs. For information on how to submit complaints to the World Bank Inspecition Panel, please visit www.inspectionpanel.org.

CHAPTER 6. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

6.1. PUBLIC CONSULTATION

576. The WB' ESS5 and ESS10 require consultation and notification to affected people and local authorities on social and environmental issues throughout project implementation.

577. Public consultation for the ESIA report must also adhere to the requirements outlined in Decree No. 08/2022/ND-CP of the Government dated 10 January 2022 and Circular No. 02/2022/TT-BTNMT of the MONRE (now MAE) dated the same date, concerning environmental impact assessment and the environmental protection plan.

578. The purpose of public consultation is to: (i) share information about the project's items and activities with the community and stakeholders in the project area; and (ii) collect comments and concerns about characteristics and environmentally and socially sensitive issues in the project area from the government and local communities. On that basis, public concerns will be included in the ESIA report and project mitigation measures.

579. Project stakeholders are defined as individuals, groups, or other entities who: (i) are impacted or likely to be impacted directly or indirectly, positively or adversely, by the project (also known as "affected parties"); and (ii) have an interest in the project ("interested parties"). They include individuals or groups whose interests may be affected by the project and who have the potential to influence the project outcomes in any way.

580. To conduct consultations for the project, open meetings, workshops, focus group discussions, and interviews are utilized in the 3 stages of the project, including the preparation stage (before project appraisal); project implementation stage (pre-construction and construction) and operation stage. The public consultation strategy, which includes targeted groups/attendees, subjects, formats, timeline, and responsibilities, is shown in *Table 118*.

Table 105: Public consultation strategy of the project

Project stage	Target stakeholders	Topics	Methods used	Locations/dates	Responsibilities
PROJECT PREPARATION (Before appraisal)	All stakeholders	– Main features of the project – Selected locations of the project components – The environmental and social legal framework of Viet Nam and ESF of WB – Identified project E&S impacts and risks and proposed solutions to avoid, minimize, and manage the impacts and risks	– Face-to-face/virtual public meetings – Separate in-depth consultation with PAPs – FGDs – Questionnaires	Project communes	– Kien Giang (now An Giang) PPMU – E&S Consultant – FS Consultant
	All stakeholders	– Project interventions and scope – Project E&S principles, risks, and impacts, and proposed mitigation measures – Draft ESIA/ESMP, RP, SEP, EMDP, ESCP, and LMP (when available) disclosures – GRM	– Face-to-face/virtual public meetings – Disclosure of project information (website of Kien Giang (now An Giang) and WB; office of CPCs of the project area) – Separate in-depth consultation with PAPs – FGDs – Questionnaires	– CPCs of Binh Giang and Binh Son – As soon as the draft documents are completed and before the project appraisal	– Kien Giang (now An Giang) PPMU – E&S Consultant – FS Consultant
PROJECT IMPLEMENTATION	**Project Affected Parties**: – Affected communities, organizations, and companies – PAPs by land acquisition – Vulnerable groups	– Project ongoing activities including mobilization of contractors and construction schedule – ESIA/ESMP and other instruments – Mitigation measures incorporated into detailed design, such as drainage or traffic safety control measures, etc. – Contractors' ESHS obligations, C-ESMP, and DMP – Grievance redress mechanism	– Face-to-face/virtual public meetings – In-depth interview with key informants – FGDs with a targeted group such as women and vulnerable – Implementation of Grievance redress mechanism	– Affected CPCs, and other places as a convenience – Before commencing project components and throughout the project implementation	– Kien Giang (now An Giang) PPMU – LFCD – CSC – IMC – Contractors/sub-contractors

