BINH DINH PROVINCIAL PEOPLE'S COMMITTEE

BINH DINH PROVINCIAL PROJECT MANAGEMENT UNIT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

BINH DINH INTEGRATED RESILIENT DEVELOPMENT PROJECT (IRDP)

BINH DINH, APRIL 2025

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ABBREVIATIONS

ADB	Asian Development Bank
BOD	Biochemical Oxygen Demand
C-ESMP	Contractor's Environmental and Social Management Plan
COD	Chemical Oxygen Demand
DARD	Provincial Department of Agriculture and Rural Development
DMS	Detailed Measurement Survey
DOC	Provincial Department of Construction
DOCST	Provincial Department of Culture, Sports, and Tourism
DOF	Provincial Department of Finance
DOIT	Provincial Department of Industry and Trade
DOLISA	Provincial Department of Labour, War Invalid and Social Affairs[1]
DONRE	Department of Natural Resources and Environment[2]
DOPA	Provincial Department of Planning and Architecture [3]
DOT	Provincial Department of Transport[4]
DPI	Provincial Department of Planning and Investment [5]
EHS	Environmental, Health and Safety
ESCOP	Environmental Social Codes of Practice
ESCP	Environmental and Social Commitment Plan
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment

[1] From March 1, 2025, the Department of Labor, War Invalids and Social Affairs is merged with the Department of Home Affairs and renamed the Department of Home Affairs.

[2] From March 1, 2025, the Department of Natural Resources and Environment is merged with the Department of Agriculture and Rural Development and renamed the Department of Agriculture and Environment.

[3] From March 1, 2025, the Department of Transport and the Department of Planning and Architecture are merged into the Department of Construction and renamed the Department of Construction.

[4] From March 1, 2025, the Department of Transport and the Department of Planning and Architecture are merged into the Department of Construction and renamed the Department of Construction.

[5] From March 1, 2025, the Department of Planning and Investment is merged with the Department of Finance and renamed the Department of Finance.

ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standard
FAO	Food and Agriculture Organization of the United Nations
GBV	Gender Based Violence
GHG	Greenhouse Gas
GIIP	Good International Industry Practice
GRM	Grievance Redress Mechanism
HIV/AIDS	Human immunodeficiency virus/ Acquired immunodeficiency syndrome
ILO	International Labour Organization
IUCN	International Union for Conservation of Nature and Natural Resources
LMP	Labour Management Procedure
MONRE	Ministry of Natural Resources and Environment
MPI	Ministry of Planning and Investment
ODA	Official Development Assistance
OHS	Occupational, Health and Safety
PM	Particulate Matter
PPE	Personal Protective Equipment
PPMU	Provincial Project Management Unit
RIDP	Resilient Infrastructure Development Project
ROW	Right of Way
RP	Resettlement Plan
SEA	Sexual Exploitation and Abuse
SEP	Stakeholder Engagement Plan
SH	Sexual Harassment
STD	Sexual Transmitted Disease
TSP	Total Suspended Particulate
TSS	Total Suspended Solid

US EPA	United States Environmental Protection Agency
UXO	Unexploded Ordnance
VND	Vietnam Dong (currency)
WB	World Bank
WHO	World Health Organization

EXECUTIVE SUMMARY

1. Introduction

The proposed project aims to (i) complete the coastal road from north to south within the province, connecting to the national coastal road system; enhance transportation connectivity, eliminate the traffic monopoly on National Highway 1A; ensure uninterrupted transport during natural disasters such as floods, landslides, and rescue operations; promote economic development in coastal areas, link infrastructure in key coastal economic regions, industrial zones, residential areas, urban centers, and coastal eco-tourism; (ii) promote industrial and tourism economic development while improving quality sustainably and adapting to climate change; and (iii) enhance the effectiveness of public investment and stimulate socio-economic development.

Total Investment for the Sub-Project is 2,660 billion VND, equivalent to 115.15 million USD (estimated exchange rate: 1 USD = 23,100 VND). The sub-project will be implemented over a period of 6 years (2025 - 2031).

The Environmental ESIA/ESMP was drafted in 2021 in parallel with the prefeasibility (PFS) and submitted to the Bank for review and comments. Subsequently, an Environmental Impacts Assessment (EIA) Report was prepared in parallel with the Feasibility Study (FS), and approved by the Ministry of Natural Resources on 4 October 2022. This ESIA/ESMP is prepared based on the FS and approved EIA.

2. Components of the Sub-Project

The proposed sub-project will be implemented in 10 wards and communes of Quy Nhon City, Hoai Nhon Town, and Phu My District in Binh Dinh Province. Specifically, these are My Thanh, My Tho, My An, My Duc, and My Thang communes in Phu My District; Hoai My and Hoai Hai communes in Hoai Nhon Town; Dieu Tri Town (Tuy Phuoc District); and Nhon Phu and Nhon Binh wards in Quy Nhon City. The sub-project consists of two components:

Component 1: Construction of Climate-Resilient Infrastructure, comprising two parts:

- **The road connecting National Highway (NH) 19C to Quy Nhon Port:** The road section is designed according to class II traffic road standards with total length of 6.35 km and width ranging from 24 to 32 and 40 meters. The road begins at Km1220+600, where it intersects with NH 1A (Dieu Tri junction) in Dieu Tri Town, Tuy Phuoc District, and ends at Nguyen Man Road in Nhon Binh Ward, Quy Nhon City. The road will be 4 to 6 lanes, design speed at 80 km per hour, side walks of 5 to 7m wide, road divider is 0 to 4 m wide for tree planting.
- Structures along the road include: Truong Uc Bridge, 19 meters wide and 675.45 meters long, and the bridge crossing Dinh River, 27 meters wide and 113.3 meters long. The drainage infrastructure consists of longitudinal drains and 19 cross-drainage culverts. There will also be street lighting systems, tree planting along sidewalks and median strips, and traffic safety systems on the route.

- **The Other structures along the route:** Intersections will be treated and smoothly connected with existing local roads to ensure smooth traffic flow, traffic safety, and proper

drainage for the existing residential areas. A drainage system will be installed along and across the road to ensure proper surface and area drainage. Protective works and traffic safety facilities will be constructed. Sidewalks and green spaces will be completed to ensure urban aesthetics. Along the route, an urban lighting system and green trees will be installed to ensure traffic safety and enhance the urban landscape.

- **Construction of a railway intersection:** A new level crossing will be opened at Km3+665.05 (on the Dieu Tri – Quy Nhon railway line) with a width of 59 meters. The safety system will include manned guard posts, electric barriers, and an automatic train warning bell system.

- **Coastal road DT 639, section My Thanh – Lai Giang:** The road section is designed according to class III plain road standards, with a length of 38.14 km and width of 12 to 20.5 meters. It begins at Km 45+00, adjacent to the De Gi – My Thanh section, and ends at the Lai Giang Bridge. Design speed V = 80km/h (with flexibility, at sections passing residential clusters at the foots of the Phu Thu and Lo Dieu passes V = 40km/h). The works along the road include expansion of the Ha Ra Bridge to raise the width from 8 to 14 m meters, with a length of 315.92 meters. Build the new the Cong Luong Bridge, 12 meters wide and 111.3 meters long. The drainage infrastructure along the route consists of longitudinal drains and 113 cross-drainage culverts. There will also be street lighting systems, traffic safety systems, and tree planting in the median strip along sections with a roadbed width (B) of 20.5 meters.

Component 2: Technical Support and Project Management
This component will be implemented using grant funding from the World Bank and consists of:

- **Sub-component 2.1:** Public investment management: enhancing institutional and technical capacity for relevant departments and agencies.
- **Sub-component 2.2:** Project implementation support, including (i) technical support during the implementation of sub-projects; (ii) independent monitoring of environmental and social safeguards; (iii) independent financial auditing; (iv) strengthening strategic communication (including the design and creation of websites and other content for public and social media communication) and citizen engagement activities; and (v) corresponding training for staff and others involved in project implementation, particularly on safeguards, procurement, contract management, monitoring, and evaluation.

3. Policy, Legal, and Administrative Framework

The implementation of the sub-project must comply with (i) the Environmental and Social Framework (ESF) of the World Bank, which includes the following Environmental and Social Standards (ESS): ESS1 (Assessment and Management of Environmental and Social Risks and Impacts), ESS10 (Stakeholder Engagement and Information Disclosure), 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), and ESS8 (Cultural Heritage); (ii) national environmental policies and frameworks, including laws, decrees, circulars, and national technical regulations; (iii) international agreements on environmental and social issues. The sub-project will also apply the World Bank Group Environmental, Health, and Safety Guidelines (WBG EHSG).

Environmental and Social (ES) tools have been prepared for the sub-project in accordance with the ESF, including: an Environmental and Social Impact Assessment (ESIA), which encompasses an Environmental and Social Management Plan (ESMP). The ESIA/ESMP is linked to other independent documents, including the Labor Management Procedures (LMP), Stakeholder Engagement Plan (SEP), and Environmental and Social Commitment Plan (ESCP). The Resettlement Plan (RP) is also referenced in the ESIA/ESMP. These documents identify and assess the potential environmental and social risks and impacts related to the construction components proposed under Component 1 of the Project, along with the proposed management plans.

4. Baseline Condition

4.1. Nature condition

The project area is located within Binh Dinh's coastal plain, characterized by sedimentary terrain interspersed with low mountains and eroded coastline features. The surface geology consists mainly of Quaternary riverine and marine sediments (clay, sandy loam, sand). Hydrologically, the area is influenced by rivers such as Ha Ra, Duc, Cay Me, and Dinh, which are subject to both seasonal floods and tidal effects, potentially impacting road construction.

Binh Dinh experiences a tropical monsoon climate with a dry season (Jan–Aug) and a rainy season (Sep–Dec), frequently affected by typhoons and floods. Annual rainfall ranges from 1,580 to 3,505 mm, with average temperatures between 26.3°C and 28.1°C. Climate change projections indicate a potential sea level rise of up to 1 meter by 2100, which may result in flooding of over 127 km²—an important consideration for road alignment and design near the coast.

Ecologically, the province contains natural and secondary forests, agricultural ecosystems, and important inland and coastal water bodies. Notably, the area is located in proximity to three major lagoons: Thi Nai Lagoon (5,060 ha), located approximately 41 km from the My Thanh–Lai Giang route; Tra O Lagoon (approximately 1,200 ha), located about 2.5 km from the route; and De Gi Lagoon (1,580 ha), located about 2 km from the route. These ecosystems are significant for biodiversity conservation and fisheries. The subproject area supports a wide range of biodiversity with 222 species of higher plants, 215 bird species, 92 mammal species, 42 amphibian species, 56 reptile species, 8 insect species, and 114 fish species. The landscape is dominated by agricultural land and planted forests with low ecological sensitivity.

Environmental quality assessments conducted in 2021 showed that ambient air, noise, vibration, groundwater, and soil within the project zone meet Vietnamese national technical standards (QCVNs). However, surface water along Road 2 showed signs of organic pollution (elevated COD and BOD5), suggesting potential risks to aquatic ecosystems and the need for mitigation during construction.

Overall, sensitive environmental factors for the road construction project include the proximity to river systems prone to flooding, nearby lagoons, and surface water quality in certain sections. These elements should be carefully addressed in construction planning, erosion control, and drainage system design.

4.2. Socio-Economic condition

As of 2019, the population of Binh Dinh Province is 1,487,817, with a population density of 245 individuals per square kilometer. The urban population constitutes 30.8%, while the rural population accounts for 69.2%. The population aged 15 and older is 891,238, comprising 52.2%

male and 47.8% female. The distribution of the labor force between rural and urban areas is 72.4% (645,256 individuals) and 27.6% (245,982 individuals), respectively.

Economy: The average growth rate of Gross Regional Domestic Product (GRDP) in Binh Dinh Province from 2016 to 2020 was 6.4%. Specifically, the agricultural, forestry, and fishery sectors grew by 4.04%; the industry and construction sectors by 9.13%; services by 6.16%; and taxes by 7.96%. In 2020, the economic structure of Binh Dinh Province was as follows: agriculture, forestry, and fishery at 27.6%; industry and construction at 28.6%; services at 39.3%; and tax revenue at 4.5%. Compared to 2015, the proportion of industry and construction in GRDP increased by 3.7% (with a planned increase of 6.6%). Notably, the share of industry in GRDP rose by 3% from 2015 to 2020 (with a planned increase of 4.7%). This indicates a slow structural shift towards increasing the share of the industry and construction sectors. However, due to the negative impact of the COVID-19 pandemic in 2020, the service sector experienced very low growth (estimated at 3.1%), resulting in an average growth rate of only 6.16% for services. Excluding 2020, the average growth rate for the service sector from 2016 to 2019 was 6.94%.

Poverty Rate: During the period from 2016 to 2020, the average poverty rate decreased by 1.83% per year, with 37,000 households escaping poverty. Specifically, for households classified under Resolution 30a, the average reduction rate was 6.5% per year, with over 7,900 households escaping poverty—meeting and exceeding the planned targets. Throughout the entire period from 2011 to 2020, the average poverty rate for the province decreased by nearly 2% per year, especially in poor districts under Resolution 30a, which saw a reduction of 5.68% per year.

Education: The province is home to 2 universities, 3 vocational schools, 51 high schools, 145 middle schools, 244 primary schools, and 220 kindergartens, serving nearly 267,000 students. Community learning centers have been established and are increasingly active. The literacy rate for individuals aged 15 and older has significantly increased over the past decade, reaching 97.2% in Binh Dinh—1.4% higher than the national average and 1.0% higher than the North Central Coast and Central Coastal regions.

Social Order: In the first half of 2021, authorities investigated and clarified 252 out of 271 criminal cases (achieving a rate of 93%), including 38 out of 40 very serious and particularly serious cases (achieving 95%); 528 offenders were arrested and prosecuted. The investigative police handled 672 cases with 1,161 defendants, initiating 462 new cases and prosecuting 807 defendants, while referring 366 cases and 755 defendants to the People's Procuracy for prosecution.

Currently, 100% of health stations have doctors, 97.5% of communes meet national healthcare standards, 80.7% of the population participates in health insurance, and there are 30.2 hospital beds per ten thousand people.

Gender Ratio and Gender-Based Violence (GBV): The gender ratio in Binh Dinh is 97.0 males for every 100 females.

From 2008 to the present, there have been 2,495 reported cases of GBV in the province. GBV manifests in various forms, primarily physical violence; the majority of victims are women, with an average age ranging from 16 to 59 years. Perpetrators of such violence are predominantly male. The primary causes include gambling, alcohol consumption, poverty, unemployment, child marriage, infidelity, gender inequality, and a lack of knowledge regarding coping skills.

Binh Dinh Province aims to keep the HIV infection rate in the population below 0.4%. The province has comprehensively and effectively deployed the HIV/AIDS prevention and control program, encompassing behavior change communication, harm reduction interventions, pre-exposure prophylaxis, care, and treatment for individuals living with HIV/AIDS.

Ethnic Groups: According to the 2019 national population census, the province has 1,445,150 Kinh individuals, accounting for 97.2% of the population, and 41,768 individuals from other ethnic minorities, representing 2.8%. Over the past decade, the average annual population growth rate of ethnic minorities has been 1.91%, higher than the provincial average growth rate of 1.907%. The survey results indicate that there are no ethnic minorities residing in the project area.

Vulnerable Groups: Binh Dinh Province currently has 32,372 individuals with disabilities (excluding war veterans and those with illnesses), comprising 1.98% of the total population. Approximately 193,000 elderly individuals reside in the province, representing 12.8% of the population, with a total of 168,947 elderly members. Vulnerable groups also include (i) poor households, (ii) households headed by women or female-headed households with dependents, and (iii) policy families under the provincial government's regulations.

Children and Forced Labor: No cases of child forced labor have been reported in Binh Dinh Province.

Cultural Heritage: There are no archaeological sites or nationally or internationally recognized tangible and intangible cultural heritage within the project's affected area. However, there are several cemeteries managed locally, a small temple, and a church located near the road connecting Highway 19C to Quy Nhon Port, as well as the historical site of unnumbered ships and a few small local churches along the coastal road from My Thanh to Lai Giang.

4.3 Infrastructure

Electricity System: Binh Dinh Province is connected to the national electricity grid, encompassing both 110kV and 220kV networks. Currently, 81% of main streets and 45% of alleys have street lighting installed. The rural low-voltage electricity grid effectively meets the power supply needs of the local population.

Water Supply and Wastewater Treatment: Binh Dinh Province operates a water supply plant located in Quy Nhon City, currently capable of producing 43,000 m^3 per day, which meets the water consumption needs of the city's residents at a rate of 100 liters per person per day. To date, 75% of urban households have access to clean water. The province has a total of 126 water supply stations in rural areas, with a combined capacity of nearly 45,000 m^3 per day.

Administratively, the province comprises 11 units at the district and city levels; however, only Quy Nhon City has two centralized wastewater treatment plants: Nhon Binh Treatment Plant with a capacity of 14,000 m^3 per day, achieving a treatment efficiency of 95%, and Treatment Plant 2A with a capacity of 2,350 m^3 per day, achieving 50% treatment efficiency. Wastewater from other towns and districts has not yet been collected or treated in compliance with regulations, leading to domestic wastewater being discharged into stormwater drainage systems, which ultimately flow into various water bodies (canals, ditches, rivers, and streams) or onto land.

Road Infrastructure: The road infrastructure in the province is well-developed, featuring national highways, provincial roads, and inter-district and inter-communal roads. The existing road network facilitates the transportation of construction materials necessary for the activities of the sub-project.

Solid Waste Collection and Treatment: the solid waste collection rate in urban areas during the period from 2015 to 2020 reached approximately 49.5%, while in rural areas, it was around 27.7%. Consequently, the amount of uncollected waste constitutes about 50.5% in urban areas and 63.3% in rural areas. Solid household waste is primarily managed by residents through methods such as landfilling or incineration.

Landfill Sites: Currently, Phu My District operates a solid waste landfill located in Gia Hoi Village, My Phong Commune, with an area of 1.6 hectares and a total investment of 25 billion VND funded through non-refundable aid from Belgium, designed to handle 36.3 tons per day.

The Long My solid waste treatment facility located in Quy Nhon City is expected to establish a solid household waste treatment plant covering an area of approximately 4.33 hectares, with a capacity of around 800 tons per day (currently in the preparation phase).

5. Types of workers

The World Bank's Environmental and Social Standard 2 (ESS2) classifies workers into four categories: direct workers, contracted workers, community workers, and primary supply workers. The Environmental and Social Impact Assessment (ESIA) indicates that the labor force for the sub-project will comprise: a) direct workers (those directly recruited or hired by the Binh Dinh Project Management Unit), b) contracted workers (recruited by third parties, such as contractors/subcontractors), and c) supply workers (contractors providing essential materials and equipment for the sub-project). The sub-project will not employ community workers for construction activities. However, local residents may establish a community investment monitoring board to oversee the implementation of risk mitigation measures and address environmental and social impacts, as well as construction safety, on a voluntary basis. The sections below describe the types and estimated numbers of workers to be utilized throughout the sub-project lifecycle.

Regarding construction, it is estimated that a total of 595 contracted workers will be hired by construction contractors to implement components 1.1 and 1.2. This includes: project preparation consultants (30 individuals), construction and supervision consultants (5 individuals), independent environmental monitoring consultants (10 individuals), skilled workers hired by contractors and subcontractors (400 individuals), and other workers (150 individuals). The sub-project does not anticipate the involvement of international workers or consultants. Workers from other provinces may be mobilized to Binh Dinh Province as construction bidding packages are initiated.

6. Positive environmental and social (ES) impacts

Overall, the subproject implementation will bring a number of positive impacts. The coastal route (PR 639) My Thanh - Lai Giang section of 38.14 km long and National Highway 19 C connecting Quy Nhon port of 6.35 km long will bring about numerous socio-economic benefits and efficiency. It will help complete the coastal road that is smoothly connected from the North to the South as part of the national coastal road system. Other key benefits include enhancing Binh Dinh's access

to disaster risk adaptation infrastructure services in the project provinces; strengthening traffic connection, eliminating the monopolistic position of traffic on National Highway 1A; ensuring continuous traffic in disaster emergencies such as floods, landslides, and rescue; promoting marine economic development, linking infrastructure of key coastal economic zones, industrial parks, residential areas, urban areas and coastal eco-tourism areas.

In addition, the subproject will contribute to promoting the development of the industrial and tourism economy, improving quality towards sustainability and adaptation to climate change and improve the efficiency of public investment activities, promote socio-economic development.

7. Environmental and social risks and impacts, mitigation plan

The sub-project has identified and evaluated the potential negative environmental and social impacts during the pre-construction, construction, and operational phases, including direct, indirect, and cumulative impacts. It has sought to quantify risks and negative impacts on the environment and society wherever feasible.

The key potential impacts and risks, and mitigation measures are summarized in the Table below

Potential Impacts/Risks	**Mitigation measures proposed**	**Implement by and phase**
Pre-construction impacts		
Land Acquisition (157 ha) 661 households (AHs) / 1,065 people affected: 117 vulnerable AF loose from 10% of their total agricultural land, 313 AH lose from 20% agricultural land, 231 AH to be relocated	Maximise the use of existing road for upgrading Avoid, miminise land acquisition through alternative analysis of road alignment, RAP prepared, budgeted at 30,3 Millions USD	Feasibility study (FS) in coordination with ES consultants, to be confirmed during detail design
UXO Left from the wars happended in the past	Contract an authorised entity to detect, clear UXOs at sites to be disturbed by the Project. 4.7 Bilions VND (approximately 192,000 USD)	PMU (already completed during detail design
Removal of forests and plantations) (18 ha watershed protection forest and 20 ha production forest)	Carry out alternative analysis to avoid or minimize impacts on forested land Pay compensation to forest owners according to the RP Contribute financial resources (estimated 4.3 millions VND or 188,000 USD) to the Provincial Fund for Forest Planting so as MAE can arrange for the planting of	FS consultants/ stage PMU, Before construction commencement During project implementation, before project

	replacement forest	completion
Construction impacts and risks (mostly localized, at moderate to substantial levels, short to medium terms, reversible)		
Common Construction impacts and risks • dust, noise, vibrations, • generation of wastes and waste water • Flooding risks • safety risks to workers and communities • Traffic disturbance, safety risks • Disturbance to forested land and fire risks • Social disturbance and risks • Degradation of existing infrastructure (irrigation, drains etc.) • Etc.	Contractors to implement the mitigation measures listed in the ESMP, such as installation of warning signs, house keeping measures at construction sites and workers' camp, collect and store excavated materials at the approved storage sites, arrange materials and equipment tidily, clean up the sites regularly, the workers are required to follow Codes of Conducts, safeguard trainings will be provided, GRM mechanisms will be set up etc., These are incorporated into Safeguard terms and conditions in the construction bidding documents/contracts. The costs are parts of civil works contracts.	Contractors during construction phase, monitored by Construction Supervision Consultants (CSC) and Independent Safeguard Monitoring Consultants (ISMC)
Site-specific impacts and risks (at sensitive locations such as schools, business, historical sites, residential areas along the alignment, at disposal sites etc.)	Implement the site-specific mitigation measures (such as carrying out construction half of roadwidth each time, install fences and warnings, cover trucks and control speed , avoid rush hours etc) described in the ESMP and construction bidding documents/contracts	
Type-specific impacts and risks (blasting, water way disturbance during bridge construction etc.)	Same as above. For example, guarding, signaling, safe procedures proposed for safe blasting. Survey, apply safety procedures for weak structures in proximity areas before blasting	
Operation phase		
Increased flooding risks	Survey and carry out consultations to track historical flooding records. Establish and run hydraulic model to project flooding level at various	Design and construction

	scenarios. Design, build adequate cross and longitudinal drains according to the chosen scenario.	
Increased traffic safety risks	Design, build traffic safety system in accordance with national standard QCVN 41:2019/BGTVT, especially atintersections, curves, on slopes etc.	Design and construction
Climate resilience	Greening (prioritizing native species) and mitigation measures are considered and incorporated into engineering design of roads and ancillary items, slope protection etc. where possible	Design and construction

Below are some more details.

Pre-Contruction Phase

The sub-project will affect 1,065 individuals in 661 households (AHs). These are comprised of : a) 117 vulnerable households losing at least 10% of their total agricultural land, b) 313 households losing at least 20% of agricultural land, c) 231 households required to relocate, and d) 178 business households. The total number of households identified as "vulnerable households" is 141 (including 34 poor households, 18 female-headed households with dependents, 6 physically or mentally disabled households, 14 elderly individuals living alone, and 69 marginalized households). No ethnic minority households will be affected by land acquisition for the project.

The total area of land to be permanently acquired for the project, including road construction and material storage sites, is 1,571,262 m², which includes: 46,874 m² of residential land belonging to households (approximately 231 households required to relocate); around 191,689 m² of agricultural land (approximately 96,854 m² of rice cultivation); approximately 200,300 m² of production forest land; and about 187,600 m² of protective forest land, along with 944,799 m² of various other land types. The area of temporarily acquired land is estimated to be around 33,720 m² for service roads, including unused land and agricultural land.

Contruction phase

The potential negative environmental and social impacts during construction include dust and emissions, noise, vibration, traffic accidents and congestion, safety and health risks for workers and the community, generation of non-hazardous and hazardous waste (e.g., solid waste and wastewater), loss of vegetation cover, house cracks, erosion and sedimentation, damage to existing infrastructure such as roads and drainage systems, electrical systems, and social issues related to labor dynamics such as labor exploitation, sexual exploitation and abuse (SEA), sexual harassment (SH), child labor, and forced labor. Given that the upgraded and newly constructed roads are provincial roads, and the scale of construction activities is not large, the negative impacts during construction have been assessed as low to moderate.

Blasting activities for rock removal and cutting slopes to lower road gradients in the Phu Thu and

Lo Dieu areas may pose landslide risks in these areas.

An estimated excess soil volume of approximately 1,736,671 m³ will be transported and disposed of at agreed local materials storage sites for leveling purposes, which are low-lying areas approximately 2-14 meters lower than the surrounding region. This includes: (1) For the coastal road: materials storage sites at km56+356.34 in My An commune; materials storage sites at km69+414-km69+823, km70+247-km70+500, km70+981-km71+130 in My Duc commune; a disposal site at km71+765-km71+812 in Hoai My commune; three materials storage sites in Con Vang - Kim Giao hamlet, Dieu Quang hamlet, and the phase 2 resettlement area in Hoai Hai commune; (2) For the QL19C – Quy Nhon Port route: disposal site A1 in zone 3 of Nhon Binh ward. Due to the low-lying nature of the area, disposal activities will not cause soil overflow into surrounding areas or be washed away by rainwater. Additionally, the materials storage sites do not border residential areas, resulting in a low assessment of impacts on surface water and surrounding communities.

Operation Phase:

During the operation phase, negative impacts on the environment and society are expected, such as noise, effects on land, water, and surrounding air quality. The activities of the sub-project may also lead to social impacts, including traffic accidents, flooding, and effects stemming from the rapid development of service, trade, and urban areas along the routes. Risks and impacts will be mitigated through the implementation of established mitigation measures for this sub-project. Overall, the implementation of the sub-project is anticipated to not result in any significant negative impacts on the environment and society during the operational phase.

The route from National Highway 19C connecting to Quy Nhon Port: upon formation of the route, localized impacts on flooding levels due to differences in water levels on either side of the road are expected, particularly from the area after the Ha Thanh - Cay Me river junction to the railway intersection, with water level differences ranging from 0.56m to 0.30m; there will also be a redistribution of minor flood flows intermingling between the branches of Ha Thanh, Dinh, and Cay Me rivers. In the near future, when comprehensive planning such as downstream flood drainage planning for Ha Thanh River is implemented, the road and urban infrastructure in this area will be protected by a flood dike with a 5% frequency of occurrence, thus preventing flooding. Flood drainage from upstream to downstream to the sea will be confined within the planned river routes and dike systems.

8. Cumulative impacts

The key Valued Environmental Components (VECs) include air quality, traffic safety, shrimp farming, and aquatic ecosystems, among others. The existing Lai Giang - Thien Chanh road has contributed to increased traffic, leading to higher levels of air pollution from vehicle emissions. The proposed Mỹ Thành - Lai Giang road, air quality will be further impacted by dust and emissions from construction machinery, compounding the existing pollution levels.

- The two roads led to a significant increase in traffic flow, creating safety concerns, particularly in areas with high population density or near intersections. The construction activities on the road will exacerbate these risks, with construction vehicles and temporary disruptions further adding to the potential for accidents.
- The two roads have the potential to negatively impact aquatic ecosystems. The existing Lai Giang - Thien Chanh road has already contributed to some degradation of water quality,

and the construction of the road will likely increase sedimentation and runoff, leading to further harm to aquatic habitats. Changes in water flow, increased turbidity, and potential contamination from construction activities could worsen the situation.

- The existing Lai Giang - Thien Chanh road has disrupted habitats, leading to increased human activity and traffic in surrounding areas. The proposed road will lead to further habitat disturbance, particularly in forested or hilly regions, with additional impacts on local wildlife populations.
- The existing road has indirectly contributed to soil erosion in surrounding areas, while the road construction will disturb soil stability through land clearing and excavation. This can increase the risk of erosion, landslides, and sedimentation in nearby water bodies, further degrading the environment.
- The existing road has affected surrounding ecosystems and water quality. The propsed road may alter local hydrology, change water flow patterns, and increase sedimentation and pollution, negatively affecting water quality for both human use and aquatic life.
- The propsed road will further impact the visual landscape, leading to permanent changes in the natural appearance of the area.
- Construction waste from the completed road has been relatively contained, but the ongoing construction of the road will generate substantial waste, including debris and materials. If not managed properly, this waste could contribute to environmental degradation.

In summary, cumulative impacts arise from the combination of the operational effects of the Lai Giang - Thien Chanh road and the ongoing construction of the Mỹ Thành - Lai Giang road. These impacts affect various VECs, including air quality, traffic safety, aquatic and terrestrial ecosystems, soil stability, water resources, and the visual landscape. Given that the previous road project is already operational and the proposed subproject has not yet begun construction, the cumulative impact is considered to be *low*. However, monitoring and mitigation measures will be essential to minimize the negative effects and ensure the protection of the environment and local communities.

9. Induced impact

The upgrading and construction of roads can trigger significant secondary or induced environmental impacts, resulting from the direct effects of road development and the subsequent changes it causes to the surrounding areas. These impacts, often indirect, can have far-reaching consequences for both the natural environment and local communities.

One of the most notable induced effects is land use change. The construction of roads often accelerates urbanization and the development of previously undeveloped areas, leading to the transformation of natural habitats into residential, commercial, and industrial zones. This shift can cause habitat fragmentation, loss of biodiversity, and disruption of local ecosystems as species are displaced or face altered environments.

The roads also increase traffic volumes, which can lead to congestion and higher emissions from vehicles. This surge in traffic contributes to air pollution, including higher levels of particulate matter and greenhouse gas emissions, while also exacerbating noise pollution. These changes can negatively affect human health, particularly in densely populated areas, and disrupt wildlife, altering their behaviors, migration patterns, and habitats.

Another significant concern is environmental degradation due to deforestation and the loss of habitats. As new areas are developed for industrial, commercial, or residential purposes, forests

and other vital ecosystems may be cleared. This leads to a reduction in biodiversity, as species that rely on these habitats for survival may face challenges to their continued existence. This loss of natural areas further contributes to the disruption of the local environment, including changes to soil structure and water quality.

Water resources are also impacted by the construction and subsequent use of roads. The alteration of water courses due to construction activities—such as excavation, drainage, or other earthworks—can lead to increased sedimentation and pollution of nearby water bodies. This contamination affects local ecosystems, disrupting aquatic life and threatening the health of water-dependent species. The changes in water flow can also increase the risks of flooding in certain areas, further exacerbating environmental impacts.

The construction and use of roads also lead to soil erosion. Changes in land use, combined with the removal of vegetation during construction, often result in the increased risk of soil erosion. This can lead to sedimentation in rivers and streams, which harms aquatic habitats and impacts water quality, potentially causing further damage to ecosystems and increasing the likelihood of flooding in downstream areas.

Finally, the increased activity around newly constructed roads contributes to higher levels of air and noise pollution, which can affect both human health and local wildlife. Pollution from construction machinery and increased traffic can lead to respiratory issues, hearing damage, and disruptions in wildlife communication, which in turn can alter the behavior and distribution of animal species.

These secondary impacts are considered *moderate* in their overall significance, but they must be carefully managed. Effective planning, oversight, and coordination with local authorities—ranging from provincial to community levels—are essential in ensuring that these induced impacts are mitigated. Policymakers and planners should be actively involved throughout the development and operation of the subproject to prevent or minimize adverse effects, ensuring that both environmental and social factors are adequately addressed.

10. Analysis of alternatives

The analysis of alternatives begins with a comparison of two scenarios: the “no project” and “with project” scenarios, focusing on social, environmental, and economic benefits.

The “no project” scenario would not cause negative environmental and social risks and impacts; however, if the project is not implemented: (i) the overall connectivity of Binh Dinh Province's road network, including certain sections that have already been invested in, may not be ensured, and the socio-economic development of coastal provinces, particularly the exploitation of marine resources and coastal areas, would not be strengthened; (ii) access to resilient infrastructure services is unlikely to be maintained or improved; and (iii) several key benefits from improving road infrastructure would be missed.

In the “with project” scenario, the feasible options are considered based on (i) technical aspects, (ii) economic aspects, (iii) environmental and social aspects, and (iv) costs. For the “with project” scenario, two alternatives for the entire route of the My Thanh – Lai Giang Coastal Road were evaluated, and Alternative 2 was selected. Alternative 2 maximizes the economic benefits for coastal areas. However, it also entails environmental and social risks and impacts during construction, as well as land acquisition requirements. These risks and impacts can be effectively managed through the Environmental and Social Management Plan (ESMP), which has been

prepared as an integral part of this Environmental and Social Impact Assessment (ESIA).

For the My Thanh – Lai Giang Coastal Road: (i) two alternatives were considered for the Phu Thu Pass section (from Km 68+169.14 to Km 72+469.14), and Alternative 2 was chosen; and (ii) two alternatives were evaluated for the Lo Dieu Pass and the bypass road around residential areas (from Km 75+269.14 to Km 81+969.14), with Alternative 2 being selected.

For the Road Connecting Highway 19C to Quy Nhon Port, two alternatives were evaluated, and Alternative 2 was chosen. Although Alternative 2 has a higher construction cost, it presents fewer environmental and social risks and impacts during construction, requires less land acquisition, and involves lower excavation and embankment volumes. Alternative 2 also ensures better alignment and harmony with provincial planning, ensuring connectivity with existing and future road networks.

11. Environmental and Social Management Plan

The Environmental and Social Management Plan (ESMP) has been developed as an integral part of this Environmental and Social Impact Assessment (ESIA). It includes mitigation measurse and the requirements for implementation, monitoring, reporting and capacity building to address the identified potential environmental and social impacts and risks. The ESMP details the roles and responsibilities of relevant stakeholders and the coordination mechanisms for its implementation. As the implementing agency, the Binh Dinh PPMU is fully responsible for executing the ESMP, including ensuring the provision of adequate funding for its implementation throughout the preparation, construction, and operation phases.

The project preparation incorporated safeguard considerations during site selection, feasibility study, and detailed design phase. Alternative analysis had been conducted to minimize the potential adverse environmental and social impacts, especially those related to land acquisition. UXO clearance has been designed and implemented as part of the project. Budget has been reserved to replant and compensate for the affected forested land. A comprehensive set of mitigation measures including Common Environmental and Social Mitigation Measures, Workers Codes of Conducts, Site-specific and Type-specific mitigation mesures (including those for dust control, noise and vibration mitigation, waste management, safety measures for workers and nearby communities, blasting operation control, traffic management etc.) had been proposed in the ESMP to address the known commn construction impacts and risks. These will be incorporated into construction bidding documents and contracts, and the Contractors are required to prepare Contractor's ESMP for submission to the PMU or their representative before construction commencement. Finally, during the operation phase, ongoing monitoring and maintenance are conducted to ensure the proper functioning of environmental controls, such as wastewater treatment systems, and the prevention of pollution and ecological disruption. The project also ensures that all safety measures for public health, including disease prevention, are maintained, and that communication with local communities continues to be a priority for timely information and addressing concerns.

11.1. Institutional arrangements

The Binh Dinh PPMU will be responsible for the overall management and supervision of the project implementation, including ensuring the project's environmental compliance. PPMU will have ultimate responsibility for the execution of the ESMP and the project's environmental performance during the construction and operation phases. Specifically, PPMU will: (i) coordinate

closely with local authorities and communities during the project preparation and implementation phases; (ii) monitor and inspect the ESMP implementation, including the integration of the ESMP into detailed design, bidding documents, and contracts; (iii) ensure that the environmental management system is properly established and functioning; and (iv) report on ESMP implementation to the Department of Agricultural and Environment (DAE) and the World Bank. To ensure effective implementation, PPMU will assign a dedicated Environmental Specialist (ES) to support PPMU in monitoring the project's environmental compliance and hire an Independent Environmental Monitoring Consultant (IEMC) when necessary.

The contractor will be responsible for implementing mitigation measures which are specified in the ESIA, ESMP, bidding documents and contracts. The Construction Supervision Consultant (CSC) will be responsible for daily supervision of the contractors' implementation of these mitigation measures.

The Independent Environmental Monitoring Consultant (IEMC), directly hired by the Binh Dinh PPMU, will oversee the overall environmental monitoring, including supporting PPMU in environmental and safety compliance supervision and monitoring, building ES capacity for CSC and contractors, environmental quality sampling, and reporting on implementation through regular monitoring reports.

11.2. Grievance redress mechanism (GRM)

11.2.1. Subproject-level GRM

The objective of the subproject GRM is to provide complainants with grievance redress mechanism that are easily accessible and used to raise project related concerns and grievances. The subproject GRM provide information on how the complaint are lodged, including forms, channels, particularly resolution steps as well as timeframe for each step, such as for acknowledging receipt of complaint, notification of resolution decision, and prescriptive period. During grievance resolution progress, dialogues will be hold between the subproject designated GRM units/personnel and the aggrieved people, where necessary, for mutual understanding and collaboration for effective resolution. The subproject also has an appeal process that complainant can use if not satisfied with the proposed resolution of the complaint.

The subproject GRM is based on the existing formal grievance mechanism, as specified by relevant national laws and regulations. The PPMU shall consider deploying their existing GRM to receive, handle and lodge complaints and denunciations. In addition to formal mechanism, informal grievance mechanism which is culturally appropriate and recognized by government is available at communities. All grievances will be registered and documented by the agencies receiving the complaints. The PPMU will maintain a record of all grievances received under the subproject and monitor the overall resolution process to ensure time resolution. Collective grievances are accepted through group representative. To ensure people, including vulnerable people and women, can raise their concerns, the GRM will be publicly disclosed in communal Peoples Committee offices and will be also delivered to all affected people– in the form of project leaflet, during project implementation.

Complaints relating to any subproject's environmental and social risks and impacts will be solved through negotiations to achieve the consensus. A complaint will go through three stages before it can be transferred to the court. The PPMU will be encouraged to properly disclose the GRM channel to the relevant stakeholders. A complaint hotline, at the working/neighborhood level

would help resolve minor issues and prevent the escalation of grievances and complaints.

11.2.2. World Bank Grievance Redress Service (GRS)

The World Bank's Grievance Redress Service (GRS) serves as a channel for individuals and communities to directly submit complaints to the World Bank if they believe that a World Bank-financed project has caused or may cause negative impacts to them, their community, or the environment. The GRS enhances the World Bank's responsiveness and accountability to affected communities by ensuring that grievances are reviewed and addressed in a timely manner. Complaints must be submitted in writing to the GRS. For information on how to file a complaint with the World Bank's Grievance Redress Service (GRS), please visit www.worldbank.org/grs.

11.2.3. World Bank Inspection Panel

The Inspection Panel is an independent grievance mechanism for individuals and communities who believe they have been or may be negatively impacted by a project financed by the World Bank. The Inspection Panel has the authority to review projects funded by the Bank and assess whether the Bank's management is complying with the World Bank's operational policies and procedures, which are designed to promote social and economic benefits and prevent harm to people or the environment. For information on how to submit a complaint to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

11.2.4. GRM for Workers

While the sub-project will have a grievance mechanism (GRM) to address the concerns of affected parties, the nature of workplace concerns for workers tends to differ. Typical workplace grievances include demands for employment opportunities, wage issues, delays in payment, disagreements over working conditions, and concerns regarding health and safety in the workplace. Therefore, a separate grievance mechanism will be established for project workers (both direct workers and contracted workers), as required by ESS2.

Handling grievances must be objective, prompt, and responsive to the needs and concerns of the affected workers. Workers should be allowed to submit grievances through various channels, such as direct submission, phone, text messages, letters, or emails. Grievances raised must be recorded and acknowledged within one day. While the resolution timeline will depend on the nature of the grievance, workplace health and safety issues or other urgent matters should be addressed immediately. In cases where a grievance cannot be resolved within a reasonable timeframe, the affected worker must be informed in writing, allowing them to consider taking the matter to the State labor inspectorate (for more details, see below). This mechanism will also enable anonymous grievances to be raised and addressed. Individuals submitting their concerns or complaints may request that their identity be kept confidential.

A step-by-step grievance resolution process will be established for both direct and contracted workers, along with responsibilities for handling labor-related grievances. The primary objective of this document is to present the GRM procedure in an effective and user-friendly manner.

Publicizing the GRM: The PPMU and contractors will be responsible for publicizing the GRM to both direct and contracted workers, ensuring that the GRM is explained to them upon recruitment and is available at the PPMU office and contractor's office. Contact phone numbers of GRM focal points will also be provided to workers.

11.3. Capacity development and training

Binh Dinh PPMU will be the implementing agency for the project. PPMU have previously implemented several World Bank-funded projects. However, this project will be executed under the World Bank's new Environmental and Social Framework (ESF), introducing new requirements that their designated Environmental and Social (ES) staff may not be familiar with. Therefore, the designated ES staff of Binh Dinh PPMU will need to undergo training on the ESF and actively engage with the World Bank's safety/standards specialists to understand the new ESF requirements and receive timely support as needed. The ES staff of Binh Dinh PPMU should actively participate in ESF training sessions organized by the World Bank when available.

The designated ES staff of Binh Dinh PPMU will also be responsible for coordinating with the Independent Environmental Monitoring Consultant (IEMC) to enhance the ES management capacity of the Construction Supervision Consultant (CSC) and construction contractors. ES staff from both the CSC and IEMC will be tasked with coordinating and providing Occupational Health and Safety (OHS) training to new staff and contractors, following the World Bank Group (WBG) Environmental, Health, and Safety (EHS) guidelines.

11.4. Monitoring and reporting

11.4.1. Monitoring

Compliance monitoring will be conducted regularly by the Project Management Unit (PPMU) and the Construction Supervision Consultant (CSC). PPMU and CSC will be responsible for daily monitoring of contractor compliance with the agreed-upon mitigation measures. The results will be reflected in monthly progress reports and/or internal environmental monitoring reports.

Local authorities and communities, including the community monitoring board and the Department of Natural Resources and Environment (DONRE), will carry out independent monitoring tasks as mandated by the government. Additionally, the Environmental, Health, and Safety (EHS) staff of the contractor will be responsible for daily monitoring of occupational safety and environmental sanitation on the construction site, reporting to PPMU and CSC.