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Project stage	Target stakeholders	Topics	Methods used	Locations/dates	Responsibilities
		– Resettlement policy and land acquisition schedule – Livelihood restoration program – Employment opportunities – Social risk and impact related to labor influx (GBV/SEA/SH) and mitigation measures			
	Interested Parties – Kien Giang (now An Giang) PPMU – Project CPCs – Kien Giang (now An Giang) provincial agencies (DOF, DOC, DOHA, DOIT, DAE, DOERA) – LARC – LFDC – Public Utilities – Project workers	– On-going activities of the project, especially the progress of vegetation clearance, etc. – Roles and responsibilities of the implementing agencies – E&S performance/ compliance including resource allocation for E&S implementation budget – Social risk and impact related to labor influx (GBV/SEA/SH) and mitigation measures – GRM	– Face-to-face or virtual training workshop – Sharing of project-relevant documents	– PPMU – Before commencing project components	– PPMU – Construction supervision and independent E&S monitoring consultants – Contractors/sub-contractors. – CSC and independent monitoring consultant – Support of WB team
	Other Interested Parties: – Mass organizations (women's union, farmers' union, youth' union) – Representatives of surrounding communities, – Services providers	– Project on-going activities – Environmental, social, health, and safety risks and impacts, and management protocols – GRM – Livelihood restoration – Potential social and health risks related to labor influx (GBV/SEA/SH) and mitigation measures	– Face-to-face or virtual training workshop – Mass/social media communication – Disclosure of brochures, posters, website	– Project communities' meeting places – Before commencing project components and throughout project implementation	– PPMU – Contractors/sub-contractors – CSC and independent monitoring consultant – Support of WB team

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Project stage	Target stakeholders	Topics	Methods used	Locations/dates	Responsibilities
PROJECT OPERATION	**Project Affected Parties:** – PAPs – Vulnerable groups – Affected communities/ companies/ organizations	Stakeholder engagement in project operation and maintenance	– Face-to-face or virtual public meetings – Separate in-depth consultation with PAPs – Separate meetings as needed for women and the vulnerable – FGDs – HH questionnaires	– Affected CPCs, and other places as a convenience – After project implementation	– Project operation unit
	Other Interested Parties: – Mass organizations – Local community – NGOs/Others	– The operational procedure of the sluice gates – Stakeholder engagement in the project operation and maintenance	– Training/workshops – Mass/social media communication – Disclosure of brochures, posters, website	– Project communities' meeting places – After the project completion and during the operation	– Project operation unit – Related sector agencies

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6.1.1. During preparation stage

6.1.1.1. Public consultation

a) Public consultation process

a.1). Consultations through posting on the website

581. The project owner sent Official letter No. 122/BQLDA-ĐHDA on April 2, 2024, to the Kien Giang (now An Giang) DONRE (now DAE), requesting the publication of the project's ESIA report on the website of DONRE (now Department of Agriculture and Environment).

- Managing Agency of the Website: Kien Giang (now An Giang) DONRE (DAE).
- Link to the Consultation Content:

  https://stnmt.kiengiang.gov.vn/Trang/DuThaoVanBan/ChiTietDuThaoDN.aspx?nid=64
- Date of consultation: April 10, 2024.
- Duration of consultation: 15 days, from April 10, 2024, to April 26, 2024.

a.2). Consultations through meetings

582. After completing the draft ESIA report, the project owner sent Document No. 27/BQLDA-DHDA dated January 23, 2024, along with the draft report, to the Binh Giang and Binh Son CPCs, requesting coordination to organize community consultation meetings on January 24-26, 2024 (*Figure 100* and *Figure 101*).

583. The consultation results are summarized in *Table 106*. The list of participants and meeting minutes are included in *Appendix 2*.



Figure 100: Public consultation meeting in Binh Giang commune



Figure 101: Public consultation meeting in Binh Son commune

a.3). Consultations through documents

584. In addition to the consultation meetings, the Project Owner also sent documents to the People's Committee and Fatherland Font Committee of Binh Son and Binh Giang communes requesting their opinions on the ESIA report. All communes, upon receiving the documents, provided their feedback in writing to the project owner. The responses from the communes are attached in *Appendix 3*.