An environmental quality monitoring program focusing on air, soil, and water quality will provide data that can be used to assess the effectiveness of pollution management strategies. A recommended environmental quality monitoring planning process will ensure that the collected data is adequate for its intended purpose (and to avoid unnecessary data collection). This process will define the purpose of data collection, the decisions to be made based on the data and the consequences of making incorrect decisions, the timing and spatial scope, and the quality of data required for accurate decision-making.

Environmental incident monitoring will be initiated immediately upon occurrence of an environmental incident. The purpose of this monitoring is to promptly assess the level of pollution affecting air, soil, and water sources due to the leakage and dispersal of hazardous waste and toxic chemicals into the air, nearby water bodies, and soil, and to make timely decisions regarding pollution control to help mitigate risks to the environment and public health. The environmental incident monitoring plan will be developed by the Independent Environmental Monitoring Consultant (IEMC) for PPMU's review and approval before the commencement of construction activities, and will be shared with the CSC and construction contractors. This plan will identify potential environmental incident risks due to the leakage and dispersal of hazardous waste and toxic chemicals into the air and nearby water bodies and soil. It will also specify the procedures

for conducting this monitoring, such as employing qualified personnel, equipment, monitoring locations and parameters, analysis methods, specialized laboratories, and cost estimations.

11.4.2. Reporting

The Project Management Unit (PPMU) is responsible for the regular reporting of the Environmental and Social Management Plan (ESMP) implementation to the World Bank, typically every six months as per the loan agreement, and to local government environmental agencies such as the Department of Natural Resources and Environment (DONRE) of Binh Dinh Province every six months in accordance with current national environmental regulations. PPMU must immediately report to the World Bank and DONRE any incidents or accidents related to the project that have, or may have, significant negative impacts on the environment, communities, or workers. During the operational phase, the monitoring and reporting of environmental issues will fall under the responsibility of the Operations Management Unit.

11.5. Cost estimates

The costs for implementing mitigation measures are included in the contractor's construction costs and will be appropriately estimated during the detailed design phase. The costs for capacity building, independent environmental monitoring consulting (IEMC), and surrounding environmental quality monitoring are included in the project management costs of the Project Management Unit (PPMU).

The table below presents the estimated costs for the implementation of the Environmental and Social Management Plan (ESMP).

Item	Estimated Cost	Funding Source
Implementation of mitigation measures during construction	Included in construction costs	World Bank
Land compensation and resettlement	In the Resettlement Plan	Counterpart
Mine and UXO clearance *(completed in 2023)*	4.7 billion VND (equivalent to 200,000 USD)	Counterpart
Environmental quality monitoring	368,082,804 VND (equivalent to 15,910 USD)	Counterpart
Capacity building and training	300,000,000 VND (equivalent to 12,967 USD)	Counterpart
IEMC performance compliance monitoring	5,000,000,000 VND (equivalent to 216,123 USD)	Counterpart
Replacement reforestation (According to Document No. 48/BQL-TCKT dated February 5, 2025, issued by the Project Management Unit of	4,353,089,000 VND (equivalent to 188,445 USD)	Counterpart

Agriculture and Rural Development)		

12. Public consultation

PPMU Binh Dinh has engaged in community consultations with key stakeholders to ensure that their perspectives are incorporated into the project design and social and environmental performance, in alignment with the Environmental and Social Framework (ESF) and the relevant Environmental and Social Standards (ESS1, ESS5, ESS8, and ESS10).

The project owner has undertaken consultations through the publication of information on the website of the Ministry of Natural Resources and Environment (MONRE) and through written consultations with the People's Committees of Phu My District, Hoai Nhon Town, Quy Nhon City, and Tuy Phuoc District.

Additionally, the investor has submitted a request to the Environmental Impact Assessment (EIA) authority, the Ministry of Natural Resources and Environment, to conduct consultations via publication on the MONRE's website for a period of 15 days (from March 7, 2022, to March 23, 2022) as per regulations.

In addition to online consultations and written correspondence with local authorities, the project owner has held community consultation meetings with residents of My Thang Commune (February 2, 2021), My Duc (February 4, 2021), My An (April 2, 2021), My Tho (April 3, 2021) in Phu My District, Hoai Hai (April 1, 2021), and Hoai My (February 3, 2021) in Hoai Nhon Town, as well as with the town of Dieu Tri (March 26, 2021) in Tuy Phuoc District, Nhon Binh Ward (March 30, 2021), and Nhon Phu (March 31, 2021) in Quy Nhon City. Consultations were also conducted with the People's Committees of Phu My District (February 3, 2021), Hoai Nhon Town (February 3, 2021), Quy Nhon City (March 30, 2021), and Tuy Phuoc District (March 30, 2021), as well as with the Management Boards of Protected Forests in Phu My and Hoai Nhon during February, March, and April 2021.

The Environmental Impact Assessment report was presented directly at the consultation meeting to seek feedback.

The outcomes from the community consultations indicate that all participants support the project's implementation and recommend that the execution of the sub-project strictly adhere to the Environmental and Social Management Plan (ESMP) as an integral part of the Environmental and Social Impact Assessment (ESIA) report approved by the Bank.

13. Information disclosure

The draft Environmental and Social Impact Assessment (ESIA) report, Resettlement Plan (RP), Labor Management Procedure (LMP), Stakeholder Engagement Plan (SEP), and Environmental and Social Commitment Plan (ESCP) in Vietnamese were published at the offices of the People's Committees of the communes in the sub-project area, the Provincial People's Committee of Binh Dinh, and the Provincial Project Management Unit (PPMU) on March 26, 2021.

The final versions of the ESIA, RP, LMP, SEP, and ESCP in Vietnamese will be made available at accessible locations within the sub-project area for affected individuals, local socio-political organizations, and other interested parties prior to the sub-project appraisal.

Draft and final versions of the ESIA, RP, LMP, SEP, and ESCP in English will be published on the World Bank's public website by the sub-project appraisal.

14. Labor Management Procedure (LMP)

The Labor Management Procedure (LMP) is an independent document prepared for the sub-project to meet the requirements of ESS2. The purpose of the LMP is to support the planning and implementation of the sub-project by identifying key labor requirements and associated risks, as well as determining the necessary resources to address labor-related issues. The LMP provides general guidance concerning different types of labor and addresses issues and concerns related to occupational health and safety. The LMP in Vietnamese has been published at various locations within the sub-project area.

CHAPTER 1. SUBPROJECT INTRODUCTION AND DESCRIPTION

1.1. BACKGROUND AND OBJECTIVES OF THE SUBPROJECT

1.1.1. Background

As the transportation gateway for the Central Highlands provinces, Binh Dinh currently has only five national highways with a total length of approximately 300 kilometers and twelve provincial roads with a combined length exceeding 480 kilometers. The province's critical transportation infrastructure primarily runs along the coastline and is susceptible to natural disasters, including fluctuations in temperature, rainfall, storms, and flooding. It is estimated that approximately 30% of the transportation infrastructure in the province is impacted by annual storms and floods, resulting in average annual damages exceeding 1 trillion VND.

In recent years, Binh Dinh has acknowledged the vital role of transportation infrastructure in the socio-economic development of the province. Consequently, provincial authorities have concentrated resources on investing in the construction of key transportation projects aimed at connecting economic zones, industrial parks, and urban areas. However, due to insufficient funding, these projects have yet to be implemented in a synchronized manner, preventing them from fully realizing their investment potential. Therefore, Binh Dinh Province plans to propose investments in several projects, including a road connecting National Highway 19C to Quy Nhon Port and the coastal road section from My Thanh to Lai Giang. This initiative is part of the Integrated Adaptive Development Project for Binh Dinh, which will seek funding from the World Bank (WB) for implementation during the 2022-2027 period.

Accordingly, the People's Committee of Binh Dinh Province has issued Document No. 8123/UBND-KT dated December 7, 2020, proposing the "Integrated Adaptive Development Project - Binh Dinh Province," which has been approved by the Prime Minister in Document No. 1815/TTG-QHQT dated December 18, 2020. This approval serves as a foundation for the People's Committee to engage in further discussions with the World Bank and relevant central ministries to advance subsequent steps, ensuring a structured negotiation process and the signing of the Project Agreement. The project received formal investment policy approval from the Prime Minister in Decision No. 2265/QD-TTg dated December 31, 2021.

The project falls within the category of transportation initiatives and encompasses both the construction of new transport routes and the rehabilitation of existing ones.

The implementation of this project will inevitably entail adverse impacts on environmental factors and the health of construction workers. In compliance with environmental protection regulations, the Project Management Board of Agriculture and Rural Development of Binh Dinh Province has prepared an Environmental Impact Assessment (EIA) report for the project. This report has been submitted to the Ministry of Natural Resources and Environment for review and approval, facilitating the next phases of the project while strictly adhering to current environmental protection standards.

The scope of the Environmental Impact Assessment report includes (1) Component 1: Construction of adaptive infrastructure, which encompasses the construction and operation of two roads: (i) a road connecting National Highway 19C to Quy Nhon Port, measuring 6.35 kilometers in length, along with associated structures (Truong Uc Bridge, 19 meters wide and 675.45 meters long; Dinh River Bridge, 27 meters wide and 113.3 meters long; drainage works, including right-side ditches and 19 cross-drainage culverts, lighting systems, landscaping of sidewalks and medians, and traffic safety systems along the route); (ii) a coastal road section from My Thanh to Lai Giang, extending 38.14 kilometers, along with associated structures (widening the existing Ha

Ra Bridge from 6.5 meters to 18 meters in width, 315.92 meters long; Cong Luong Bridge, 12 meters wide and 111.3 meters long; drainage works, including 113 cross-drainage culverts, lighting systems, traffic safety systems, and landscaping of medians for sections with a base width of 20.5 meters); activities related to site clearing, ground preparation, and changes in land use; (2) Component 2: Technical assistance and project management, which includes (i) strengthening institutional and technical capacity among relevant departments and agencies; (ii) independent monitoring of environmental and social protection measures; (iii) independent financial auditing; (iv) enhancing strategic communication (including the design and creation of websites and other content for public outreach and social media communication) and citizen engagement activities; and (v) targeted training for personnel and stakeholders involved in project implementation, particularly concerning protective measures, procurement and contract management, monitoring, and evaluation.

1.1.2. Project Development Objectives

The overarching objective of the project is to enhance access to adaptive infrastructure services and improve the capacity for planning and managing disaster risk reduction development in Binh Dinh Province.

1.1.3. Subproject objectives

The Binh Dinh Sub-Project is one of the components of the Integrated Adaptive Development Project. The sub-project aims to achieve the following objectives:

- To construct and complete the transportation axis connecting the Phu Tai Industrial Park, Long My Industrial Park, the Becamex Binh Dinh Urban-Industrial-Service Complex, and the Long Van-Long My new urban area with the center of Quy Nhon City. This will help distribute traffic flow from Hung Vuong Street and National Highway 1 (through the Phu Tai, Long My Industrial Parks, and the Becamex Binh Dinh Urban-Industrial-Service Complex), thereby creating a complete transport network. It will also contribute to the socio-economic development, commercial production, tourism, and services of Quy Nhon City and Tuy Phuoc District.
- To enhance the coastal road from north to south within the province, connecting to the national coastal road system; this will improve transportation connectivity, eliminate the dependency on National Highway 1A, and ensure continuous transport during natural disasters such as floods and landslides, facilitating rescue and relief operations. Additionally, it will promote the development of the marine economy and integrate the infrastructure of key coastal economic zones, industrial parks, residential areas, urban centers, and coastal eco-tourism sites.
- To promote the development of an industrial and tourism economy, enhancing quality in a sustainable manner and adapting to climate change.
- To increase the effectiveness of public investment activities and accelerate socio-economic development.

The projected outcomes include: (1) completion of 6.35 km of urban roads and 38.14 km of coastal roads; (2) direct beneficiaries of the project estimated at 188,055 individuals; and (3) indirect beneficiaries of the project estimated at 234,671 individuals.

1.1.4. Sub-project components

The sub-project comprises two main components:

- **Component 1: Construction of Adaptive Infrastructure**, which includes two sub-projects:

- **Sub-Project 1: The Road from National Highway 19C to Quy Nhon Port**: This initiative involves strategic urban road investments aimed at enhancing connectivity. The proposed road projects have undergone preliminary assessments to ensure alignment with existing plans and are based on analyses of travel demand and traffic patterns. The implementation of these proposed road segments in the city is expected to improve residents' access to employment, education, and other essential services, while enhancing traffic safety—crucial for sustaining local economic development. Drainage systems will be designed using hydrological analyses that consider climate change scenarios, while road and bridge elevations will account for rising sea levels.

- **Sub-Project 2: Coastal Road Segment from My Thanh to Lai Giang**: This project focuses on investing in the national coastal road infrastructure, enhancing traffic connectivity and eliminating reliance on National Highway 1A. It aims to ensure uninterrupted transportation during natural disasters such as floods and landslides, facilitating rescue and relief efforts. The project will promote marine economic development and integrate the infrastructure of key coastal economic zones, industrial parks, residential areas, urban centers, and coastal eco-tourism sites. Proposed road projects have been assessed to ensure compliance with existing planning frameworks. Drainage infrastructure will also be designed based on hydrological analyses considering climate change scenarios, with road and bridge heights adjusted for rising sea levels.

- **Component 2: Technical Support and Project Implementation Assistance**: This component will finance technical assistance (TA) activities and support the overall implementation of the project.

  - **Sub-Component 2.1: Public Investment Management**: Public investment managed by local governments is a significant and increasing share of overall expenditures, particularly in Vietnam. Local authorities are tasked with crucial functions, including land management, urban services, transportation, water, and environmental management. However, they are often the most affected by extreme weather events related to climate change and are the least equipped to handle the increasing frequency and severity of these phenomena. Consequently, local governments must adapt and mitigate these risks, requiring adjustments to their Public Investment Management (PIM) systems to enhance sensitivity to climate change and improve the resilience of public investment projects and assets, contributing to a transition toward sustainable development. A new diagnostic tool for climate-informed public investment, developed by the World Bank, aims to assess the strengths and weaknesses of local public investment management and climate resilience. This diagnostic framework will address the need for in-depth climate-informed analysis, combining quantitative and qualitative assessments to help local governments identify gaps, efficiencies, and key risks in their public investment allocations and operations. It will evaluate the strengths and weaknesses of core PIM functions and their effectiveness. Heat maps, results, and recommendations will assist the four project provinces in prioritizing reforms to address weaknesses that yield the greatest potential efficiencies. This diagnostic tool will be utilized to assess the PIM systems of Quang Nam, Binh Dinh, Phu Yen, and Khanh Hoa provinces. Based on the assessment outcomes, TA will be provided to enhance institutional and technical capacities of relevant departments within the provinces to improve the effectiveness of their PIM systems in addressing climate response and economic challenges.
  - **Sub-Component 2.2: Project Implementation Support**: Technical assistance (TA) will be provided to all four provinces to support project implementation, including (i) preparing

technical designs for sub-projects; (ii) overseeing construction and contract management; (iii) conducting independent monitoring of environmental and social safeguards; and (iv) performing independent financial audits. This TA will also enhance: (v) strategic communication (including designing and creating websites and other content for public and social media outreach) and citizen engagement activities; and (vi) appropriate training for staff and other stakeholders involved in project implementation, particularly regarding safeguards, procurement, contract management, monitoring, and evaluation.

1.1.5. Outcomes of the subproject

Expected Outcomes of Component 1: It is anticipated that approximately 45.49 km of roads will be upgraded and newly constructed, comprising (i) the construction of a new 6.35 km road connecting National Highway 19C to Quy Nhon Port; and (ii) the upgrading of 38.14 km of coastal road (DT639) from My Thanh to Lai Giang Bridge. Upon completion of the sub-project, a cohesive network of coastal roads within Binh Dinh province will be established. An estimated 422,726 individuals will benefit from this sub-project, with 188,055 receiving direct benefits and 234,671 benefiting indirectly. Additionally, the completed road will enhance connectivity throughout the eastern region of Binh Dinh province, significantly stimulating development in coastal areas and facilitating transport between various industrial zones and Quy Nhon Port. This connectivity is expected to attract both domestic and foreign investors, thereby contributing to the socio-economic development of Binh Dinh province and the broader Central Highlands region.

Expected Outcomes of Component 2: The activities encompassed within this component will include, but are not limited to, consulting services for construction insurance, assessments of current conditions, and recommendations for public investment management. Furthermore, services will include evaluations of the tourism sector and proposals for its development. Additional consultancy activities may consist of (i) human resource training programs, technology transfer and implementation, and resource management; (ii) forecasting medium- to long-term tourism development scenarios; proposing integrated infrastructure solutions to support tourism growth; and recommending strategies to enhance service quality and promote smart tourism initiatives.

1.1.6. Associated Facilities

To arrange resettlement land fund for affected households of the Binh Dinh sub-project, Binh Dinh province will establish three (03) resettlement areas, including: (i) the Nhon Phu Resettlement Area in Quy Nhon City; (ii) the resettlement area located on the western land of the Nhon Binh social housing complex in Quy Nhon City; and (iii) the resettlement area north of Dieu Tri Bridge (referred to as the Dieu Tri Resettlement Area) in Tuy Phuoc District.

These three resettlement areas will be developed with comprehensive infrastructure, including the construction of transportation systems, stormwater drainage systems connected to the existing drainage network, household wastewater collection systems, electricity supply systems, domestic water supply systems, and communication systems.

The Environmental Impact Assessment (EIA) report for the construction of the three resettlement areas has been approved under Decision No. 3801/QD-UBND dated November 17, 2022, by the People's Committee of Binh Dinh Province. An environmental and social assessment for the three resettlement areas is detailed in Appendix 5 of this Environmental and Social Impact Assessment (ESIA).

1.2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

1.2.1. Legal documents and technical standards of the GoV

1.2.1.1. Law

At EIA approval:

- Law on Environmental Protection No. 72/2020/QH14: Enacted by the National Assembly of Vietnam on November 17, 2020, effective from January 1, 2022.
- Investment Law No. 61/2020/QH14: Passed by the National Assembly on June 17, 2020.
- Construction Law No. 50/2014/QH13: Enacted on June 18, 2014, and amended by Law No. 62/2020/QH14 on June 17, 2020.
- Land Law No. 31/2024/QH15: Approved by the 15th National Assembly on January 18, 2024, effective from August 1, 2024.
- Water Resources Law No. 28/2023/QH15: Approved by the 13th National Assembly on November 27, 2023.
- Labor Law No. 45/2019/QH14: Approved by the 14th National Assembly on January 1, 2021.
- Urban Planning Law No. 30/2009/QH12: Enacted on June 17, 2009, and amended by Law No. 35/2018/QH14 on November 20, 2018, modifying 37 related laws.
- Biodiversity Law No. 20/2008/QH12: Enacted on November 13, 2008.
- Fire Prevention and Fighting Law No. 27/2001/QH10: Enacted on June 29, 2001, with amendments under Law No. 40/2013/QH14 on November 22, 2013.
- Road Traffic Law No. 23/2008/QH12: Enacted on November 13, 2008.
- Road Law No. 35/2024/QH15: Approved on June 27, 2024 (effective January 1, 2025).
- Road Traffic Order and Safety Law: Approved on June 27, 2024 (effective January 1, 2025).
- Disaster Prevention Law No. 33/2013/QH13: Enacted by the National Assembly of Vietnam on June 19, 2013.
- Dyke Law No. 79/2006/QH11: Enacted on November 29, 2006.
- Law No. 60/2020/QH14: Approved on June 17, 2020, amending certain provisions of the Disaster Prevention and Dyke Laws.
- Cultural Heritage Law No. 28/2001/QH10: Enacted on June 29, 2001, and amended by Law No. 32/2009/QH13 on June 18, 2009.
- Forestry Law No. 16/2017/QH14: Approved by the 14th National Assembly on November 11, 2017.
- Inland Waterway Traffic Law No. 23/2004/QH11: Passed by the 11th National Assembly on June 15, 2004.
- Amendment Law No. 48/2014/QH13: Amending certain provisions of the Inland Waterway Traffic Law, approved on June 17, 2014.
- Complaints Law No. 02/2011/QH13: Enacted on November 11, 2011.
- Occupational Safety and Health Law No. 84/2015/QH13: Enacted on June 25, 2015.

- Law on Energy Saving and Efficiency No. 50/2010/QH12: Enacted on June 17, 2010.
- Marine and Island Resources and Environment Law No. 82/2015/QH13: Approved by the 13th National Assembly on June 29, 2018.
- Child Law No. 102/2016/QH13: Approved by the 13th National Assembly on April 5, 2016, with amendments under Law No. 28/2018/QH14 on June 15, 2018.
- Railway Law No. 06/2017/QH14: Enacted on June 16, 2017.

After EIA approval:

- Land Law No. 31/2024/QH15 adopted by the National Assembly of the Socialist Republic of Vietnam on January 18, 2024;
- Law No. 43/2024/QH15 amending and supplementing a number of articles of Land Law No. 31/2024/QH15, Housing Law No. 27/2023/QH15, Real Estate Business Law No. 29/2023/QH15, and Law on Credit Institutions No. 32/2024/QH15, dated June 29, 2024;
- Road Law No. 35/2024/QH15 promulgated on June 27, 2024;
- Law on Urban and Rural Planning No. 47/2024/QH15 dated November 26, 2024;
- Law on Water Resources No. 28/2023/QH15 adopted by the National Assembly on November 27, 2023.

1.2.1.2. Decrees

At EIA approval:

- Decree No. 08/2022/ND-CP: Issued on January 10, 2022, by the Government, detailing certain provisions of the Law on Environmental Protection, effective from January 10, 2022.
- Decree No. 80/2014/ND-CP: Issued on August 6, 2014, by the Government, regarding drainage and wastewater treatment, effective from January 1, 2015.
- Decree No. 201/2013/ND-CP: Issued on November 27, 2013, by the Government, detailing the implementation of certain provisions of the Water Resources Law.
- Decree No. 114/2021/ND-CP: Issued on December 16, 2021, by the Government, concerning the management and use of official development assistance (ODA) and preferential loans from foreign donors.
- Decree No. 43/2014/ND-CP: Issued on May 15, 2014, by the Government, detailing the implementation of certain provisions of the Land Law 2013.
- Decree No. 44/2014/ND-CP: Issued on May 15, 2014, by the Government, regarding land prices.
- Decree No. 47/2014/ND-CP: Issued on May 15, 2014, by the Government, concerning compensation, support, and resettlement when the State reclaims land.
- Decree No. 15/2021/ND-CP: Issued on March 3, 2021, by the Government, detailing certain aspects of project investment management.
- Decree No. 156/2018/ND-CP: Issued on November 16, 2018, by the Government, detailing the implementation of certain provisions of the Forestry Law, effective from January 1, 2019.
- Decree No. 35/2015/ND-CP: Issued on April 13, 2015, by the Government, concerning the

management and use of rice land.

- Decree No. 35/2023/ND-CP: Issued on June 20, 2023, by the Government, amending and supplementing certain provisions of decrees related to state management in the construction sector.
- Decree No. 06/2021/ND-CP: Issued on January 26, 2021, by the Government, detailing certain provisions regarding quality management, construction execution, and maintenance of construction works.
- Decree No. 02/2023/ND-CP: Issued on February 1, 2023, by the Government, detailing the implementation of certain provisions of the Water Resources Law.
- Decree No. 102/2024/ND-CP: Issued by the Government, detailing the implementation of certain provisions of the Land Law.
- Decree No. 45/2022/ND-CP: Issued on July 7, 2022, by the Government, concerning administrative penalties in the field of environmental protection.
- Decree No. 53/2020/ND-CP: Issued on May 5, 2020, by the Government, concerning environmental protection fees for wastewater.
- Decree No. 83/2020/ND-CP: Issued on July 15, 2020, by the Government, amending and supplementing certain provisions of Decree No. 156/2018/ND-CP.
- Decree No. 71/2018/ND-CP: Issued on July 1, 2018, by the Government, detailing certain provisions of the Law on Management and Use of Weapons, Explosives, and Supporting Tools.
- Decree No. 20/2023/ND-CP: Issued on May 4, 2023, by the Government, amending and supplementing certain provisions of Decree No. 114/2021/ND-CP regarding ODA and preferential loans.
- Decree No. 112/2024/ND-CP: Issued on September 11, 2024, by the Government, detailing provisions regarding rice cultivation land.

After EIA approval:

- Decree No. 05/2025/ND-CP, issued on January 6, 2025, by the Government, amending and supplementing certain provisions of Decree No. 08/2022/ND-CP, issued on January 10, 2022, by the Government, detailing certain provisions of the Law on Environmental Protection.
- Decree No. 54/2024/ND-CP, issued on February 1, 2023, by the Government, regulating the practice of groundwater drilling, declaration, registration, licensing, water resource services, and fees for the right to exploit water resources.
- Decree No. 22/2023/ND-CP, issued on May 12, 2023, by the Government, amending decrees related to business activities in the field of natural resources and environment.
- Decree No. 102/2024/ND-CP, issued by the Government, detailing the implementation of certain provisions of the Land Law.
- Decree No. 08/2022/ND-CP, issued on January 10, 2022, by the Government, detailing certain provisions of the Law on Environmental Protection.
- Decree No. 35/2023/ND-CP, issued on June 20, 2023, by the Government, amending and supplementing certain provisions of decrees related to state management in the construction sector.

- Decree No. 88/2024/ND-CP, issued on July 15, 2024, by the Government, regulating compensation, support, and resettlement when the State reclaims land.

1.2.1.3. Circulars and Decisions

At EIA approval:

- Circular No. 02/2022/TT-BTNMT: Issued on January 10, 2022, by the Ministry of Natural Resources and Environment (MONRE), detailing the implementation of certain provisions of the Law on Environmental Protection, effective from January 10, 2022.
- Circular No. 37/2014/TT-BTNMT: Issued on June 30, 2014, by MONRE, detailing provisions on compensation, support, and resettlement when the State reclaims land.
- Circular No. 30/2014/TT-BTNMT: Issued by MONRE, regulating land allocation, leasing, change of land use purpose, and land recovery.
- Circular No. 36/2014/TT-BTNMT: Issued on June 30, 2014, by MONRE, detailing methods for land valuation, development and adjustment of land price tables, specific land valuation, and land price determination consultancy.
- Circular No. 19/2016/TT-BYT: Issued on June 30, 2016, by the Ministry of Health, providing guidance on occupational health and safety management, effective from August 15, 2016.
- Circular No. 146/2007/TT-BQP: Issued on September 11, 2007, by the Ministry of National Defense, concerning the management and clearance of unexploded ordnance.
- Circular No. 13/2019/TT-BNNPTNT: Issued on October 25, 2019, by the Ministry of Agriculture and Rural Development, regarding reforestation when changing the use of forest land for other purposes.
- Circular No. 32/2019/TT-BCT: Issued on December 30, 2019, by the Ministry of Industry and Trade, regulating the national technical standards on safety in the production, testing, acceptance, storage, transportation, use, and disposal of industrial explosives, effective from July 1, 2020.
- Decision No. 4857/QD-UBND: Issued on December 27, 2022, by the People's Committee of Binh Dinh Province, approving investment rates for reforestation, silviculture promotion, and protection of protective and special-use forests in Binh Dinh Province, effective from December 27, 2022.

After EIA approval:

- Circular No. 25/2022/TT-BNNPTNT: Issued on December 30, 2022, by the Ministry of Agriculture and Rural Development, regarding reforestation when changing the use of forest land for other purposes, effective from February 15, 2023.
- Circular No. 07/2025/TT-BTNMT: Issued on February 28, 2025, by the Ministry of Natural Resources and Environment, amending and supplementing certain provisions of Circular No. 02/2022/TT-BTNMT dated January 10, 2022, by the Ministry of Natural Resources and Environment, detailing the implementation of certain provisions of the Law on Environmental Protection.
- Circular No. 35/2024/TT-BTNMT: Issued on December 19, 2024, by the Ministry of Natural Resources and Environment, promulgating technical procedures for the collection, transportation, and treatment of household solid waste.

1.2.1.4. Applicable technical standards and regulations

- QCVN 01-1:2018/BYT: National technical regulation on the quality of drinking water.
- QCVN 03:2023/BTNMT: National technical regulation on soil quality.
- QCVN 05:2023/BTNMT: National technical regulation on air quality.
- QCVN 08:2023/BTNMT: National technical regulation on surface water quality.
- QCVN 09:2023/BTNMT: National technical regulation on groundwater quality.
- QCVN 10:2023/BTNMT: National technical regulation on seawater quality.
- QCVN 43:2017/BTNMT: National technical regulation on sediment quality.
- QCVN 14:2008/BTNMT: National technical regulation on domestic wastewater.
- QCVN 15:2008/BTNMT: National technical regulation on pesticide residue in soil.
- QCVN 26:2010/BTNMT: National technical regulation on noise.
- QCVN 27:2010/BTNMT: National technical regulation on vibration.
- TCVN 6705:2009: Common solid waste - Classification.
- QCVN 07:2009/BTNMT: National technical regulation on hazardous waste thresholds.
- QCVN 07:2016/BXD: National technical regulation on technical infrastructure works.
- QCXD VN 01:2021/BXD: National technical regulation on construction planning.
- QCVN 18:2014/BXD: National technical regulation on construction safety.
- QCVN 01:2019/BCT: National technical regulation on safety in the production, testing, acceptance, storage, transportation, use, and disposal of industrial explosives and the storage of precursor materials.

1.2.1.5. Subproject-related legal documents

- Decision No. 2265/QD-TTg dated December 31, 2021, of the Prime Minister on the Investment Policy of the Project "Adaptive Integrated Development - Binh Dinh Province," financed by WB loans.
- Document No. 3500/BTNMT-BDKH dated June 25, 2021, regarding comments on the investment policy of the project "Adaptive Integrated Development - Binh Dinh Province," financed by World Bank loans.
- Decision No. 2540/QD-BTNMT of the Ministry of Natural Resources and Environment dated October 4, 2022, on the approval of the environmental impact assessment report for the Project "Adaptive Integrated Development - Binh Dinh Province."
- Document No. 1815/TTg-QHQT dated December 18, 2020, of the Prime Minister on the approval of the project proposal "Adaptive Integrated Development - Binh Dinh Province," financed by WB loans.
- Memorandum of Understanding between the World Bank and participating provinces in the Project: First Memorandum in April 2020, Second Memorandum in December 2020.
- Resolution No. 31/2020/NQ-HDND dated December 6, 2020, of the People's Council of Binh Dinh Province on the loan policy from the World Bank (WB) to implement the Project: Adaptive Integrated Development - Binh Dinh Province.
- Resolution No. 06/2021/NQ-HDND dated March 19, 2021, of the People's Council of

Binh Dinh Province on the approval of the Pre-Feasibility Study Report for the Project: Adaptive Integrated Development - Binh Dinh Province.

- Document No. 2221/SNN-KL dated August 25, 2021, of the Department of Agriculture and Rural Development of Binh Dinh Province sent to the People's Committee of Binh Dinh Province, regarding the conversion of forest land use for the construction of the coastal road (DT.639) section from My Thanh to Lai Giang under the Adaptive Integrated Development Project of the Agriculture and Rural Development Project Management Unit.
- Document No. 2247/SNN-KL dated August 26, 2021, of the Department of Agriculture and Rural Development of Binh Dinh Province sent to the Departments of Natural Resources and Environment, Construction, Transportation, Planning and Investment, Phu My District People's Committee, Hoai Nhon Town People's Committee, regarding the conversion of forest land use for the construction of the coastal road (DT.639) section from My Thanh to Lai Giang under the Adaptive Integrated Development Project of Binh Dinh Province.
- Document No. 2328/SNN-KL dated September 6, 2021, of the Department of Agriculture and Rural Development of Binh Dinh Province sent to the Agriculture and Rural Development Project Management Unit of Binh Dinh Province, regarding comments on the results of the forest status survey for the construction of the coastal road (DT.639) section from My Thanh to Lai Giang.
- Forest Status Inspection Report for the construction of the coastal road (DT.639) section from My Thanh to Lai Giang under the Adaptive Integrated Development Project of Binh Dinh Province.
- Proposal No. 270/TTr-BQL dated October 11, 2021, of the Agriculture and Rural Development Project Management Unit regarding the policy of converting forest land use for other purposes under the Adaptive Integrated Development Project of Binh Dinh Province.
- Document No. 2765/SNN-KL dated October 18, 2021, of the Department of Agriculture and Rural Development on the conversion of forest land use for the construction of the coastal road from My Thanh to Lai Giang under the Adaptive Integrated Development Project of Binh Dinh Province.
- Resolution No. 75/NQ-HDND dated December 11, 2021, on the Policy of Forest Land Use Conversion for Other Purposes, issued by the People's Council of Binh Dinh Province, Session XIII, 4th Meeting.
- Resolution No. 34/NQ-HDND dated July 14, 2023, of the Provincial People’s Council on the policy of converting forest land use for other purposes.
- Decision No. 3056/QD-UBND dated August 17, 2023, of the People’s Committee of Binh Dinh Province on the conversion of forest land use for other purposes to implement the Adaptive Integrated Development Project of the Agriculture and Rural Development Project Management Unit.
- Decision No. 1008/QD-UBND dated March 28, 2024, of the People’s Committee of Binh Dinh Province on the conversion of forest land use for other purposes to use as a spoil disposal site for the coastal road (DT.639) section from My Thanh to Lai Giang under the Adaptive Integrated Development Project of the Agriculture and Rural Development Project Management Unit.
- Document No. 229/UBND-KT dated January 12, 2022, of the People's Committee of Binh

Dinh Province sent to the Agriculture and Rural Development Project Management Unit of Binh Dinh Province, regarding the implementation of reforestation when converting forest land use for other purposes to implement projects of the Agriculture and Rural Development Project Management Unit.

- Document No. 3157/BGTVT-KCHT dated March 31, 2022, of the Ministry of Transport on the construction of a railway crossing at km3+665.05, Dieu Tri – Quy Nhon railway line.

1.2.2. International Environmental and Social Agreements

Vietnam is a signatory to a number of international agreements and conventions relating to environmental management, OHS, community rights and ethnic minorities. The international conventions are not always translated into national legislation. Some of the key agreements are listed in the following Table.

Table 0-1 International Agreements

Agreements/Conventions	Status	Objectives/Relevance
A. ENVIRONMENTAL		
United Nations Convention on Biological Diversity, 1992	Signed in May 1993	Promotes 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	Sets international guidelines on restrictions of GHG emissions in order to prevent climate change
Convention on the International Trade of Endangered Species of Wild Fauna and Flora (CITES), 1973	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 protection to more than 33,000 species of animals and plants.
Stockholm Convention on Persistent Organic Pollutants, 2001	Signed in July 2002	UNEP called for global action to be taken on POPs which is defined as chemical substances that persists in the environment, bio-accumulation in the food chain and cause adverse impact on human health.
Intended Nationally Determined Contribution (INDC) of Vietnam to the UNFCCC	Signed in June 1992	Identifying the GHG reduction pathway in the 2021-2030 period.

Agreements/Conventions	Status	Objectives/Relevance
B. SOCIAL AND CULTURAL		
UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972 (World Heritage Convention)	Joined in 1987	Promotes 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.

Vietnam is a signatory to certain ILO Conventions, the details for which are provided in Table 1-2. 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 0-2. Vietnam Ratification to ILO Conventions

Convention	Date	Status	Note
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	Not in force	Effective as of 05 July 2020
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	
C155 – Occupational Health and Safety Convention, 1982	03 Oct 1994	In force	

1.2.3. World Bank ESF, Environmental and Social Standards (ESSs), and WBG EHS Guidelines

1.2.3.1. Introduction

The World Bank Environmental and Social Framework (ESF) sets out the World Bank's commitment to sustainable development, through a Bank Policy and a set of Environmental and Social Standards that are designed to support Borrowers' projects, with the aim of ending extreme poverty and promoting shared prosperity.

The Environmental and Social Standards set out the requirements for Borrowers relating to the identification and assessment of environmental and social risks and impacts associated with projects supported by the Bank through Investment Project Financing. The Bank believes that the application of these standards, by focusing on the identification and management of environmental and social risks, will support Borrowers in their goal to reduce poverty and increase prosperity in

a sustainable manner for the benefit of the environment and their citizens. The standards will: (a) support Borrowers in achieving good international practice relating to environmental and social sustainability; (b) assist Borrowers in fulfilling their national and international environmental and social obligations; (c) enhance nondiscrimination, transparency, participation, accountability and governance; and (d) enhance the sustainable development outcomes of projects through ongoing stakeholder engagement.

1.2.3.2. ESSs relevant to the subproject

- ***ESS1- Assessment and Management of Environmental and Social Risks and Impacts***

The objectives of this ESS are:

- To identify, evaluate and manage the environment and social risks and impacts of the project in a manner consistent with the ESSs
- To adopt a mitigation hierarchy approach to:
  (a) Anticipate and avoid risks and impacts;
  (b) Where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels;
  (c) Once risks and impacts have been minimized or reduced, mitigate; and
  (d) Where significant residual impacts remain, compensate for or offset them, where technically and financially feasible.
- To adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities resulting from the project.
- To utilize national environmental and social institutions, systems, laws, regulations and procedures in the assessment, development and implementation of projects, whenever appropriate.
- To promote improved environmental and social performance, in ways which recognize and enhance Borrower capacity.

The subproject implementation is anticipated to potentially cause environmental and social risks and impacts associated with construction and operation activities of the subproject, so ESS1 is relevant.

- ***ESS2 Labor and Working Conditions***

The objectives of this ESS are:

- To promote safety and health at work.
- To promote the fair treatment, nondiscrimination and equal opportunity of project workers.
- To protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with this ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate.
- To prevent the use of all forms of forced labor and child labor.
- To support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law.
- To provide project workers with accessible means to raise workplace concerns.

The subproject implementation shall require direct workers (such as PPMU staff and consultants hired by the PPMU), contracted workers (e.g. skilled and non-skilled construction workers engaged by contractors) and primary supply workers (e.g. workers engaged for essential construction materials to be purchased for the subproject, as defined in ESS2). Use of workers will potentially arise social issues relating to labour force as mentioned in the objectives of ESS2. Therefore, ESS2 is relevant.

- ***ESS3 Resource Efficiency and Pollution Prevention and Management***

The objectives of this ESS are:

- To promote the sustainable use of resources, including energy, water and raw materials.
- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.
- To avoid or minimize project-related emissions of short and long-lived climate pollutants
- To avoid or minimize generation of hazardous and non-hazardous waste
- To minimize and manage the risks and impacts associated with pesticide use

The subproject implementation will require use of water, energy and raw materials for construction activities. In addition, construction activities will generate solid and liquid wastes that potentially cause negative impacts on the environmental and human health. Thus, ESS3 is relevant.

- ***ESS4 Community Health and Safety***

The objectives of this ESS are:

- To anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project life cycle from both routine and nonroutine circumstances.
- To promote quality and safety, and considerations relating to climate change, in the design and construction of infrastructure, including dams.
- To avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials.
- To have in place effective measures to address emergency events.
- To ensure that the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.

The subproject implementation has been anticipated to cause adverse risks and impacts on community health and safety. The subproject activities will likely cause (i) air, soil and water pollution due to wastes, (ii) traffic safety risk, (iii) landslide and erosion, (iv) health hazards those relating to poor sanitation and living conditions, sexual transmission and vector-borne infections such as dengue and malaria, and potential transmission of communicable diseases of HIV/AIDS and COVID-19 due to labor mobility. Therefore, ESS4 is relevant.

- ***ESS5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement***

The objectives of this ESS are:

- To avoid involuntary resettlement or, when unavoidable, minimize involuntary resettlement by exploring project design alternatives.
- To avoid forced eviction.
- To mitigate unavoidable adverse social and economic impacts from land acquisition or

restrictions on land use by: (a) providing timely compensation for loss of assets at replacement cost and (b) assisting displaced persons in their efforts to improve, or at least restore, their livelihoods and living standards, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher

- To improve living conditions of poor or vulnerable persons who are physically displaced, through provision of adequate housing, access to services and facilities, and security of tenure.
- To conceive and execute resettlement activities as sustainable development programs, providing sufficient investment resources to enable displaced persons to benefit directly from the project, as the nature of the project may warrant.
- To ensure that resettlement activities are planned and implemented with appropriate disclosure of information, meaningful consultation, and the informed participation of those affected.

The subproject implementation will cause land acquisition and resettlement, so ESS5 is relevant.

- ***ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources***

The objectives of this ESS are:

- To protect and conserve biodiversity and habitats.
- To apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity.
- To promote the sustainable management of living natural resources.
- To support livelihoods of local communities, including Indigenous Peoples, and inclusive economic development, through the adoption of practices that integrate conservation needs and development priorities.

The subproject implementation will cause forest land acquisition of about 4.5 hectares including 1.4 hectares of protective forest land and 3.1 hectares of productive forest land along both sides of the existing coastal road. Besides, construction activities have been anticipated to potentially cause detrimental effects on aquatic ecosystem due to waste generation. Thus, ESS6 is relevant.

- ***ESS7 Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities***
    - This standard is not relevant. It has been confirmed that the subproject will be implemented in the urban and peri-urban areas where there are no ethnic minority people present who have a collective attachment to the subproject area.
- ***ESS8 Cultural Heritage***

The objectives of this ESS are:

- To protect cultural heritage from the adverse impacts of project activities and support its preservation
- To address cultural heritage as an integral aspect of sustainable development
- To promote meaningful consultation with stakeholders regarding cultural heritage
- To promote the equitable sharing of benefits from the use of cultural heritage.

The subproject implementation has been anticipated to mainly cause relocation of some burial grounds. In addition, construction activities may cause adverse impact such as dust and disruption to access to a Built Heritage of Landing site in Hoai Nhon district located near the roadside of the provincial coastal road (Road#1), and some small worhip houses owned by local people. In

addition, construction activities may encounter chance finds. Thus, ESS8 is relevant.

- ***ESS9 Financial Intermediaries***

This standard is not relevant. The subproject will not channel funds through financial intermediaries, Binh Dinh PPMU will manage the fund.

- ***ESS10 Stakeholder Engagement and Information Disclosure***

The objectives of this ESS are:

- To establish a systematic approach to stakeholder engagement that will help Borrowers identify stakeholders and build and maintain a constructive relationship with them, in particular project-affected parties.
- To assess the level of stakeholder interest and support for the project and to enable stakeholders' views to be taken into account in project design and environmental and social performance.
- To promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle on issues that could potentially affect them
- To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format.
- To provide project-affected parties with accessible and inclusive means to raise issues and grievances, and allow Borrowers to respond to and manage such grievances.

The subproject implementation requires engagement of many parties, including relevant provincial departments such as DOT, DOF, DPI, DONRE, DARD, and local authorities and communities who will be benefitted and/or affected by the subproject implementation, where the subproject construction activities take place. The subproject has recognized the the importance of open and transparent engagement between the Binh Dinh PPMU and subproject 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. Therefore, ESS10 is relevant.

1.2.3.3. WBG EHS Guidelines

- The World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) are technical reference documents with general and industry-specific examples of good international industry practice (GIIP). The General EHS Guideline contains information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. It should be used together with the relevant industry sector guideline(s).
- When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternative performance level is protective of human health and the environment.