b) Results of public consultation

585. The results of public consultation for the project are summarised in *Table 120*.

Table 106: Summary of public consultation about E&S documents of the project

No.	Time	Avenue	Participants			Contents	Results	
			Total	Female	Details		Opinions of participants	Response of the project
1	24/01/2024	Headquarter of Ranh Hat Hamlet		15	- Binh Giang CPC - CSOs of the commune - Affected people in Hat and Giong Ke hamlets	- Investment components of the project - Contents of E&S documents: ESIA/ESMP, SEP, LMP, RP, EMDP, GAP	- This is a modern project that is being built to meet the needs of future growth, but canals and rivers will still be used to move people and goods in the project area. So, the completed roads should be made to make travel easier and cut down on waterway accidents in the whole area. Also, power lines should be put in place for the whole area instead of the operation of sluices. - The connecting road is severely damaged. People are planning to upgrade the road. So, the construction duration for the connecting road should be notified to the people to be proactive in the road's upgrade. - During operation, the sluices shall be of sufficient quality to prevent the infiltration of saline water into the rice production area. - Constructing Canal 200 and Don Dong Canal during the rice harvest period is not discouraged due to the high volume of boats transporting rice-related supplies along these canals. - Many local businesses have closed, leaving ethnic minorities unemployed. As a result, the project is requested to support loans, vocational training (with a focus on home-based jobs), and a market for local products. - The width and height of the sluices should be suitable for the passage of boats. - Whether the road construction will move households in Ranh Hat hamlet?	- The project's budget only covers a 7km road in the area, not other roads. - The road is set to begin in 2026 and will take 2 years to finish. However, the specific construction timeline will be disclosed to the locality shortly. - There will be close supervision of the sluice construction to make sure that it follows the approved detailed design. The sluices will also be regularly checked while it is in use to make sure that salty water doesn't leak into the rice production area. - This opinion is taken into account by the project, and it will be kept in mind during construction to make sure that residents can travel easily. - The comments will be included in the project EMDP. - The sluices of the project have the same vertical clearance as the sluices currently possessing the maximum vertical clearance. Furthermore, the sluices of the project have a width ranging from 5.5 to 8m. As a result, ship navigation will be facilitated once the project sluices have been completed. - The construction of the road will relocate 4 households in the Ranh Hat hamlet, according to the preliminary inventory of losses. However, this is not the final one.

							- Will households affected by the project's land acquisition receive compensation or support?	The project will notify affected households once the route has been approved. - Affected households by land acquisition will receive compensation and assistance following prevailing regulations set forth by Viet Nam, Kien Giang (now An Giang) province, as well as the WB.
2	25/01/2024	Headquarters of Giong Ke hamlet		16	- Binh Giang CPC - CSOs of Binh Giang commune - Affected people in Giong Ke hamlet, Binh Hoa hamlet and Hamlet 4	- Investment components of the project - Contents of E&S documents: ESIA/ESMP, SEP, LMP, RP, ESCP, EMDP, GAP	- This is a community development project that comprises building infrastructure for easy movement and aquaculture development. However, our small ethnic community is currently experiencing economic difficulties due to a lack of land for aquaculture growth. As a result, I propose that once the project is operational, if there are companies specializing in aquaculture in the area, I hope the project will provide opportunities for us to work for these companies (particularly women) so that we can work locally, avoiding the need to travel far and allowing women to care for their families while earning money. - The natural conditions of the area don't allow for small poultry like chickens and ducks. So, techniques and breeds of large animals like buffalo, cows, and pigs were asked for by the EM so that they could increase output and generate income - Will the construction of Binh Giang 1 road affect our land and houses? If so, are we entitled to any compensation and support? The project will build sluices to bring saltwater in for aquaculture, will there be a shortage of fresh water for rice production and daily life? In addition, currently, in our area, there is a shortage of clean water for domestic use. Therefore, let me know if	- The project recognizes this opinion and will incorporate it into the project development process. - The project recognizes this opinion and will consider it during the implementation of the project - The construction of saltwater supply drains for aquaculture still ensures the supply of fresh water for rice production. However, the project does not invest in clean water supply for daily life. - The construction of Binh Giang 1 road will have an impact on land, houses, and other structures on the land. All impacts on land, houses, and structures will be compensated and supported per current policies of Vietnam in general and Kien Giang (now An Giang) in particular.

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							there are any items in the project to support the water supply for daily life.	
3	26/01/2024	Binh Son Commune People's Committee		50	- Binh Giang CPC - CSOs of Binh Giang commune - Affected people	- Investment components of the project - Contents of E&S documents: ESIA/ESMP, SEP, LMP, RP, ESCP, EMDP, GAP	- I have read many documents talking about the impacts of climate change to 2050 (La Nina, El Nino...). Rice production may remain effective now, but under the influence of climate change in the future, transitioning to shrimp farming may be necessary. Therefore, I fully support the project. - Water transport in the construction area of 2 sluices: ▪ Vam Ray 1: The canal segment, where is now deposited, resulting in less boat traffic. Dredging is required. ▪ Vam Ray 2: only a few boats travel during the rice harvest period. - When the project is completed, is it easy for us to shift from rice cultivation to shrimp farming? - The family owns very little land (1-2 acres), is currently raising rice, and lacks the resources to invest in shrimp farming. As a result, there is fear about not having enough land for shrimp farming and even having to borrow money for it. There is also concern that if shrimp farming fails, the land title will be at risk. I'd like to know if the project gives finances to develop such a model, or if borrowing without payback would result in the loss of land title. - Request the project to consider technical support for shrimp farming, hatcheries, feed, etc. for EM so that we can transition to shrimp farming.	- The project would like to thank you for supporting the implementation of the project. - The comments on the dredging of the Vam Ray 1 sluice construction area will be shared with relevant agencies. - It is easy to shift from rice cultivation to rice-shrimp farming. - During the implementation process, the project will pay attention and bring ethnic minority households to participate in demonstration models if they need - The project will take note of this opinion and will consider supporting EM if they need to shift to shrimp-rice farming. - The construction of sluices still ensures fresh water sources for rice farming households and no need to buy equipment to store freshwater

							- This is a freshwater production area, and my family is poor. As a result, when I create the sluices to provide saline water, I'll need to purchase freshwater storage equipment. I wonder if the government offers loans for this purpose.	

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6.1.1.2. Consultations with experts, scientists, and professional organizations

586. The project does not fall under the category requiring consultation with experts, scientists, and professional organizations.

6.1.2. During implementation stage

587. **Project implementation**. At this stage, the details of proposed project components and specific project-affected stakeholders will be determined. The consultation will focus more specifically on people who are impacted by the project, especially those adversely impacted, to address their concerns through the implementation of project-specific E&S plans. In addition, the project will ensure that the GRM is disseminated and active to promptly address any grievances. Special attention will be paid to vulnerable/disadvantaged groups to ensure inclusion, non-discrimination, and access to project benefits. Consultations will also focus on job opportunities, specific action plans, etc. (see *Table 105*).

588. **Project operation**. At this stage, the consultation will focus on feedback from stakeholders, particularly affected ones, on the performance of E&S impact and risk mitigations, results of grievance resolution conducted during the implementation stage as well as general project operations, including implementation of the operational procedure of the sluice gates. The consultation on employment opportunities for operation and maintenance (O&M) of the project works will be also conducted. Also, areas for improvement and lessons learned should be identified for the project. Furthermore, dissemination and reporting back to stakeholders on the outcome of the monitoring and evaluation of the project will be also arranged (see *Table 105*).

6.2. INFORMATION DISCLOSURE

589. To comply with WB's information disclosure policy, all the draft E&S documents for the project (ESIA/ESMP, RP, EMDP, ESCP, LMP, and SEP) in Vietnamese will be properly disclosed at the project site and Kien Giang (now An Giang) province's website on 15 August 2025. These documents in English were also disclosed on the WBs external website on 15 May 2025. The final project safeguards instruments will be disclosed locally at the project sites, Kien Giang (now An Giang) province's website, and the WB's external website on 15 September 2025 as well.

CONCLUSIONS, RECOMMENDATIONS, AND COMMITMENTS

1. CONCLUSIONS

590. The project is implemented under the political, economic, cultural, and social development conditions of Kien Giang (now An Giang) province. It is a feasible and socio-economically efficient project aligned with the investment policy for infrastructure development in Vietnam in general and Kien Giang (now An Giang) province in particular, including:

- Proactively transitioning from traditional rice cultivation to shrimp-rice farming to adapt to climate change and sea level rise.
- Enhancing livelihoods for residents.
- Improving infrastructure and transportation connectivity.

591. The ESIA report has fundamentally identified and quantified most of the sources of waste; and proposed practical and feasible measures to minimize environmental and social impacts and risks, ensuring effective treatment of waste sources. The report has developed an environmental management and monitoring program suitable for each stage of the project and particularly emphasizes environmental incidents throughout the construction and operation of the project.

592. The ESIA report indicates several issues that need to be closely controlled during the project implementation with specific characteristics such as:

- Domestic and construction waste will be gathered, collected, transported, and treated according to current regulations;
- Signs of environmental pollution will be strictly controlled by controlling sources of pollution and the surrounding environment;
- Criteria for labor safety and environmental sanitation will be met;
- Regional traffic safety will be controlled;
- Safe operation, maintenance, and periodic maintenance will be met.