1.2.4. Gap analysis between the GoV and the WB's ESF

The application of environmental assessment policies in Vietnam, as well as various efforts directed to policy harmonization between the GoV and donors, has gradually narrowed the gap between the two systems. However, significant differences remain between the GoV's environmental policies and the ESF of the World Bank. These differences and proposed gap filling measures are described in the table below:

Table 0-3. Summary of the World Bank (WB) ESA and National EIA Processes and gap filling measures

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam (Decree 40/2019, Circular 25/2019/TT-BTNMT	Vietnam (Decree 08/2022, Circular 02/2022 effective 2022)	Gap Filling Measures
Objectives	Starting October 2018, the WB applies the Environment and Social Framework (ESF) describing the 10 Environmental and Social Standards (ESSs) which were designed to avoid, minimize, reduce or mitigate the adverse E&S risks and impacts of projects. The WB will assist Borrowers in their application of the ESSs to projects with WB support.	Investment projects are required to submit EIA or EPP for approval	Investment projects are required to submit an Environmental Impact Assessment (EIA) report or an Environmental Permit (EP) for approval.	To be eligible for WB financing, 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. In determining the appropriate risk classification, the WB will take into account relevant issues, such as the type, 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. Other areas of risk may also be relevant to the delivery of E&S mitigation measures and outcomes, depending on the specific project and the context in which it is being developed. These could include legal and institutional considerations; the nature of the mitigation and technology being proposed; governance structures and legislation;	Categories are indicated in annexes I and II of Decree 40/2019. Prescriptive, fixed regulated in Annex I and II - List of projects subject to requirements of SEA and EIA report submittal and approval. Normally the project owners self-screen the project based on the categorization indicated in Decree 40/2019 and consult the Provincial Department of Natural Resources and Environment (DONRE) or Vietnam Environment Administration (VEA) for the appropriate classification and EA report requirement of the	The categories designated in Appendices III, IV, and V of Decree No. 08/2022/ND-CP specify projects that must conduct an EIA and obtain an EP. According to Clause 1, Article 30 of Law No. 72/2020/QH14, the subjects include: Group I investment projects (Clause 3, Article 28)—listed in Appendix III—and Group II investment projects (points c, d, đ, e of Clause 4, Article 28)—listed in Appendix IV of Decree No. 08/2022/ND-CP—are required to conduct an EIA and obtain an EP. In contrast, Group III projects (Clause 5, Article 28)—listed in	Since the Project involves multiple subprojects which are classified as "substantial risk", ESA of the subproject is in accordance with national law and any requirement of the ESSs that the Bank deems relevant to the subproject.

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam (Decree 40/2019, Circular 25/2019/TT-BTNMT	Vietnam (Decree 08/2022, Circular 02/2022 effective 2022)	Gap Filling Measures
	and considerations relating to stability, conflict or security. The WB will disclose the project's classification and the basis for that classification on the WB's website and in project documents.	project, such as: Project falls into Annex I: SEA is required; Project falls into Annex II: EIA or EPP is required.	Appendix V of Decree No. 08/2022/ND-CP—are only required to obtain an EP.	
ESA instrument	Depending on the project risks and impact, a range of instruments and procedures required to meet the ESSs' objectives, these include: ESIA; ESMF; ESMPs, sectoral & regional ESIA; SESA; hazard or 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 the Stakeholder Engagement Plan (SEP) to WB before appraisal.	The type of ESA instruments such as SEA, EIA or EPP is decided based on Annex I and II of Decree 40/2019.	The subjects required to conduct EIA, EP, and Environmental Registration are regulated under Articles 28 and 29 of Law No. 72/2020/QH14 and enumerated in Appendices III, IV, and V of Decree No. 08/2022.	Preparation of an ESIA, RPF, RAPs, ESCP, SEP, and LMP for the Project will be required to meet the ESSs 1, 2, 3, 4, 5, 6, 8, and 10 while an EIA will be prepared to meet GOV requirements.
Scope and clearance	The WB will require the Borrower to carry out appropriate E&S assessment (ESA) of subprojects, and prepare and implement such subprojects, as follows: (a) high risk subprojects, in accordance with the ESSs; and (b) substantial risk, moderate risk and low risk subprojects, in accordance with national law and any requirement of the ESSs that the Bank deems relevant to such subprojects.	TORs for EIA are not required. Normally after consultation with the local DONRE or VEA for the EIA category, the project owner will proceed with EIA report preparation.	There is no requirement for a Terms of Reference (TOR) for the EIA. The EIA report must be prepared in accordance with the structure prescribed in Decree No. 08/2022/ND-CP.	The ESIA, RPF, ESCP, SEP and LMP for the Project will be submitted to the WB for clearance. To comply with the GOV's

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam (Decree 40/2019, Circular 25/2019/TT-BTNMT	Vietnam (Decree 08/2022, Circular 02/2022 effective 2022)	Gap Filling Measures
	If the WB is not satisfied that adequate capacity exists on the part of the Borrower, all high risk and, as appropriate, substantial risk subprojects will be subject to prior review and approval by the WB until it is established that adequate capacity exists. If the risk rating of a subproject increases to a higher risk rating, the WB will require the Borrower to apply relevant requirements of the ESSs in a manner agreed with the WB. The measures and actions agreed will be included in the ESCP, and will be monitored by the WB. The WB helps Borrower draft the TOR for ESA report and identify the scope of ESA, procedures, schedule and outline of the ESA report. For high risk project, the ESS1-10 applied. For substantial, moderate, and low risk, the national system can be applied with some specific ESSs as deem necessary by WB. WB prior clearance is required if the implementing agency do not have adequate capacity to ensure effective implementation of the required mitigation measures.			requirements, the EIA or the project will be submitted to the GOV for approval.
Public consultation, stakeholder engagement, and grievance redress mechanism	During the ESA process, the Borrower consults project affected groups and local NGOs 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,	The project owner shall consult with the People's Committee of communes, wards and towns (hereinafter referred to as communes) where the project is carried out, with organizations or community under the direct	The stakeholders for consultation are specified in Article 26 of Decree No. 08/2022, including the local community, individuals directly affected by the project (waste, landslides, subsidence),	Conduct ESIA and RPF consultation as per GOV regulation taken into account the WB requirements regarding the ESIA, RPF, ESCP, SEP,

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam (Decree 40/2019, Circular 25/2019/TT-BTNMT	Vietnam (Decree 08/2022, Circular 02/2022 effective 2022)	Gap Filling Measures
(GRM)	and establishment and operations of a GRM are required to ensure adequate consultation and transparency. ESS2 also require the preparation of the labor management procedures (LMP) and an establishment and operation of a GRM for project workers. If ethnic minority is presence and adversely impacts, free, prior, and meaningful consultation (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.	impact of the project; research and receive objective opinions and reasonable requests of relevant entities in order to minimize the negative effects of the project on the natural environment, biodiversity and community health. The People's Committee of the commune where the project is carried out and the organizations under direct impact of the project shall be consulted. The project owner shall send EIA reports to the People's Committee of the commune where the project is carried out and organizations under the direct impact of the project together with the written requests for opinions. Within 15 working days, from the date on which the EIA reports are received, the People's Committee of the commune and organizations under the direct impact of the project shall send their responses if they do not approve the project. The consultation with the	and relevant agencies and organizations such as the local People's Committee, the Fatherland Front, the irrigation management authority, environmental management authorities, and police and national security (if related to security factors). The forms of consultation stipulated in Article 26 of Decree No. 08/2022 include: (a) Posting information on the electronic portal for public opinion for 15 days; (b) Organizing community meetings for feedback, coordinated by the project owner and the local People's Committee; (c) Written consultation with a response period of 15 days, or deemed agreed upon if no feedback is received. According to point e, Clause 4, Article 26 of Decree No. 08/2022/ND-CP, for road projects, the project owner shall conduct consultations by posting on the electronic portal	and LMP during consultation. The results from consultation will be incorporated into the ESIA, RPF, SEP, LMP, and ESCP.

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam (Decree 40/2019, Circular 25/2019/TT-BTNMT	Vietnam (Decree 08/2022, Circular 02/2022 effective 2022)	Gap Filling Measures
		community under the direct impact of the project shall be carried out in the form of community meeting co-chaired by project owner and the People's Committee of the commune where the project is carried out together with the participation of representatives of Vietnamese Fatherland Front of communes, socio-political organizations, socio-professional organizations, neighborhoods, villages convened by the People's Committee of the commune. All opinions of delegates attending the meeting must be sufficiently and honestly stated in the meeting minutes.	of the Ministry of Natural Resources and Environment and through written consultations with the district/town/city People's Committee.	
Disclosure	The WB will disclose documentation relating to the E&S risks and impacts of high risks and substantial risks projects prior to project appraisal. Once the WB officially receives the report, it will make the ESA report in English available to the public through the World Bank's external website.	After an EIA report is approved, the project owner shall formulate, approve and publicly display its EMP at the office of the commune-level People's Committee of the locality in which consultation of the community is made for people's information, examination and oversight. (Article 16, Decree	In accordance with Vietnamese regulations, the disclosure of the Environmental Impact Assessment (EIA) report is prescribed in Articles 37 and 114 of Law No. 72/2020/QH14.	Follow GoV requirements and WB requirements. The ESIA, RPF, RPs, ESCP, SEP, and LMP will be publicly disclosed as per requirements on the relevant ESSs.

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam (Decree 40/2019, Circular 25/2019/TT-BTNMT	Vietnam (Decree 08/2022, Circular 02/2022 effective 2022)	Gap Filling Measures
		40/2019).		
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. Experts/consulting firm will be selected through bid process under strict observation of the WB.	Not regulated in Vietnam policies. Project owner shall make, or hire an institution meeting the conditions provided in Clause 1, Article 13 (Decree 18/2015) to prepare an EIA report. Project owner or consulting service provider must fully meet the following conditions: (i) Having staff members in charge of EIA must obtain at least Bachelor's degrees and Certificate in EIA consultancy; (ii) Having specialist staff members related to the project obtaining at least Bachelor's degrees; (iii) Having physical-technical foundations and special-use devices for measuring, taking, processing, and analyzing environmental samples, which meet technical requirements. In case of unavailability of qualified special-use devices, having a contract to hire a capable institution.	Under Vietnamese law, the implementation of the Environmental Impact Assessment (EIA) is governed as follows: Law No. 72/2020/QH14, Article 31, requires EIA consulting organizations to meet competency standards, but does not mandate independent experts.	Risk of the proposed Project substantial and dam safety will not be involved. The Project will not require any independent experts.
Clearance	Review responsibility is internal to the WB. If the	The Ministry of Natural	The authority for EIA appraisal	GoV's approval of

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam (Decree 40/2019, Circular 25/2019/TT-BTNMT	Vietnam (Decree 08/2022, Circular 02/2022 effective 2022)	Gap Filling Measures
procedure	ESA report is satisfactory, the WB will issue its clearance memo. If the ESA report needs to be improved the WB will issue a conditional clearance with the understanding that the Borrower will revise the ESA to satisfy the WB for the final clearance.	Resources and Environment shall assess and approve the EIA reports on projects prescribed in Appendix III of this Decree, except for projects subject to national defense and security secrets. Ministries, ministerial agencies shall assess and approve the EIA reports on projects under their competence in approval for investment, except for projects in Appendix III of this Decree; The People's Committee of the province shall assess and approve EIA reports on projects in the province, except for projects prescribed above. The appraisal will take place no later than working 45 days at MONRE level and 30 working days at DONRE level and 5 working days at district level for after receipt of a full eligible EIA or EPP.	is outlined in Article 35 of Law No. 72/2020/QH14 as follows: The Ministry of Natural Resources and Environment conducts appraisals for Group I investment projects under Clause 3 of Article 28, and Group II investment projects under points c, d, đ, and e of Clause 4 of Article 28, which fall under the decision-making authority of the National Assembly, the Prime Minister, or projects located in areas spanning two or more provincial administrative units. The Ministry of Defense and the Ministry of Public Security appraise projects related to state secrets concerning national defense and security as per Clause 2, Article 35. Provincial People's Committees appraise other projects within their jurisdiction per Clause 3, Article 35, except for those under the jurisdiction of the aforementioned agencies. The appraisal period shall not	the EIA and RPF will be required. WB's review and clearance of the ESIA, RPF, RPs, ESCP, SEP, and LMP will be required prior to project appraisal

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam (Decree 40/2019, Circular 25/2019/TT-BTNMT	Vietnam (Decree 08/2022, Circular 02/2022 effective 2022)	Gap Filling Measures
			exceed 45 days for Group I projects and 30 days for Group II projects. The authority to issue environmental permits under Article 41 of Law No. 72/2020/QH14: The Ministry of Natural Resources and Environment issues permits for projects that have approved EIA reports, located in two provinces, or involve hazardous waste treatment (Clause 1); the Ministry of Defense and the Ministry of Public Security issue permits for projects related to national defense and security secrets (Clause 2); provincial People's Committees issue permits for Group II and III projects as per Article 39 (Clause 3); and district People's Committees issue permits for all other projects (Clause 4). The permit issuance period shall not exceed 45 days (Ministry level) and 30 days (provincial and district level).	

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam (Decree 40/2019, Circular 25/2019/TT-BTNMT	Vietnam (Decree 08/2022, Circular 02/2022 effective 2022)	Gap Filling Measures
Number and language of ESIA required for appraisal	Number of copies not specified. Language requirement: English No requirement for feasibility survey: the WB does not advance discussions on any investments without the preparation by the Borrower of the minimum required technical studies that prove the investments are feasible from socio-economical and technical point of view.	The project owner has to submit at least seven copies of EIA report in Vietnamese language (depend on the number of appraisal council members) and one copy of the Feasibility Study or the Economic-Technical argument for the proposed project.	Project owners must submit at least one EIA report in Vietnamese and provide additional copies as necessary according to the number of appraisal committee members, along with one copy of the feasibility study report or the economic-technical justification for the proposed project.	Follow the GoV's requirements and the WB policy requirements
Content of ESIA report	According to the ESS1. Due attention will be given address labor and working conditions as well as community health and safety	EA report should be in line with Circular 25/2019/TT-BTNMT	The main content of the Environmental Impact Assessment report as per Article 32 of Law No. 72/2020/QH14 includes: (a) Project origin, project owner, approving authority, legal basis, techniques, and evaluation methods; (b) Compliance with national, regional, and provincial planning and environmental protection laws; (c) Technology assessment and items that may adversely impact the environment; (d) Natural conditions, socio-economic factors, biodiversity, and sensitive factors; (e)	Prepare 2 documents: one follow the GOV's requirements and one follows the WB policy requirements.

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam (Decree 40/2019, Circular 25/2019/TT-BTNMT	Vietnam (Decree 08/2022, Circular 02/2022 effective 2022)	Gap Filling Measures
			Forecasting and assessing environmental impacts, waste, biodiversity, heritage, and historical sites; (f) Measures for waste collection, treatment, and mitigation of negative impacts, and emergency prevention; (g) Environmental management and monitoring program; (h) Consultation results; (i) Conclusions, recommendations, and commitments from the project owner. The report structure is stipulated in Decree No. 08/2022/ND-CP.	
Environmental and social performance monitoring	During project implementation, the WB will monitor the project's environmental and social performance in accordance with the requirement of the legal agreement, including the ESCP and will review any revision of the ESCP including changes resulting from changes in the design of the project or project circumstances. The Bank will monitor the project on an ongoing basis as required by OP 10.00. A project will not be considered complete until the measures and actions set out in the legal agreement (including the ESCP) have been implemented. Where the Bank has identified and agreed with the	The local DONRE is entrusted to supervise the environmental compliance of the project. By the end of project construction stage, the Environmental Management Agencies will coordinate with Construction Management Agencies to supervise the compliance of environmental management activities stated in EIA study.	The local Department of Natural Resources and Environment is tasked with monitoring compliance with environmental regulations for the project. Periodic monitoring reports must be submitted to the management authority according to the Decision approving the EIA report appraisal results.	Follow the ESCP and the approved ESIA, RPF, RPs, SEP, and LMP of the Project.

EA Process Stage	WB (stipulating in the ESF and ESSs)	Viet Nam (Decree 40/2019, Circular 25/2019/TT-BTNMT	Vietnam (Decree 08/2022, Circular 02/2022 effective 2022)	Gap Filling Measures
	Borrower and, as relevant, other agencies, on corrective or preventive measures and actions, all material measures and actions will be included in the ESCP.			

1.3. SUBPROJECT DESCRIPTION

The proposed subproject will be implemented in 10 wards and communes of Quy Nhon City, Hoai Nhon Town and Phu My District, Binh Dinh Province. Phu My District includes communes of My Thanh, My Tho, My An and My Thang. Hoai Nhon Town includes communes of Hoai My and Hoai Hai. Quy Nhon City includes wards of Nhon Phu, Nhon Binh and Dong Da. Figures 1-1 and 1-2 illustrate the location maps of two proposed routes of the subproject in Binh Dinh province.

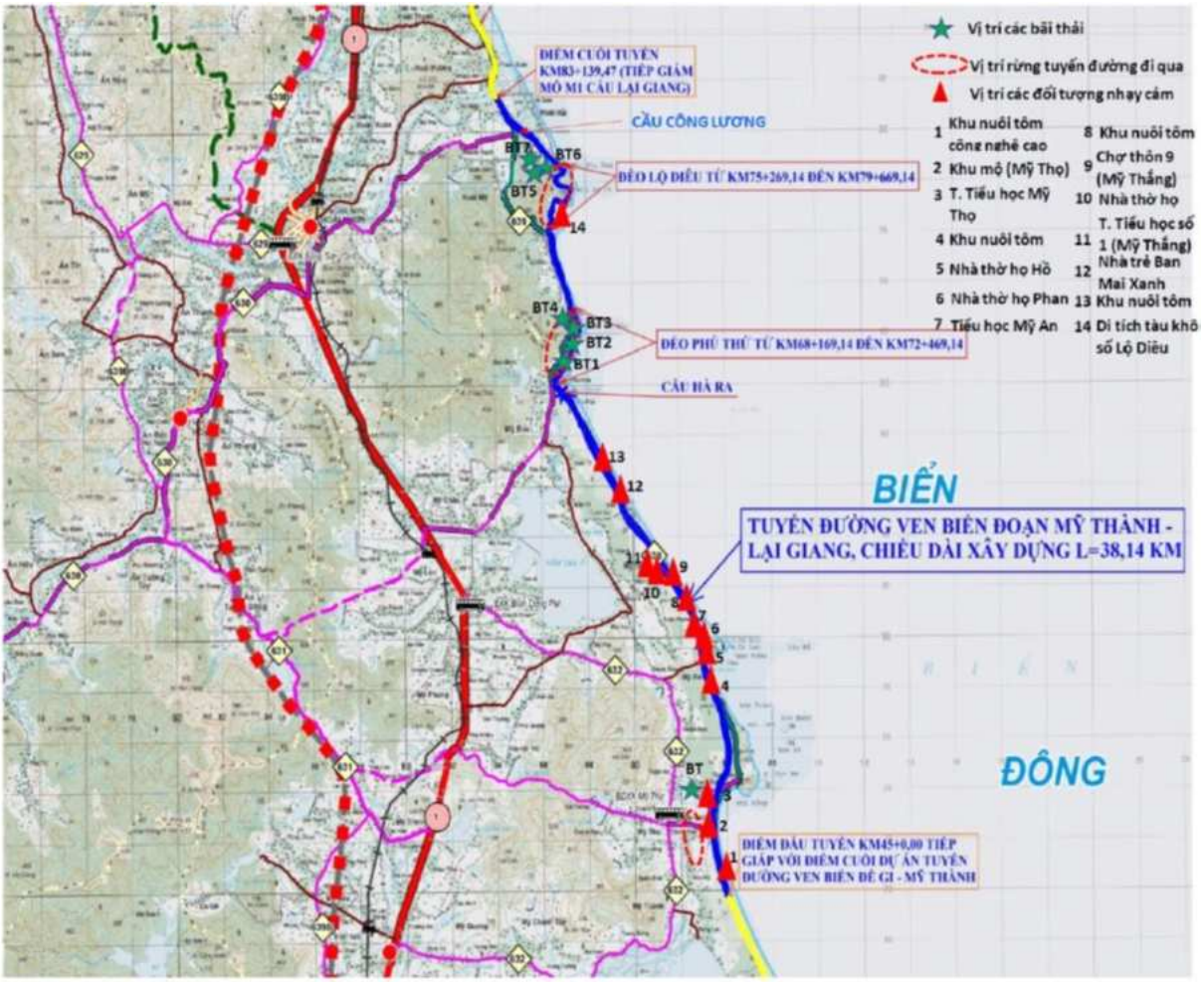


Figure 0-1 Map of the Coastal Provincial Road (PR639) Route, Section from Mỹ Thanh to Lai Giang Bridge.

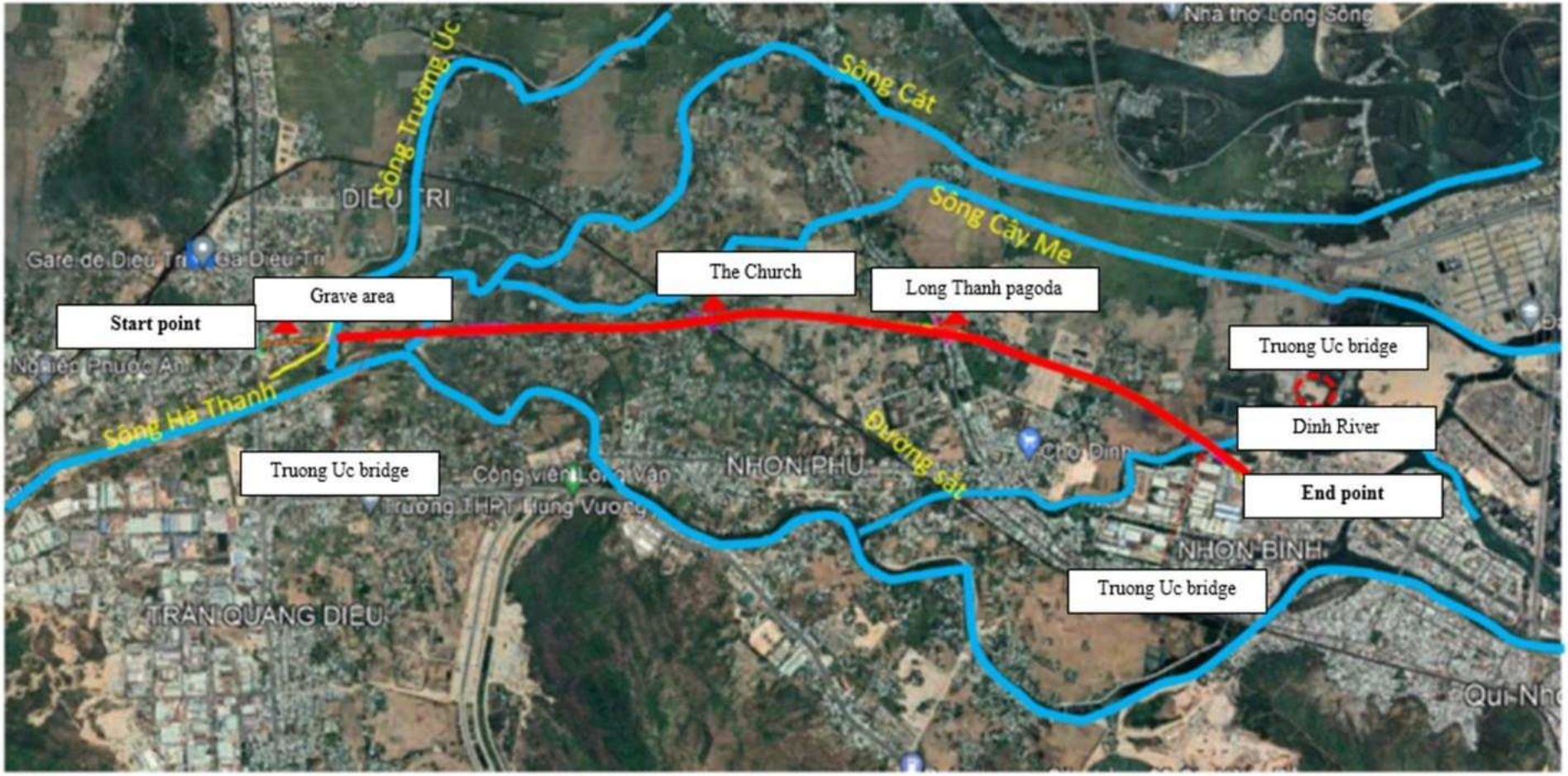


Figure 0-2. Map of the new route connecting National Highway 19C to Quy Nhon Port.

1.3.1. Scope of subproject construction items

Table 0-4 Summary of Subproject construction scope

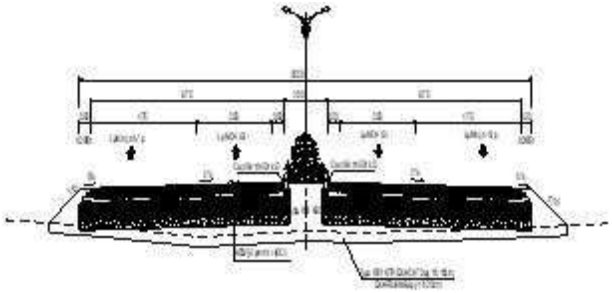
No.	Subproject construction items	Scope
I	***The National Route 19C Connecting Quy Nhon Port***	
1	Road and Bridge Works	- Road Classification: Class II Traffic Road; Design Speed: 50 km/h - The road segment from National Route 19C connecting Quy Nhon Port has a length of approximately 6.35 km, starting at the intersection with National Route 1 at chainage Km1220+600 (Dieu Tri Intersection), Dieu Tri Town, Tuy Phuoc District, and ending at the junction with Nguyen Man Road. - The total length of the route is 6.35 km, divided into three segments: + Segment 1: from Km0+0.00 to Km1+131.53: designed for 4 lanes, roadbed width Bn=24m. + Segment 2: from Km1+131.53 to Km4+202.86: designed for 6 lanes, roadbed width Bn=40m. + Segment 3: from Km4+202.86 to Km6+353.03: designed for 4 lanes, roadbed width Bn=32m. - Two bridges will be constructed along the route: + Truong Uc Bridge: Newly constructed at Km0+755.71, width 19m, length 674.3m, consisting of 20 I-beam spans. + Dinh River Bridge: Newly constructed at Km6+36.67, width 27m, length 113.3m, consisting of 3 I-beam spans. - Intersections: + Regular Intersections: Intersection with National Route 1, intersection with the old National Route 19, terminal junction, and various local road intersections. The intersections are designed as at-grade. + Railway Intersection: One intersection at Km3+665.05. The design includes the upgrading of the railway information system and signal system in conjunction with the level crossing, replacing all existing P30 rails with P43 rails from Km3+630.60 to Km3+705.60; the establishment of a new level crossing at Km3+665.05, width 59m. The protective system includes a guard and electric barriers, as well as an automatic train warning bell. The road portion crossing the railway has a width of 40m.
2	Drainage System	The drainage works include: + Side Drains: Circular pipes Ø60cm - Ø100cm arranged on one side (the right side), inside the sidewalk. In curved road sections, superelevation is applied, and drainage openings are placed in the median with a spacing of 20m between each opening.

		+ Box Culverts: 12 culverts Ø120cm; 1 culvert Ø150cm; 1 double Ø150cm culvert; 5 box culverts (at Km0+406.90 with dimensions 2x(3x3)m; at Km2+509.29 with dimensions 1x(3x2)m; at Km5+510.60 with dimensions 1x(3x2)m; at Km4+114.10 and Km4+756.00 with dimensions 10x(4x2)m).
3	Other Works	- Traffic Lighting: Construction of 2 lighting transformer stations (50kVA and 75kVA), with a 22kV power supply line for the transformer stations spanning 55m, and 8 traffic signal poles. - Technical Utility Ditch: Running along the left sidewalk, with a technical ditch crossing the road every 500m. - Access Roads: Design of local access roads with a width of 6.5m at deep excavations and high embankments through residential areas. - Traffic Safety Design: Includes traffic signs (using reflective film stickers), paint markings, speed bumps, delineators, corrugated steel barriers, and kilometer markers. - Greenery: Planting green trees on sidewalks and in medians. Design of pump wells on the median (drilling and installing a 3HP pump, utilizing groundwater), with an average spacing of 500m per well.
II	***Coastal Road DT639, Section My Thanh – Lai Giang***	
1	Road and Bridge Works	- Road Classification: Class III plain road, designed speed: 80 km/h - The coastal road (DT.639) section My Thanh - Lai Giang has a length of approximately 38.14 km, with the starting point connecting to the De Gi - My Thanh section at KM45+00 and the endpoint at Lai Giang Bridge. - The total length of the route is L = 38.14 km, divided into two sections: + Section Km45+0.00÷Km55+365.60: From the starting point to the intersection at Xuan Thanh hamlet, My An commune, Phu My district, constructed with a scale of 4 lanes, road width Bn = 20.5m; + Section Km55+365.60 ÷ Km83+139.47: From the intersection at Xuan Thanh hamlet, My An commune, Phu My district to the endpoint constructed with a scale of 4 lanes, road width Bn = 12m. - Two bridges are constructed along the route: + Ha Ra Bridge: widening the existing bridge from 6.5m to a bridge with a width of 18m. Total length of 316.5m comprising 17 I-beam spans. + Cong Luong Bridge: width of 12m, length of 111.3m comprising 3 I-beam spans. - Intersections: including the intersection at Xuan Thanh (km55+396.76), intersections with the old DT639 road (km68+169.14, km72+397.54, km75+397.54, and km82+7.41) designed at-grade.
2	Drainage System	- Surface Drainage: Ditches along the residential area and restoration of old ditches: rectangular ditches 60cm wide are arranged. For

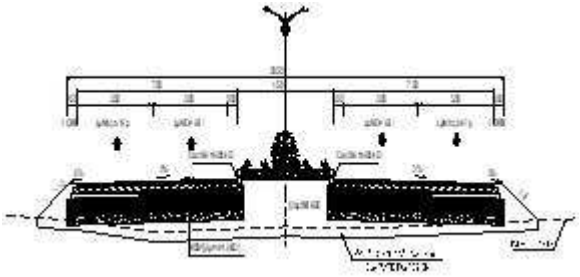
		sections passing through hills and areas without residents, a trapezoidal ditch with a small bottom width of 40cm and height of 40cm is arranged. - Super High Drainage: drainage slots are arranged at the median strip with a distance of 20m/slot. - Cross Drainage Pipes: + From km45+00 to km68+169.14: constructing 33 cross drainage pipes Ø100-120cm, 1 square pipe (1x0.5)m. + From Km68+169.14 to Km83+139.47: constructing 71 new cross drainage pipes D600-D2000, 08 box culverts. - Ditch Restoration: restoration of 2 ditches at km68+167.87 – km68+508.02 (right side) and km68+167.87 – km68+518.97 (left side), consisting of earthen ditches, ditch bottom 1m, depth 0.5m, side slope 1:1.
3	Other Works	- Traffic Lighting: Construction of 7 new transformer stations with capacities of 50kVA and 75kVA, a 22kV medium voltage cable line of 2308m, installation of light poles using LED lights. - Traffic Safety Design: Signage (using reflective film type), road markings, speed bumps, guide posts, corrugated sheets, and kilometer markers. - Access Roads: Designing a 4m wide local access road in areas with deep excavation and high embankments through residential areas at chainages Km55+455.94 - Km55+639.95 (both sides) and Km55+639.95 - Km55+667.07 (left side). - Greenery: Planting trees in the median strip of the road section with Bn = 20.5m. Designing pump wells on the median strip (drilling, installing a 3HP pump using groundwater), on average every 500m/well. - Section km45+0.00 – km68+152.98: The lower slope is reinforced with concrete slabs, dimensions (50x50x6)cm, total length 4939.63m. The upper slope is reinforced with concrete slabs, dimensions (40x40x6)cm, leaving holes for planting grass with a diameter of 20cm, total length 3700m, sand dune protection barriers sized (20x30)cm made of BT grade 200, 1x2 stones. - Section km68+191.97 - km83+139.47: slopes reinforced with concrete slabs. Arranging concrete retaining walls on the lower slopes at 13 locations from km69+119.77 to km78+979.31.

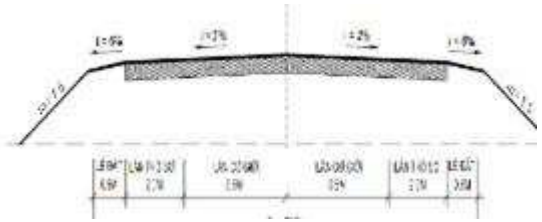
1.3.2. Detailed description of Binh Dinh subproject investments

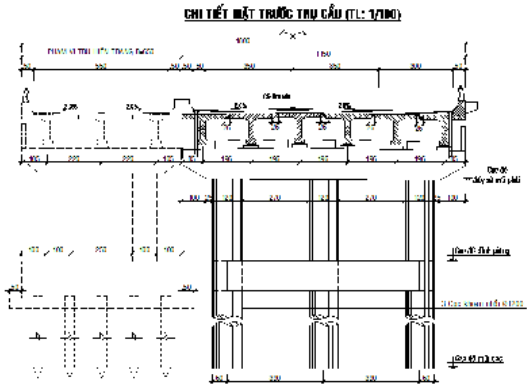
Table 0-5. Detailed description on Binh Dinh subproject investments

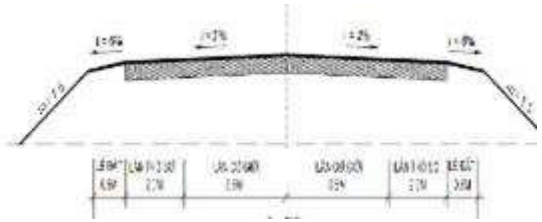
Item	Description	Specifications	Cross section design	Alignment/Photos
I. Construction and upgrading of the coastal road section from My Thanh to Lai Giang Bridge				
Section 1: Km 45+00 to Km 55+365.60 (Length 10.4 km)				
1.1. From Km 45 to Km 49+952.40 (Length 5.0 km)	- The route follows the alignment of the existing provincial road DT639 with a width of B = 9.0 m. - Utilizing the existing roadway. - The terrain is flat. - On the right is a high-tech shrimp farming area, while the left side is an empty lot.	- Construction of a road with 4 traffic lanes, with a roadbed width of Bn = 20.5 m. - Including: + Width of the roadway for motor vehicles: 2 x 3.5 m = 7.0 m. + Width of the roadway for mixed vehicles: 2 x 4.75 m = 9.5 m. + Width of the safety strip: 2 x 0.5 m = 1.0 m. + Width of the median strip: 2.0 m. + Width of the shoulder: 2 x 0.5 m = 1.0 m. + Roadway slope: I = 2%. + Shoulder slope: I = 6%.	Road typical cross section 	The road follows the existing concrete road, with a width of B = 9.0 m.  The Viet-Uc high-tech shrimp farming area is located to the right of the road, approximately 30 m from the road axis. 

Item	Description	Specifications	Cross section design	Alignment/Photos
1.2. From Km 49+952.40 to Km 51+900 (Length 1.9 km)	- The new route is developed to the north and connects with DT639 at Km 51+900. - The area on both sides of the road consists of sandy land planted with casuarina trees interspersed with rice and vegetable fields. - The route passes through the cemetery area of My Tho commune.			The road passes through sandy hills planted with casuarinas. 
1.3. From Km 51+900 to Km 55+365.60 (Length 3.5 km)	- The route is newly opened. - Casuarina and eucalyptus trees are planted on both sides of the road. - There is a relatively steep cross slope and longitudinal			The road traverses areas planted with acacia and eucalyptus. 

Item	Description	Specifications	Cross section design	Alignment/Photos
	slope. - The route intersects with the concrete road at the entrance to Tan Phung 1 village. - The route is upgraded and widened on the existing dirt road, averaging 5.5 m wide, and a portion of the concrete road, which is 3.5 m wide, has deteriorated. - There are no drainage structures in this section. - The existing road surface is a 3.5 m wide concrete that has degraded and deteriorated. The terrain on both sides consists of barren sandy hills. The population is concentrated at the end of the route. There are several shrimp ponds at the beginning of the			The road goes through an earthen area with an average width of 5.5 m. 
			Road typical cross section 	The existing road has a concrete structure, with a width of 3.5 m.  To the left of the road, there is a medium-voltage power line.  It passes through the

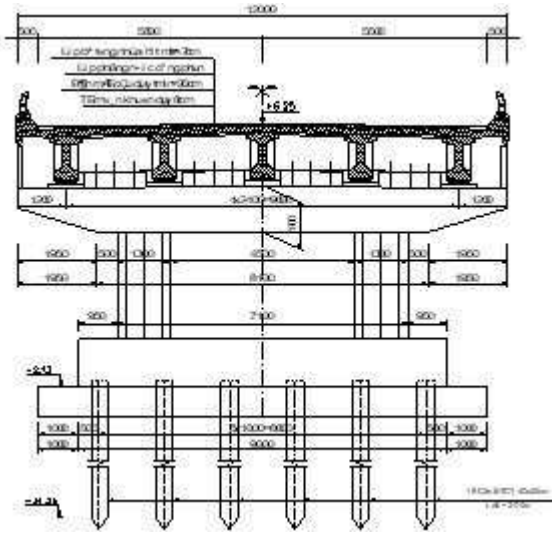
Item	Description	Specifications	Cross section design	Alignment/Photos
	route. - On the left side of the route, there are medium-voltage power lines.			intersection at Xuan Thach commune (km 64 +700). 
Section 2: From km 55+365.60 to km 83+139.47 (Length 27.77 km)				
2.1. From Km 55+365.60 to Km 68+169.14 (Length = 4.3 km)	- The road traverses relatively flat terrain with a surface composed of concrete and asphalt, ranging in width from 5.5 to 6.5 meters. - On both sides of the road, there are open fields with shrimp farming ponds.	- Number of lanes: 2 lanes - Roadbed width: 12 m - Including: + Width of the roadway for motor vehicles: 2 x 3.5 m = 7.0 m + Width of the roadway for non-motorized vehicles: 2 x 2.0 m = 4.0 m + Width of the shoulder: 2 x 0.5 m = 1.0 m + Roadway slope: I = 2% + Shoulder slope: I = 6%	Typycal cross section 	The road traverses a relatively flat terrain, with a surface composed of concrete and asphalt.  On both sides of the road are vacant lands with shrimp farming ponds. 

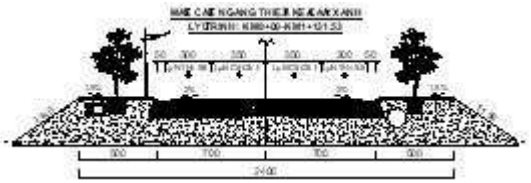
Item	Description	Specifications	Cross section design	Alignment/Photos
Km68	- Ha Ra Bridge was designed and constructed in 2003. - Road dimensions: B = 0.5 + 5.5 + 0.5 = 6.5 m. - The span length is Ln = 18 m, comprising 17 spans. - The total length of the bridge Lc = 316.5 m, consisting of 17 simple spans of L = 18 m. - The area surrounding the bridge consists of rice fields and shrimp farming zones. - Local residents engage in fishing, shrimp catching, and crab trapping in the river near the road.	At Km68, a new structure will be constructed alongside the old Ha Ra Bridge. The bridge will be permanently built using conventional reinforced concrete. + Bridge length: 315.92 m + Number of spans: 17 simple spans, each span length L = 18 m + Width of the driving lane: 5.5 m + 2 x 3.5 m + 3 m = 15.5 m + Safety lane: 1 x 0.5 m = 0.5 m + Bridge railing: 4 x 0.5 m = 2.0 m + Bridge abutment: U-shaped abutment, consisting of 2 bored piles d = 1.0 m, concrete grade 40 MPa, stone size 1x2. + Bridge pier: Type of pier shaft: foundation of pier consists of 2 bored piles d = 1.0 m, concrete grade 40 MPa,	Ha Ra bridge typical cross section 	Ha Ra Bridge.  Local residents catch shrimp and crabs in the river. 

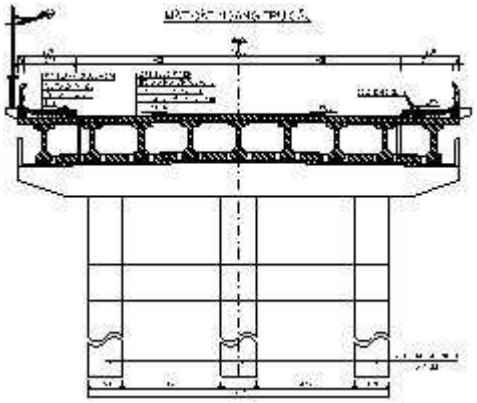
Item	Description	Specifications	Cross section design	Alignment/Photos
		stone size 1x2.		
From Km 68+169.14 to Km 72+469.14 (Length = 4.3 km)	- The road crosses the Phu Thu Pass, beginning at the base of the Ha Ra Bridge on the southern side and terminating at the intersection with PR639 on the northern side.	- Roadbed width: 12 m - Including: + Width of the roadway for motor vehicles: 2 x 3.5 m = 7.0 m + Width of the roadway for non-motorized vehicles: 2 x 2.0 m = 4.0 m + Width of the shoulder: 2 x 0.5 m = 1.0 m + Roadway slope: I = 2% + Shoulder slope: I = 6%		The road passes through rice fields.  After Phu Thu Pass, the road goes through areas planted with acacia and eucalyptus. 
2.3. From Km 72+469.14 to Km 75+269.14 (Length = 2.8 km).	- The road follows the existing PR639 route, which is currently an asphalt concrete road with a surface width of Bm = 6.0 m and a subgrade width of Bn = 7.0 m. - The area is densely populated on the left side, while the			The road follows Provincial Road 639, running alongside the coast. On the left side of the road is a belt area of casuarina trees for wave protection. 

Item	Description	Specifications	Cross section design	Alignment/Photos
	right side borders a beach. - At the end of this section is the historical site of the "Numberless Ship" in the village of Lo Dieu.			The historical site of the "numberless ship" is located near the road at km 75 + 269.14 in the village of Lo Dieu, Hoai Nhon District. 
From Km 75+269.14 to Km 79+669.14 (Length = 4.4 km)	- Newly constructed route towards the east from the Lo Dieu Pass to the existing concrete road in Hoai Hai commune, Hoai Nhon district.			The segment runs through Lo Dieu Pass. 
From Km 79+669.14 to Km 81+169.14 (Length = 1.5 km)	The road follows the current route, featuring a concrete surface with a width of Bm = 3.0 m and a subgrade width of Bn = 4.0 m. To the left of the current road, there is a			The road runs parallel to areas of shrimp farming interspersed with residential areas.

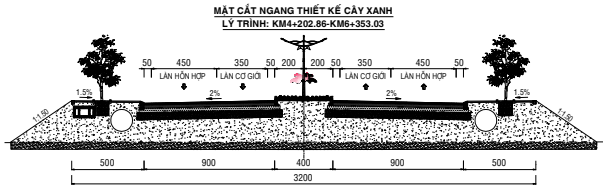
Item	Description	Specifications	Cross section design	Alignment/Photos
	residential area, while the right side primarily consists of shrimp farming ponds interspersed with houses. This section has a relatively low elevation and flat terrain.			
From Km 81+169.14 to Km 81+969.14 (Length = 0.8 km)	- The road passes through open land, bypassing the densely populated area of Cong Luong village in Hoai My commune.			The section passes through the residential area of Cong Luong village, Hoai My commune. 
2.7. From Km 81+969.14 to Km 83+139.47 (Length = 1.17 km)	- The road runs along the existing DT639, which is an asphalt concrete road. - The surface width is Bm = 6 m, and the subgrade width is Bn = 7 m. - On both sides of the road, there are			The endpoint is at Lai Giang Bridge. 