593. The ESMP will be strictly implemented by the project owner. The objective of the plan is to closely manage and mitigate negative environmental and social impacts and risks while maximizing the positive impacts of the project.

594. With strict adherence to current environmental laws and proposed mitigation measures in this ESIA report, the project will certainly operate effectively, bringing positive outcomes for the economy, society, and the environment.

2. RECOMMENDATIONS

595. The Project Owner respectfully requests:

- The relevant departments and agencies of Kien Giang (now An Giang) province to assist in the project implementation.
- Local environmental management authorities support providing capacity building on environmental protection for the project's workers and local communities.

- All levels of the province support the project owner and contractors in workers management (if applicable) and responses in case of safety and environmental incidents.
- Local authorities and security units support the project owner in ensuring security and traffic safety in the area.
- The local authorities responsible for natural resources and environment regularly inspect and provide specific guidance on environmental monitoring in the project area and the implementation of environmental commitments.

3. COMMITMENTS

- The project owner commits to complying with the current environmental protection regulations in Viet Nam: the Environmental Protection Law of 2020, related laws, and regulations (Government Decree 05/2025/ND-CP dated 06 January 2025, Decree No. 08/2022/ND-CP dated January 10, 2022, Circular No. 07/2025/TT-BTNMT dated 28 February 2025, Circular No. 02/2022/TT-BTNMT dated January 10, 2022), as well as other provisions during the project implementation.
- The project owner commits to strictly implementing proposed mitigation measures outlined in the report and adhering to relevant national technical regulations during project implementation. Some key aspects include:
  - Commitment to collect, transport, and treat all types of solid waste, hazardous waste, and household waste generated during the project implementation to ensure compliance with safety and environmental sanitation requirements stipulated in Decree 05/2025/ND-CP dated 06 January 2025, Decree No. 08/2022/ND-CP dated January 10, 2022, Circular No. 07/2025/TT-BTNMT dated 28 February 2025, Circular No. 02/2022/TT-BTNMT dated January 10, 2022.
  - Commitment to implement construction organization measures and appropriate technical solutions to minimize dust, noise, water turbidity, and rainwater runoff during the project construction.
  - Commitment to apply technical and management measures to ensure waste disposal meets environmental safety and sanitation requirements; and restore the environmental landscape of temporary land acquisition areas during project construction.
  - Commitment to cooperate with relevant agencies to develop plans for preventing and responding to environmental incidents caused by project activities; implement awareness-raising measures for project workers regarding environmental protection.
  - Commitment to implement an environmental management and monitoring program as outlined in the approved ESIA report and maintain data for state environmental protection management agencies to conduct inspections when necessary.
  - Adherence to regulations on traffic safety, environmental sanitation, fire and explosion prevention, and labor safety during project implementation according to current legal provisions.
  - Ensuring funding for environmental protection activities, and environmental monitoring programs, to fulfill commitments as outlined in the ESIA report.
- Commitment to the accuracy and honesty of the information, data, and documents provided in the ESIA report.

- Commitment that if any incidents occur during the implementation of the project that affect the environment, structures, and the health of workers and nearby residents, the project owner will provide compensation and remedy the consequences.
- Commitment to ensure the feasibility of fulfilling the responsibilities of the project owner after the ESIA report is approved by the competent authority following legal regulations.
- Adherence to regulations on traffic safety, environmental sanitation, fire prevention, explosion prevention, and labor safety during project implementation according to current legal provisions.
- Ensuring funding for environmental protection activities, environmental monitoring, and surveillance programs, to fulfill commitments as outlined in the ESIA report.

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APPENDICE

APPENDIX 1: LEGAL DOCUMENTS RELATED TO THE PROJECT

APPENDIX 2: OTHER DRAWINGS, MAPS RELATED TO THE PROJECT

APPENDIX 3: ENVIRONMENTAL QUALITY ANALYSIS RESULTS

APPENDIX 4: DOCUMENTS RELATED TO PUBLIC CONSULTATION AND SOCIO-ECONOMIC SURVEYS

APPENDIX 5: PHOTOS