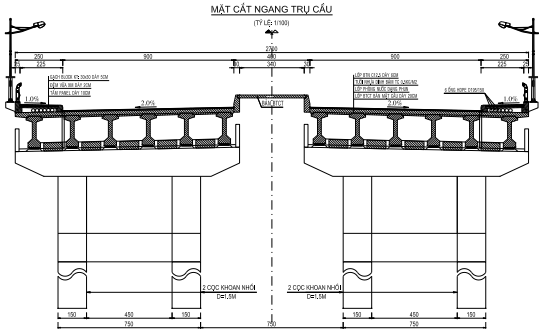
Item	Description	Specifications	Cross section design	Alignment/Photos
	rice fields and residential houses. - The end of this section connects with the M1 pier at the Lai Giang Bridge. - At Km 82+432.73, the area of the Cong Luong Bridge is approximately 10-25 m wide.			
Km 82+432,73	- The waterway at the Cong Luong Bridge located at Km 82+432.73 has a width of approximately 10-25 meters.	Construction of the Cong Luong Bridge with a width of 12 m and a length of 111.3 m, consisting of 3 I-beam spans, each span measuring 33 m. The bridge abutment is U-shaped, constructed of reinforced concrete, comprising 5 bored piles with a diameter of 1.2 m, with pile caps of reinforced concrete measuring 40x40 cm, and a length of 33.0 m. The bridge pier is in the form of a cylindrical column made of cast-in-place reinforced concrete, with pile caps of reinforced concrete measuring		

Item	Description	Specifications	Cross section design	Alignment/Photos
		40x40 cm, and a length of 33.0 m.		
II. Constructing a road to connect National Route 19C to Quy Nhon Port.				
2.1. Section Km0+0.00 to Km1+131.53	The route passes through a densely populated area, rice fields, crossing the Truong Uc River at Km0+755.71 and the Cay Me River at Km0+975.00. The road traverses rice fields and leads to the Go Tru residential area (Van Ha Urban Area).	Constructing a 4-lane road with a total width of Bn = 24m, which includes: + Width of the roadway for motor vehicles: 2 x 3.5m = 7.0m + Width of the roadway for mixed vehicles: 2 x 4.0m = 8.0m + Width of the safety strip: 2 x 0.5m = 1.0m + Width of the sidewalk: 2 x 5.0m = 10.0m + Road surface slope: I = 2% + Sidewalk slope: I = 1.5%	Typical cross section of road B = 24 m 	The starting point is located adjacent to Tran Phu Street and Le Hong Phong Street. The road passes through a densely populated residential area. 

	Truong Uc Bridge at Km0+755.71	Dimensions: + Width: 19 meters, Length: 675.30 meters Superstructure: + 20 I-beam spans made of reinforced concrete, each span measuring 33 meters. Abutment Structure: + U-shaped abutment made of cast-in-place reinforced concrete. + Abutment foundation: 6 bored piles with a diameter of 150 cm. + Abutment M1: Piles measuring 33 meters. + Abutment M2: Piles measuring 36 meters. Pier Structure: + Piers constructed from cast-in-place reinforced concrete, each pier having 3 columns with a diameter of 150 cm. + The columns are connected by horizontal bracing measuring 150 x 150 cm. + The pier foundations	Truong Uc bridge typical cross section 	The road crosses the Cay Me River at kilometer 0+977.76. 

Item	Description	Specifications	Cross section design	Alignment/Photos
		consist of 3 bored piles with a diameter of 150 cm, with pile lengths expected to range from 17 to 33 meters.		
Km1+131.53 to Km3+191.30: L = 2.06 km	This section aligns with the planned main route of the Van Ha urban area in Nhon Phu ward. The terrain is characterized by sparse residential areas, with many fruit orchards and rice fields. The route crosses the Dieu Tri - Quy Nhon railway line at Km2+770.	+ Total roadway width (Bn): 40 m + Width of the roadway for motor vehicles: 14.0 m (4 x 3.5 m) + Width of the roadway for mixed vehicles: 8.0 m (2 x 4.0 m) + Width of the safety strip: 2.0 m (4 x 0.5 m) + Width of the median strip: 4.0 m + Width of the sidewalk: 12.0 m (2 x 6.0 m) + Road surface slope: 2% + Sidewalk slope: 1.5%	Typical cross section of road B=40 m 	This route aligns with the main planned axis of the Van Ha urban area. 
2.3. Km3+191.30 to Km6+353.03: L = 3.16 km	This road section will traverse residential areas interspersed with rice fields, leading to an intersection with National Route 19 at Km7+383 and crossing	- The section from Km3+191.30 to Km4+202.86 will have a roadway width of 40m (designed similarly to the section from Km1+131.53 to Km3+191.3). - The section from	Typical cross section of road B=40 m 	The road traverses residential areas interspersed with rice fields.

Item	Description	Specifications	Cross section design	Alignment/Photos
	the Dinh River at Km6+36.67, reaching the Nhon Binh industrial cluster. The endpoint of the route intersects with Nguyen Man Road (Nhon Binh ward - Quy Nhon City). The route has been adjusted to avoid residential houses from Km3 to Km4+240.	Km4+202.86 to Km6+353.03 will have a total roadway width (Bn) of 32 m: + Width of the roadway for motor vehicles: 7.0 m (2 x 3.5 m) + Width of the roadway for mixed vehicles: 9.0 m (2 x 4.5 m) + Width of the safety strip: 2.0 m (4 x 0.5 m) + Width of the median strip: 4.0 m + Width of the sidewalk: 10.0 m (2 x 5.0 m) + Road surface slope: 2% + Sidewalk slope: 1.5%	Typical cross section of road B=32 m 	 The intersection with National Route 19 is located at kilometer 7+383.  The road passes through the Nhon Hoi industrial cluster.  The route follows Nguyen Man Street and Le Thanh Nghi

Item	Description	Specifications	Cross section design	Alignment/Photos
				Street. 
	Construction of Dinh River Bridge at Km6+36.67 The bridge begins in rice-growing areas and ends at the Nhon Binh Industrial Zone.	Superstructure: + Width: 27 meters (comprising 2 units). + Length: 113.3 meters, consisting of 3 I-beam spans of 33 meters each. + Length of each span: 33 meters. - Abutment Structure: + Type: Heavy U-shaped abutment, made of cast-in-place reinforced concrete. + Each abutment: Comprises 2 units. + Each unit: 5 bored piles Ø150 cm. - Expected pile lengths: + M1: 75.5 meters + M2: 46.5 meters - Pier Structure:	Dinh-river bridge typical cross section 	

Item	Description	Specifications	Cross section design	Alignment/Photos
		+ Each pier consists of 2 units. + The pier body: Columns of cast-in-place reinforced concrete, each unit having 2 columns Ø150 cm. + Horizontal bracing: 150 x 150 cm. + Foundations: Each unit has 2 bored piles Ø150 cm. - Expected pile lengths: + T1: 75.5 meters + T2: 59 meters		

1.3.3. Construction methods

1.3.3.1. Road

a. Road Construction:

Excavation Work: Proceed with the excavation/removal of the surface soil layer.

For the construction of the coastal roads at My Thanh and Lai Giang, additional activities will include rock blasting at sections passing through Phu Thu Pass (locations: 1. Km68+600 - Km68+707; 2. Km69+181.59 - Km69+526.59; 3. Km69+853.08 - Km72+200) and Lo Dieu Pass (locations: 1. Km77+000 - Km78+031; 2. Km78+633.50 - Km79+047.53). The construction areas where blasting is planned are located far from residential areas (the nearest point to residential areas is at Lo Dieu Pass, with a distance of more than 400 meters). The sequence for organizing blasting operations includes:

- Prepare blasting design documentation and blasting passport, covering the following details: Location of explosives on the plan, type of explosives, blasting method, timing of explosions, safe distance zones and cordons for blasting personnel,construction site, and residents, communications plan, operational safety and emergency plan, and other instructions on handling potential incidents during blasting operations.
- Blasting operations must fully comply with current regulations on safety and environmental protection. A safety plan must be developed for each specific project during the blasting process (e.g., calculating the distance of flying rocks, shockwave hazardous distances, transmission blast distances, seismic hazard distances, and the distance of rocks falling and rolling down slopes, direction of smoke and dust emission).
- Blasting is only allowed after completing all safety preparations and obtaining a blasting permit from the competent authorities.
- To ensure safety in surrounding areas, the Project's blasting operations are expected to use directional blasting and differential blasting methods. Blasting holes of 30-50 mm in diameter will be drilled, with the explosives oriented inward to limit the scattering of rocks. After blasting, the rocks will be excavated using a combination of excavators (V = 1.25m3 - 1.6m3), bulldozers (140Cv), and transported by 10-ton trucks to the agreed material disposal area.
- Blast scale: Dependent on the location of drilling and blasting, and the workface conditions, the drilling network will be arranged as per the blasting passport requirements. The blast commander and the authorized person approving the blasting passport will determine the scale of each blast at the exploitation level in accordance with terrain and drilling conditions.
- Blasting technology: Utilize electric differential blasting technology, with non-electric detonators set at different time intervals to create varying explosion times between blast holes and rows, enhancing the efficiency of rock fragmentation.

Roadbed Earthwork: Earthwork for the roadbed will be conducted using a combination of excavators, graders, and compactors. Earth filling will be carried out in layers, with each layer being compacted and inspected according to regulations before proceeding to the next layer, ensuring the design compaction standards are met.

Construction of the Aggregate Base Layer: Before spreading material on the roadbed, the aggregate must be moistened to its optimum moisture content for compaction. If segregation, waves, or other unsuitable conditions appear during the spreading process, the material must be manually mixed or replaced with new material to meet the required specifications.

Asphalt Concrete Paving: Asphalt concrete will be purchased from the plant and transported to the construction site. The asphalt paving machine must be followed by immediate compaction while the mixture is still in suitable condition, ensuring that compaction does not cause cracking or displacement of the material.

If any localized damage is detected after compaction, the damaged area must be excavated while the mixture is still warm, thoroughly cleaned, treated with a layer of liquid asphalt at the bottom and around the edges, filled with good-quality asphalt concrete, and compacted again.

Throughout the construction process, the alignment and elevation of the road centerline must be regularly checked using a theodolite and level, while geometric dimensions are measured using a steel tape, and flatness is measured using a straightedge.

b. Drainage Pipe Construction:

The drainage pipes are manufactured at the factory and transported to the construction site. The sequence of drainage pipe construction is as follows:

- Determine the construction area and establish the centerline of the pipe.
- Clear the construction site.
- Transport materials and drainage pipes.
- Excavate the pipe foundation.
- Install the pipe supports.
- Install the drainage pipes and treat the pipe joints.
- Backfill over the pipes: Backfilling must be done evenly on both sides of the pipe, in layers with a thickness of approximately 20 cm. Each layer of soil must be properly compacted, and the next layer can only be added after the previous layer has been compacted. The backfill elevation over the top of the pipe must be at least 50 cm above the pipe's crown.

The sequence of outfall construction is as follows:

- Clear the construction site.
- Transport materials.
- Excavate the outfall foundation.
- Construct and compact 4x6 stone.
- Install formwork and pour concrete for the pipe apron, base slab, headwall, and wing walls.

1.3.3.2. Bridge construction

Construction of Bridge Abutment using Bored Pile Method: The construction process involves drilling a hole, stabilizing the borehole walls with casing and bentonite slurry, cleaning the hole, installing and lowering the steel cage using a crane, and pouring concrete using the underwater concrete placement method. The foundation pit is then excavated to the design level, the pile head concrete is removed, a leveling concrete layer is poured and leveled, followed by the installation of formwork, reinforcement, and the pouring of foundation concrete. Backfilling is then carried out up to the top of the foundation. Formwork and scaffolding are erected, and steel reinforcement is placed for the abutment body, walls, and wing walls. The concrete is poured and treated, and the scaffolding and formwork are dismantled. The construction of the cone,

installation of the bridge deck slab, and completion of the abutment follow.

Pier Construction on Land:

- For piers with foundations on bored piles: The site is leveled, and bored pile construction equipment is installed. Holes are drilled, and the borehole walls are stabilized with casing and bentonite slurry. The hole is cleaned, and the steel cage is installed and lowered using a crane. Concrete is poured under water using the bored pile method. The foundation pit is excavated to the design level, the pile head concrete is removed, and a leveling concrete layer is poured and smoothed. Formwork is installed, and reinforcement is placed for the foundation, followed by the concrete pouring and backfilling up to the top of the foundation. Scaffolding and formwork are erected, and reinforcement is placed for the pier body and cap beam. The pier is completed up to the natural ground level and finalized.
- For piers with foundations on driven concrete piles: The site is leveled, and the centerline of the pier and pile positions are determined. Pile-driving equipment is installed, and piles are driven to the design level. The foundation pit is excavated to the design level, the pile head concrete is removed, and the leveling concrete is poured and smoothed. Formwork and reinforcement are installed for the foundation, followed by the pouring of foundation concrete and backfilling up to the top of the foundation. Scaffolding and formwork are erected, reinforcement is placed for the pier body and cap beam, and concrete is poured. The scaffolding and formwork are then dismantled, and the pier is completed to the natural ground level and finalized.

Underwater Pier Construction:

- For piers on bored pile foundations: Bored pile construction equipment is installed on a floating platform or working platform. Holes are drilled for the piles, and the borehole walls are stabilized with casing and bentonite slurry. The hole is cleaned, the steel cage is installed and lowered using a crane, and concrete is poured using the underwater concrete method. Sheet piles are driven to form a cofferdam, and excavation is carried out within the cofferdam. The bottom concrete is poured, and the water is pumped out of the foundation pit. The pile head is treated, and the leveling concrete is poured and smoothed. Formwork and reinforcement are installed for the foundation, followed by concrete pouring. Scaffolding and formwork are erected, reinforcement is installed for the pier, and concrete is poured. Scaffolding and formwork are dismantled, and riverbed cleaning and finalization of the pier are completed.
- For piers on driven concrete pile foundations: The centerline and pile positions are determined. Positioning piles are driven, or a working platform is constructed. Pile-driving equipment is installed on the floating platform or working platform, and piles are driven to the design level. A sheet pile cofferdam is driven, excavation is carried out within the cofferdam, and the bottom concrete is poured. Water is pumped out, the pile head is treated, and leveling concrete is poured and smoothed. Formwork and reinforcement are installed for the foundation, followed by concrete pouring. Scaffolding and formwork are erected, reinforcement is installed for the pier, and concrete is poured. The scaffolding and formwork are dismantled, the riverbed is cleaned, and the pier is finalized.

Superstructure Construction of the Bridge: A casting yard is prepared (the casting yard is located near the bridge construction site in vacant land, as agreed with local authorities. Upon completion of the construction, the yard will be dismantled, and the land will be restored). Equipment and materials are mobilized, and the casting bed or formwork is constructed.

Reinforcement and prestressing cables are installed for the beams, and formwork is set. Concrete is poured and cured. The beams are then transported to the construction site. The beams are placed into position using cranes or specialized beam launching vehicles. The construction of the deck slab and concrete parapets is carried out. Waterproofing is applied to the deck surface, asphalt is laid, and the bridge is finalized. Top of Form

1.3.4. List of equipment and machines

The table below presents the list of main machinery and equipment to be mobilized for construction activities of (i) upgrading of the existing coastal road PR 639 (section from My Thanh - Lai Giang Bridge) (Road #1) and (ii) new construction of an urban road connecting highway 19C with Quy Nhon port (Road #2).

Table 0-6. Main machinery and equipment

Equipment	**Estimated quantity**					
	My Thanh-Lai Giang coastal road			***QL19C to Quy Nhon port connection road***		
	Road	***Ha Ra bridge***	***Cong Luong bridge***	***Road***	***Truong Uc bridge***	***Dinh-river bridge***
Excavator	6	1	1	3	1	1
Crane	7	1	1	3	1	1
Bulldozer	5	1	1	3	1	1
Roller Compactor	7	1	1	4	1	1
Digger	4	1	1	2	1	1
Wheel Loader	10	-	-	5	-	-
Front Loader	10	-	-	8	-	-
Scraper	5	-	-	4	-	-
10T Dump Truck	20	2	1	10	2	1
Drill Machine	20	1	1	10	1	1
Water Truck	5	1	1	2	1	1
Asphalt Paver	5	1	1	2	1	1
Pile Driver	5	1	1	5	1	1

Welding Machine	10	2	1	7	1	1

***(Source:** FS report, 2022)*

1.3.5. Construction materials

According to the Feasibility Study (FS) report, the demand for construction materials for the subproject is presented in the following table.

Table 0-7. Demand for construction materials

Activity	**Estimated quantity**				
	Cement (ton)	**Sand (m^3)**	**Asphalt (m^3)**	**Gravel (m^3)**	**Steel (ton)**
QL19C to Quy Nhon port connection road	6,419	111,625	2,027	51,809	1,690
Truong Uc bridge	7,326	12,738	80	14,863	2,872
Dinh-river bridge	2,792	8,011	15	5,806	926
My Thanh-Lai Giang coastal road	14,438	218,604	5,468	117,256	1,448
Ha Ra bridge	1,589	3,269	24,203	3,908	719
Cong Luong Bridge	925	1,212	-	2,148	361

***(Source:** FS report, 2022)*

From the FS report, balance of earthwork and potential construction material sources for these two routes are presented in Table 1-8 and 1-9 respectively.

Table 0-8 Earthwork balance

Project Items	**Quantity**					
	Demolition volume *(m^3)*	Organic removal *(m^3)*	Purchase of soil *(m^3)*	Excavated/ blasted soil and rock *(m^3)*	Backfill soil *(m^3)*	Excess soil *(m^3)*
I. 19C Highway - Quy Nhon Port Road	*O*	*46,814*	*473,850*	*69,565*	*509,647*	*80,582*
- Road construction	17,685	46,814	445,304	52,700	471,621	73,197
-Truong Uc Bridge	15,469	-	12,895	11,858	20,370	4,383
-Dinh River Overpass Bridge	14,515	-	15,651	5,007	17,656	3,002
II. Coastal Road from My Thanh to Lai Giang	*1,756*	*109,579*	*261,220*	*699,514*	*858,925*	*1,656,089*
Road construction	1,651	109,579	228,287	2,122,199	820,910	1,639,155
Ha Ra Bridge	105	-	32,933	4,622	34,933	2,622

Cong Luong Bridge	-	-		17,394	3,082	14,312
Total	49,425	156,393	735,070	2,213,780	1,368,572	1,736,671

***(Source:** FS report, 2022)*

Table 0-9 Potential construction material sources

No	Mine Name	Location	Area (ha)	Reserves (m^3)	Distance (km)	Mining License
1	Bong Son Sand Mine	Bong Son Ward, Hoai Nhon Town	1.9	124,300	16.7	Decision No. 28/2017/QD-UBND by Binh Dinh Provincial People's Committee
2	Binh De Stone Mine	Hoai Thanh Tay Commune, Hoai Nhon Town	5.33	212,732	21.8	Decision No. 28/2017/QD-UBND by Binh Dinh Provincial People's Committee
3	209 Soil Mine	Canh Vinh Commune, Van Canh District, Binh Dinh Province	12	7,000,000	10.2	Document No. 4585/UBND-KT dated 29/07/2021 by Binh Dinh Provincial People's Committee

***(Source:** FS report, 2022)*

1.3.6. Construction packages

The construction of the My Thanh – Lai Giang Coastal Road and the Road Connecting Highway 19C – Quy Nhon Port will be divided into five construction packages, comprising three packages for the My Thanh – Lai Giang Coastal Road and two packages for the Road Connecting Highway 19C – Quy Nhon Port, as follows:

- C1 - BD - W1: Road from Highway 19C to Quy Nhon Port (Segment from Km 0 to Km 2+00) – Contract duration is 24 months.
- C1 - BD - W2: Road from Highway 19C to Quy Nhon Port (Segment from Km 2+00 to the Endpoint) – Contract duration is 24 months.
- C1 - BD - W3: Coastal Road, My Thanh – Lai Giang Segment (from Km 45+000 to Km 62+000) – Contract duration is 24 months.
- C1 - BD - W4: Coastal Road, My Thanh – Lai Giang Segment (from Km 62+000 to Km 73+000) – Contract duration is 24 months.
- C1 - BD - W5: Coastal Road, My Thanh – Lai Giang Segment (from Km 73+000 to the Endpoint) – Contract duration is 24 months.

1.3.7. Types of workers

The World Bank's ESS2 categorizes the workers into four types: direct workers, contracted

workers, community workers and primary supply workers. The environmental and social impact assessment (ESIA) indicates that the subproject's workforce will include a) direct workers (people directly employed or engaged by the PPMU), b) contracted workers (recruited by third parties, such as contractors/subcontractors), and c) primary supply workers (contractor who provide main materials and equipment for the subproject). The subproject will not engage community workers in civil works, yet local people may be hired to serve as unskilled workers for simple works such as excavation, leveling, loading/unloading materials, supporting skilled workers, site cleaning, watering working sites, etc. As per Decree 84/2015/ND-CP (dated 30 September 2015) regarding investment supervision and assessment, local people can establish community investment supervision board to supervise the implementation of environmental, social risk and impact mitigation measures as well as of construction safety on their voluntary basis. The sections below describe the types and estimated number of workers to be engaged throughout the subproject life.

1.3.7.1. Direct workers

Direct laborers are individuals directly recruited by the PPMU. They are employees of the PPMU and consultants hired by the PPMU to support the implementation of the sub-project.

Provincial Project Management Unit (PPMU): The PPMU is responsible for assessing and managing E&S risks and impacts, as well as the overall implementation of the project, which includes detailed sub-project design, procurement, disbursement, and construction and contract management. The PPMU will engage approximately 20 employees and individual consultants to carry out these tasks in accordance with Decision No. 3919/QD-UBND dated November 1, 2016, issued by the Binh Dinh Provincial People's Committee regarding the organizational regulations and operations of the Provincial Project Management Unit for the construction of agricultural and rural development works in Binh Dinh Province.

1.3.7.2. Contracted workers

During the implementation of the sub-project, the PPMU will engage various contractors to carry out different types of works, including technical design, construction supervision, and construction itself. The labor requirements for these works depend on the scale of each project. The duration of labor engagement will also vary according to the construction phases. The following outlines the anticipated types of contractual workers.

- For construction, it is estimated that a total of 595 contract workers will be hired by construction contractors under the two sub-components. This includes 30 consultants for sub-project preparation, 5 consultants for construction supervision, and 10 consultants for independent environmental supervision, 400 skilled workers hired by contractors and subcontractors, and 150 unskilled laborers.
- **Permanent technical staff of contractors (construction companies):** The permanent technical staff of contractors will be involved in the sub-project, including project managers, construction engineers, construction site managers, safety officers, and social, health, and environmental (ESHS) officers, as well as administrative and financial staff. It is anticipated that approximately 300 workers will be hired by the construction contractors.
- **Skilled workers hired by subcontractors:** Depending on the specialized requirements of each type of investment, contractors will engage subcontractors to perform works that meet the technical requirements of the PPMU. These skilled laborers may include

drivers and operators of heavy machinery to support construction activities such as piling, grading, compaction, filling, excavation, and the construction of bridges and embankments. These workers are expected to have the appropriate skills and experience to meet the job requirements. Skilled workers may be recruited locally or brought in from other areas (migrant workers). Based on experience from previous sub-projects, it is estimated that approximately 100 workers will be hired by subcontractors.

- **Unskilled community laborers hired by contractors/subcontractors:** To minimize the need to mobilize a large number of migrant workers, the sub-project will encourage contractors and subcontractors to hire local residents as unskilled laborers for simple tasks such as excavation, filling, material handling, assisting skilled workers, site cleaning, and watering the construction site. Under their contracts with the PPMU, contractors are required to coordinate with the PPMU to provide employment opportunities for local residents, particularly those from impoverished backgrounds seeking additional income. Local women are encouraged to take on roles suited to them in accordance with the 2019 Labor Code. Where necessary, contractors may liaise with local mass organizations, such as the Women's Union, to seek their assistance in recruiting female unskilled workers. It is estimated that approximately 150 local unskilled laborers will be mobilized to support road construction activities.
- **Consultants for sub-project preparation:** Several consulting firms will be engaged during the preparation phase of the sub-project. The PPMU will hire approximately 10 to 15 consultants to provide advisory services in sub-project design, environmental and social risk and impact assessment, procurement, and unexploded ordnance (UXO) clearance, among other areas.
- **Construction supervision consultants:** The PPMU will engage a construction supervision firm to oversee the daily construction works. The construction supervision team will consist of 15 to 20 individuals, including sub-project managers, sanitation, water supply, M&E engineers, hydraulic and road design engineers, sub-project support officers, geospatial technical staff, quantity surveyors, cost estimators, community liaison officers, and environmental, health, and safety officers. This team will be hired during the sub-project preparation phase but is expected to be involved from the early implementation phase through the completion of construction works.
- **Independent social and environmental supervision consultants (E&S supervision):** The PMU will hire independent E&S supervision consultants responsible for monitoring and evaluating the effectiveness of E&S compliance, including adherence to approved environmental and social plans. The independent E&S supervision consultants will be mobilized at the start of sub-project implementation and remain engaged until the completion of all resettlement activities, as required by the relevant environmental and social plans.

1.3.7.3. Primary supply workers

The subproject will need supply of construction materials such as aggregates, bitumen, steel, and precast concrete interlocking blocks, etc. to support construction operations. Those who are involved in supplying such material for the subproject construction are considered “primary suppliers” and workers who are engaged by such primary suppliers are considered “primary supply workers” - as defined in ESS2. The number and types of primary suppliers will be determined during subproject implementation and is estimated to be around 100 persons at this stage. The timing of labour use of primary supply workers will cover the construction stage of the subproject.

1.3.7.4. Community workers

The PPMU will not engage community workers as contribution of community labor to the subproject. The community members may be engaged by the contractors, if they need, and will be categorized and managed as "contracted workers".

1.3.7.5. Other stakeholders working in connection with the subproject

Stakeholders working in connection with the subproject other than the above subproject workers will include the government civil servants. They include staff of DOC, DOT, DARD, DONRE, district Land Fund Development Centers (district LFDC), provincial, township, district, commune People's Committees. These governmental staff will remain subject to the terms and conditions of their existing public sector employment, which are governed by the Vietnam Labor Code, the Law on Public Employees, and the Law on Civil Servants. There will be no legal transfer of their employment to the subproject. Thus, ESS2 will not apply to government civil servants and public employees.

1.3.7.6. Migrant workers

The subproject workers may come from other provinces to work in the subproject sites. The subproject is not expected to mobilize international workers because all construction packages are implemented in National Competitive Bidding (NCB).

1.3.8. Materials storage sites

The excavated soil and rock, which are not to be utilized, amount to approximately 1,736,674 m^3, including surface organic soil (of which 1,656,089 m^3 is from the My Thanh – Lai Giang coastal road and 80,582 m^3 from the 19C – Quy Nhon Port road). These materials will be gathered at locations agreed upon with local authorities in the communes along the route for local land leveling purposes. The surplus soil and rock will be mainly deposited at the bottom, with only about 156,393 m^3 of organic soil being partially used for planting, while the remainder will be spread over four designated sites in My Duc and Hoai My communes. The remaining sites will only receive excess soil and rock.

The designated sites are listed in the table below, where 7.45 hectares of production forest land will be reclaimed in My Duc and Hoai My communes for the project, and after land leveling, the area will be handed back to the local authorities. The conversion of the forest land has been approved under Decision No. 1008/QD-UBND dated March 28, 2024, by the People's Committee of Binh Dinh Province. For the remaining sites, depending on local demand, the excess materials will be used for land leveling at agreed-upon locations. During the dumping of excess materials, leveling must be carried out to meet technical requirements, ensuring proper drainage to prevent stagnation. There is no need for environmental rehabilitation, and after the process, the sites will be handed back to the local authorities as per the agreement with the local authorities.

Table 0-10. Specifications of materials storage sites

No.	Materials storage Sites	Location	Area (ha)	Capacity (m^3)	Describe
I. Coastal Road from My Thanh to Lai Giang					
From km 45+00 to km 68+169,14					
Disposal site	km56+356,34	On the left side of the route, located in My An Commune. Coordinates: **X** **Y** 1580303.95 598205.491 1579563.94 598539.005 1579601.57 598650.658 1579876.05 598656.469 1580044.27 598602.753 1580370.70 598375.473	17.35	386,089	This location is currently unused vacant land under the management of the My An Commune People's Committee (CPC). Upon completion of the land leveling, the site will be returned to the local authorities for further use. The area is approximately 2 to 2.5 meters lower than the surrounding land, with a planned disposal height of around 2 meters. The vegetation primarily consists of Casuarina trees, shrubs, grass, and common wildlife species such as mice, insects, and lizards. Upon completion of the site leveling, the land will be returned to the local authority for further use.

No.	Materials storage Sites	Location	Area (ha)	Capacity (m^3)	Describe
					
From km 68+169,14 to km 83+ 139,47					
#1	km 69 +414 - km 69 +823	On the right side of the route, located in My Duc Commune. Coordinates: **X** **Y** 1590976.83 593855.909 1590932.36 593885.958 1590897.42 593874.603 1590848.55 593849.276 1590814.49 593792.657 1590776.80 593750.836 1590759.71 593665.151 1590791.19 593641.518 1590823.50 593632.077 1590851.87 593639.370	3.16	348,000	This site is designated as production forest land, managed by My Duc CPC. It has been converted for a different use according to Decision No. 1008/QD-UBND dated March 28, 2024 by the Binh Dinh Provincial People's Committee (PPC), for use as a disposal site. Upon completion of the site leveling, the land will be returned to the local authority for further use. Currently the land has eucalyptus trees less than 3 years old. The site is approximately 10-12 meters lower than the surrounding land, with no residential areas nearby. The material dumping height is approximately 12 meters, leveled to match the road surface. The vegetation primarily consists of acacia, eucalyptus, shrubs, grass, and

No.	Materials storage Sites	Location	Area (ha)	Capacity (m^3)	Describe
		1590939.26 593726.917 1590959.06 593776.008			common wildlife species such as mice, insects, and lizards. 
#2	Km 70 +247 - km 70+500	On the right side of the route, located in My Duc Commune. Coordinates: **X Y** 1591307.90 593790.769 1591358.44 593818.261 1591401.91 593836.925 1591443.08 593785.150 1591454.88 593749.587 1591430.51 593715.361	1.19	149,000	This area planned to be production forest land, managed by the My Duc CPC. Land use purpose has been revised in accordance with Decision No. 1008/QD-UBND dated March 28, 2024, by the Binh Dinh PPC, for use as a disposal site. Upon completion of the land leveling, it will be returned to the local authorities for further use. The site is entirely planted with eucalyptus trees younger than 3 years old. It is a low-lying area, with the existing elevation approximately 12 to 14 meters lower than the surrounding area and not adjacent to any residential zones. The material dumping height will be around 14 meters, aligning with the road surface. The vegetation

No.	Materials storage Sites	Location	Area (ha)	Capacity (m^3)	Describe
		1591398.87 593703.663 1591357.66 593715.349 1591337.05 593737.291			mainly includes eucalyptus, shrubs, grass, and common wildlife species such as mice, insects, and lizards. 
#3	Km 70 +981 - Km 71 +130	On the right side of the route, located in My Duc Commune. Coordinates: **X Y** 1591710.94 594064.863 1591727.74 594127.366 1591757.81 594164.213 1591791.98 594193.757 1591837.28 594144.963 1591822.99 594101.713	1.2	128,000	This area is planed for production forest land under the management My Duc CPC. It has been reclassified for a new use as per Decision No. 1008/QD-UBND dated March 28, 2024 by the Binh Dinh PPC, to serve as a storage yard. Upon completion of the land leveling, it will be handed back to the local authorities for utilization. The site is entirely planted with eucalyptus trees younger than 3 years old. It is a low-lying area, with the current elevation approximately 12 to 13 meters lower than the surrounding area and not adjacent to any residential zones. The material dumping height will be approximately 12 meters,

No.	Materials storage Sites	Location	Area (ha)	Capacity (m^3)	Describe
		1591781.91 594030.596 1591733.14 594025.634			aligning with the road surface. The vegetation mainly includes eucalyptus, shrubs, grass, and common wildlife species such as mice, insects, and lizards. 
#4	km 71 + 765 - km 71 +812	On the left side of the route, located within the territory of Hoai My Commune. **X Y** 1592352.62 594038.116 1592403.44 594116.743 1592416.81 594120.468 1592479.97 594089.451 1592522.66 594024.91 1592484.31 593981.622	1.9	232,000	This area is designated as production forest land, managed by the Hoai My CPC. It has been reclassified for a different purpose under Decision No. 1008/QD-UBND dated March 28, 2024by Binh Dinh PPC to be used as a storage yard. Upon completion of land leveling, it will be returned to the local authorities for further use. The site is entirely planted with acacia trees that younger than 3 years old. It is a low-lying area, with the existing elevation from 12 to 14 meters lower than the surrounding area and not adjacent to any residential zones. The material dumping height will be around 14 meters, aligning with the road

No.	Materials storage Sites	Location	Area (ha)	Capacity (m^3)	Describe
		1592484.31 593981.622 1592371.80 593941.827			surface. The vegetation mainly includes eucalyptus, shrubs, grass, and common wildlife species such as mice, insects, and lizards. 
#5	km 78+ 232 - km 78 +613	On the left side of the route, located in Con Vang, Kim Giao Nam Hamlet, Hoai Hai Commune (situated in plot 31 on map sheet 10 and plot 01 on map sheet 12). Coordinates: **X Y** 1627751.139 588902.3 1627791.298 588963.9 1627652.613 589108.2	6	270,000	This land has been zoned for residential and commercial service infrastructure in Hoai Hai Commune and is managed by the Commune People's Committee. The area is currently a low-lying site, with the existing elevation approximately 5 meters lower than the surrounding area, covering an area of 6 hectares. It is in need of leveling. The material dumping height will be 5 meters, matching the elevation of the surrounding area. Upon completion of the site leveling, the land will be returned to the local authority for further use.

No.	Materials storage Sites	Location	Area (ha)	Capacity (m^3)	Describe
		1627496.217 589274.9 1627334.657 589156.9			The vegetation mainly includes eucalyptus, shrubs, grass, and common wildlife species such as mice, insects, and lizards. 
#6	km 78+ 232 - km 78 +613	Dieu Quang Hamlet, Hoai Hai (located in plots 49, 59 on map sheet 12, and plots 2, 3 on map sheet 13). Coordinates: **X Y** 1626304.235 590169.8529 1626346.709 590262.5271 1626583.142 590129.6868 1626839.289 590013.969 1626815.918 589960.5298	0.5	20,000	This is a vacant land managed by the Commune People's Committee. It is a low-lying area, with the current elevation approximately 4 meters lower than the surrounding area. The commune is seeking to level the site. The material dumping height will be 4 meters, bringing it in line with the surrounding elevation. Upon completion of the site leveling, the land will be returned to the local authority for further use. The vegetation mainly includes eucalyptus, shrubs, grass, and common wildlife species such as mice, insects, and lizards.

No.	Materials storage Sites	Location	Area (ha)	Capacity (m^3)	Describe
		1626651.235 590007.5113 1626514.237 590043.6524			
#7	km 78+ 232 - km 78 +613	Phase 2 Resettlement Area (located in plot 08, map sheet 14). Coordinates: **X Y** 1626366.573 590048.8084 1626567.877 589898.6195 1626421.416 589702.9207 1626200.083 589962.9819	6.18	123,000	This land is managed by the commune and designated for Phase 2 of the resettlement area. It is currently a low-lying area, with the existing elevation approximately 2 meters lower than the surrounding area. The commune plans to level the site. The material dumping height will be around 2 meters, matching the elevation of the surrounding area. Upon completion of the site leveling, the land will be returned to the local authority for further use. The vegetation mainly includes eucalyptus, shrubs, grass, and common wildlife species such as mice, insects, and lizards.

No.	Materials storage Sites	Location	Area (ha)	Capacity (m^3)	Describe
					
Materials storage sites total capacity				1,656,089	
II. Road connecting 19C Highway - Quy Nhon Port					
#1	Km 1 + 081,9-km1+245,48	A1 Area, located in Zone 3, Nhon Binh Ward. Coordinates: **X** **Y** 1526218.55 603170.747 1526171.19 603308.048 1526139.72 603318.037 1526068.21 603285.233 1526124.22 603141.036	1.61	80,582	This is an unused vacant land managed by the People's Committee of Nhon Binh Ward. The current elevation of the land is approximately 5 meters lower than the surrounding area and it is not adjacent to any residential areas. The ward is currently seeking to level this area. The material dumping height is expected to be around 5 meters, matching the surrounding area's elevation. Upon completion of the site leveling, the land will be returned to the local authority for further use. The vegetation mainly includes eucalyptus, shrubs, grass, and common wildlife species such as mice, insects, and lizards.

No.	Materials storage Sites	Location	Area (ha)	Capacity (m^3)	Describe
					
Materials storage sites total capacity				80,582	
Total				1,736,671	

*(**Source**: FS report, 2022)*

The domestic solid waste generated from worker's activities will be collected and transported to the solid waste landfill in Phu My district, An Nhon town and Quy Nhon city.

1.3.9. Demand for water and power

Electricity Supply: The contractor will collaborate with the local electricity regulatory authority to arrange for connection to the town's electrical grid to provide power for construction activities and for the use of workers. Mobile generators will also be prepared for use as necessary.

Fuel Supply: Diesel and gasoline required for the operation of construction machinery on-site will be supplied by local oil companies. Given the existing distribution network, fuel supply for the subproject is relatively convenient.

Water Supply: Water for construction and domestic use will be sourced from local clean water supplies. Prior to usage, the water must be tested and certified according to current standards. The contractor will coordinate with relevant authorities to establish water supply connections. Additionally, drinking water may be provided in storage tanks for use within the site. For worker accommodation, according to TCVN 13606:2023, the water supply standard is 45 liters per person per day. he estimated total water supply required is 24.75 m^3 per day.

1.3.10. Ancillary works Potential transportation routes

Transportation Routes

The planned transportation routes used for the subproject are as follows:

Table 0-11. Potential transportation routes for construction materials

No.	Source of Construction Materials	Transportation Route	Total Distance (km)
I. Coastal Road from My Thanh to Lai Giang			
1.1	Binh De Quarry	National Route 1 - Hoai Thanh Intersection - Provincial Route 639 (end point)	21.8
1.2	Cement	National Route 1A, Phu Kim Hamlet, Cat Trinh Commune, Phu Cat District - Provincial Route 635 Junction (km 1196 + 600, National Route 1A) - National Route 1A (km 1157 + 500, National Route 1A, My Chau Commune People's Committee)	50.5
1.3	Steel and Iron	Quy Nhon Port - National Route 1 (km 1157 + 500) - My Chau Commune People's Committee - Project end point (km 83 + 139)	83.6
1.4	Bong Son Sand Quarry	National Route 1A (Old Bong Son Bridge) - National Route 1 (km 1139 + 700) (Ba To Intersection) - DT 639 (end	16.7

No.	Source of Construction Materials	Transportation Route	Total Distance (km)
		point)	
1.5	Asphalt	Quy Nhon City - National Route 19 (km 17 + 256) - National Route 1 (km 1214 + 500) (My Chau Commune People's Committee) - Start point of the route	83.6
II. Road connecting 19C Highway - Quy Nhon Port			
2.1	Soil purchased from Quarry 209 (Canh Vinh Commune, Van Canh District)	Following QL19C - QL1A - Project location	10.6
2.2	Thuan Duc Quarry	National Route 1A - Dieutri Intersection - Start point of the route (Le Hong Phong and Tran Phu Streets)	6.4
2.3	Van Canh Sand Quarry -04 (Canh Vinh Commune)	Canh Vinh Commune Road - National Route 19C - Dieutri Intersection - Project starting point (intersection of Le Hong Phong and Tran Phu Streets)	23.4
2.4	Thu Thien Thuong Sand Quarry, Binh Nghi Commune	Binh Nghi Commune Road - National Route 19 - National Route 1A - Dieutri Intersection - Start point of the route	30.9
2.5	Other Material Sources	Quy Nhon Port - Tran Hung Dao (Dong Da Road) - Dong Da Junction - Nhon Hoi Economic Zone - Le Thanh Nghi Road - Project end point	5.4

*(**Source**: FS report, 2022)*

1.3.11. Implementation arrangements

**** Implementation plan***

The subproject will be implemented for 6 years (2022 - 2027). Detailed activities are presented in the following table.

Table 0-12. Tentative implementation plan

No.	Description	Completion Time
A	Preparation Phase	
1	Project formulation and approval	December 2020 (Completed)

No.	Description	Completion Time
2	Approval of Pre-Feasibility Study (Pre-FS)	December 2021 (Completed)
3	Submission and approval of Safety Policy reports (including EIA report)	Q4/2024
4	Approval of Feasibility Study (FS) and Project Operations Manual (POM)	Completed
5	Agreement negotiations	Q4/2024 - Q2/2025
6	World Bank approval	Q2/2025
7	Agreement signing	Q2/2025
B	Implementation Phase	
1	Preparation/Approval of detailed construction design	Completed
2	Selection of other Consulting Services (Construction Supervision Consultant; Safety Policy Monitoring Consultant; Monitoring and Evaluation Consultant; Auditor; etc.)	Q4/2025
3	Land clearance and compensation	Q4/2024
4	Clearance of unexploded ordnance and explosives	Completed
5	Selection of construction contractors	Q4/2025
6	Construction implementation	24 months (Q1/2026 – Q4/2027)
C	Completion Phase	
1	Project Completion Report	Q4/2027

(Source: FS report, 2022)

**** Total investment:***

Total Investment of the Subproject: The total investment for the subproject is 2,660 billion VND, equivalent to 115.15 million USD (temporary exchange rate: 1 USD = 23,100 VND).

**** Organization and management model***

(i) The role of Viet Nam Government

Viet Nam Government will manage, monitor and supervise the implementation of the subproject through monitoring and checking the management and implementation of the subproject; accelerating and supporting the disbursement of the ODA fund; resolving any

arising issues beyond the authority of the PPMU.

(ii) The role of the People's Committee of Binh Dinh province

- Cooperate with the MPI and relevant agencies to develop a strategy and plan to attract and utilize ODA and coordination of ODA; developing policies and measures for coordinating and improving efficiency of ODA utilization in the province and town;
- Coordinate with the Ministry of Planning and Investment to submit to the Government the signing of specific international treaties on ODA for programs and projects in their respective domains;
- Ensure the quality and efficiency of utilization of ODA capital directly under local management and implementation;
- Be responsible for land acquisition, clearance, implementation of policies for compensation and resettlement for programs and projects in the province in accordance with the law;
- Organize and direct the implementation the approved plans, periodically reporting to the Ministry of Construction; and
- Approve the feasibility study report of Binh Dinh's subproject.

(iii) The role of Binh Dinh Provincial Project Management Unit (PPMU)

- Develop and implement the procurement plan in compliance with the law on procurement;
- Provide information and documents related to the contract and advise the setting up and implementation of programs and projects; to be responsible for the legal basis and the reliability of the information and documents provided; to record and keep documentation of programs and projects in accordance with the law;
- Take full responsibility for management and utilization of investment capital from the preparation, investment and implementation. Exploit the possibility of investment return to repay the on-lending ODA;
- Perform supervision, project assessment, management and exploitation of the programs and projects;
- Take full responsibility for errors or violations committed in the course of program/project management which cause adverse effects on the economy, society, ecology, environment and national prestige;
- Be responsible in accordance with the law to compensate for any economic loss or to change the project's owner for any delay or violation with the investment decisions and approved documents or technical assistance, causing loss, waste and corruption, affecting the objectives and overall effectiveness of the programs and projects; and
- Comply with other rights and responsibilities as prescribed by law.

(iv) The role of functional units

There are 04 functional units including Administrative Office, Planning and Finance Unit, Technical Assessment Unit and Subproject Administration Unit to support Binh Dinh PPMU in the subproject implementation regarding procurement, financial management, and environmental and social performance.

The following figure describes the organizational structure of the subproject implementation:

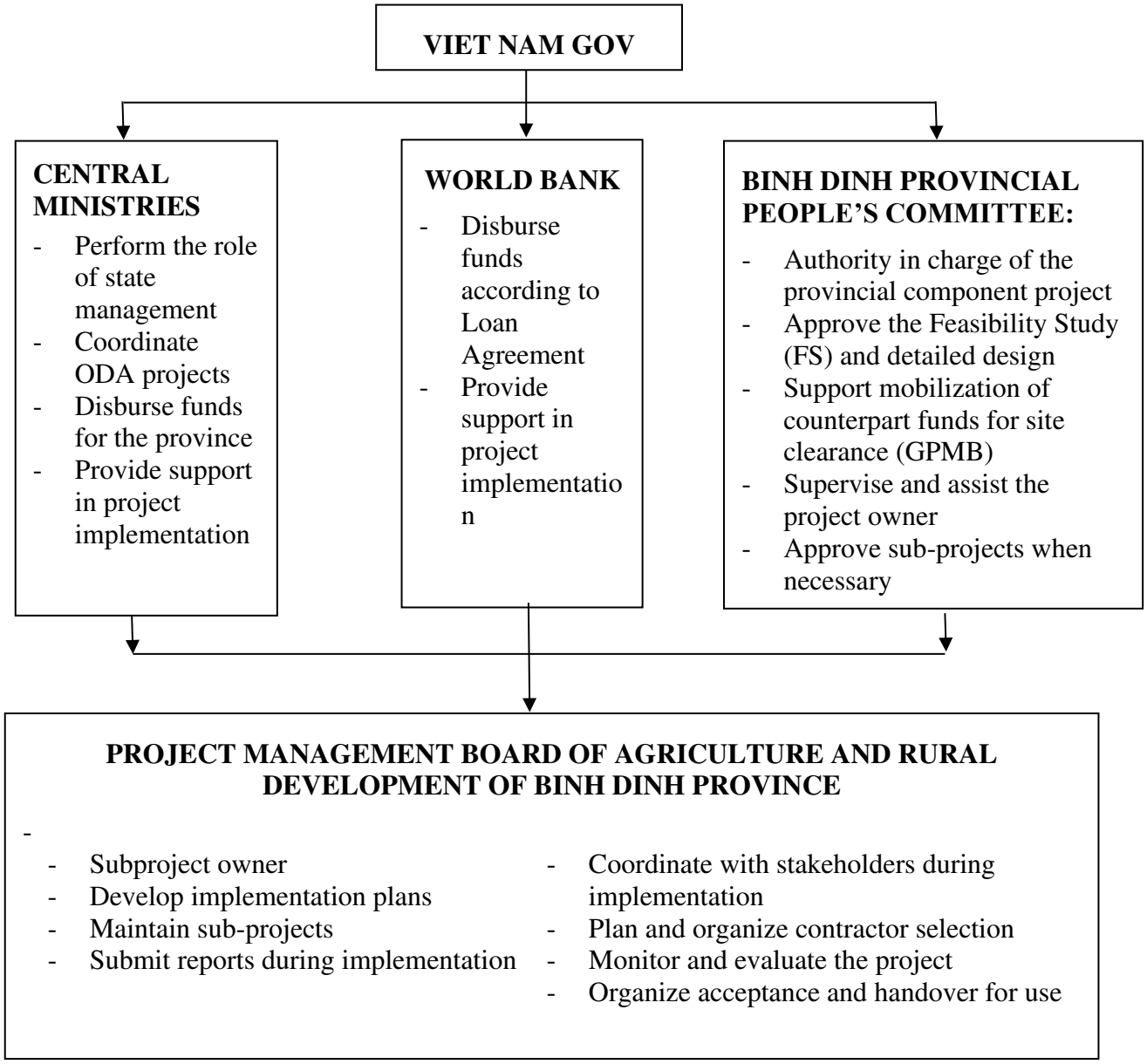


Figure 0-3. Organization and management model

1.4. ENVIRONMENTAL AND SOCIAL ASSESSMENT METHODS

In order to conduct environmental and social impact assessment, various methods and techniques have been deployed to serve ESIA study, as follows:

Checklists: Checklists are standard lists of types of impacts associated with a particular type of subproject. Checklists methods are primarily for organizing information or ensuring that no potential impact is overlooked. They are more formalized version of ad hoc approaches in that specific areas of impacts are listed and instructions are supplied for impact identification and evaluation.

Rapid assessment: Based on WHO's Guidelines, entitled Rapid Assessment of Sources of Air, Water and Land pollution, which focused primarily on the source inventory aspects of the management process. The rapid assessment procedure has been found particularly useful in the design of environmental control strategies and policies using relatively modest resources. The

rapid assessment procedure is most useful in making initial appraisal of the sources and levels of emissions from an area that has little or no previous pollution load data. It is also useful in selecting priority areas to conduct more extensive monitoring surveys.

Desktop review: The review and analysis of documents related to the subproject provided baseline information about the subproject and help explain why such changes or why not. On the other hand, it also helps to identify data gaps for further collection and assessment.

Expert judgment: Most methods and techniques for identifying, measuring, and assessing impacts rely on expert judgment. The experts themselves are heavily involved in all aspects of the assessment — they are used to help identify the potential for significant impacts, plan data collection and monitoring programs, provide their judgment on the level of significance for specific impacts, and suggest ways of reducing or preventing impacts.

Matrix: Matrix methods identify interactions between various subproject actions and environmental parameters and components. They incorporate a list of subproject activities with a checklist of environmental components that might be affected by these activities. A matrix of potential interactions is produced by combining these two lists (placing one on the vertical axis and the other on the horizontal axis).

Modelling: used to forecast the subproject impacts especially during construction such as air pollution, noise and vibration.

Comparison: Results of surveys on natural environment and laboratory analysis were compared with national technical regulations on the physical environment components to assess the baseline conditions of the environments in the subproject area.

GIS mapping: Use GIS, coordinate with available maps (such as topographical map) and special software (such as MapInfo, AutoCAD) to create comprehensive maps serving ESIA process, including: maps of sampling sites for flora and fauna survey; maps of sampling sites for air quality and surface water quality.

Field investigations and surveys: Based on available environmental data and maps (topographical map of Binh Dinh province, etc.), the implementation of on-site measurements, sampling, investigations and field surveys on natural environment components (air, water, soil and flora and fauna) in the project area was conducted throughout the year both in dry and rainy seasons.

Environmental analysis: All water, air and soil samples collected in the field were stored and brought to the laboratory for analyzing at the Environment and Construction Alliance Joint Stock Company (EAC ALLIANCE, JSC). All methods used for analysis are in accordance with the current national technical regulations and standards.

Stakeholder engagement and Information disclosure: Public consultation is conducted in accordance with ESS10 to (i) enable stakeholder's views to be taken into account the subproject design and environmental and social performance, (ii) ensure that appropriate subproject information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format, and (iii) provide stakeholders with accessible and inclusive means to raise issues and grievances, and allow Binh Dinh PPMU to respond to and manage such grievances.

Statistical and data processing: All statistical data and documents obtained from local levels (Commune, Ward and City levels), as well as on-site measurements were processed and expressed in tables, figures and charts for interpretation. This data is systematized according to time, adjusted to serve the determination of natural and socio-economic environment situation;

the analysis of trend in environmental change in the subproject area. These data are very crucial to make the basis of environmental impact assessment and prediction when implementing the subproject, as well as proposing countermeasures.

1.5. SUBPROJECT'S AREA OF INFLUENCE

The subproject's area of influence includes all construction sites of 9 communes/wards and town where the two routes go through. Besides, the subproject's area of influence also includes transportation routes, soil borrow pits, and materials storage sites listed in Tables 1.9, 1.10 and 1.11.

The following table describes identified social, economic and cultural and biophysical objects within the subproject's area of influence to be potentially affected by the subproject implementation.

Table 0-13 Identified areas and objects to be affected

No	Activity	Subproject's area of influence	Specific Receptors	
			Social, economic and cultural objects	**Bio-physical objects**
1.	Upgrading of the existing coastal road PR 639 (section from My Thanh to Lai Giang Bridge)	My Thanh, My Tho, My An, My Thang communes, Phu My district Hoai My commune, Hoai Hai, Hoai Nhon town	Residential areas of My Thanh, My An, My Thang, My Tho (Phu My district). Residential areas of Hoai My and Hoai Hai commune (Hoai Nhon town) (25 m far from the route). The area of agencies including as the high-tech shrimp farming belonging to Viet Uc - Phu My Company Limited; Sai Gon - Quy Nhon Mining Corporation; Livestock Joint Stock Company; My An Border Guard Station; My An Police Station; BCG Phu My Solar Power Plant. The family's worship houses include the Phan family and the Ho's family. There are 3 schools and kindergartens as My An Primary School; My Thang Primary School No.1; Ban Mai Xanh Kindergarten. Built heritage of the landing site (Lo Dieu). The market of Village 9, My Thang commune. The inter-village and inter-commune roads belong to	Air, soil, and water environment. Aquaculture area of households along the route. Aquatic ecosystems in the Ha Ra river, and coastal water in Lo Dieu. The area of casuarina forest, eucalyptus forest as sand preventing belt. The productive and protective forests of acacia, eucalyptus and mint trees. Home garden and agricultural ecosystems.

			this area. Medium voltage transmission line (Xuan Binh village, My An, Phu My). Grave sites in My Tho commune	
2.	New construction of an urban road connecting Highway 19C with Quy Nhon port	Nhon Binh, Nhon Phu and Dong Da ward, Quy Nhon city	The church (next to the route) and Long Thach pagoda. The Ha Thanh river dyke and the North-South railway pass through Binh Dinh province. Telecommunication Center 1 - VNPT in Binh Dinh province (close to the route), the amusement and entertainment complex including as coffee shops, swimming pools, football area - Danang gymnasium, belonging to Ha Thanh Joint Stock Company (close to the route area). The dyke along the Ha Thanh river. Graves and the water supply station on the left side.	Air, soil, and water environment Aquatic ecosystems in the area of Duc river, Cay Me river and Dinh river. Home garden and agricultural ecosystems.

1.6. PARTICIPANTS IN ESIA REPORT PREPARATION

No.	Name	Location	Work unit	Responsibility
I	**PPMU Binh Dinh**			
1	To Tan Thi	Manager	Binh Dinh Department of Agriculture and Rural Development (DARD)	- Overview of issues related to subproject design and implementation.
2	Nguyen Nhat Tien	Technical staff	Binh Dinh Department of Agriculture and Rural Development	- Provide technical support and coordinate with relevant agencies. - Coordinate the work.
II	**ESIA Consulting Group**			
1	Le Van Tuan	General Director	Vietnam Clean Water and Environment Joint Stock Company (VIWASE)	General management. Manage and coordinate all environmental and social consulting services

No.	Name	Location	Work unit	Responsibility
2	Nguyen Le Phu	Team Leader/ Master of Environmental Ecology	Team Leader - VIWASE	- Team Leader - General reporting management
3	Tran Thien Cuong	PhD in Environmental Science	Expert - VIWASE	Environmental impact assessment and pollution calculation. Synthesize and finalize all chapters in the report
4	Cao Thi Thu Huong	Master of Environmental Science	Expert - VIWASE	- Conduct field surveys and write chapters 1 and 2 of the report.
5	Tran Minh	Master of Environment and Sustainable Development	Expert - Vietnam Clean Water and Environment Joint Stock Company	Conduct field surveys, analyze alternatives and assess cumulative impacts. Participate in writing chapter 3
6	Pham Hung Son	Master of Environmental Science	Expert - VIWASE	- Conduct field surveys and write chapters 1 and 2 of the report.
7	Nguyen Quoc Huan	Master of Environmental Science	Expert - Vietnam Clean Water and Environment Joint Stock Company	- Participate in community consultation and develop chapter 6, participate in writing chapter 5
8	Quang Thu Nguyet	Master of Sustainable Development	Resettlement Specialist - VIWASE	- Survey and assess social status, social impact and measures to minimize social impact
9	Hoang Hoa	Master of Social Sciences	Gender Expert - VIWASE	Responsible for gender balance issues and enhancing the role of women in the implementation of the subproject
10	Nguyen Tuan Anh	Bachelor of Social Sciences	Expert - VIWASE	Conduct social surveys and community consultations
11	Bui Ngoc Ha	Bachelor of Social Sciences	Expert - VIWASE	- Survey and assess social status, social impact and measures to minimize social impact

CHAPTER 2. NATURAL, ENVIRONMENTAL AND SOCIO - ECONOMIC CONDITIONS OF THE SUBPROJECT AREA

2.1. NATURAL CONDITIONS

2.1.1. Geographical location

Binh Dinh is a coastal province located in the South Central Coast of Vietnam, with a total natural area of 6,025 km², comprising 11 administrative units, including Quy Nhon City and 10 districts and towns. The northern boundary of the province borders Quang Ngai Province, with the northernmost point located at 14°42'10"N, 108°55'4"E. The southern boundary borders Phu Yen Province, with the southernmost point at 13°39'10"N, 108°54'00"E. The western boundary borders Gia Lai Province, with the westernmost point at 14°27'N, 108°27'E (see Figure 1-1). The eastern boundary of the province is bordered by the East Sea, with a coastline stretching

134 km, and the easternmost point is located in Nhon Chau Commune, Quy Nhon City. Binh Dinh holds a strategically significant position in the socio-economic development of the Central Region, serving as one of the gateways to the sea for the Central Highlands, Southern Laos, and Northeastern Cambodia.

The coastal road DT639, along the My Thanh – Lai Giang section, passes through the communes of My Thanh, My Tho, My An, My Thang, and My Duc (Phu My District) and Hoai Hai, Hoai My (Hoai Nhon Town).

The road connecting National Highway 19C to Quy Nhon Port passes through Dieu Tri Town (Tuy Phuoc District) and the wards of Nhon Binh and Nhon Phu (Quy Nhon City) in Binh Dinh Province.

2.1.2. Topographical conditions

The construction site is characterized by coastal plains formed by river and marine deposition, interspersed with low mountains (<900m) extending to the sea. The coastline in this section is predominantly made up of erosive cliffs, highly rugged with many semi-enclosed bays and headlands. The surface is covered by Quaternary (QIV) sedimentary formations of mixed fluvial and marine origin, consisting of clay, sandy clay, and sand, with a thickness of several tens of meters.

The coastal road, My Thanh – Lai Giang section: The route through Phu My District and Hoai Nhon Town has the following topographical characteristics:

Phu My District: Phu My features diverse and complex terrain, including high mountains, midlands, and coastal plains. The mountain ranges are concentrated in the west and northwest, with terrain sloping from west to east at a steep gradient. This results in limited water retention, causing rapid and heavy water accumulation during the rainy season, while in the summer, the area suffers from droughts.

Hoai Nhon Town: The terrain of Hoai Nhon Town slopes down towards the northeast, and is divided into two main topographical types”

- Plain Terrain: Surrounded by mountain ranges, forming a three-sided valley (north, west, and south), with an average elevation of 8-10 meters. The highest point, near the mountain ranges, is 25 meters, while the lowest point, near the coast, is 1 meter.
- Low Mountain Terrain: The mountains are connected, forming an arc-shaped range, with an average elevation of 400 meters, the lowest point being 100 meters, and the highest point reaching 725 meters.

The terrain along the route is as follows:

- From Km45+00.0 to Km48+157.27 (L= 3,157.27m): The current cement concrete road has a roadbed width of 10.0-12.0m and a road surface width of 8.5m. The terrain is flat, with a high-tech shrimp farming area on the right and vacant land on the left.
- From Km48+157.27 to Km48+981.97 (L= 824.70m): The terrain on both sides of the route consists of sand and burial grounds. The area has sparse population, and the slope is relatively flat both vertically and horizontally.
- From Km48+981.97 to Km49+932.40 (L= 950.43m): The route ascends sand hills, with garden land, acacia, and eucalyptus plantations on both sides. The terrain is complex and obstructed, with relatively steep vertical and horizontal slopes.
- From Km49+932.40 to Km52+810.61 (L= 2,878.21m): The route passes through sand dunes behind a residential area and cuts across Tan Phung village's landfill. To the right

are cemetery and crop lands, while to the left are industrial plantations of acacia and eucalyptus. The terrain here is relatively flat, and the current road is an earthen road with an average width of 5.5m.

- From Km52+810.61 to Km55+365.60 (L= 2,554.99m): The route continues north along the current cement concrete road with a 3.5m-wide surface that is severely damaged. To the left are barren sand hills, and to the right are the Viet-Australia Binh Dinh Joint Stock Company, the Binh Dinh Livestock Joint Stock Company, and several shrimp breeding farms.
- From Km55+365.60 to Km55+412.40 (L= 46.80m): The route crosses Xuan Thanh village's intersection in My An commune.
- From Km55+412.40 to Km55+512.40 (L= 100m): The current Asphalt road is widened on both sides with cement concrete. The roadbed is 8.0m, and the road surface is 5.5m wide. The terrain on both sides is residential.
- From Km55+512.40 to Km56+172.59 (L= 660.19m): The current Asphalt road has a roadbed of 7.0m and a road surface of 5.5m. The terrain on both sides is residential.
- From Km56+172.59 to Km56+432.56 (L= 259.97m): The current BTN road is widened on both sides by 0.25m with cement concrete. The roadbed is 7.0-7.5m, and the road surface is 6.0m wide. The terrain on both sides consists of sand fields and a few shrimp farms.
- From Km56+432.56 to Km61+289.05 (L= 4,856.49m): The current Asphalt road has a roadbed width of 7.0-8.0m and a road surface width of 5.5m. The terrain on both sides mainly consists of sand fields, with several shrimp farms and ponds owned by a few households along the route.
- From Km61+289.05 to Km62+071.95 (L= 782.90m): The current Asphalt road is widened on both sides with cement concrete. The road surface is 5.5m wide. The terrain on both sides is residential, with many intersections for local traffic.
- From Km62+071.95 to Km62+571.77 (L= 499.82m): The current Asphalt road has a roadbed width of 7.0m and a road surface width of 5.5m. The terrain on both sides is residential.
- From Km62+571.77 to Km63+258.32 (L= 686.55m): The current Asphalt road is widened on both sides with cement concrete. The road surface is 5.5m wide. The terrain on both sides is residential.
- From Km63+258.32 to Km66+668.44 (L= 3,410.12m): The current Asphalt road is widened on both sides with cement concrete. The road surface is 5.5m wide. The terrain on both sides mainly consists of sand fields and vacant land, with several shrimp farms and ponds.
- From Km66+668.44 to Km67+798.33 (L= 1,129.89m): The current Asphalt road is widened on both sides with cement concrete. The road surface is 5.5-7.0m wide. The terrain on both sides is residential, with many intersections.
- From Km67+798.33 to Km68+105.18 (L= 306.85m): The route crosses the Ha Ra Bridge, which has 17 spans of 18m each.
- From Km68+105.18 to Km68+169.14 (L= 63.96m): The route widens to the right compared to the current Ha Ra Bridge. The terrain on both sides is relatively flat.
- From Km68+191.97 to Km72+469.14: The route follows the eastern slope of the Phu Thu Pass. The terrain consists of low hills and mountains.
- From Km72+469.14 to Km75+269.14: The route follows the current DT639 road with a road surface width of 6.0m and a roadbed width of 7.0m. A dense residential area lies to the left, and the beach is to the right.
- From Km75+269.14 to Km79+669.14: The route is entirely new, running east of the current Lo Dieu Pass, connecting to the existing cement concrete road in Hoai Hai

commune, Hoai Nhon district. The terrain consists of low hills and mountains.

- From Km79+669.14 to Km81+169.14: The current cement concrete road has an old cement concrete surface with a road surface width of 3.0m and a roadbed width of 4.0m. A densely populated residential area lies to the left of the existing road, while shrimp ponds and scattered houses are to the right. The terrain is flat.
- From Km81+169.14 to Km81+969.1: The route heads east through vacant land mounds to avoid the existing residential area in Cong Luong village, Hoai My commune, Hoai Nhon district.
- From Km81+969.1 to Km83+139.47: The route follows the current DT.639 road, which is asphalt overlaid on an old cement concrete road for a length of 1.17km. The road surface is 6m wide, and the roadbed is 7m wide. The current terrain on both sides consists of rice fields and residential areas. The route ends at the abutment M1 of Lai Giang Bridge.

The road connecting National Highway 19C to Quy Nhon Port passes through Tuy Phuoc district and Quy Nhon city, with the following terrain characteristics:

Tuy Phuoc District: Tuy Phuoc district is surrounded by the Kon River and Ha Thanh River, with an average elevation of 6 to 10 meters. It lies in the basin of two major rivers and near Nui Mot Reservoir.

Quy Nhon City: The terrain of Quy Nhon city is diverse, consisting of mountains, plains, coastal sand dunes, and islands. This variety makes the area highly susceptible to atmospheric flows from the sea, which cause heavy rain, strong winds, and flooding. Additionally, due to the short and steep mountain range, there is little capacity to regulate floods, leading to rapid flood flows and an increased risk of landslides.

The road is located in the downstream area of the Ha Thanh River, primarily passing through rice fields interspersed with residential areas, and the terrain is relatively flat.

2.1.3. Geological conditions

Based on the geotechnical measurement documents, boring results for geological surveys of roadbeds, bridges, field tests and results of soil samples in the laboratory, the stratigraphy of the work construction area is divided into soil layers described in the order from top to bottom as follows:

a. Upgrading of the Existing Coastal road (PR 639)

** Section from Km 45+0,00 to Km 68+169,14:*

Roadbed er D: Depending on each specific section, it may be necessary to dig out or make use of it, but it must be plowed and milled to the required density;

- Layer B: Soil layer with weak load capacity, strong compressive properties and unstable.
- Layer 1: Soil with fairly average load capacity for roadbed works;

Ha Ra Bridge

The bridge strata is mainly natural soil layers of from weak to very good load capacity, specifically:

- Layer B: Very soft silty clay. This class has low load capacity and is unstable. Conventional intensity R '<1 kG/cm^2

- Layer 1: Sand mixed with fine grains and gravel, poorly graded, loose to medium dense (SP). This layer has a fairly stable and fairly average load capacity. Conventional intensity R '= 1.5-2.0 kG/cm^2
- TK layer: Sandstone lens layer: The layer lies in layer 1 and only appears on the My Thanh side with a thickness of from 0.5 m to 1.0 m. This is a layer with high strength such as stone, so special attention should be paid to the construction.
- Layer 2: Less plastic clay (CL): This layer has good load-bearing capacity with conventional intensity R '= 2.5 kG/cm^2.
- Layer 3: Sand with clay (SC): The composition is sand mixed with clay and weathered laterite. This is a layer of soil with good load capacity, conventional intensity R'= 2.5-3.0 kG/cm^2.
- Layer 4: Sand with silt (M): The composition is sand mixed with silt and some gravel. This is a layer of soil with good load capacity, conventional intensity R '= 2.0 kG/cm^2.
- Layer 5: Weathered granite, strongly to medium cracked. The class has very good load capacity.

** Section from Km 68+169.14 to Km 83+139.47:*

From the distributions of geological formations in the boreholes along the route, the investigation area is considered in general in two areas with different stratigraphic features as follows:

From Phu Thu to end of Lo Dieu Pass (Km 68+169.14m to Km 79+616m)

- Layer 1: Concrete pavement structure, surface layer of borehole HKND1, thickness of 0.5 m
- Layer 2: Brownish yellow medium sand. Layer thickness > 1.0 m. Medium dense to dense structure with a predominant composition of sand. Origin from accumulation of the sea and accumulation by wind.
- Layer 3: Bluish yellow-gray sand, thickness of 2.1 m; Very stiff, silt, clay and sand.
- Layer 4: Plastic, bluish grey sand, thickness of 2.7 m. The main composition includes sand and clayed silt. Alluvial origin.
- Layer 5: Reddish brown, yellowish brown, gray white cobble, gravel, clay with granular nodules. Thickness> 1.0 m. Plastic to hard. The main composition is clayed silt and gravel. Weather rock local origin.
- Layer 6a: Bluish grey, dark grey, brownish red strong weathered magma. The thickness has not been fully determined, about> 5.9 m. Low hardness, average dry compressive capacity is 189.2dN/cm^2.
- Layer 6: Bluish grey, dark grey, aggregate, medium weathered magma rock. The thickness has not been fully determined (> 5.0m). The hardness is not high due to the grain distribution during formation, the average dry compressive strength is 322.9 dN/cm^2.

<u>Cong Luong Area (from Km 79+616 m to Km 83+137.42 m):</u>

- Layer 1a: Yellowish grey, bluish grey sand clay mixed with the plant remains of the boreholes. Thickness of 1.0 to 1.5 m.
- Layer 1b: Surface layer is road embankment with a thickness of 1.3 m.

- Layer 1: Fine to coarse sand mixed with gravel and clayed silt, bluish brown, dark brown, brown and dark gray. Layer thickness > 7.0 m, is the surface layer, porous to tight texture. The main composition is sand. Alluvial origin.
- Layer 2: Reddish brown, grey, bluish grey, whitish grey, yellowish brown clayed sand, clayed silt. Thickness> 1.6 m. Plastic to very stiff. The main composition includes sand and clayed silt. Alluvial origin.
- Layer 3: Yellowish bluish yellow, medium sand and clayed silt. Thickness 4.1 to 5.3 m. Medium dense structure. The main composition includes sand and clayed silt. Alluvial origin.
- Layer 4: Bluish grey, yellowish brown grey clayed sand, clayed silt. Thickness 2.8 to 6.8 m. Plastic to very stiff. The main composition includes sand and clayed silt. Alluvial origin.
- Layer 5: Yellowish brown, yellow, medium sand, clayed silt, thickness of 9.7 –10.0 m, medium dense to dense structure with mainly sand composition. Alluvial origin.
- Layer 6: Yellowish grey, whitish grey sand mixed gravel; the layer thickness has not been fully determined (> 5.7 m), with very dense structure.

Assessment: Since the strata in the project construction area mainly consist of loose soil layers (coarse sand) on the surface, constructing the roadbed may result in erosion and scouring. Therefore, measures to protect the slope and roadbed are necessary. According to Vietnam's construction standards (TCXD VN 375:2006), the surveyed area is located in an earthquake zone of level VII (based on the MSK-64 scale). Areas prone to landslides are shown in Table 1-11.

b. Road construction connecting Highway 19C with Quy Nhon Port

** Normal roadbed section: (from Km0 to Km1+120)*

- Layer D: The filling soil is mainly sand mixed with debris. This layer appears in the sections from Km0 + 65 to Km0 + 81.
- Layer 1: Sand mixed with clayed dust (SM-SC), yellowish brown, bluish grey, plastic state. The layer has an alluvial origin, the layer thickness ranges from 0.3m (LK.ND1) to 4.0m (LK.CM2). Conventional intensity R '= 1.0 kG/cm^2. This class appears mostly in the section.
- Layer 3: Poorly graded gravel and gravel (GP), bluish grey, porous to medium dense. The layer has flood origin, the layer thickness ranges from 1.8m (LK.ND9) to 10.7m (LK.ND1). Conventional intensity R '= 3.0 kG /cm^2. This layer is uniformly distributed in the study area.

** Weak roadbed: (Km1+120 to Km6+418)*

- Layer D: Compound soil of embankment includes field embankment soil, sand and debris. This layer appears in the sections from Km 1 + 242 to Km1+255; Km2+355 to Km2+377; Km2+774 - Km2+785; Km3+547 - Km3+552; Km4+150 - Km4+270; Km4+734 - Km4+764; Km5+190 - Km5+193; Km6+93 - Km6+418.
- Layer R: Field soil: Very plastic clay, greyish brown, soft to plastic. The layer is modified by humans to grow rice, the thin layer thickness ranges from 0.4m to 1.0m. This layer appears in the sections from Km1+908 - Km1+983; Km2+270 - Km2+355; Km2 + 377 - Km2+454; Km2+545 - Km2+592; Km2+629 - Km2+638; Km2+895 -

Km2+911; Km2+976 - Km3+27; Km3+46 - Km3+193; Km3+238 - Km3+277; Km3+328 - Km3+622; Km3+701 - Km3+832; Km3+897 - Km3+994; Km4+69 - Km4+148; Km4+278 - Km4+401; Km4+445 - Km4+473; Km4+710 - Km5+88; Km5+178 - Km5+252; Km5+335 - Km6+03.

- Layer 1: Sand mixed with clayed silt (SM-SC), yellowish brown, bluish grey, plastic. The layer has an alluvial origin, the layer thickness ranges from 0.3m (LK.ND1) to 4.0m (LK.CM2). Conventional intensity R '= 1.0 kG/cm^2. This layer appears in the sections from Km1+120 - Km1+921.24; Km1+983 - Km2+270; Km2+455 - Km2+895.52; Km2+914 - Km2+976; Km3+28 - Km3+60; Km3+193 - Km3+238; Km3+277 - Km3+327; Km3+621 - Km3+701; Km3+832 - Km3+897; Km3+994 - Km4+78; Km4+144 - Km4+710; Km5+88 - Km5+178; Km5+252 - Km5+335; Km5+994 - Km6+35.
- Layer 2: Less plastic clay (CL), yellowish brown, bluish grey, plastic to stiff. The layer has an alluvial origin, the layer thickness ranges from 0.6m (LK.ND10) to 3.0m (LK.ND4). Conventional intensity R '= 2.0 kG/cm^2. This layer appears in the section from Km 2+30 to Km 4+45; Km 4+85 – Km 4+473; Km 4+902 – Km 5+252.
- Layer 3: Poorly graded gravel (GP), bluish grey, porous to medium dense. The layer has flood origin, the layer thickness ranges from 1.8 m (LK.ND9) to 10.7 m (LK.ND1). Conventional intensity R '= 3.0 kG/cm^2. This layer is uniformly distributed in the study area.
- Layer 4: Very plastic clay (CH), also known as clayed mud, bluish grey, soft plastic. The layer has an alluvial origin, the layer thickness ranges from 3.7 m (LK.ND1) to 46.0 m (LK.CC1). Conventional intensity R '<1.0 kG/cm^2. This layer is distributed in the section from Km1 + 121 to Km 6 + 418. The layer has gradual slope from Cay Me bridge to Vo Nguyen Giap street.
- Layer 5: Poorly graded gravel (GP), whitish grey, bluish grey, medium dense. The layer has flood origin, the layer thickness ranges from 1.5m (LK.CC1) to 38.2m (LK.VL2-02). Conventional intensity R '= 3.5kG/cm^2. This layer is distributed in the section from Km 1+121 to Km 6+349. The layer inclined gently from Cay Me bridge towards Vo Nguyen Giap street.

Assessment: The geological foundation is stable, with no signs of dynamic geological activity that could negatively affect the stability of the structure.

2.1.4. Hydrogeological Characteristics

National Route 19C Connecting Quy Nhon Port: Groundwater in the study area lies within the aeration zone, influenced by surface water levels. At the time of the survey, no signs of dynamic geological activity that could compromise structural stability were detected. Groundwater levels were recorded as follows:

- For the roadbed section from Km1 to Km2, groundwater levels fluctuated between elevations of 1.0 and 1.5 meters.
- For the roadbed section from Km2 to Km6+349, groundwater levels were recorded at an elevation of -1.0 meter.

Coastal Road Section from My Thanh to Lai Giang: Surface water in the surveyed area consists of rainwater flowing from the high mountainous regions, draining into the sea through streams. Water accumulates in ditches, ponds, and cultivated fields. Groundwater levels in the surveyed area fluctuate between elevations of 0.29 and 2.45 meters.

2.1.5. Climatic and Meteorological conditions

Binh Dinh belongs to South Central Coast climate - Eastern Annamite climate region. There are two distinct seasons, the dry season from January to August and the rainy season from September to the end of December. In the rainy season, it is often affected by storms with an average frequency of 1 to 2 storms per year.

2.1.5.1. Precipitation

The total rainfall during the period from 2019 to 2021 averaged between 1,293.4 mm and 2,458 mm. The lowest rainfall was recorded in March, April, and June of 2019, with amounts close to zero. The highest rainfall occurred in November 2021, totaling 1,091.3 mm. The highest daily rainfall during this period was 277 mm, recorded in October 2021.

Table 0-1. Annual total rainfall (mm)

Month	2019	2020	2021
Yearly	1944,5	1293,4	2458,1
Jan	302,8	15,6	16,7
Feb	0,3	42,4	4,0
March	0,0	0,4	21,2
April	0,0	144,3	33,6
May	117,7	10,5	51,9
June	0,0	3,0	12,3
July	37,1	3,5	39,4
August	54,6	88,0	60
Sep	347,3	151,3	294,5
Oct	622,6	504,1	622,2
Nov	438,4	241,1	1091,3
Dec	23,7	89,2	211,0

*(**Source:** The Meteorological and Hydrological Center of Binh Dinh Province)*

2.1.5.2. Air Temperature

The annual average temperature in the province ranges from 26.3^{0}C - 28.1^{o}C, Quy Nhon city is the place with the highest average annual temperature of 28.1^{o}C (2019) and the average annual temperature increases year by year.

Table 0-2. Average temperature (^{0} C)

Month	2019	2020	2021

Yearly average	**28,1**	**27,3**	**27,4**
Jan	24,3	24,8	22,2
Feb	25,8	24,5	23,8
March	27,3	24,1	26,5
April	28,8	27,7	28,1
May	29,8	29,5	29,6
June	31,6	29,9	30,8
July	31,4	29,6	30,2
August	31,5	30,1	31,3
Sep	29	29,5	28,3
Oct	27,7	27,5	27,7
Nov	26,0	26,4	25,8
Dec	24,2	24,2	24,2

*(**Source:** The Meteorological and Hydrological Center of Binh Dinh Province)*

2.1.5.3. Sunshine hours and Evaporation

Binh Dinh Province experiences a relatively high total sunshine duration ranging from 2,518 to 2,752 hours, distributed evenly over the years from 2019 to 2021. There is a notable increasing trend in 2019, reaching 2,752 hours. The total sunshine duration throughout the year influences the evaporation rate, with total evaporation varying between 882.3 mm and 1,407 mm.

Table 0-3. Number of Sunshine Hours

Month	**2019**	**2020**	**2021**
Yearly	**2752**	**2602**	**2518**
Jan	172	194,0	194,0
Feb	244	185	204,0
March	276	295,0	259,0
April	303	246,0	260,0
May	301,0	318	312,0
June	307,0	287,0	270,0
July	257,0	298,0	224,0
August	244,0	224,0	292

Sep	161	248,0	182,0
Oct	223,0	123,0	142,0
Nov	123,0	116,0	77,0
Dec	141,0	68,0	102,0

*(**Source:** The Meteorological and Hydrological Center of Binh Dinh Province)*

2.1.5.4. Humidity

The annual average humidity ranges from 76 - 83% and tends to decrease in 2019 due to such weather factors as temperature, the total number of sunny hours and rainfall in the year. The annual average humidity range varies from 1 to 2%.

Table 0-4. Annual average humidity (%)

Month	**2019**	**2020**	**2021**
Yearly average	**76,4**	**73,3**	**78,7**
Jan	80	83	85
Feb	81	81	73
March	82	84	79
April	78	23,0	80
May	76	80	80
June	71	78	70
July	67	80	70
August	65	72	69
Sep	74	78	84
Oct	83	82	84
Nov	83	82	87
Dec	77	80	83

*(**Source:** The Meteorological and Hydrological Center of Binh Dinh Province)*

2.1.5.5. Wind velocity

In Binh Dinh, the average annual wind speed is relatively low, ranging from 2.5 to 2.7 m/s, with average monthly wind speeds varying from 1.7 to 3.8 m/s. In coastal areas, the average wind speed during the winter monsoon is higher than in the summer monsoon, peaking in November and December. Conversely, in valleys within mountainous regions, the average monthly wind speed during the summer monsoon exceeds that of the winter monsoon, with the highest speeds

occurring in July and August. On the wind-swept highlands, the average wind speed is greater than that in lower areas and sheltered valleys. At the same elevation, wind speeds in coastal regions tend to be higher than those in inland areas.

2.1.5.6. Extreme weather phenomena

In Binh Dinh province, dry and hot foehn winds from Laos usually blows from June to August. On average, foehn winds blows for a period of 8 days in June, 10 days in July, and 11 days in August. Storms usually come from September to November, concentrating in October. Every year, on average 1.13 storms hit Binh Dinh province, and tends to rise. In years where La Nina and El Nino manifest, there is usually one additional storm, with La Nina bringing in more storms than El Nino. Rainstorms are also popular from April to October, particularly from May to September with a monthly average of 3-7 rainstorm days. Flooding usually occurs in the later months when rainfall reaches peak levels, and the subproject area is one of the areas most likely to be affected by flood. The dry season lasts for 8 months, droughts usually occur in summer and fall (from May to September).

Storms mainly occur in September, November and October, accounting for 47% of the total number of storms and affect Binh Dinh province every year.

Based upon the observational data from the hydrological stations in Binh Dinh province, it indicates that in the upstream area of Kon river (Binh Tuong station), the probability of biggest flood in the year appears in November is 55.9%; it is 29.4% in October; and it is 11.8% in December. In the Kon river delta (Thanh Hoa station), the probability of the largest flood appearing in November is 47.1%; it is 35.3% in October; and the remaining in September and December.

In the upstream area of Ha Thanh river (Van Canh station), the biggest flood of the year is 50% appearing in November; it is 36.4% and 9.1% in October and December respectively. In the downstream area of Ha Thanh river (Dieu Tri station), the highest likelihood of flooding in November is 64.7% and 23.5% in October.

Storms, floods and droughts frequently happen in the province. During three years of 2012, 2013, 2014, there were 5 storms consisting of storm No.7, No.10, No.14, No.15 and No.4. The level of risk is from level 3 (storm No.7) to level 5 (storm No.14, No.15 influenced by the Haiyan typhoon); the damage level is assessed at medium to large. When the damage in the previous year caused by storms and floods has not been overcome, the following year continues to be affected by storms, floods with stronger levels; the vulnerability therefore is higher. The three main subjects namely as people, production and infrastructure severely damaged. In the last 5 years from 2015 to 2019, storms have caused the total of 94 deaths, 55 injuries, 1,219 collapsed houses and 2,578 destroyed houses; 58 sunken boats. Infrastructure for transportation, irrigation, water supply, medical stations, and schools were severely damaged. The physical damage is estimated at about 4,500 billion VND.

Due to such extreme factors, the route from National Highway 19 connecting to Quy Nhon port has calculated the hydraulic and hydrological factors with a design frequency of 5% for foundation, road surface and structures.

As for the coastal route (PR.639), the My Thanh - Lai Giang section, due to its less complicated nature and not located in the flood drainage area, the hydraulic and hydrology characteristics have been calculated with the design frequency for the foundation, road surface and culverts, small bridges with P = 4% and large and medium bridges at P = 1%. For the section km 68+169.14 to km 83+139.47 passes though the Phu Thu and Lo Dieu mountain passes, slope stabilization and protection measures are proposed to reduce erosion and land slide such as

planting grass (vetiver grass) and slope revetment and pitching.

Regarding to Pre-FS report confirm that the My Thanh – Lai Giang not occur the flooding due to the section is kept in touch with sea and water is rapidly drainage to the sea. Sea level rise scenarios of Binh Dinh province did not warn any issues on flooding for this area.

2.1.6. Climate change and Sea level rise scenarios

The scenarios for climate change and sea level rise in Binh Dinh Province were developed by the Institute of Meteorology, Hydrology, and Climate Change based on the climate change and sea level rise scenarios for Vietnam, published by the Ministry of Natural Resources and Environment in 2020, following the RCP 4.5 and RCP 8.5 scenarios.

Temperature: Calculations indicate that during the period of 2046-2064, the average temperature in Binh Dinh is expected to increase by approximately 1.3°C (RCP 4.5) and 1.8°C (RCP 8.5). By 2080-2099, the temperature is projected to rise an additional 1.7°C under RCP 4.5 and 3.2°C under RCP 8.5 compared to the baseline period (1986-2005).

Precipitation: By 2046-2064, the average annual precipitation in Binh Dinh is anticipated to range between 1,857 mm and 1,893 mm, with changes compared to the baseline (1986-2005) varying from approximately 13.2% (RCP 4.5) to 15.4% (RCP 8.5). From 2080-2099, precipitation is expected to further increase by approximately 15.6% under RCP 4.5 and 13.2% under RCP 8.5. Additionally, calculations show that average precipitation during the four periods (December-February, March-May, June-August, September-November) is projected to increase compared to the baseline period. Thus, it is evident that precipitation in Binh Dinh is likely to rise in the future, leading to an increased risk of flooding.

Sea Level Rise: Sea level rise in coastal areas is projected to increase over time according to climate change scenarios. In the early decades of the 21st century, the results among scenarios are relatively close; however, significant differences emerge around 2040. The lowest increase in sea level is projected under the RCP2.6 scenario, while the highest is under the RCP8.5 scenario. By mid-century, sea level rise under RCP8.5 is expected to reach 28 cm compared to the baseline period, which is 5 cm higher than RCP4.5. By the end of the century (2100), sea level rise under RCP8.5 will accelerate significantly, reaching 77 cm compared to the baseline.

Calculations indicate that the highest projected sea level rise due to climate change in Binh Dinh by 2100 is approximately 59.02 to 101.41 cm under RCP8.5 and approximately 39.62 to 74.0 cm under RCP4.5. In the first half of the century, sea level rise is expected to occur at a slower rate (about 15-20 cm per 50 years) compared to the second half of the century.

Areas at risk of flooding due to sea level rise in Binh Dinh have been estimated based on coastal sea level rise scenarios. If sea level rises by 1 meter, over 124 square kilometers in Binh Dinh will be at risk of flooding (accounting for more than 2.04% of the province's total area). If sea level rises by 70 cm, approximately 87.7 square kilometers in Binh Dinh will be at risk of flooding (about 1.44% of the province's total area).

Dieu Tri Town and Quy Nhon City are located near the downstream areas of the Ha Thanh River and a tributary of the Kon River. In recent years, due to the effects of climate change, the frequency and severity of heavy rainfall and flooding in the Kon-Ha Thanh river basin have increased significantly, causing flooding in the districts of Tay Son, Tuy Phuoc, Phu Cat, An Nhon Town, and Quy Nhon City. This has greatly impacted the socio-economic development goals and the livelihoods of people in Binh Dinh Province. Recent consecutive heavy floods indicate that the downstream areas of the Kon-Ha Thanh rivers are critical flood-prone zones in the province. Contributing factors include flood regulation from upstream reservoirs, high tidal surges, loss of protective forests and vegetation cover, infrastructure projects obstructing

water flow, newly constructed roads, and irrigation dams that hinder flood drainage. However, the primary factor remains heavy and widespread rainfall.

2.1.7. Hydrological conditions

2.1.7.1. Hydrological regime

The rivers in Binh Dinh Province all originate from the high mountainous areas on the eastern slopes of the Truong Son mountain range. In the upper reaches, many mountain ranges are located close to the riverbanks, resulting in steep gradients, rapid flood fluctuations, and short flood transmission times.

In the delta regions, the riverbeds are wide and shallow, with numerous channels and streams. During the dry season, water sources are very scarce; however, during heavy floods, water inundates vast areas in the downstream regions, causing prolonged flooding due to the narrow river mouths and flood control structures, which hinder effective flood drainage.

The project area is influenced by the hydrology of four major rivers: Lai Giang River, Kon River, La Tinh River, and Ha Thanh River. The main characteristics of these rivers are as follows:

a) Lai Giang River

Lai Giang River consists of two main branches: An Lao River, which originates from the mountainous region in the north of An Lao bordering Quang Ngai Province and flows through An Lao District in a north-south direction; and Kim Son River, which starts from the forested mountains of Hoai An District, flowing in a southwest-northeast direction. An Lao River and Kim Son River converge at a junction located approximately 2 km west of Bong Son Bridge, then discharge into the sea through the An Du estuary.

The drainage area up to the confluence is 1,272 km², with An Lao River contributing 697 km² and Kim Son River contributing 575 km². The total drainage area is 1,402 km², and the main river length is 85 km.

According to flow data from the Binh Dinh Provincial Meteorological and Hydrological Center since 1982, the average annual flow rate of Lai Giang River across the entire basin is 67.18 m³/s, with a flow modulus of 45.83 l/s·km², and the total annual flow volume is 2.18 billion m³. The annual flow distribution is uneven, with the flow during the flood season from October to December accounting for approximately 73% of the annual flow. Flooding occurs rapidly and significantly, with high tides contributing to flooding, erosion, and sedimentation in areas along both riverbanks.

b) La Tinh River

La Tinh River is the smallest among the four main rivers in the province. It originates from the mountainous forest region at an elevation of 400 to 700 meters in the western parts of Phu My and Phu Cat districts. The river flows in a northwest-southeast direction until it reaches Cay Gai Dam, where it shifts to a west-east direction, then turns northeast at Cay Ke Dam and discharges into Nuoc Ngot Lagoon before flowing out to the sea through De Gi estuary. The drainage area is 780 km², and the main river length is 52 km.

The La Tinh River basin has a low flow modulus of 35 to 40 l/km²/s. Due to its small drainage area and steep gradient, there is no groundwater replenishment during the dry season, leading to poor surface buffering. The flood flow accounts for up to 90% of the annual flow, with the flood flow modulus being less than 80 l/km²/s and the dry season flow modulus ranging from 10 to 15 l/km²/s.

c) Kon River

Kon River is the largest river in the province, with a total drainage area of 3,067 km² and a main river length of 178 km. The river originates from the eastern slopes of the Truong Son mountain range, with elevations ranging from 700 to 1,000 meters. It flows in a northwest-southeast direction until it reaches Thanh Quan - Vinh Phuc, where it shifts to a north-south direction. Upon reaching Binh Tuong, the river changes to a west-east direction, and at Binh Thanh, it splits into two main branches: the Da Dam branch, which flows out to An Loi estuary and discharges into Thi Nai Lagoon, and the Tan An branch, which has the Go Cham branch approximately 2 km downstream from the confluence. After flowing through the lowlands, it joins the Tan An River and empties into Thi Nai Lagoon at Tan Giang estuary. All branches, including Da Dam and Tan An, discharge into Thi Nai Lagoon and then to the sea via Quy Nhon Port. In addition to these main river channels, the lower plains of Kon River are interconnected by a dense network of smaller rivers.

A notable characteristic of the main Kon River is that its middle section has a wide channel, which becomes increasingly narrow downstream due to consistently low flows being extensively utilized for agricultural irrigation.

d) Ha Thanh River

Ha Thanh River originates from peaks reaching 1,100 meters in the southwestern part of Van Canh District, flowing in a southwest-northeast direction. Upon reaching Dieu Tri, the river splits into two branches: Ha Thanh and Truong Uc. The Ha Thanh branch further divides into four branches: Cay Me River, Cat River, Dinh River, and Ha Thanh River, all of which discharge into Thi Nai Lagoon through the Hung Thanh and Truong Uc estuaries, then flow into the sea via Quy Nhon Port. The drainage area is 539 km², and the main river length is 58 km.

<u>At bridges construction sites:</u>

- Truong Uc River (Duc River): Truong Uc River is the main branch, accounting for 42.6% of the total flood discharge of the Ha Thanh River. The riverbed width ranges from 60 to 80 meters, with a bed elevation between -0.25 and -0.5 meters. The 10% flood flow is approximately 321 m³/s, corresponding to a water level of 4.22 meters.
- Cay Me River: This river contributes 19.5% of the total flood flow of the Ha Thanh River. The riverbed width is about 60 meters, with a bed elevation of approximately -0.5 meters. The 10% flood flow is around 79 m³/s, resulting in a water level of 3.75 meters.
- Dinh River: Dinh River is a tributary of the Ha Thanh River, with a riverbed width ranging from 40 to 45 meters and a bed elevation between +0 and -2.3 meters. The 10% flood flow is about 52 m³/s, with a corresponding water level of approximately 2.63 meters.
- Cong Luong Bridge Hydrological Area: This area is approximately 10 to 25 meters wide, with a bed elevation of around 0.87 meters. The 4% flood flow is approximately 414.08 m³/s, corresponding to a water level of around 3.25 meters.
- Ha Ra Bridge Hydrological Area: This area has a width of 60 to 115 meters and a bed elevation ranging from -2 to 0.47 meters, with a water level of about 4 meters. It is located in a region with flow rates fluctuating between 35 to 45 l/s/km². The area connects to the sea through Ha Ra estuary, which opens temporarily during the flood season and becomes silted during the dry months.

Currently, there are no erosion phenomena observed in these hydrological areas.

Table 0-5. Water flow rate (m^3/s)

River	Months												Average
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lai Giang	3.35	3.74	3.86	7.97	4.05	4.07	8.79	4.32	2.99	2.84	5.01	4.75	4.65
La Tinh	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Kon	1.21	1.44	1.48	4.53	1.68	1.76	5.56	2.10	0.94	0.70	2.31	2.19	2.16
Ha Thanh	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19

2.1.7.2. Oceanography

The tidal regime in the study area is characterized by the tidal flow from Quang Ngai to Nha Trang. The primary tidal condition is semi-diurnal with irregularity. The number of tidal days in a month ranges from 17 to 26 days, with additional minor tides typically occurring on low water days. The duration of high tide is generally longer than that of low tide by 1 to 2 hours, which is favorable for irrigation water collection but also affects the duration of flood receding and increases salinity intrusion. According to the tidal data recorded in Quy Nhon, the calculated tidal characteristics are as follows:

Table 0-6. Characteristics of Tide Levels at the Quy Nhon Station by Month (cm)

(Chart Datum System)

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Yearly
Average Tide Level	158	153	151	148	146	143	140	145	155	170	170	168	154
High Tide Peak	257	256	238	243	246	254	242	248	271	277	271	296	296
Low Tide Base	50	38	56	45	33	25	36	27	59	83	63	57	27
Average High Tide Peak	243	229	211	216	226	228	227	223	227	246	252	252	232
Average Low Tide Base	72	74	86	77	65	52	49	62	83	99	89	75	74
Average Tide Range	171	155	125	139	161	176	178	161	144	147	163	177	158

From the table above, it can be seen that the average tidal range for the months is between 134 cm and 176 cm.

Coastal Route from My Thanh to Lai Giang: The coastal route segment from My Thanh to Lai Giang crosses the estuarine area of the Lai Giang and La Tinh river basins. This route experiences complex hydrological conditions with steep river gradients, short flood propagation

times, and flood flows comprising 80-90% of the annual discharge. It is influenced by both the floodwaters from major rivers and the tidal regime of the East Sea. According to the water level survey data along the route, the most significant flood event occurred in 2013, leading to potential landslides in the roadway area. Consequently, the design consultants have arranged for cross-drainage culverts to be installed at water drainage gaps in the watershed. The culvert openings have been determined through surveys and hydrological calculations, with circular culverts having diameters of 0.6 to 2 meters and box culverts having a minimum opening of 0.5 x 0.5 meters. The design frequency for the roadway, surface, and small culverts is set at P = 4%, while the larger and medium bridges are set at P = 1%.

National Route 19C: National Route 19C connects Quy Nhon Port through the estuary of the Ha Thanh River basin. The route has a complex hydrological regime, influenced by both the floodwaters from major rivers and the tidal regime of the East Sea. The water level surveying data along this route shows that the most significant flood event occurred in 2009 due to prolonged heavy rainfall combined with upstream flood inflow, resulting in high water levels and flooding. Therefore, the design consultants will integrate hydrological surveys and calculations to determine the culvert openings for drainage. The design frequency for the roadway connecting QL19C to Quy Nhon Port is set at 5% for the surface and structures, with a design frequency of 1% for bridges.

Bridge Construction Area: In the areas where bridges are being constructed on the two road routes, there are no aquatic traffic activities. The bridges are designed without navigational openings. There are no observed erosion phenomena in the bridge construction areas.

Map of Ha Thanh River Basin is illustrated below.

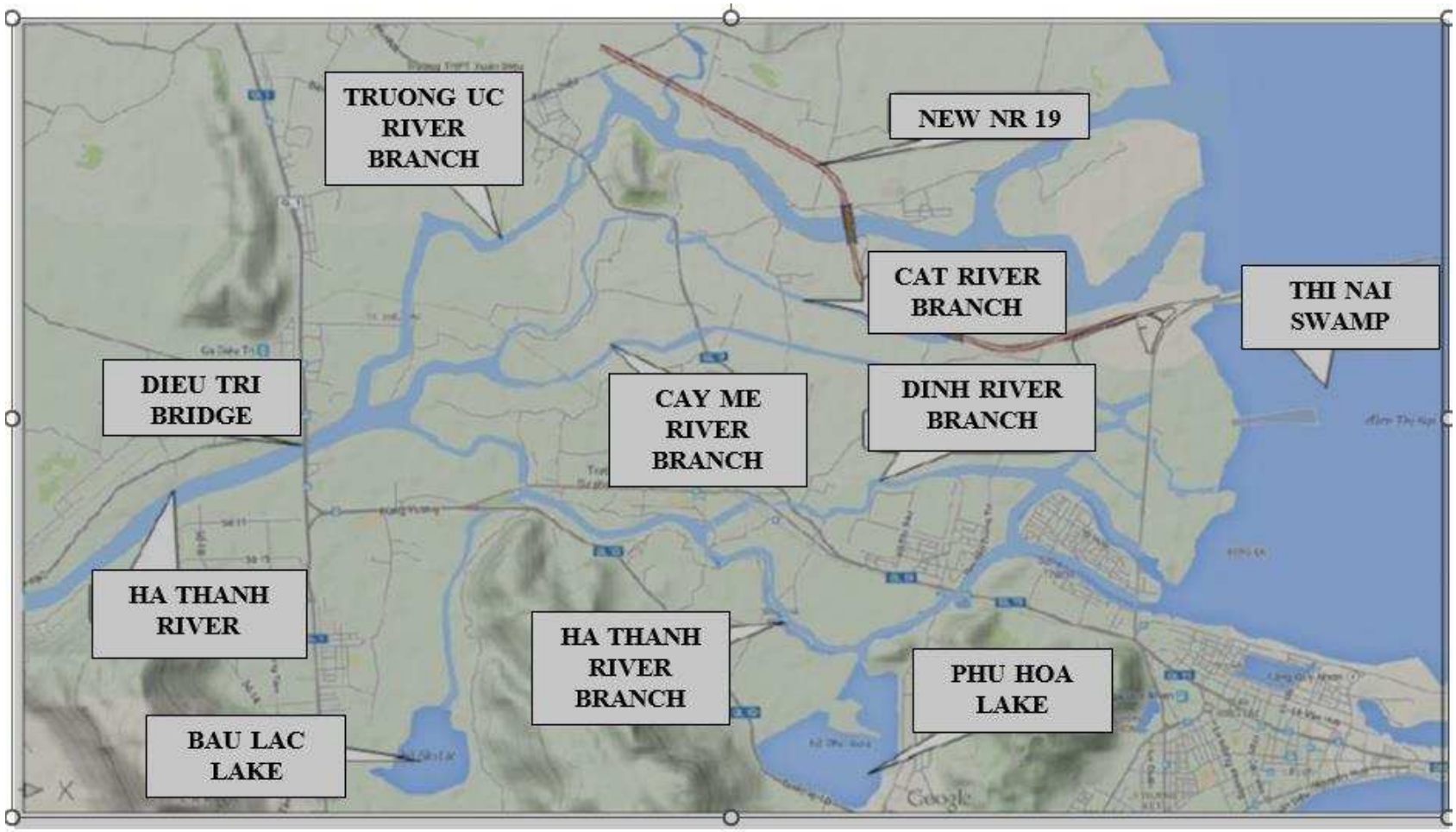


Figure 0-1. Ha Thanh River Basin Diagram

2.1.8. Natural resources

2.1.8.1. Land resources

The total land area used for the Integrated Adaptive Development Project in Binh Dinh Province is 1,571,262 m², of which 1,496,762 m² is allocated for road construction and 74,500 m² is designated for materials storage sites. The specifics are in Table 2.7.

2.1.8.2. Forest Resources

Within the framework of the Binh Dinh Integrated Resilient Development Project, the project owner has collaborated with consulting units and local agencies to conduct the Forest Status Survey Report in the project area. The report indicates that in the two proposed road sections of the project, the coastal road (DT.639) from My Thanh to Lai Giang, although the alignment primarily follows the existing DT.639 provincial road, some sections will pass through forested land, including protective and production forests. The protective forest, consisting of Casuarina trees, serves to block sand and coastal winds, especially during the storm season, and prevents desertification in coastal residential areas. The production forest is planted with Acacia and Eucalyptus trees. According to current legal regulations, before project construction can commence, forest land must undergo conversion to non-forest land use.

Additionally, the project has surveyed production forests in the areas designated for material storage and filling. These areas are planted with Acacia and Eucalyptus.

It is estimated that there are approximately 40,476 Casuarina trees (at a density of 2m per tree), 991 Acacia trees (diameter <10 cm), and 2,901 Eucalyptus trees (density of 2m per tree, height of 5m).

In general, except for the Casuarina trees, these are plantation species harvested by local residents (typically on a 3-5 year cycle) and are common species with low ecological diversity. Moreover, the forested area has an estimated volume of 1,228.87 m³ over 115.29 ha, equivalent to approximately 10.6 m³/ha, classifying it as a low-volume forest according to Article 8 of Circular No. 34/2009/TT-BNNPTNT of the Ministry of Agriculture and Rural Development, which stipulates criteria for forest classification.

Regarding the forest area to be reclaimed, the entire process of converting forest land use has been completed, with a total converted area of 38.79 ha (including 18.76 ha of protective forest and 20.03 ha of production forest). Of this, 31.34 ha (including 18.76 ha of protective forest and 12.58 ha of production forest) will be used for the construction of the coastal road (DT.639) section from My Thanh to Lai Giang, as per Decision No. 3056/QD-UBND dated August 17, 2023, by the Binh Dinh Provincial People's Committee; and 7.45 ha of production forest land will be used for material disposal for the same road section, as per Decision No. 1008/QD-UBND dated March 28, 2024, by the Binh Dinh Provincial People's Committee.

Table 0-7. Summary of the Current Status of Land Types in the Project Area [1]

No.	Item	Area (m^2)											
		Total	**Residential Land**	**Garden Land**	**Annual Cropland**	**Perennial Cropland**	**Rice Land**	**Aquaculture Land**	**Forest Land**	**Non-Agricultural Land**	**Cemetery Land**	**Unused Land**	**Other Land**
1	Coastal Road 639, Section from My Thanh to Lai Giang	1.266.087	26.865	0	1.854	413	6.154	5.848	1.152.900[6]	0	6.981	42.409	22.663
2	National Highway 19C Connecting to Quy Nhon Port	305.175	20.009	28.714	56.828	29.892	90.700	0	0	29.749	8.040	41.243	0
Total		**1.571.262**	**46.874**	**28.714**	**58.682**	**30.305**	**96.854**	**5.848**	**1.152.900**	**29.749**	**15.021**	**83.652**	**22.663**

[6] The data has been updated according to the Forest Status Survey Report of the Project conducted in 2021 and 2022, comprising 20.03 hectares of production forest, 18.76 hectares of protective forest, and land outside the three-forest classification planning.

Summary of the investigation results on the area of forest land types and the forest volume affected by the project is as follows:

Table 0-8. Summary of the Areas of Various Types of Forest Land in the Project Area

No.	Land Type	Total Area (ha)	Planted Forest (ha)	Newly Planted Forest (ha)	Non-Forested Land (ha)	Other (ha)	Forest Volume (m^3)
I	Road Construction*	107.84	15.38	14.29	22.19	55.98	1218.04
1	Protective Forest Land	18.76	7.98	4.00	6.78	-	-
1.1	According to Decision 4854	12.90	5.93	3.37	3.60	-	478.96
1.2	According to Decision 2937	5.86	2.05	0.63	3.18	-	175.48
2	Production Forest Land	12.58	1.66	7.50	3.42	-	-
2.1	According to Decision 4854	12.17	1.41	7.34	3.42	-	68.42
2.2	According to Decision 2937	0.41	0.25	0.16	-	-	21.4
3	Other Lands	6.00	-	-	-	6.00	-
4	Land Outside 3 Forest Types	70.50	5.74	2.79	11.99	49.98	473.78
II	Material Storage Area **	7.45	0.19	6.08	1.18	-	10.83
1	Production Forest Land	7.45	0.19	6.08	1.18	-	10.83
2	Other	-	-	-	-	-	-
3	Land Outside 3 Forest Types	-	-	-	-	-	-
III	Total	115.29	15.57	20.37	23.37	55.98	1228.87

*(**Source:** * Report on the Results of the Forest Status Survey of the Project, 2021.*

*** Report on the Forest Status Survey at Storage Areas, 2022.)*

2.1.8.3. Surface Water Resources

Binh Dinh Province has a total watershed area of 6,024.43 km^2, with an annual surface flow of 9.23 billion m^3, primarily concentrated in four major river basins: Lai Giang River, Kon River, Ha Thanh River, and La Tinh River. The total amount of water used annually is approximately 1.19 billion m^3, accounting for about 13% of the total available water in the province. Of this,

80% of the water is utilized for agricultural activities. Additionally, water is used for energy generation, aquaculture, as well as industrial, service, and tourism activities.

Results from surface water quality surveying conducted by the Binh Dinh Department of Natural Resources and Environment from 2016 to 2019 indicate that surface water quality is primarily affected by organic pollution, particularly when comparing the BOD and COD indicators with QCVN 08-MT:2015/BTNMT, which specifies national technical regulations on surface water quality (Column B1 - For irrigation or similar quality requirements or for use classified as B2).

The Kon River basin showed a decreasing trend in organic pollution parameters in 2018 and 2019. In contrast, the La Tinh River and Lai Giang River basins exhibited relatively stable pollution parameter values over the years, with no significant fluctuations in either direction.

The water quality in the Lai Giang River basin, characterized by TSS, BOD, and COD pollution indicators, improved significantly from 2018 to 2019; however, two downstream sampling points (river mouths) indicated a sudden increase in Cl- concentration in 2019. This may be attributed to the dry season, during which surveying points near the river mouth are affected by seawater intrusion, resulting in a spike in chloride (Cl-) levels.

According to the environmental status report for Binh Dinh Province from 2016 to 2020 by the Department of Natural Resources and Environment, water pollution and over-exploitation in recent years have also contributed to the decline of aquatic species in the lagoons, lakes, and coastal areas of Binh Dinh Province. Moreover, saltwater intrusion has impacted ecosystems in coastal areas, river mouths, and lagoons. This intrusion has negative effects, such as reducing the adaptability of organisms to increasing salinity and limiting the area available for freshwater aquaculture. Particular attention should be given to the Thi Nai lagoon area (in Quy Nhon City and Tuy Phuoc District) and the river mouth area (Quy Nhon City, Hoai Nhon Town, and Phu My District).

In the Truong Uc River area, the Me Tree area (where the Truong Uc bridge is constructed) and the Dinh River (where the Dinh River bridge is constructed) serve as downstream surface water resources for irrigation and drainage of the Ha Thanh River downstream. The Ha Ra and Cong Luong bridges only cross natural drainage areas, with water used for drainage purposes and partly for irrigating crops in the downstream areas leading to the Ha Ra river mouth and Hoai My commune.

2.1.8.4. Groundwater resources

In Binh Dinh province, underground water exists in two main forms: pore water in loose formations and fissure water in fractured bedrock, in tectonic destruction zones. The total potential extractable reserve of groundwater in Binh Dinh province is about 1,454,051 m^3/day, of which the total static reserve is 3,487,086,760 m^3/day, the total natural dynamic reserve is 1,349,438 m^3/day.[7]

The quality of groundwater samples collected from households near industrial, animal husbandry, and seafood processing areas, etc., has not shown any sign of organic pollution, but mostly microbiological pollution (Coliform). In some areas, the intermittent manganese and chlorine pollution may occur.

[7] Data compiled from surface water exploitation licensing activities of the Department of Water Resources - Department of Natural Resources and Environment;

2.1.8.5. Quality of coastal waters

The coastal water quality in Binh Dinh province is fairly good, most of the parameter values are under the National technical regulation on marine water quality. However, the influence of river activities often carries a large amount of materials in the rainy season to the sea. Therefore, the TSS concentration in areas adjacent to the estuary in the rainy season is often higher than the dry season. The results of seawater surveying in 2016, 2017 and 2019 also shows that the fluoride concentration in some shrimp farming areas, the tourist areas of Phu Cat and Phu My district in the dry season is higher than the rainy season and exceeds the National technical regulation from 1.03 - 1.13 times.

The content of mineral oil and grease was detected in the results of sea water quality analysis but the content was not high and still lower than threshold set forth in the National technical regulation. It has no sign of pollution over the years, the surveying results in 2018 showed that oil is undetectable.

2.1.8.6. Ecosystem Features in Binh Dinh province

In Binh Dinh province, main ecosystems include natural forest ecosystem, ecosystem of secondary growth forest, bamboo forest ecosystem, grass beds and shrubs agricultural ecosystem, freshwater ecosystem, lagoon ecosystem, and coastal ecosystem.

- *Natural forest ecosystem***:** determined on the basis of rich forest with vegetation in forest status IIIA and IIIB. The natural forest ecosystem has high biodiversity, less affected by economic development activities and direct human intervention. The ecosystem of natural forests in Binh Dinh province has an area of about 47,420 ha, distributed mainly in districts of An Lao, Vinh Thanh and Van Canh and represented in two main forest types: closed evergreen humid forest at an altitude belt above 800 m and closed tropical evergreen humid rainforest at an altitude below 800 m. Main ecosystem services include provision of timber and non-timber forest products; protection of watersheds, water resources for hydropower, irrigation and water supply; absorption of CO_2 to reduce GHG and climate change; ecotourism, culture and resort; stabilization and prevention of soil erosion; absorption of air pollutants and improvement of air quality; pest management; aesthetic benefits; and control of natural disaster risks.
- *Secondary growth forest ecosystem:* poor secondary forest types corresponding to forest status of IIA and IIB. The ecosystem of secondary forest is recovered after shifting cultivation and deforestation. The area of this ecosystem is 237,070 ha, accounting for 39.2% of the province's natural land area. Secondary forest ecosystems are distributed mainly in districts of Vinh Thanh, An Lao, Hoai An and Van Canh and scattered in districts of Phu Cat and Phu My. Main ecosystem services include surface water purification, carbon storage and sequestration, climate regulation, protection from natural hazards, and soil formation, nutrient cycling and primary production.
- *Ecosystem of bamboo forest, grass beds and shrubs:* originated indirectly from the closed tropical humid evergreen forest and was the direct result of the slash-and-burn process or exhausted exploitation without recovering the timber forest with forest status at IA, IB, IC level. However, in many areas, there are still small remnants of forest on bamboo forests with scattered timber trees. The area of ecosystems is about 12,740 ha, accounting for 2.1% of the natural land area. At present, this habitat type is still able to be restored because the seedling source of tree species is still present and the soil condition has not been largely modified. Main ecosystem services are provision of products for construction, handicraft, and paper production; surface water purification,

carbon storage and sequestration, climate regulation, and protection from natural hazards.

- *Agricultural ecosystem:* The area is 280,100 ha, accounting for 46.3% of the natural land area, distributed mainly in districts of Phu Cat, Phu My, Hoai Nhon, An Nhon, Tuy Phuoc, Tay Son, including multi-seasonal field areas, low-yield fields, and possibly abandoned fields. The most important ecosysemt service provided by agriculture ecosystem is its provision of food, fuel, and fiber. Grain, livestock, fuel, forage, and other products are used to meet subsistence or market needs, usually without regard to the provision of other services. Nevertheless, a number of other services are also provided. Arguably, the most important of these is the maintenance of soil fertility, which is fundamental to sustain agricultural productivity.
- *Freshwater ecosystem:* Freshwater ecosystems typical with habitats for aquatic species, including rivers, streams, lakes, ponds, etc. The inland water bodies are distinguished based on natural features such as shape, geomorphology, base and hydrological regime. The area of freshwater of inland water bodies is 10,790 ha, accounting for 1.7% of the natural land area, mainly distributed in An Lao, Tay Son, Vinh Thanh, Van Canh and scattered in other districts. Freshwater bodies are home to many species of fish, amphibians, invertebrates, aquatic plants, and microorganisms. Freshwater systems provide a range of vital regulating and maintaining ecosystem services through processes that move water, energy, nutrients, organisms and sediment across different landscapes and habitats, linking atmospheric, terrestrial, groundwater and marine systems.
- *Lagoon ecosystem:* Coastal lagoons are ecosystems with high biological productivity, which are the place to store aquatic organisms, diverse habitat types, such as estuaries, swamps, water grass, marshes having mangrove vegetation, mud bottoms, tidal creeks, sandy tidal flats, rocky tidal areas, so biodiversity is high. In particular, the estuaries, swamps and water grass in the lagoon are very rich in nutrients, breeding sources, and aquatic resources. Binh Dinh province has a lagoon system typical of the South Central Coast, including three large lagoons: Thi Nai with an area of 5,060 hectares, Tra O with an area of about 1,200 hectares and De Gi with an area of 1,580 hectares. The total area of 3 lagoons is about 8,000 ha, located in Quy Nhon city, Phu My district and Phu Cat district. Main ecosystem services are to regulate climate and flood; stabilize groundwater resource and water supply in coastal plains and coastal sandy areas; restore the water quality before it is discharged into the sea through the process of accumulation and deposition of waste; provide aquatic products such as fish, crab, shrimp and plants for local people; and develop local economy through ecotourism.
- *Coastal ecosystem of Binh Dinh province*, 42 genera of corals were recorded, of which 38 genera of hard corals and 4 genera of soft corals. Additional research results identified 77 species in the coastal area of Binh Dinh. The dominant reef genera include Acropora, Montipora, Porites, Goniopora, Platygyra, Favia, Simularia and Lobophyton. The number of coral genera recorded on each reef ranged from 13 (Hon Tranh) to 28 genera (Hon Dan, Ganh Nhon Ly, Hon Kho). Main ecosystem services are to play as nurseries for many fish species by helping to provide shelter from predators, giving the fish a chance to thrive, and bring about economic benefits for local people such as tourism, habitat for commercial fisheries, coastal protection, and conservation of marine ecosystems.

An Toan Nature Reserve is located in An Lao district. This protected area is far away from the

subproject area, about 30 to 60 km away from the existing coastal road (PR 639) section of from My Thanh to Lai Giang Bridge and the urban road connecting National Highway 19C with Quy Nhon port. An Toan Nature Reserve was established under Decision 580/QD-UBND on March 11, 2013 of the People's Committee of Binh Dinh province in the special-use forest system in Vietnam. The nature reserve was established on the basis of converting An Toan landscape protection forest (established in 1995) and An Son forestry enterprise. The planning and development of An Toan nature reserve aims to protect tropical and subtropical forest samples with high biodiversity of the South Central Coast; protect many species of forest animals and plants with endemic and rare genetic resources and endangered species; environmental protection and restoration, ecological balance in order to create forest cover, increase forest quality to promote the ability to protect the environment, protect water sources, protect agricultural production and dams for irrigation, hydropower. In addition, the planning and development of the conservation area also improves and enhances people's living standards, contributes to hunger eradication and poverty alleviation through the project's operational programs and regional socio-economic development programs in buffer zone and promote the great potential of forests in terms of education, training and scientific research.

According to IUCN 2018, Binh Dinh province did not establish any marine and coastal protected areas. There is only Tra O lagoon inland water reservation area.

2.1.8.7. Biodiversity

Diversity of Species: Binh Dinh is relatively rich and diverse with 2,269 species of higher plants; 315 species of phytoplanktons; 244 bird species; 103 species of mammals; 45 species of amphibians; 95 species of reptiles; 353 species of insects; 281 species of fish, 160 species of zooplankton; 210 species of benthic animals. Currently, new species are not discovered.

Diversity of Genetic resources: Binh Dinh province has rare genetic resources that have been identified with 222 species of higher plants (Rauvolfia verticillata (Lour.) Baill., Telectadium edule Baill and Stemona collinsae Craib...), 215 species of birds (Lopura diardi, Rheinardia ocellata....), 92 species of mammals (Yellow-cheeked gibbon, Gray-shanked Douc Langur, Leopard Panthera pardus, Palm Civet Chrotogale owstoni, Truong Son muntjac Muntiacus truongsonensis, Java Pangolin...), 42 species of amphibians (Rhacophorus kio, Pajo Toad), 56 Reptiles (Python molurus, Python reticulatus, King Cobra, Golden coin turtle Cuora trifasciata...), 8 species of insects (common birdwing Troides helena...), 114 species of fish (bombay duck fish, Marbled eel, Indian shortfin eel, Sardines, Milkfish...) are listed in the list of rare species of the Red Book of Nature Conservation International (2015) and Vietnam Red Book (2006).

2.1.9. Typical biological resources in the subproject's area of influence

(a) *Upgrading the existing coastal road (PR639), section from My Thanh to Lai Giang Bridge:*

The road primarily traverses agricultural and forest ecosystems (protection and production forests). The functions and services of planted forests are quite diverse. For example, FAO distinguishes between 'production' and 'protection' plantations (FAO, 2006). The primary ecosystem services of production forest plantations focus on producing industrial timber, firewood, and non-timber forest products (such as fodder, beekeeping, essential oils, tannin bark, cork, rubber sap, and food), while protective plantations are established for conservation, recreation, carbon sequestration, water quality control, erosion control, and the restoration of degraded land, including enhancing landscape and amenity (e.g., Fuhrer, 2000; Shelton et al., 2001; Lamb et al., 2005).

The flora includes shrubs, acacia, eucalyptus, casuarina, and annual crops such as peanuts,

beans, and rice. The fauna mainly consists of domesticated animals like chickens, ducks, dogs, and cats. Wild species include common species such as birds and reptiles found in many other regions of the country. Consultations with the Management Board of Protection Forests in Hoai Nhon Town and Phu My District confirmed that there are no rare or endangered species in the protection forests in the sub-project area.

The coastal road passes through the protection forest ecosystem in Phu My District. The protection forest land invested by the state budget is Casuarina equisetifolia forests managed by the Phu My Protection Forest Management Board, covering an area of 80.42 hectares. Protection forest land invested by other sources is 3.3 hectares and is cultivated and managed by local people. The coastal protection forest, mainly casuarina trees, plays a crucial role in wind and sand shielding, especially during the rainy season, providing safety for coastal residents, infrastructure, and socio-economic activities. The final section from km 63 to km 83+139.37 – Phu Thu Pass and Lo Dieu (Hoai My Commune, Hoai Nhon Town) passes through production forest ecosystems with acacia and eucalyptus trees managed by the Hoai Nhon Protection Forest Management Board. Currently, the Management Board of Protection Forests in Hoai Nhon Town manages nearly 7,900 hectares of forest, including over 1,500 hectares of production forests and nearly 6,400 hectares of protection forests. In addition, this road passes by aquaculture ponds where black tiger shrimp, white-leg shrimp, marine fish (groupers, cobia), and lobsters are farmed.

The river system flows into the sea at the Ha Ra Bridge area. Currently, local people exploit natural mollusks, shrimp, crabs, and fish species. The common fish species in this sub-project area include grass carp (Ctenopharyngodon idella), catfish (Claridae), climbing perch (Anabas testudineus), and tilapia (Oreochoromis). No fish species from the Vietnam Red Book or the IUCN Red List of Threatened Species have been recorded here.

(b) *Construction of a new urban road connecting National Highway 19C to Quy Nhon Port:*

The road primarily passes through agricultural ecosystems. The main crops are annual crops such as peanuts, beans, and rice. Animals are mainly domesticated species like chickens, ducks, dogs, and cats. The most important ecosystem service provided by the agricultural ecosystem is the provision of food, fuel, and fiber. Cereals, livestock, fuel, animal feed, and other products are used to meet household or market needs, often without regard for providing other services. However, some other services are also provided, with perhaps the most important being the maintenance of soil fertility, which is essential for sustaining agricultural productivity.

This road crosses the Ha Thanh River. Surveys show that the fauna includes wild mollusks, shrimp, crabs, and fish species. According to a JICA report from 2003, the fish resources in the river are relatively poor, mainly due to extremely low flow rates during the dry season and significant runoff during the rainy season. A total of 18 fish species were recorded in the field survey. Most of them are common species in Central Vietnam, such as grass carp (Ctenopharyngodon idella), catfish (Claridae), climbing perch (Anabas testudineus), and tilapia (Oreochoromis). The Ha Thanh River basin does not have any fish, migratory species, or rare aquatic species that require gene conservation. Natural heron flocks (Egretta garzetta) appear along small branches of the Ha Thanh River system. Surveys show that herons typically appear from March to July. The flora includes annual crops such as maize, potatoes, and rice, along with shrubs on the banks of the Ha Thanh River branches.

Phytoplankton

According to the EIA report for the CCSEP project under the Quy Nhon sub-project in 2016, sampling and research results from lakes and lagoons in Quy Nhon city show that the area has 166 species of phytoplankton, including: i) Green algae with 61 species, accounting for 37% of

the total species; ii) Blue-green algae with 41 species, accounting for 24.8%; and iii) Bacillariophyta with 41 species, accounting for 24.8%.

In freshwater basins, green algae always dominate, followed by blue-green algae and then Bacillariophyta. Conversely, Bacillariophyta dominate in brackish water. In natural lakes, blue-green algae grow rapidly, indicating that the lakes are nutrient-poor. The phytoplankton species found in the inland water bodies of Binh Dinh are widely distributed species: Surirella, Synecdra, Melosira, Ceratium, Nijchia, Navicula, Cymbella, Sicnedesnus cloterium, Periclinium, Skiletonema.

Zooplankton

The number and characteristics of dominant phytoplankton species: the number of phytoplankton cells is quite high, averaging 22,215.4 x10^3 cells/l, with natural lakes having 860 x 10^3 cells/l, and streams having 510 x 10^3 cells/l. The average biomass of phytoplankton across the entire water body is 2,186 mg/l. Additionally, the biomass of 59 identified phytoplankton species includes 23 Chlorophyta species, 18 Bacillariophyta species, 7 Euglenophyceae species, 6 Dynophyta species, and 5 Cyanophyta species. Overall, phytoplankton biomass varies greatly: the largest species reached 1.858 x 10^{-6} mg/L, while the smallest species reached 0.020 x 10^{-6} mg/L.

Benthic organisms

Species composition: 15 species were collected, divided into 3 phyla, with Mollusca having 7 species, Annelida having 6 species, and Arthropoda having 2 species. The water environment of the study area is salty seawater and brackish water, and all species collected in this area are typical of coastal water environments.

The number and characteristics of dominant species: The density of invertebrates collected ranged from 3 to 633 individuals/m^2, with Neanthes sp. being the dominant species.

2.2. EXISTING PHYSICAL ENVIRONMENTAL CONDITIONS OF THE SUBPROJECT AREA

To having an appropriate assessment of the adverse impact level of the subproject activities during construction on the ambient environmental conditions of the subproject area of influence, the subproject has conducted a baseline assessment of the existing ambient environmental conditions before commencement including the existing air, surface, groundwater, sediment, and soil quality. The sampling locations, number of samples collected, and parameters surveyed for both roads are presented in the following table.

Table 0-9. Sampling locations and monitored parameters

No	Environmental sample	Road #1	Road #2	Parameters
1	Ambient air quality	5 sampling sites	3 sampling sites	Temperature, humidity, winspeed, wind direction, pressure, suspended dust, CO, SO_2, NO_2, PM_{10}, O_3.
2	Noise level	5 sampling sites	3 sampling sites	dBA
3	Vibration	5 sampling sites	3 sampling sites	dB

No	Environmental sample	Road #1	Road #2	Parameters
2	Surface water quality	5 sampling sites	3 sampling sites	pH, Temperature, DO, TDS, EC, TSS, COD, BOD_5, Ammonium (NH_4^+ as N), Nitrite (NO_2^- as N), Nitrate (NO_3^-as N), PO_4^{3-} (as P), Total N, Total P, Lead (Pb), Cadmium (Cd), Arsenic (As), Mercury (Hg), Copper (Cu),, Zinc (Zn), ion (Fe), SO_4^2, oil and grease, Coliform
3	Groundwater quality	5 sampling sites	3 sampling sites	pH, temperature, DO, EC, TSS, hardness (as $CaCO_3$), Cl-, Nitrate (NO_3^- as N), Total N, Total P, SiO_3, PO_4^{3-}; SO_4^{2-} lead (Pb), Cadmium (Cd), Arsenic (As), Mercury (Hg), Copper (Cu), Zinc (Zn), Manganese (Mn), iron (Fe), Coliform
4	Soil quality	5 sampling sites	3 sampling sites	Cl^-, SO_4^{2-}, HCO_3^-, Total P_2O_5, total K_2O, total N, total P, total salt, total organic, Ca^{2+}, Mg^{2+}, K^+, Na^+, Al^{3+}, Fe^{3+}, Mn^{2+}, Cd, Hg, Cd, Pb.
5	Sediment	5 sampling sites	3 sampling sites	$N\text{-}NO_2$, $N\text{-}NO_3$, $N\text{-}NH_3$, $P\text{-}PO_4$, Pb, Cd, Hg, As, Cu, Zn, CN^-, Relative humidity, Organic matter, Total N, Total P, Chlorinated pesticides, Phosphorus pesticide, Oil

2.2.1. Air quality, noise and vibration

a) Sampling locations

Table 0-10. Sampling locations for air quality, noise and vibration

Symbol	Location	Coordinate	
		N	E
Coastal Road section from My Thanh to Lai Giang			
KK1	Air, noise and vibration sampling No.1	14°11'50.73"	109°10'58.74"
KK2	Air, noise and vibration sampling No.2	14°16'28.67"	109°10'32.61"
KK3	Air, noise and vibration sampling No.3	14°22'12.82"	109° 7'13.67"
KK4	Air, noise and vibration sampling No.4	14°24'25.11"	109° 7'12.88"
KK5	Air, noise and vibration sampling No.5	14°28'31.53"	109° 5'32.19"
Connection road from Road 19C to Quy Nhon port			
KK1	Air, noise and vibration sampling No.1	13°48’08.1"	109°08’51.84"
KK2	Air, noise and vibration sampling No.2	13°48’12.51"	109°10’21.9"
KK3	Air, noise and vibration sampling No.3	13°47’46.2"	109°12’07.4"

Notes:

My Thanh – Lai Giang Coastal Road:

- **KK1**: Starting point of the project road near the coastal road (TL 639) section from De Gi – My Thanh, Binh Dinh Province.
- **KK2**: Near the intersection of the coastal road (TL 639) and the inter-village road at My An commune, Phu My district, Binh Dinh Province.
- **KK3**: At km 77 of TL. 639 - residential area of My Duc commune, Phu My district.
- **KK4**: Residential area of Hoai My commune, Hoai Nhon district, Binh Dinh Province.
- **KK5**: The project's endpoint at Lo Dieu Pass.

QL19C – Quy Nhon Port Road:

- **KK1**: Starting point of the project road at Dieu Tri town, Tuy Phuoc district, Binh Dinh Province.
- **KK2**: Residential area in Nhon Phu ward, Quy Nhon city, Binh Dinh Province.
- **KK3**: Residential area in Nhon Binh ward, Quy Nhon city, Binh Dinh Province.

b) Sampling time: February 1 - February 2, 2021

c) Analysis results

The air quality surveying results in the project area are all within the permissible limits. The concentrations of total suspended particulates (TSP), CO, NO2, and SO2 are all below the allowable values according to QCVN 05:2023/BTNMT. The air quality in the project area is assessed as relatively clean.

The noise and vibration surveying results in the project area are within the limits of the National Technical Regulations on noise and vibration (QCVN 06:2009/BTNMT: National Technical Regulation on the maximum allowable concentration of certain hazardous substances in ambient air; QCVN 26:2010/BTNMT: National Technical Regulation on noise in residential areas). The results also align with the surveying data on noise and vibration levels from 2016-2019 conducted by the Department of Natural Resources and Environment of Binh Dinh Province. According to the Department of Natural Resources and Environment of Binh Dinh, in 2020, the noise levels at three positions in the project area—KK2 (Nguyen Thai Hoc street and National Highway 1D intersection); KK3 (National Highway 19B and Bac Song Ha Thanh shopping center intersection); KK7 (Main road 1A, Phu My town)—in 2017, 2018, and 2019 were all within the limits of the national technical regulations on noise and vibration (QCVN 06:2009/BTNMT and QCVN 26:2010/BTNMT).

Figure 0-2. Sampling Location Diagram for Road 19C – Quy Nhon Port

Figure 0-3. Sampling Location Diagram for My Thanh – Lai Giang Road

Figure 0-4. Sampling Location Map for My Thanh – Lai Giang Road (Continued)

Table 0-11. Monitoring results of air quality in the subproject area

No.	Parameter	Unit	Monitoring results								Testing method	QCVN 05:2013/ BTNMT	QCVN 26: 2010/BTNMT	QCVN 27: 2010/BTNMT
			Coastal Road section from My Thanh to Lai Giang					*Connection road from Road 19C to Quy Nhon port*						
			KK1	**KK2**	**KK3**	**KK4**	**KK5**	**KK1**	**KK2**	**KK3**				
1.	Temperature	^oC	26.8	26.9	26.5	26.1	26.7	26.7	26.3	26.4	*QCVN 46:2012/BTNMT*	-		
2.	Humidity	%	63.4	66.8	65.7	63.3	62.4	60.8	63.5	61.5		-		
3.	Wind speed	*m/s*	0.4	0.6	0.6	0.5	0.5	0.3	0.5	0.4		-		
4.	Wind direction	-	Northeast	Northeast	Northeast	Northeast	Northeast	Northeast	Northeast	Northeast		-		
5.	Pressure	*mmHg*	754	753	754	754	755	751	755	753		-		
6.	Total Suspended particulate	$\mu g/m^3$	138	166	158	169	130	114	146	130	*TCVN 5067:1995*	***300***		
7.	CO	$\mu g/m^3$	5,350	5,210	4,870	4,530	4,720	5,150	4,980	4,650	*SOP.PT.KXQ.03*	***30,000***		
8.	SO_2	$\mu g/m^3$	65	78	71	53	46	43	68	63	*TCVN 5971:1995*	***350***		
9.	NO_2	$\mu g/m^3$	36	44	57	31	29	45	56	39	*TCVN 6137: 2009*	***200***		
10.	PM_{10}	$\mu g/m^3$	<10	<10	<10	<10	<10	<10	<10	<10	*40CFR part 50 appendix J*	-		

No.	Parameter	Unit	Monitoring results								Testing method	QCVN 05:2013/ BTNMT	QCVN 26: 2010/BTNMT	QCVN 27: 2010/BTNMT
			Coastal Road section from My Thanh to Lai Giang					*Connection road from Road 19C to Quy Nhon port*						
			KK1	**KK2**	**KK3**	**KK4**	**KK5**	**KK1**	**KK2**	**KK3**				
11.	O_3	$\mu g/m^3$	<5	<5	<5	<5	<5	<5	<5	<5	*MASA Method 411*	***200***		
12.	Pb	$\mu g/m^3$	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	*TCVN 6152:1996*	**-**		
13.	Noise level	*dBA*	57.1	59.3	54.4	53.7	53.9	65.2	61.7	56.6	*TCVN 7878 - 2:2010*		***70***	
14.	Vibration level	*dB*	59.6	62.8	58.3	59	57.3	68.1	63.9	60.2	TCVN 6963: 2001			***75***

Comparison Standards: (i) QCVN 05:2023/BTNMT: National Technical Regulation on Ambient Air Quality; (ii) QCVN 26:2010/BTNMT: National Technical Regulation on Noise; (iii) QCVN 27:2010/BTNMT: National Technical Regulation on Vibration

2.2.2. Surface water quality

a) Sampling locations

Table 0-12. Sampling locations for surface water

Symbol	Location	Coordinate	
		N	E
Coastal Road section from My Thanh to Lai Giang			
NM1	Surface water sampling No.1	14°11'43.6"	109°11'08.4"
NM2	Surface water sampling No.2	14°22'15.7"	109°07'11.9"
NM3	Surface water sampling No.3	14°22'17.8"	109°07'07.2"
NM4	Surface water sampling No.4	14°24'21.7"	109°07'15.0"
NM5	Surface water sampling No.5	14°28'37.7"	109°05'28.3"
Connection road from Road 19C to Quy Nhon port			
NM1	Surface water sampling No.1	13°47’58.0’’	10908’51.8’’
NM2	Surface water sampling No.2	13°48’17.2’’	109010’14.9’’
NM3	Surface water sampling No.3	13°47’46.6’’	109012’04.2’’

Note:

Coastal road PR639 My Thanh – Lai Giang:

- NM1: Lake on the left side of the coastal road PR639 My Thanh – Lai Giang in My Thanh commune, Phu My district, Binh Dinh province
- NM2: Ha Ra Bridge, My Duc commune, Phu My district, Binh Dinh province
- NM3: Pond on the right side of the coastal road PR639 My Thanh – Lai Giang in My Duc commune, Phu My district, Binh Dinh province
- NM4: Bridge in Hoai My commune, Hoai Nhon district, Binh Dinh province
- NM5: Pond on the right side of the coastal road PR639 My Thanh – Lai Giang in Hoai My commune, Hoai Nhon district, Binh Dinh province

National Highway 19C – Quy Nhon Port:

- NM1: Dinh River in Nhon Phu ward, Quy Nhon city, Binh Dinh province
- NM2: Cay Me River in Nhon Phu ward, Quy Nhon city, Binh Dinh province
- NM3: Truong Uc River in Nhon Phu ward, Quy Nhon city, Binh Dinh province

b) Sampling time: From February 1 to February 2, 2021

c) Analysis results:

Regarding the surface water quality surveying results in the sub-project area, at some points such as NM1 and NM3 on the route from National Highway 19 to Quy Nhon Port, there are signs of organic pollution. The Chemical Oxygen Demand (COD) exceeded the allowable limits of QCVN 08-MT:2015/BTNMT (column B1) for irrigation purposes or similar uses by 1.2 times (NH19-NM1) to 1.4 times (NM3). The Biological Oxygen Demand (BOD5) also exceeded the threshold of QCVN 08-MT:2015/BTNMT (column B1) by approximately 1.04

times. The primary cause is that the Ha Thanh river area continues to receive waste and domestic wastewater from households living along the riverbanks. The surveying results align with the water quality surveying data from 2016-2019 conducted by the Department of Natural Resources and Environment of Binh Dinh province.

Compared to QCVN 08:2023/BTNMT, the water samples had BOD5 and COD indicators that did not meet the B-standard, indicating moderate water quality. The ecosystem in the water consumes a large amount of dissolved oxygen due to the high concentration of pollutants. The water can be used for industrial and agricultural production after appropriate treatment measures are applied.

Table 0-13. Monitoring results of surface water quality in the subproject area

No.	Parameter	Unit	Monitoring results								Testing method	QCVN 08: 2023/BTNMT table 1, class B table 2*
			Coastal Road section from My Thanh to Lai Giang					Connection road from Road 19C to Quy Nhon port				
			NM1	NM2	NM3	NM4	NM5	NM1	NM2	NM3		
	Temperature	^oC	25,6	25,1	25,0	25,4	25,6	25,4	25,3	25,6	*SMEWW 2550B:2017*	-
	pH	-	6,98	6,73	6,90	7,04	7,11	6,76	6,87	6,98	*TCVN 6492:2011*	*6,0 – 9**
	DO	*mg/L*	5,6	5,3	5,1	5,8	4,5	5,4	5,6	5,5	*TCVN 7325:2016*	*⩾5**
	TDS	*mg/L*	354	329	409	433	415	324	398	464	*SOP.QT.N.07*	-
	EC	*mS/cm*	0,55	0,51	0,64	0,68	0,65	0,51	0,62	0,73	*SMEWW 2510B:2017*	-
	TSS	*mg/L*	32	27	41	36	34	25	21	27	*TCVN 6625:2000*	*100**
	COD	*mg/L*	27	21	26	23	26	36	28	42	*SMEWW 5220C:2017*	*15**
	BOD_5	*mg/L*	10,2	9,2	12,3	11,9	12,9	12,7	11,5	15,6	*TCVN 6001-1:2008*	*6**
	NH_4^+	*mg/L*	0,12	0,18	0,21	0,14	0,09	0,08	0,12	0,18	*TCVN 6179-1:1996*	*0,3*
	Total N	*mg/L*	<2	<2	<2	<2	<2	<2	<2	<2	*TCVN 6638:2000*	*1,5**
	Total P	*mg/L*	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	*TCVN 6202:2008*	*0,3**
	NO_3^-	*mg/L*	0,09	1,21	1,83	0,06	2,08	0,06	0,87	1,14	*TCVN 6180:1996*	-
	NO_2^-	*mg/L*	<0,003	<0,003	<0,003	<0,003	<0,003	<0,003	<0,003	<0,003	*TCVN 6178:1996*	*0,05*
	Pb	*mg/L*	<0,002	<0,002	<0,002	<0,002	<0,002	<0,002	<0,002	<0,002	*SMEWW 3113B:2017*	*0,02*
	Cd	*mg/L*	<0,0007	<0,0007	<0,0007	<0,0007	<0,0007	<0,0007	<0,0007	<0,0007	*SMEWW 3113B:2017*	*0,005*
	As	*mg/L*	<0,003	<0,003	<0,003	<0,003	<0,003	<0,003	<0,003	<0,003	*SMEWW 3113B:2017*	*0,01*
	Hg	*mg/L*	<0,0008	<0,0008	<0,0008	<0,0008	<0,0008	<0,0008	<0,0008	<0,0008	*SMEWW 3112B:2017*	*0,001*
	Cu	*mg/L*	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	*SMEWW 3111B:2017*	*0,1*
	Mn	*mg/L*	<0,021	<0,021	<0,021	<0,021	<0,021	<0,021	<0,021	<0,021	*SMEWW 3500-*	*0,1*

No.	Parameter	Unit	Monitoring results								Testing method	QCVN 08: 2023/BTNMT table 1, class B table 2*
			Coastal Road section from My Thanh to Lai Giang					Connection road from Road 19C to Quy Nhon port				
			NM1	NM2	NM3	NM4	NM5	NM1	NM2	NM3		
											Mn.B:2017	
	Zn	*mg/L*	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	*SMEWW 3111B:2017*	*0,5*
	Fe	*mg/L*	0,08	0,28	0,13	0,18	0,09	0,06	0,16	0,13	*TCVN 6177:1996*	*1,5*
	SO_4^{2-}	*mg/L*	56,7	35,9	88,7	64,4	46,9	43,4	25,9	67,9	*SMEWW 4500-SO42-.E:2017*	-
	PO_4^{3-}	*mg/L*	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	*TCVN 6202:2008*	-
	Cl^-	*mg/L*	54	37	51	43	78	87	54	36	*TCVN 6194:1996*	*250*
	Oil and grease	*mg/L*	0,7	0,4	0,9	0,5	0,6	0,3	0,7	0,7	*SMEWW 5520.B:2017*	*5*
	Pesticides in the Organic Chlorine Group											
-	*Aldrin*	*µg/L*	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	*USEPA Method 3510C + USEPA Method 3620C + USEPA Method 8081B*	*0,1*
-	*Benzene hexachloride (BHC)*	*µg/L*	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01		*0,04*
-	*4,4'-DDT*	*µg/L*	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01		*1,0*
-	*Dieldrin*	*µg/L*	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01		*0,1*
-	*Heptachlor*	*µg/L*	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01		-
-	*Heptachlorepoxide*	*µg/L*	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05		-
	TotalColiform	*MPN/ 100mL*	3400	3900	3600	4200	2900	2600	3600	3400	*TCVN 6187-2:1996*	*5000**

Comparison standards:

- QCVN 08-MT:2023/BTNMT: National Technical Regulation on Surface Water Quality

(-): No regulation.

2.2.3. Groundwater quality

a) Sampling locations

Table 0-14. Sampling locations for groundwater

Symbol	Location	Coordinate	
		N	E
Coastal Road section from My Thanh to Lai Giang			
NN1	Ground water sampling No.1	14°16'29.3"	109°10'25.1"
NN2	Ground water sampling No.2	14°16'29.6"	109°10'31.0"
NN3	Ground water sampling No.3	14°24'26.2"	109°07'12.7"
NN4	Ground water sampling No.4	14°28'31.2"	109°05'31.5"
NN5	Ground water sampling No.5	14°28'31.8"	109°05'33.7"
Connection road from Road 19C to Quy Nhon port			
NN1	Ground water sampling No.1	13°48’07.8’’	$109^0$8’52.0’’
NN2	Ground water sampling No.2	13°48’12.4’’	$109^0$10’22.8’’
NN3	Ground water sampling No.3	13°47’45.7’’	$109^0$12’05.5’’

Note:

Coastal road PR639 My Thanh – Lai Giang:

- NN1: Groundwater at My Thanh CommunNN1: Groundwater at My Thanh Commune, Phu My District
- NN2: Groundwater at My An Commune, Phu My District
- NN3: Groundwater at My Duc Commune, Phu My District
- NN4: Groundwater at Hoai My Commune, Hoai Nhon District
- NN5: Groundwater at Hoai Hai Commune, Hoai Nhon District

National Highway 19C – Quy Nhon Port:

- NN1: Groundwater at Nhon Phu Ward, Quy Nhon City
- NN2: Groundwater at Nhon Binh Ward, Quy Nhon City
- NN3: Groundwater at Dieu Tri Town

b) Sample Collection Time: From February 1st to February 2nd, 2021

c) Analysis Results:

According to the results of groundwater quality surveying in the project area, the groundwater is relatively clean, with no signs of contamination. This explains why all residents in the project area continue to use well water for drinking and daily activities.

Table 0-15. Monitoring results of underground water quality in the subproject area

Parameter	Unit	Monitoring results								Testing method	QCVN 09:2023/ BTNMT
		Coastal Road section from My Thanh to Lai Giang					*Road 19C to Quy Nhon port*				
		NN1	**NN2**	**NN3**	**NN4**	**NN5**	**NN1**	**NN2**	**NN3**		
pH	-	6,34	6,87	6,52	6.39	6,72	6.32	06.65	6,46	*TCVN6492:2011*	***5,5 – 8,5***
Temperature	*0C*	25.3	25.0	25.2	25,6	25.3	25,5	25.2	25,6	*SMEWW 2550B:2017*	**-**
DO	*mg/L*	1,5	1.9	1,5	1.4	1.8	1.3	1.6	1.4	*TCVN 7325:2016*	**-**
EC	*mS/cm*	0,29	0,36	0,32	0,42	0,38	0,22	0,30	0,27	*SMEWW 2510B:2017*	**-**
Hardness (as $CaCO_3$)	*mg/L*	183	170	192	153	162	157	134	168	*TCVN6224:1996*	***500***
TSS	*mg/L*	<2	<2	<2	<2	<2	<2	<2	<2	*TCVN6625:2000*	**-**
NH_4^+_N	*mgN/L*	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	<0,01	*TCVN6179-1:1996*	***1***
Cl^-	*mg/L*	21	15	12	18	24	35	22	33	*TCVN6194:1996*	***250***
NO_2^-	*mgN/L*	<0,003	<0,003	<0,003	<0,003	<0,003	<0,003	<0,003	<0,003	*TCVN6178:1996*	***1***
NO_3^-	*mgN/L*	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	*SMEWW 4500.NO3.E:2017*	***15***
SO_4^{2-}	*mg/L*	24	36	21	39	33	26	31	19	*SMEWW 4500-SO42-.E:2017*	***400***
PO_4^{3-}	*mg/L*	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	*TCVN6202:2008*	**-**

Parameter	Unit	Monitoring results								Testing method	QCVN 09:2023/ BTNMT
		Coastal Road section from My Thanh to Lai Giang					*Road 19C to Quy Nhon port*				
		NN1	**NN2**	**NN3**	**NN4**	**NN5**	**NN1**	**NN2**	**NN3**		
Total N	*mg/L*	<2	<2	<2	<2	<2	<2	<2	<2	*TCVN6638:2000*	**-**
Total P	*mg/L*	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	*TCVN6202:2008*	**-**
As	*mg/L*	<0,003	<0,003	<0,003	<0,003	<0,003	<0,003	<0,003	<0,003	*SMEWW 3113B:2017*	***0,05***
Cd	*mg/L*	<0,0007	<0,0007	<0,0007	<0,0007	<0,0007	<0,0007	<0,0007	<0,0007	*SMEWW 3113B:2017*	***0,005***
Pb	*mg/L*	<0,002	<0,002	<0,002	<0,002	<0,002	<0,002	<0,002	<0,002	*SMEWW 3113B:2017*	***0,01***
Hg	*mg/L*	<0,0008	<0,0008	<0,0008	<0,0008	<0,0008	<0,0008	<0,0008	<0,0008	*SMEWW 3112B:2017*	***0,001***
Cu	*mg/L*	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	*SMEWW 3111B:2017*	***1***
Zn	*mg/L*	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	<0,05	*SMEWW 3111B:2017*	***3***
Mn	*mg/L*	<0,021	<0,021	<0,021	<0,021	<0,021	<0,021	<0,021	<0,021	*SMEWW 3500-Mn.B:2017*	***0,5***
Fe	*mg/L*	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	<0,02	*TCVN6177:1996*	***5***
Coliform	*VK/ 100ml*	KPH	KPH	KPH	KPH	KPH	KPH	KPH	KPH	*TCVN6187-1:2019*	***3***

Comparison Standards: QCVN 09:2023/BTNMT: National Technical Regulation on Groundwater Quality

2.2.4. Soil quality

a) Sampling locations

Table 0-16. Sampling locations for soil

Symbol	Location	Coordinate	
		N	E
Coastal Road section from My Thanh to Lai Giang			
D1	Soil sampling No.1	14°11'52.2"	109°11'01.6"
D2	Soil sampling No.2	14°16'29.3"	109°10'33.1"
D3	Soil sampling No.3	14°22'14.7"	109°07'12.3"
D4	Soil sampling No.4	14°24'25.5"	109°07'13.3"
D5	Soil sampling No.5	14°28'32.6"	109°05'32.0"
Connection road from Road 19C to Quy Nhon port			
D1	Soil sampling No.1	13°48’08.2’’	10908’51.5’’
D2	Soil sampling No.2	13°48’12.7’’	109010’21.7’’
D3	Soil sampling No.3	13°47’46.1’’	109012’03.7’’

Notes:

Coastal road PR639 My Thanh – Lai Giang:

- D1: Vacant land at My Thanh Commune, Phu My District
- D2: Rice field land at My Duc Commune along TL 639
- D3: Vacant land at My An Commune along TL 639
- D4: Vacant land at Hoai My Commune, Hoai Nhon District along TL 639
- D5: Vacant land in Lo Dieu Pass area

National Highway 19C – Quy Nhon Port:

- D1: Vacant land at Nhon Phu Commune, Quy Nhon City
- D2: Vacant land at Nhon Binh Commune, Quy Nhon City
- D3: Vacant land at Nhon Binh, Quy Nhon City

b) Sample Collection Time: From February 1st to February 2nd, 2021

c)

c) Analysis Results: The concentration of heavy metals (Cd, As, Zn, Pb, Cu) in the sub-project area is below the permissible limits set by QCVN 03:2023/BTNMT - National Technical Regulation on Soil Quality – Type 1: Agricultural land, aquaculture land, salt land, residential land, and land for building material production. According to the environmental status report of Binh Dinh Province for the period 2015-2019, soil quality remains good with no signs of contamination. The concentrations of heavy metals such as cadmium, arsenic, lead, and zinc are all below the permissible limits as per QCVN 03:2023/BTNMT. No organochlorine or organophosphorus pesticides were detected. During the construction of the sub-project, the topsoil layer will be excavated. Depending on the soil properties, a plan for reuse or disposal will be determined. Therefore, the excavated soil may be reused for various purposes such as site leveling or treated as regular waste.

Table 0-17. Monitoring results of soil quality in the subproject area

Parameter	Unit	Monitoring results								Testing method	QCVN 03:2023/ BTNMT class 1
		Coastal Road section from My Thanh to Lai Giang					*Connection road from Road 19C to Quy Nhon port*				
		D1	**D2**	**D3**	**D4**	**D5**	**D1**	**D2**	**D3**		
Cl^-	*mg/kg*									*TCVN 8727:2012*	-
SO_4^{2-}	*mg/kg*	76,2	56,8	119,8	88,7	63,3	57,8	70,3	86,7	*TCVN 6656:2000*	-
P_2O_5**	*mg/100g soil*	2.7	2.4	2.8	2.3	2.2	2.2	3.9	4.3	*TCVN 8661:2011*	-
K_2O**	*mg/100g soil*	4.9	2.9	3.4	3.9	3.8	4.1	5.6	1.3	*TCVN 5242:1990*	-
Total N	%	0,066	0,071	0,055	0,049	0,037	0,047	0,068	0,052	*TCVN 6498:2009*	-
Total P	%	0,021	0,015	0,011	0,019	0,013	0,027	0,023	0,018	*TCVN 8940:2011*	-
Total organic matter	%	1,88	1,36	1.09	1,54	2.02	1,46	1,68	1,34	*TCVN 8941:2011*	-
Ca**	*mg/kg*	23	43	25	21	35	27	38	32	*US EPA Method 3050B+ SMEWW 3111B:2017*	-
Mg**	*mg/kg*	35	24	54	38	41	45	32	37		-
K**	*mg/kg*	2178	2876	2465	2897	3421	2567	2534	2132	*TCVN 8660:2011*	-

Parameter	Unit	Monitoring results								Testing method	QCVN 03:2023/ BTNMT class 1
		Coastal Road section from My Thanh to Lai Giang					*Connection road from Road 19C to Quy Nhon port*				
		D1	**D2**	**D3**	**D4**	**D5**	**D1**	**D2**	**D3**		
Na**	*mg/kg*	4219	3567	4097	3097	4587	3879	3234	4533	*US EPA Method 3050B+ SMEWW 3111B:2017*	-
Al**	*mg/kg*	45278	41890	56890	44678	32459	41323	37821	51652		-
Fe^{3+}**	*mg/kg*	16743	14287	11290	20891	19650	12345	16783	16578	*US EPA Method 3050B+ SMEWW 3111B:2017*	-
Mn**	*mg/kg*	435	562	382	611	298	542	485	433		-
Pb	*mg/kg*	37,7	31,9	40,9	23,4	28,8	32,4	39,8	36,6		***200***
Cd	*mg/kg*	<0,16	<0,16	<0,16	<0,16	<0,16	<0,16	<0,16	<0,16		***4***
Hg	*mg/kg*	<0,13	<0,13	<0,13	<0,13	<0,13	<0,13	<0,13	<0,13	*US.EPA Method 3051A + SMEWW 3112B:2017*	-
As	*mg/kg*	<0,8	<0,8	<0,8	<0,8	<0,8	<0,8	<0,8	<0,8	*US EPA Method 3050B+ SMEWW 3113B:2017*	***25***

Comparison Standards: QCVN 03:2023/BTNMT: National Technical Regulation on Soil Quality – Type 1.

2.2.5. Sediment quality

a) Sampling locations

Table 0-18. Sampling locations for sediment

Symbol	Location	Coordinate	
		N	E
Coastal Road section from My Thanh to Lai Giang			
TT1	Sediment sampling No.1	14°11'45.2"	109°11'15.2"
TT2	Sediment sampling No.2	14°22'16.1"	109°07'09.5"
TT3	Sediment sampling No.3	14°24'22.0"	109°07'18.4"
TT4	Sediment sampling No.4	14°28'35.5"	109°05'31.2"
TT5	Sediment sampling No.5	14°30'11.9"	109°05'12.1"
Connection road from Road 19C to Quy Nhon port			
TT1	Sediment sampling No.1	13°47’55.1’’	$109^0$8’52.0’’
TT2	Sediment sampling No.2	13°48’17.0’’	$109^0$10’13.4’’
TT3	Sediment sampling No.3	13°47’46.4’’	$109^0$12’03.9’’

Notes:

Coastal road PR639 My Thanh – Lai Giang:

- TT1: Lake on the left side of Coastal Road DT 639 My Thanh – Lai Giang at My Thanh Commune, Phu My District
- TT2: Ha Ra Bridge, My Duc Commune, Phu My District, Binh Dinh Province
- TT3: Pond on the right side of Route 1 at My Duc Commune, Phu My District
- TT4: Bridge at Hoai My Commune, Hoai Nhon District, Binh Dinh Province
- TT5: Pond on the right side of Coastal Road DT 639 My Thanh – Lai Giang at Hoai Nhon Commune, Hoai Nhon District

National Highway 19C – Quy Nhon Port:

- TT1: Dinh River at Nhon Phu Ward, Quy Nhon City, Binh Dinh Province
- TT2: Cay Me River at Nhon Phu Ward, Quy Nhon City, Binh Dinh Province
- TT3: Truong Uc River at Nhon Phu Ward, Quy Nhon City, Binh Dinh Province

b) Sample Collection Time: From February 1st to February 2nd, 2021

c) Analysis result

The analysis results indicate that the concentration of heavy metals in the sediment within the sub-project area is below the permissible limits set by QCVN 43:2017/BTNMT - National Technical Regulation on Sediment Quality. A comparison with QCVN 07:2009/BTNMT - National Technical Regulation on Hazardous Waste Thresholds shows that the heavy metal concentrations are also below the allowable limits, indicating no heavy metal contamination in the river sediment within the sub-project area.

Table 0-19. Monitoring results of sediment quality in the subproject area

Parameter	Unit	Monitoring results								Testing method	QCVN 43:2017/ BTNMT
		Coastal Road section from My Thanh to Lai Giang					*Connection road from Road 19C to Quy Nhon port*				
		TT1	**TT2**	**TT3**	**TT4**	**TT5**	**TT1**	**TT2**	**TT3**		
Pb	*mg/kg*	38.9	47.6	32.8	30.8	28.7	28.7	42.1	23.3	*US EPA Method 3050B+ SMEWW 3113B:2017*	***112***
Cd	*mg/kg*	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	*US EPA Method 3050B+ SMEWW 3113B:2017*	***4.2***
Hg	*mg/kg*	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	*US.EPA Method 3051A + SMEWW 3112B:2017*	***0.7***
As	*mg/kg*	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	*US EPA Method 3050B+ SMEWW 3113B:2017*	***41.6***
Cu	*mg/kg*	27.7	21.3	31.9	34.5	39.9	35.8	29.8	45.2	*US EPA Method 3050B+ SMEWW 3111B:2017*	***108***
Zn	*mg/kg*	56.2	49.8	39.7	51.3	56.8	41.3	39.6	26.8		***271***
Total N**	%	0.09	0.06	0.07	0.05	0.04	0.07	0.08	0.04		**-**
Total P**	%	0.12	0.18	0.14	0.09	0.15	0.11	0.19	0.12		**-**
Aldrin	*mg/kg*	<0.65	<0.65	<0.65	<0.65	<0.65	<0.65	<0.65	<0.65	*US EPA Method 3550C +*	

Parameter	Unit	Monitoring results								Testing method	QCVN 43:2017/ BTNMT
		Coastal Road section from My Thanh to Lai Giang					*Connection road from Road 19C to Quy Nhon port*				
		TT1	**TT2**	**TT3**	**TT4**	**TT5**	**TT1**	**TT2**	**TT3**		
Benzene hexachloride (BHC)	*mg/kg*	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	*US EPA Method 3510C + US EPA Method 3620C + US EPA Method 8081B*	
4,4'-DDT	*mg/kg*	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
Dieldrin	*mg/kg*	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006	<0.0006		
Heptachlor	*mg/kg*	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
Heptachlore poxide	*mg/kg*	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		

Note: (-) Not determined; KPH: not detected.

Comparison Standards: QCVN 43:2017/BTNMT: National Technical Regulation on Sediment Quality.

2.3. SOCIO-ECONOMIC CONDITIONS

2.3.1. Socio-economic conditions

2.3.1.1. Population and Labor

The population of Binh Dinh Province is 1,487,817 people (as of 2019), with a population density of 245 people/km². The urban population accounts for 30.8%, while the rural population comprises 69.2%.

The number of individuals aged 15 and older is 891,238, with 52.2% being male and 47.8% being female. The distribution of the labor force between rural and urban areas is 72.4% (645,256) and 27.6% (245,982), respectively.

2.3.1.2. Poverty

During the period from 2016 to 2020, the poverty rate decreased by an average of 1.83% per year, with 37,000 households escaping poverty—achieving the planned target. Specifically, for poor households under Resolution 30a, the average reduction rate was 6.5% per year, with over 7,900 households escaping poverty—achieving and exceeding the planned target. Throughout the 2011-2020 period, the province's overall poverty rate decreased by nearly 2% per year, while the poverty rate in districts classified under Resolution 30a decreased by 5.68% per year.

2.3.1.3. Economy

The average Gross Regional Domestic Product (GRDP) of Binh Dinh Province during the 2016-2020 period increased by 6.4%. Specifically, the contributions were as follows: agriculture, forestry, and fisheries grew by 4.04%; industry and construction by 9.13%; services by 6.16%; and product taxes minus product subsidies increased by 7.96%.

As of 2020, the economic structure of Binh Dinh Province was composed of agriculture, forestry, and fisheries at 27.6%; industry and construction at 28.6%; services at 39.3%; and taxes at 4.5%. Compared to 2015, the share of industry and construction in GRDP increased by 3.7% (with a planned increase of 6.6%). Notably, the proportion of industry in GRDP in 2020 compared to 2015 rose by 3% (with a planned increase of 4.7%). This indicates that the shift in economic structure towards increasing the share of the industry and construction sector has been slow. Additionally, due to the negative impacts of the COVID-19 pandemic, the services sector experienced very low growth in 2020 (estimated at 3.1%), resulting in an average growth rate of only 6.16% for the services sector. Excluding 2020, the average growth rate for the services sector over the four years from 2016 to 2019 was 6.94%.

2.3.1.4. Education

The province has 2 universities, 3 professional high schools, 51 high schools, 145 secondary schools, 244 primary schools and 220 preschools, with nearly 267,000 students. The system of community learning centers is built and operates more and more dynamically. Binh Dinh province was recognized by the Ministry of Education and Training to achieve the standard of primary education universalization and illiteracy eradication in 1998, achieved universalization of lower secondary education in 2004, achieved the primary school standard at the right age in December 2005.

In the 2019-2020 school year, the education and training sector continues to drastically and synchronously implement solutions to complete the goals of the 5-year plan (2016-2020). Accordingly, the 2019-2020 school year continues to (i) review and regulate planning and developing the network of education and training institutions in the province; (ii) improve the quality of teachers and administrators; (iii) implement new general education curricula and

textbooks; (iv) promote career orientation and stream students after secondary school; (v) strengthen moral education, lifestyle, life skills, physical education for students, and (v) ensure school safety. Currently, the total number of administrators and teachers in Binh Dinh province is 16,900, of which are 1,330 managers, teachers at all levels is 15,570, the rate is 100%, above the standard 68.8%.

The literacy rate of the population aged 15 and over increased sharply after 10 years from 2009 to 2019; Binh Dinh province has 97.2% of the population aged 15 years and over who can read and write, 1.4 percentage points higher than the whole country and 1.0 percentage point higher than the North Central and Central Coast regions. The literacy rate of urban areas is higher than that of rural areas due to the gap in the development of these two areas. To achieve the above results, thanks to the policies of universalization of primary education and illiteracy eradication, the ratio gap between the two regions is gradually narrowing, with a 2% difference between female and female, lower than 2.5 percentage points in 2009

Quy Nhon city and An Nhon town have the highest literacy rate (98.8%); followed by Tuy Phuoc district 98.5%; In 3 mountainous districts, the rate is still low: Vinh Thanh 91.9%, An Lao 89.9%, Van Canh has the lowest rate in the province (86.4%). Over the past 10 years, the proportion of the population of general school age but not currently attending school (never attended or dropped out) has decreased significantly, from 12.69% in 2009 to 8% in 2019.

2.3.1.5. Social security

In the challenging economic conditions of the province, with a limited budget, the government still prioritizes cultural and social sectors, significantly contributing to social security and improving the lives of citizens. The health care services for the population have shown considerable progress, actively implementing preventive healthcare and timely measures to combat dangerous diseases, preventing any major outbreaks. As of now, 100% of health stations have doctors, 97.5% of communes meet national health standards, 80.7% of the population participates in health insurance, and there are 30.2 hospital beds per 10,000 people. The government continuously enhances consultations on reproductive health care and tackles child malnutrition. The program aimed at preventing child malnutrition has reduced the rate of malnutrition among children under 5 years of age to 9.7%.

2.3.1.6. Social Order

In the first six months of 2021, the Provincial People's Committee advised the Provincial Party Committee and the Steering Committee 138 to issue directives and plans related to maintaining social order and safety. Simultaneously, the Provincial People's Committee also issued directives and plans to guide various departments and localities to effectively implement these tasks within the province.

During this period, the competent authorities investigated and clarified 252 out of 271 criminal cases (93% clearance rate), including 38 out of 40 very serious and particularly serious cases (95% clearance rate); 528 suspects were arrested and handled. The Investigative Police handled 672 cases involving 1,161 defendants, discovering 462 new cases and prosecuting 807 defendants; the investigation concluded with 366 cases referred to the Prosecution for indictment against 755 defendants.

2.3.1.7. Gender ratio and Gender-Based Violence (GBV)

In Binh Dinh, the gender ratio is 97.0 males per 100 females. The national ratio is 99.1 males per 100 females, with the North Central Coast and Central Coastal regions at 99.2 males per 100 females, and the key economic regions of the Central Coast at 97.5 males per 100 females. The

gender ratio in Binh Dinh has been steadily increasing but has remained below 100 since the national population census in 1989. (1989: 90.4 males per 100 females; 1999: 93.8 males per 100 females; 2009: 95.1 males per 100 females). Since 2008, there have been 2,495 reported cases of GBV in the province, with various forms, predominantly physical violence. Most victims are women aged between 16 and 59 years, and the perpetrators are primarily male. The main causes include gambling, alcohol abuse, poverty, unemployment, early marriage, infidelity, gender inequality, and a lack of awareness of conflict resolution skills.

Binh Dinh province has implemented necessary annual activities as directed by the central government to promote prevention and combat GBV. The Provincial People's Committee regularly directs relevant departments and localities to organize workshops, community meetings, and training for volunteer teams, and to distribute leaflets to raise awareness about GBV risks, support victims, and provide assistance. Most communes in Binh Dinh have established GBV prevention clubs. Community focal points for GBV prevention have been appointed and trained to counsel victims, with some capable of providing first aid. A healthcare system from communal to provincial levels supports individuals injured due to GBV as needed. According to legal regulations, medical personnel treating victims must maintain strict confidentiality regarding their information and report to local authorities if there are signs of criminal activity. In Binh Dinh, for victims of domestic violence, a coding system is used to indicate the location and reasons for injuries, which are not recorded in the patient's medical records.

Over the past decade, approximately 50,000 awareness-raising events have been held, reaching 10.25 million people with information related to the Law on GBV Prevention and Control. Departments have organized the compilation and distribution of 4,500 legal Q&A leaflets, including those related to GBV, for reporters, communicators, and mediators to educate the community.

The enactment of the Law on Gender-Based Violence Prevention and Control provides a legal framework for building GBV prevention models and groups. Currently, the province has established 122 GBV prevention models. Support facilities for GBV victims and counseling centers have been set up in 126 out of 159 communes, wards, and towns across the province. Trade union levels have collaborated with local authorities to mobilize 415 trustworthy addresses in communities responsible for counseling and resolving GBV conflicts, and supporting victims.

2.3.1.8. Communicable diseases of HIV situation

In order to contribute to the successful implementation of the National Strategy for HIV/AIDS Prevention and Control to 2020 with a vision to 2030, Controlling the HIV infection rate in the population less than 0.4%, Binh Dinh province has implemented synchronously, comprehensively and effectively the HIV/AIDS prevention program from communication on behavior change and intervention of harm reduction, pre-exposure prevention, care and treatment for people living with HIV/AIDS that have achieved many encouraging results, contributing to socio-economic development and stabilizing people's lives. Accumulating the number of HIV cases in Binh Dinh province, by the end of 2018 the total number of HIV infected patients in Binh Dinh province was 824, of which 383 were alive patient. In the first 10 months of year 2019, the number of newly diagnosed HIV patients was 61 people.

In order to effectively implement HIV/AIDS prevention and control in the province from the beginning of 2019, HIV/AIDS prevention and control has been comprehensively and effectively implemented with intervention services on prevention and care, support and treatment for infected people, diversified HIV testing models in the community so that people living with HIV know their HIV status early so that they can participate in ARV treatment (antiretroviral drugs).

2.3.1.9. Ethnic people

The province has 1,445,150 Kinh people, accounting for 97.2% of the population, and 41,768 people from other ethnic groups, making up 2.8% of the total population. Over the past ten years, the annual population growth rate of other ethnic groups has been 1.91%, higher than the overall provincial average growth rate of 1.907% and the Kinh group's growth rate of 1.96%.

Binh Dinh has 33 communes and towns with ethnic minorities living, primarily located in the mountainous and midland communities of six mountainous districts: An Lao, Vinh Thanh, Van Canh, Hoai An, Tay Son, and Phu Cat. The ethnic minority population in the mountainous areas consists of about 9,500 households (36,500 people). Currently, there are 27 ethnic minorities living in the province, with three majority groups: Cham, Bana, and H're, comprising 9,300 households and 35,700 long-term residents, along with about 200 new immigrant households (800 people). Survey results indicate that there are no ethnic minorities living within the impact area of the subproject.

2.3.1.10. Vulnerable Groups

Currently, Binh Dinh province has 32,372 disabled persons (excluding war veterans), accounting for 1.98% of the population. There are about 193,000 elderly people in the province (12.8% of the population), with a total of 168,947 elderly members. Vulnerable groups also include (i) poor households as discussed in the poverty section above, (ii) poor households led by women or households headed by women with dependents and no other support, and (iii) social policy households according to the policy of the Binh Dinh Provincial People's Committee.

2.3.1.11. Child Labor and Forced Labor

To date, there have been no reported cases of child labor or forced labor in Binh Dinh province.

2.3.1.12. Cultural Heritage

Binh Dinh is one of the three centers of Sa Huyhn culture, featuring a densely distributed system of archaeological sites discovered and excavated by archaeologists, such as: Hang Cuoc, Go Thap, Ca Cong, Bau Nang, Phu Nhuan, Cong Luong (Hoai Nhon), Truc Xe, Go Loi, Thuan Dao, Chanh Trach (Phu My), Hoi Loc, Nui Ngang, Doi Diep (Quy Nhon).

Binh Dinh was the capital of the Champa Kingdom from the 10th to the 16th century, and this golden period still retains invaluable heritage today, with remnants of fortresses and moss-covered towers that have stood the test of time, showcasing authentic artistic and cultural values.

The Twin Towers of Quy Nhon were built in the late 12th century, located in Dong Da Ward, Quy Nhon City. This beautiful and unique architectural work comprises two towers (the main tower is 20m tall, while the subsidiary tower is about 18m tall). In addition, Binh Dinh is home to many other ancient towers such as Ban It Tower, Duong Long Tower, Canh Tien Tower, Phu Loc Tower, Binh Lam Tower, and Thu Thien Tower.

Hoang De fortress is situated in the territory of Dap Da Town and Nhon Hau Commune, An Nhon District. Thanh Hoang De was constructed by the Tay Son dynasty in 1775 on the foundation of Do Ban Citadel of the Champa Kingdom and was officially named Thanh Hoang De in 1778.

The Quang Trung Museum - a spiritual museum - was established in the very old house of the Nguyen Hue family in Kien My village, Kien Thanh hamlet, now part of Phu Phong Town, Tay Son District. The complex of Quang Trung Museum - Tay Son Temple is a prominent museum dedicated to historical figures. It is also one of the museums that attracts many tourists for research and tourism purposes, serving as a primary attraction for visitors to Binh Dinh.

Martial arts and Quang Trung battle drums are two significant intangible heritage elements of the

Tay Son dynasty. The three brothers of the Tay Son family played a crucial role in initiating, developing, and perfecting Binh Dinh martial arts, improving martial skills and weapons to teach the military. Nguyen Hue created the Yen Phi martial arts, Doc Lu Thuong, while Nguyen Lu developed Hùng Kiet martial arts, regarded as unique forms of Binh Dinh martial arts. Nguyen Hue was the proponent of incorporating musical drums to encourage combat, a practice that has persisted to this day, known as Quang Trung battle drums.

2.3.2. Socio-Economic Conditions in the Sub-Project Area

The population of the districts/towns of Phu My, Tuy Phuoc, Hoai Nhon, and Quy Nhon City is 840,312 people. The population density in these areas is approximately 2,619.7 people/km².

Table 0-20. The population of the districts/town Phu My, Tuy Phuoc, Hoai Nhon, and the city of Quy Nhon

NO.	District/Town/City	Natural Area (km²)	Population (people)	Population Density (people/km²)
1	Hoai Nhon	420.8	208,121	494.6
2	Phu My	555.9	161,662	290.8
3	Tuy Phuoc	219.9	180,300	819.9
4	Quy Nhon	286.1	290,229	1,014.4
Total			**1,482.7**	**840,312**

*(**Source:** Resettlement Report, 2021)*

Table 0-21. Income and Poverty Rate of Households in the Communes within the Project Area

Commune/Town	Poverty Rate (%)	Income (VND/person/year)
My Thanh	3.27	40,000,000
My Tho	2.52	40,000,000
My An	4.47	41,000,000
My Thang	3.24	40,000,000
My Duc	5.34	40,000,000
Hoai My	2.1	45,000,000
Hoai Hai	3.5	45,000,000
Dieu Tri	1.6	47,000,000
Nhon Phu	0.75	54,000,000

Nhon Binh	0.66	54,000,000
Average Value	2.39	45,000,000

***(Source:** Report on the Socio-Economic Conditions of the Communes in the Project Area 2020)*

The average income per capita of the residents in the communes and wards belonging to the Project is 45,000,000 VND/year (in 2020). The poverty rate is about 2.39%.

2.3.2.1. Characteristics of Affected Households

The total number of surveyed households is 354, with 1,527 members. The male ratio is 51.1%, while the female ratio is 48.9%. For household heads, the male head ratio is 76.0% (269 individuals) and female head ratio is 24.0% (85 individuals). All affected households are of the Kinh ethnic group. There are no ethnic minority households in the project area.

The average household size of affected households is 4.31 people/household, while the affected population size is 4.26. Households with 3-4 people account for the highest percentage (64.4%), followed by households with 5 or more people (25.4%), and households with 1-2 people (10.2%), which are mostly elderly or dependent households (these households are considered vulnerable). On average, the number of working-age individuals is 2.73 people/household, and the average number of dependent members is 1.60 people/household.

Access to Utilities and Services

Most residents obtain water from groundwater as their primary source (75.3%). Tap water and drilled well water account for 12.6% and 12.1%, respectively. The main energy source used for cooking is gas (98.5%). Only 1.5% of affected households use firewood for cooking. The primary energy source for lighting is electricity (from the national power grid), accounting for 99.6%. 0.4% have used kerosene. Survey results indicate that 95.7% of households have septic toilets, while 4.3% have simple toilets (single and double compartment).

Assets

The asset value of each household largely depends on their economic conditions. Low-value assets are often found in households with average income, while valuable assets are used by rich and affluent households. Common items used by most surveyed households include gas stoves (349 households, 98.6%), televisions (345 households, 97.5%), mobile phones (344 households, 97.2%), motorcycles/electric bicycles (330 households, 93.2%), and refrigerators (297 households, 83.9%). Only 3 surveyed households own expensive assets such as cars, accounting for 0.8%.

Most wealthy and affluent households require expensive items and equipment or have higher expenditures for their living. For those with lower living standards, they have ordinary equipment such as motorcycles, refrigerators, and gas stoves for daily use. For common items like televisions, mobile phones, and refrigerators, there is no distinction between groups (by living standard). The specific status of asset and equipment ownership of households is presented in the table below.

Table 0-22. Assets of Households

Assets	**Total**		**My Thanh to Lai Giang**		**From Road 19C to Quy Nhon port**	
	N	**%**	**N**	**%**	**N**	**%**

Television	345	97,5	253	97,3	92	97,9
Internet	37	10,5	25	9,6	12	12,8
Boats/Motorboats	7	2,0	6	2,3	1	1,1
Motorbike/Electric Bicycle	330	93,2	243	93,5	87	92,6
Landline Phone	1	0,3	1	0,4	0	0,0
Mobile Phone	344	97,2	253	97,3	91	96,8
Gas Stove	349	98,6	256	98,5	93	98,9
Car (excl. agricultural workers)	3	0,8	2	0,8	1	1,1
Refrigerator	297	83,9	218	83,8	79	84,0
Air Conditioner	20	5,6	12	4,6	8	8,5
Computer	15	4,2	10	3,8	5	5,3
Washing Machine	212	59,9	153	58,8	59	62,8
Electric Water Heater	18	5,1	10	3,8	8	8,5
Water Filtration Device	168	47,5	122	46,9	46	48,9
Other Items	354	100,0	260	100,0	94	100,0

*(**Source:** Survey Results on Socio-Economic Conditions of the Project, 2021)*

Health

The illnesses reported by 260 households in the past three months include flu/headaches (68.0%), injuries (11.7%), and digestive diseases (10.7%). See the table below.

Table 0-23. Some common diseases in the past 3 months

Disease	**Quantity**	**%**
Flu/headache	70	68
Other diseases	28	27.2
Injury	12	11.7
Gastrointestinal disease	11	10.7
Viral hemorrhagic fever	8	7.8

Disease	Quantity	%
Skin disease	4	3.9

*(**Source:** Socio-economic survey results, 2021)*

Health Facilities

Respondents reported that they frequently visit healthcare facilities for medical check-ups. The frequency of visits to district and provincial hospitals is 24.2% and 59.6%, respectively. The number of respondents who reported having check-ups at commune health stations or private clinics is low at 0.8%. Only 0.8% of households purchased prescribed medication. The reason that district and provincial health centers are visited more often (compared to commune health stations) may be explained by the fact that district hospitals are located closer to their homes. For serious cases, residents seek healthcare services from provincial and central hospitals (which are further from their areas).

Table 0-24. Nearest medical facility

Medical facility	Quantity	%
1. Commune health station	88	33.8
2. Private community health unit	2	0.8
3. District hospital	64	24.2
4. Provincial hospital	155	59.6
5. Pharmacy	2	0.8
6. Traditional medicine	1	0.4

(Source: SES, 2021)

2.3.2.2. Vulnerable Households

Out of the total affected households, 131 households belong to the vulnerable group (as defined in the RAP). There are 18 households headed by single women with dependents; 24 poor households with poverty certificates; 14 households with elderly individuals living alone; and 69 households with policies for war veterans and martyrs.

2.3.2.3. Gender Equality

About 70.0% of respondents reported that household chores (cooking, cleaning, washing) are primarily performed by women in the family. However, other tasks, such as childcare, are shared. In production activities, men tend to take on heavy and outdoor jobs. They go fishing or work as hired laborers. Women tend to participate more in small business activities and farming.

The survey shows that men and women seem to have equal roles in decision-making within the household. For certain matters, such as changing jobs, borrowing capital to develop a business, owning land and other assets, men appear to play a dominant role in decision-making.

According to the results of community consultations held in communes/wards in January and February 2021, both men and women actively participated and voiced their opinions at local consultation meetings. The male/female ratio is 66.9% and 33.1%, respectively.

2.4. INFRASTRUCTURE CONDITIONS

2.4.1. Transportation System

2.4.1.1. National Road System

In Binh Dinh Province, there are 5 national highways including: QL1A, QL1D, QL19, QL19B, and QL19C:

- National Highway 1A: The section through Binh Dinh Province is 118 km long, from Binh De Pass (Km 1125) to Cu Mong Pass (Km 1243), passing through the districts of Hoai Nhon, Phu My, Phu Cat, An Nhon, Tuy Phuoc, and Quy Nhon City. The section from Ong Do Bridge Km 1218+507 to Phu Tai Culvert Km 1223+207 is 4.7 km long with an urban road standard of type II, with a construction width of 30 m. Currently, QL1A has been invested in construction with a scale of 4 lanes.
- National Highway 1D: Starting at Km 1221+450 QL1A (Phu Tai junction) and ending at Km 1262+500 QL1A (Binh Phu Bridge), it is 34 km long, connecting Binh Dinh and Phu Yen provinces. The section through Binh Dinh Province is 21.6 km long and has the following specifications:
    + From Km 0 to Km 2, the road foundation width is 21 m, with a bituminous concrete surface of 14 m.
    + From Km 2 to Km 34+400, the road foundation width is 12 m, with a bituminous concrete surface of 11 m.
    + The section from QL1A to the inter-provincial bus station has been invested with a scale of Bn = 40m.
- National Highway 19: Connecting Quy Nhon Port Km 0 to the Central Highlands provinces and ending at Le Thanh Border Gate (Gia Lai), it is 238 km long, passing through Binh Dinh and Gia Lai provinces. The section through Binh Dinh Province is 69.5 km long with the following specifications:
    + From Quy Nhon Port Km 0 to Ong Tho Junction, it is 5 km long with a road foundation width of 21.5 m; the bituminous concrete surface is 14 m.
    + From Ong Tho Junction Km 5 to Ba Gi Bridge Junction Km 17+256, the standard is class III for lowland areas, with a road foundation width of 12 m and a bituminous concrete surface of 11 m.
    + From Ganh Bridge Junction to An Khe Pass, it is 52 km long with a class IV lowland standard, having a road foundation width of 9 m and a bituminous concrete surface of 7 m.

Currently, the new section from Quy Nhon Port to the junction with National Highway 1A is 17.41 km long according to the class I road standard (TCVN 4054 - 2005) and the collector roads, secondary main roads (TCXDVN 104 - 2007) has been completed. The section from Ba Gi Bridge in An Nhon Town, Binh Dinh to Pleiku City, Gia Lai, is 134 km long and is in the process of preparing an investment project for upgrading and renovation.

- National Highway 19B: The section through the province is 60 km long, upgraded based on the Nhon Hoi Economic Zone trunk road, DT635, PR639. Accordingly, section 1 overlaps with the trunk road of Nhon Hoi Economic Zone with a total length of 15.70 km; section 2 overlaps with DT 639 road, 1.95 km long, and section 3 overlaps with DT 635

with a total length of 42.35 km (from Cat Tien to Phu Cat Airport).

- National Highway 19C: The section through the province is 39.38 km long, stretching from the starting point at Dieu Tri Town (Tuy Phuoc District), intersecting with QL1A at Km 1220+00 to the ending point at Km 39+380 in Canh Hoa Commune (Van Canh District).

2.4.1.2. Provincial Roads

Provincial roads: Include 14 routes with a total length of 537.0 km, ensuring continuous traffic between the provincial center and the districts and towns within the province.

Urban roads: The total length is 442 km, of which 390 km is concreted, achieving 88%. Generally, urban roads in Binh Dinh are of good quality, while the lighting system, greenery, sidewalks, and underground facilities on most routes have not been constructed uniformly.

Specialized roads: There are 207 km of specialized roads, mainly managed by State Forestry Enterprises (SFE).

The coastal provincial road (PR639), section from My Thanh to Lai Giang Bridge, is part of the coastal road system from Thua Thien Hue Province to Binh Dinh Province according to the detailed coastal road planning in Decision No. 129/QD-TTg by the Prime Minister on January 18, 2010. Therefore, the formation of coastal routes in the sub-project ensures synchronized connection with some already invested sections to effectively exploit and utilize marine resources and coastal areas, develop the socio-economic of coastal localities, and strengthen national defense and security to firmly protect national sovereignty.

The road connecting National Highway 19C with Quy Nhon Port will connect Dieu Tri urban area with the wards of Nhon Binh, Nhon Phu, Bui Thi Xuan, and Tran Quang Dieu of Quy Nhon City, with a cross-section of 24 - 28m. The road will connect Dieu Tri Town, Tuy Phuoc District with Quy Nhon City to (i) form an urban traffic axis to serve the socio-economic development of the region; (ii) shorten the travel distance between the two cities.

2.4.1.3. Maritime Transport

Binh Dinh has 134 km of coastline with many islands, beaches, bays, and river mouths that are very favorable for the construction of ports such as Quy Nhon, De Gi, and Tam Quan.

The port system includes Quy Nhon Port (national general port), Thi Nai Port (local general port), Dong Da Port (local port), De Gi Port, and Tam Quan Port (local fishing port). Among these, Quy Nhon Port is a national general port, playing an important role in the maritime port system in particular and in the transportation network in general in the Central region. The port has an area of 345,736 m² with 868 m² of wharf, 17,680 m² of warehouse, 153,000 m² of cargo yard, and 48,000 m² of container yard.

2.4.1.4. Inland Waterway

Inland waterways are mainly formed and operated in coastal lagoons including Thi Nai Lagoon, De Gi Lagoon, and the lower reaches of 4 major rivers flowing into the lagoons and the sea. This includes 5 routes: Dong Da - Cat Chanh (18 km from Dong Da Port to Cat Chanh wharf), Dong Da - Nhon Hoi (5 km from Dong Da Port to Nhon Hoi wharf), Dong Da - Khe Da (10 km from Dong Da Port to Khe Da wharf), Dong Da - Nhon Ly (25 km from Dong Da Port to Nhon Ly wharf), and Dong Da - Nhon Chau (30 km from Dong Da Port to Nhon Chau wharf).

The Dinh River, Dục River, Me Tree River (National Road 19C – Quy Nhon Port), and Ha Ra River (My Thanh Road – Lai Giang) do not have inland waterway traffic, so the construction activities of these bridges will not affect the inland waterway operations.

2.4.1.5. Railways

The North-South railway line passes through Binh Dinh with a total length of 148 km from Binh De Pass (bordering Quang Ngai Province) to Muc Thinh (bordering Phu Yen Province) with 11 stations, including the main station at Dieu Tri. The section from Dieu Tri station to Quy Nhon City is 10.35 km long. In addition to the North-South train, there is also an express train from Quy Nhon to Central provinces such as Nha Trang, Da Nang, Hue, and Vinh. A new urban railway is being built to connect National Highway 19C with Quy Nhon Port, intersecting with the railway at km 2+770 in area 3, Nhon Phu ward. Therefore, during the construction phase of this road, attention must be paid to traffic safety and public health.

2.4.1.6. Air Transport

Binh Dinh Province has Phu Cat Airport, designed to handle 1.5 million passengers/year.

2.4.1.7. River Dikes

The project area has the Ha Thanh dike system. The dike system is intended to protect the people, agricultural land, aquaculture, and infrastructure from flooding. Truong Uc Bridge is built across the Ha Thanh dike. The abutment and pier of Truong Uc Bridge are located within the Ha Thanh dike and the Ha Thanh riverbed; therefore, the construction activities of Truong Uc Bridge will be considered to protect this river dike system.

2.4.2. Water Supply System

Binh Dinh Province has a water supply plant located in Quy Nhon City, with a current capacity of 43,000 m³/day, providing drinking water for the city at a consumption rate of 100 liters per person per day. To date, 75% of households in the urban area have been supplied with drinking water.

Currently, the province has a total of 126 rural clean water stations with a capacity of nearly 45,000 m³/day. Among them, the Center for Rural Clean Water and Environmental Sanitation (CRWSS) manages and operates 7 large-scale facilities in Hoai Nhon, Phu My, Phu Cat, Tuy Phuoc, and Tay Son districts, with a total capacity of 21,000 m³/day, providing clean water for approximately 45,000 households.

2.4.3. Wastewater Collection and Treatment System

According to the Environmental Status Report of Binh Dinh Province for the period 2015-2020, the province has 11 units at the district, town, and city levels; however, only Quy Nhon City has two centralized wastewater treatment plants: Nhon Binh Plant with a capacity of 14,000 m³/day and a treatment efficiency of 95%, and 2A Wastewater Treatment Plant with a capacity of 2,350 m³/day and a treatment efficiency of 50%. Wastewater in other towns and districts has not yet been collected and treated according to regulations; domestic wastewater is still collected and discharged into the rainwater drainage system, flowing into various surface water sources (canals, ditches, rivers, streams) or onto land.

2.4.4. Electrical System

Binh Dinh Province is connected to the national power grid (including 110kV and 220kV). Currently, 81% of main streets and 45% of alleys have street lighting systems. The rural low-voltage power grid generally meets the electricity needs of the population. In managing electricity locally, Binh Dinh Power Company has proactively coordinated with the Department of Industry and Trade, the People's Committees of districts, and encouraged cooperatives to hand over the existing power grid for better management and service to the people. As of 2016, Binh Dinh Power Company has received the power grid from 95 communes, with 135 retail electricity service organizations, covering 23 km of medium voltage lines, 18,907 km of low voltage lines, and 28

substations with a capacity of 4,735 kVA, serving 218,638 customers. Electricity in Binh Dinh Province is supplied by hydroelectric plants such as An Khe Hydropower Plant (2x80 MW) and six other small and medium-sized hydropower plants including Vinh Son, Vinh Son 5, Tra Xom, Dinh Binh, Tien Thuan, and Van Phong.

2.4.5. Collection and Treatment of Household Waste

According to the Environmental Status Report of Binh Dinh Province, the waste collection rate for urban areas during the period 2015-2020 reached nearly 49.5%, while in rural areas, it was about 27.7%. Thus, the uncollected waste accounted for approximately 50.5% in urban areas and 63.3% in rural areas. Household waste is mainly handled by residents in their yards through burial or incineration.

Currently, Phu My District has a solid waste landfill located in Gia Hoi village, My Phong commune, covering an area of 1.6 hectares, with a total investment of 25 billion VND from non-refundable aid from Belgium, designed to handle 36.3 tons/day.

Binh Dinh Province has agreed to invest in the construction of a solid waste treatment plant and organic fertilizer production facility in Bong Son Ward, Hoai Nhon Town. The plant is designed to process 120 tons of household waste/day, with a total investment of over 89 billion VND, to be built on unused land of the solid waste landfill in Hoai Nhon Town through socialized investment.

The Long My solid waste landfill is located in Quy Nhon City. A household waste treatment plant is expected to be built at this landfill with an area of approximately 4.33 hectares and a capacity of about 800 tons/day. The Long My solid waste treatment plant is currently under implementation.

2.4.6. Flooding Status

National Route 19C connecting Quy Nhon Port: is located in the lower reach of the Ha Thanh River.

According to the hydraulic report prepared by the project owner, the flooding situation in the lower reach of the Ha Thanh River has been very complex for a long time. The main stream of the Ha Thanh River branches out after the Dieu Tri Bridge, combined with the confluence of the Kon River, flowing into Thi Nai Lagoon. The dyke system in the area is incomplete, leading to floods overflowing into fields and residential areas, causing widespread flooding. Areas where residential and important infrastructure have been elevated experience short flooding durations, ranging from a few hours to 1 day; while low-lying areas serve as reservoirs and flood retention areas, experiencing longer flooding periods that can last from 3 to 5 days, especially in Nhon Binh, Nhon Phu, and Dong Da wards. The topography slopes from west to east, and the main transport axes intersect, forming waterlogged areas (such as the area from Dieu Tri Bridge to the railway line, from the railway to the old National Route 19, and from the old National Route 19 to the East dyke) with elevation differences in water levels between upstream and downstream of the embankment ranging from 0.5m to 1.0m. The culverts crossing the railway and the old National Route 19 are insufficient for flood drainage to the lower reaches, causing upstream flooding.

Frequent flooding locations on Route 19C - Quy Nhon Port include: Km 1 + 650, Km 2 + 450, Km 3 + 122, and Km 4 + 263.

The coastal route from My Thanh to Lai Giang: This route runs close to the sea, and water from upstream flows through the rivers into the sea, so there are no flooding phenomena.

2.4.7. Religious, Belief, and Cultural Heritage Sites

Historical Sites:

The coastal route from My Thanh to Lai Giang is near the site of the "Numberless Ship" of Lo

Dieu (approximately 30m away at km 75+269.14). No heritage sites will be affected by land acquisition.

Religious and Belief Structures:

National Route 19C connecting Quy Nhon Port: 20m away from Long Thanh Pagoda at km 4+400, 20m from the family church at km 3+800.

Coastal route PR639, from My Thanh to Lai Giang: The grave site in My Tho commune (about 70m away at km 48+500), family church of Ho (about 40m away at km 55+100), family church of Phan (about 10m away at km 55+387), and another family church (about 15m away at km 62+500).

2.5. ENVIRONMENTAL AND SOCIAL CONDITIONS AT SPECIFIC LOCATIONS WITHIN THE SUB-PROJECT

2.5.1. Coastal Provincial Road (DT639), section from My Thanh to Lai Giang Bridge

From Km 45 to Km 49+952.40 (approximately 5km): The current road is a 9.0m wide concrete road, primarily passing through empty land. Along the route, there are several shrimp farming areas owned by households and companies. The high-tech shrimp farming company Viet Uc is located about 30m to the right of the road. Traffic on this route is moderate, and the population density is low. The environmental condition remains good, with no signs of pollution.

From Km 49+952.40 to Km 51+900 (approximately 1.9km): This is a newly opened section with no residential areas. The road passes through sand dunes with casuarina trees, interspersed with rice fields and crops. The sand dune area is relatively prone to erosion, and the casuarina trees are planted to protect the land from sand erosion. Access roads are internal roads in the area, already paved with concrete. Traffic and population density are low. The route passes through the cemetery area of My Tho commune. The environmental condition remains good due to the lack of industrial activities in the area.

From Km 51+900 to Km 55+365.60 (approximately 3.5km) : The road passes through areas planted with acacia and eucalyptus trees. One part of the road is an average 5.5m wide dirt road, and another part is a 3.5m wide concrete road, which is deteriorating. There are no drainage structures along the road. The population density is low, concentrated at the end of the route. On the left side, there is a medium-voltage power line. Access roads are internal roads in the area, with low traffic. The environmental condition remains good due to the lack of industrial activities.

- From Km 55+365.60 to Km 68+169.14

The terrain is flat, following the existing DT639 road. The road surface is made of concrete and asphalt, 5.5-6.5m wide. The population density along the route is low, with empty land and shrimp ponds on both sides of the road. The environmental condition remains good due to the lack of industrial activities. The Ha Ra Bridge area (at Km 68) crosses a water body about 60-115m wide, which connects to the sea through the Ha Ra estuary. This estuary only opens temporarily during the flood season and is filled in during the dry months. The distance to the sea is relatively far (about 600m). The area around the bridge consists of rice fields and shrimp farming areas. A 6.5m wide old bridge already exists. Traffic density is moderate.

- From Km 68+169.14 to Km 72+469.14 (approximately 4.3km)

This road section passes through the Phu Thu pass with steep terrain. The area mainly consists of rice fields and production forests planted by the people, with acacia and eucalyptus trees. There is no access road to the newly opened road. The existing DT639 road runs parallel to the new route, with moderate traffic and sharp turns. The population density is low. The environmental condition

remains good due to the lack of industrial activities.

- From Km 72+469.14 to Km 75+269.14 (approximately 2.8km)

The existing coastal road is about 7m wide, running along the coastline at a distance of about 0.3-1km, with a casuarina belt acting as a wave barrier on the left. The population density is relatively high on the left side of the road. Near the route, at Km 75+269.14, is the historical site of the Lo Dieu No-number Ship, in Hoai Nhon district. Traffic density is moderate. The environmental condition remains good due to the lack of industrial activities.

- From Km 75+269.14 to Km 79+669.14 (approximately 4.4km)

The road passes through the Lo Dieu pass with difficult terrain. The area is mainly production forests planted by the people, with acacia and eucalyptus trees. There is no access road to the newly opened road. The existing DT639 road runs parallel to the new route, with moderate traffic and sharp turns. The population density is low. The environmental condition remains good due to the lack of industrial activities.

- From Km 79+669.14 to Km 81+169.14 (approximately 1.5km)

The existing concrete road is about 4m wide, with a relatively high population density and moderate traffic flow. Along the route, there are several shrimp ponds, interspersed with residential areas.

- From Km 81+169.14 to Km 83+139.47 (approximately 1.97km)

The existing concrete road is 6-7m wide. The route passes through the densely populated Cong Luong hamlet (from Km 81+169.14 to Km 81+969.14), Hoai My commune. Traffic density is relatively high. After this section, the route passes through rice fields interspersed with residential houses.

Along the route, there is a water body at Cong Luong Bridge at Km 82+432.73, which is about 10-25m wide. The water quality is relatively good, with no signs of pollution. There are no aquaculture or water traffic activities in this area.

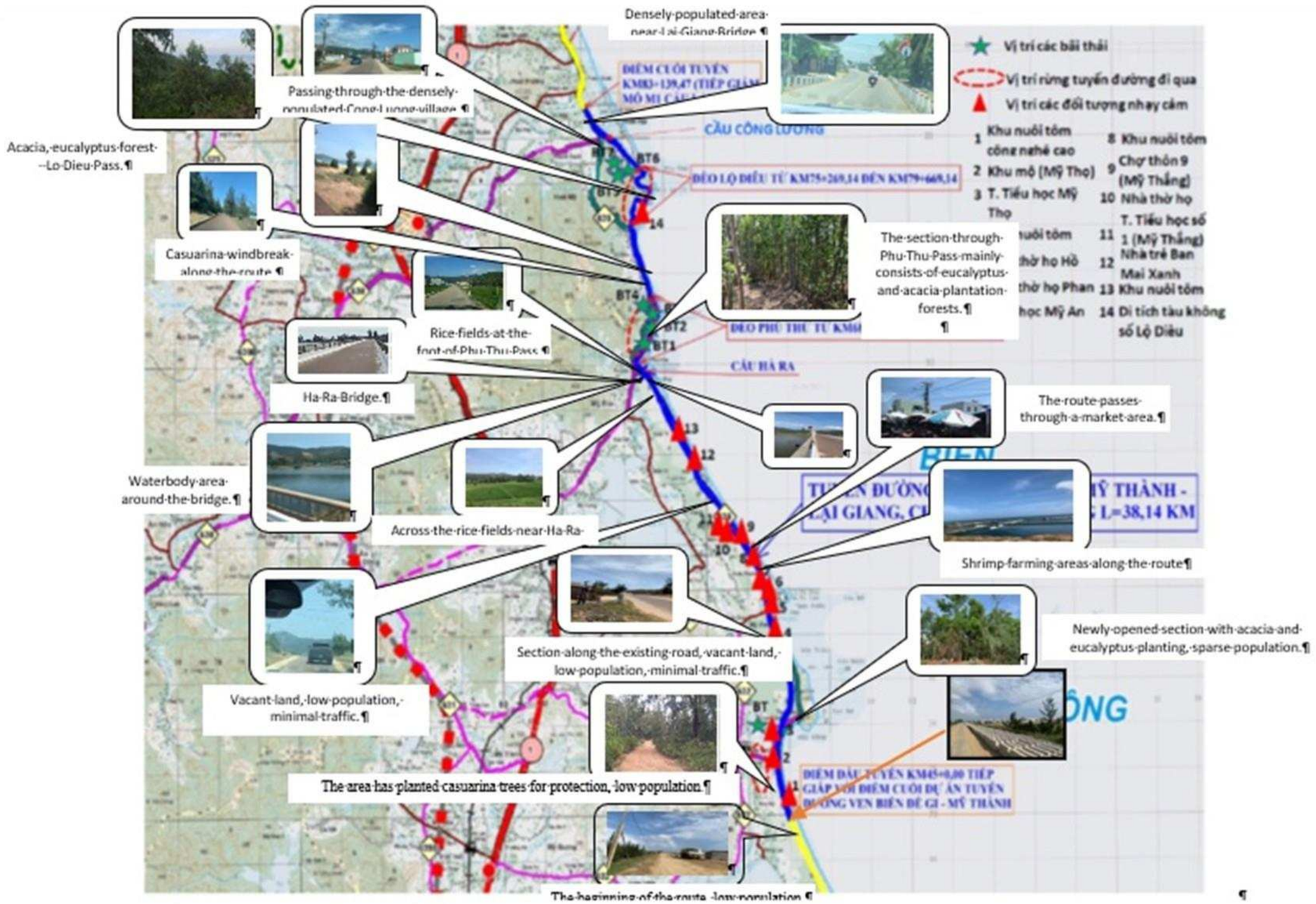


Figure 0-5. Diagram of the current status of the coastal road (PR639), section from Mỹ Thanh to Lai Giang Bridge.

2.5.2. Road Connecting National Highway 19C to Quy Nhon Port

- From Km 0+00 to Km 1+131.53 (approximately 1.13 km)

The starting point of the route intersects Tran Phu Street and Le Hong Phong Street, located in an urban area with high population density and heavy traffic. The route mainly passes through agricultural fields, making access difficult. It crosses the Truong Uc River at Km 0+755.71 and the Cay Me River at Km 0+977.76. The width of the Truong Uc River is approximately 60-80 meters, while the width of the Cay Me River is around 60 meters. The river area primarily features shrubs interspersed with fields. The water quality shows signs of organic pollution (BOD5, COD), partly due to agricultural activities and wastewater discharge from surrounding residents. Due to the low traffic in the area, the air quality has not shown signs of pollution.

- From Km 1+131.53 to Km 3+191.30 (approximately 2 km)

This section runs through areas of orchards and rice fields, with sparse population density. The main vegetation includes rice, cash crops, and common fruit trees. Access remains challenging. The environmental quality is relatively good. The route intersects the railway at Km 2+770. This area frequently experiences flooding, particularly at Km 1+650, Km 2+450, and Km 3+122.

- From Km 3+191.30 to Km 4+349.13 (approximately 1.2 km)

The road passes through a densely populated area and rice fields, ending at the intersection with National Highway 19 at Km 7+383. Access is provided from NH19 and local streets in Nhon Binh Ward. The environmental quality remains relatively good. The area is prone to flooding at Km 4+263.

- From Km 4+349.13 to Km 5+349.13 (approximately 1 km)

This section travels through a high-density residential area interspersed with rice fields. The traffic volume is average. The environmental quality is still relatively good.

- From Km 5+349.13 to Km 6+353.03 (approximately 1 km)

The current state along the route mainly consists of rice fields. The endpoint of the route passes through the Nhon Binh industrial cluster, where traffic density is high. Access is primarily from Dien Bien Phu, Nguyen Man, and Le Thanh Nghi streets. The route crosses the Dinh River at Km 6+36.67, with the river width being approximately 40-45 meters, and both banks are occupied by residential areas and the industrial cluster.

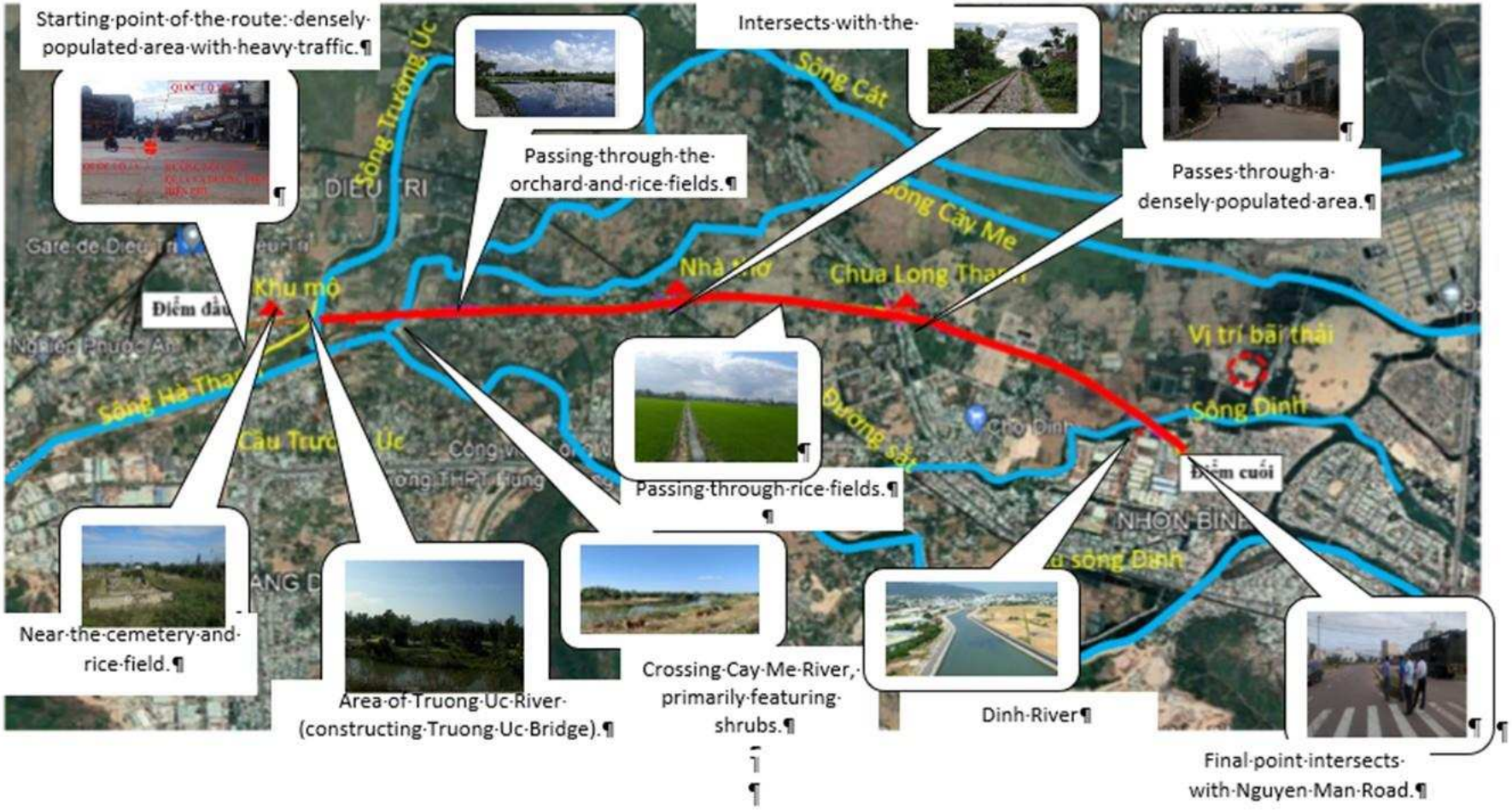


Figure 0-6. Map of the road connecting National Route 19C with Quy Nhon Port.

2.6. IDENTIFIED SENSITIVE RECEPTORS IN THE SUBPROJECT'S AREA OF INFLUENCE

The coastal route section from My Thanh to Lai Giang primarily runs along the existing road of QL 639. Several new sections include: From km 47 + 900 to km 49 + 500 (L = 1.6 km), From Km 49 + 500 to Km 50 + 900 (L = 1.4 km), From Km 68 + 169.14 to Km 72 + 469.14 (L = 4.3 km), From Km 75 + 269.14 to Km 79 + 669.14 (L = 4.4 km).

Between Km 45 + 00 and Km 47 + 900, the road follows the existing route, passing by industrial facilities such as the Viet-Australia High-Tech Shrimp Farming Company, the Aquaculture Breeding Company, and Saigon - Quy Nhon Minerals Corporation, interspersed with vacant lands planted with Casuarina trees.

Two new sections from km 47 + 900 to km 49 + 500 and from km 49 + 500 to Km 50 + 900 pass through areas of Casuarina forests, acacia trees mixed with agricultural land, and a landfill in My Tho commune.

The two new sections through Phu Thu Pass (Km 68 + 169.14 to Km 72 + 469.14) and Lo Dieu Pass (Km 75 + 269.14 to Km 79 + 669.14) traverse acacia, eucalyptus, and peppermint plantations interspersed with barren hills. These sections also run parallel to the coastline.

The remaining sections of the route are on the existing roadbed, with relatively wide pavement that can partially be utilized for construction purposes. The residential areas along the route include the Xuan Thach community in My An commune at km 64 + 700 of Provincial Road 639, the Xuan Binh hamlet from km 55 + 200 to km 56 in My An commune, and the Cong Luong hamlet in Hoai My commune from km 81 + 169.14 to Km 81 + 969.14.

On both sides of the route, from km 54 + 300 to km 54 + 800, and from km 56 to km 61, is the aquaculture area used for shrimp farming. The table below describes the sensitive receptors along the coastal route section from My Thanh to Lai Giang Bridge.

Table 0-25. Sensitive objects along the coastal route, from My Thanh to Lai Giang bridge

Image	Milestone (Km)	Distance to route center (m)	Describe
	Km45+728 – Km46 +360	30	The high-tech shrimp farming area of Viet Uc - Phu My Company Limited is located on the left side of the road.
	Km46 +000	20	Saigon - Quy Nhon Mineral Joint Stock Company is located on the left side of the road.

Image	Milestone (Km)	Distance to route center (m)	Describe
	Km48 + 500	70	The cemetery area of My Tho commune is scattered on both sides of the road.
	Km48 + 600	25	Tan Thanh village cultural house (100 households)
	Km48 + 700	30	My Tho Kindergarten accepts 25-30 children each year.
	Km49 + 000		Intersection with Tan Thanh commune road, My Tho, Binh Dinh
	Km53 +700	30	Livestock Joint Stock Company is located on the right side of the road.
	Km54 +300	20	The family shrimp farming area is located on the right side of the road.
	Km54 + 750	30	The border station is located on the left side of the road.

Image	Milestone (Km)	Distance to route center (m)	Describe
	Km55 +000	40	Thong Thai Restaurant is located on the left side of the road.
	Km55 +100	40	Ho family church, right side of the road
Medium voltage line 	Km 55+ 200		Xuan Binh village, My An commune, Phu My district, located on the left side of the road
	Km55 +387	10	Phan family church, right side of the road
	Km55 +500	30	Hiep Hoa gas station is on the right side of the road.
	Km55 +600	20	My An Primary School (campus 2) is located on the left side of the road, in Xuan Binh village, My An commune, Phu My district.

Image	Milestone (Km)	Distance to route center (m)	Describe
	Km55 +700	20	My An police station is located on the left side of the road, in Xuan Binh village, My An commune, Phu My district.
	Km55 +850	25	The cultural house of Xuan Binh village, My An, Phu My is located on the right side of the road.
	Km 56 +000 – Km 61 +000	20-25	Shrimp farming areas of households are scattered on the right side of the road.
	Km58+000-Km59+000	25-30	The factory and operator of BCG Phu My Solar Power Plant are located on the left side of the road with a capacity of 330 MW with 03 factories with a capacity of 110 MW.
	Km 62+150 to Km 62+250	10	Village 9 market, My Thang commune, located on both sides of the road

Image	Milestone (Km)	Distance to route center (m)	Describe
	Km61+500	35	Hoang Minh gas station is on the left side of the road.
	Km62+300	15	My Thang Primary School No. 1 (campus 2) is located on the left side of the road.
	Km62+ 500	15	The church is on the left side of the road.
	Km66 +800	20	Ban Mai Xanh Private Kindergarten is located on the right side of the road.
	Km67+500	20	Border guard station on the left side of the road, My Duc commune
	Km68 +200	20	Shrimp farming areas of households are located on both sides of the road. Near Ha Ra bridge

Image	Milestone (Km)	Distance to route center (m)	Describe
	km75+269	30	Historical site of the ship without number

The road connecting National Highway 19C to Quy Nhon Port passes through residential areas, rice fields, and orchards. The route intersects with the Dieu Tri - Quy Nhon railway at Km 2 + 770 and National Highway 19 at Km 7 + 383. The route runs close to a clan church at the railway junction at km 2 + 800, which may be affected by land acquisition. The road aligns with the main road axis planned for the Van Ha Urban Area in Nhon Phu Ward. The terrain is characterized by sparsely populated residential areas, primarily passing through orchards and rice fields from Km 1 + 97.76 to Km 2 + 637.80 within the Go Tru residential area. The road also passes through an industrial cluster and Nhon Binh rice fields from Km 5 + 438 to Km 6 + 349.

A road will be constructed. Along the route, two bridges over the Truong Uc River (Duc River), the Cay Me River, and the Dinh River (tributaries of the Ha Thanh River) will be built. The table below presents the sensitive receptors along the route connecting National Highway 19C to Quy Nhon Port.

Table 0-26. Sensitive objects along the route connecting National Highway 19C with Quy Nhon port

Image	Milestone (Km)	Distance to route center (m)	Describe
	Km0+700	20 minutes	Grave and water station on the left side.
	Km 1+500- Km 1+800	Over the dike	The dike is located along the Ha Thanh River. The bridge will cross the dike.
	Km2+800	Railroad crossing	The route will intersect the railway at area 3, Nhon Phu ward. This is a sparsely populated area.

Image	Milestone (Km)	Distance to route center (m)	Describe
	Km3+800	Close to the route	A shrine near the road
	Km4+400	20	Long Thanh Pagoda is located behind the road.

CHAPTER 3. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

This chapter assesses the potential environmental and social risks and impacts, positive and negative, of the subproject and quantifies the extent of the effects to the extent possible. The ecological and social risks and impacts of the subproject will be identified and assessed in the three phases of subproject implementation, including preparation, construction, and operation. This chapter also proposes measures to mitigate environmental impacts during the preparation, construction, and operation phases.

3.1. POSITIVE ENVIRONMENTAL AND SOCIAL IMPACT

In general, the implementation of the subproject will bring many positive impacts. The subproject will bring many socio-economic benefits and efficiency. After the project is completed, about 450,000 people in 4 districts/towns/cities will benefit directly and all people in the surrounding areas will benefit indirectly. The upgraded transport infrastructure and convenient traffic connections in the province will attract more tourists and investors, creating favorable conditions for economic development in Binh Dinh province. The project will gradually build a complete transport system, ensuring convenient connections between Quy Nhon City and neighboring districts. Promote economic and social development, contribute to poverty reduction for residents in the area where the project passes, reduce traffic accidents and congestion, improve the environment, and create landscapes. The project will improve the lives of local communities, enhance cultural exchange, and create favorable conditions for economic development and social integration. When the project is completed, the increased trade between regions will also create more services and jobs for workers, contributing to the socio-economic development of the locality. However, in addition to the positive impacts, some potential negative impacts may arise during the project implementation phase from preparation to operation. Such impacts require the sub-project to apply technically feasible and management measures to avoid and minimize impacts.

3.2. POTENTIAL ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS ASSESSMENT

The level of environmental and social impacts is classified based on the criteria discussed in Table 3-1. The classification criteria are also applicable to other World Bank-funded projects in Vietnam.

Table 0-1 Criteria negative impact classification

Level of impact	Typical standard description
No (N)	No impact
Low (L)	Small scale works; impacts are temporary, localised and reversible. Some measurable changes in attributes, quality, and level
Average (M)	Small scale works in urban/sensitive areas; medium scale works Impacts are site-specific and largely reversible, temporary, localized, mitigated and manageable.
Height (H)	Medium scale works in sensitive areas/small urban areas; large scale works with significant impacts (and social / or environmental) many of which are irreversible and require compensation Loss of resources /impact on the quality and integrity of the object, serious

Level of impact	Typical standard description
	damage to key features, functions or components.

Based on the analysis of baseline data, field surveys, and discussions with relevant sector officials and stakeholders, the potential negative impacts of the subproject on the physical, biological, and socio-economic environment have been identified and assessed. The scale of potential negative environmental and social impacts is summarized in Table 3-2.

Table 0-2 Level of impact of subproject

Stage	**Physical environment**			**Biological environment**		**Social environment**				**Other effects**	
	Air, Noise, Vibration	Earth and Water	Solid and liquid waste	Forest ecosystem, natural habitat	Aquatic system	Land acquisition and resettlement	Indigenous peoples	Cultural heritage	Livelihood, Community Disorder	Flooding/Soil Erosion/Landslide/ Traffic/Safety	Impact outside the project area
Construction cost	L	L	L	M	L	M	N	L	M	L	L
Construction Manager	M	M	M	M	M	N	N	L	M	M	M
Work	M	L	L	L	L	N	N	N	N	L	L
Comment: Significant impacts require specific mitigation measures and close monitoring. Low to moderate impacts are typically controlled and mitigated through ESCOPs. M and H effects Monitoring and implementation of mitigation measures as well as adequate institutional capacity for safety are needed.											

Potential negative environmental and social impacts are also classified into direct, indirect, and cumulative impacts as defined by the World Bank ESF.

Direct impacts: direct impacts that occur through the direct interaction of a subproject activity with environmental and social or economic components.

Indirect impacts: indirect impacts on the environment and society are impacts that are not a direct result of the subproject, often created later, or are a result of a complex impact practice. Indirect impacts are also known as secondary, or even tertiary impacts.

Cumulative impacts: are impacts that are created as a result of a combination of the subproject with other projects that cause related impacts. These impacts occur when the incremental impacts of the subproject are combined with the cumulative impacts of past, present, or future projects that are reasonably foreseeable.

Temporary impacts: are impacts that occur during construction or shortly after construction.

Long-term impacts: are impacts that arise during construction but the majority of their results occur during the operation phase and may persist beyond the end of the project.

3.2.1. Social risks and impacts during pre-construction phase

The environmental and social risks and impacts during the preparation phase have been identified and analyzed in the following sections. These impacts are considered direct impacts.

3.2.1.1. Social impacts

a. Affected households

The IOL results indicate that the project will affect 1,065 households (including 654 households on the DT639 route, My Thanh - Lai Giang section; and 411 on the QL19C route connecting Quy Nhon Port). Of these, 661 households will be severely damaged, including a) 430 households losing at least 20% of their agricultural land (or 10% for vulnerable households), b) 231 households that have to relocate their houses and c) 178 business households. The total number of households identified as "vulnerable households" is 141 (including 34 poor households, 18 households with women with dependents, 6 households with physical disabilities, 14 single people, and 69 households under the national social assistance policy). No ethnic minority households will be affected by land acquisition for project implementation..

Table 0-3 Number of households affected by the project

No.	Investment category	Number of affected households	Heavy impact		Minorly affected households	Vulnerable households	Business household
			Severely [8]affected households	Households to be relocated			
1	DT 639 Road, My Thanh - Lai Giang section	654	251	14	300	131	153
2	National Highway 19C connecting Quy Nhon Port	411	179	217	75	10	25

[8]Those whose agricultural land will be affected by 20% or more (10% or more for vulnerable households) of their agricultural land area

No.	Investment category	Number of affected households	Heavy impact		Minorly affected households	Vulnerable households	Business household
			Severely [8]affected households	Households to be relocated			
Total		**1,065[9]**	**430**	**2 31**	**375**	**141**	**178**

Currently, Binh Dinh is implementing a project to build 3 resettlement areas to resettle households affected by project implementation in the province using the province's counterpart funds, including (i) Resettlement area of Nhon Phu ward in Quy Nhon city; (ii) Resettlement area on the land west of Nhon Binh social housing apartment building in Quy Nhon city; and (iii) Resettlement area north of Dieu Tri bridge (called Dieu Tri Resettlement Area) in Tuy Phuoc district. The areas have a total of 330 residential plots and the Binh Dinh Province Adaptive Integrated Development Project can accommodate affected households in this area (Expected to be completed in 2025).

This project is not considered a joint project, however, the report will conduct an assessment to consider social environmental compliance and conformity with the social environmental policy of Vietnam and the World Bank (See Annex 5).

Therefore, the impact level is assessed at a medium level.

b. Land acquisition

According to the survey results and statistics for preparing the resettlement plan report of the Integrated Adaptive Development Project in Binh Dinh Province, the total area impacted by land acquisition for the construction of roads, bridges, and materials storage sites is 1,571,262 m² (including 1,496,762 m² for road construction and 74,500 m² for waste disposal). This area consists of 46,874 m² of residential land, 187,600 m² of protective planted forest, 200,300 m² of production planted forest, 191,689 m² of agricultural land (including 96,854 m² of two-crop rice), and 944,799 m² of other land types.

For the area of forest land being acquired, the entire process of changing the land use purpose has been completed, with a total conversion area of 38.79 ha (including 18.76 ha of planned protective forest and 20.03 ha of planned production forest). Of this, 31.34 ha (including 18.76 ha of planned protective forest and 12.58 ha of planned production forest) is designated for the construction of the coastal road (DT.639) section from My Thanh to Lai Giang (according to Decision No. 3056/QD-UBND dated August 17, 2023, by the People's Committee of Binh Dinh Province); and 7.45 ha of planned production forest land will be used as a waste disposal site for the coastal road (DT.639) section from My Thanh to Lai Giang (according to Decision No. 1008/QD-UBND dated March 28, 2024, by the People's Committee of Binh Dinh Province). The total forest volume affected is approximately 1,228.87 m³, consisting of casuarina, eucalyptus, and acacia trees.

The project will also temporarily impact approximately 33,720 m² of land required for construction activities. The temporarily affected land (including unused land and agricultural land) will be restored to its previous condition or better before the project owner returns it to the landowners.

c. Impacts on assets attached to land

House and structures: The IOL results show that approximately 25,062 m2 of housing will be affected, of which 206 houses will be completely affected. Households with partially affected

[9]A household may experience more than one impact type. Therefore, the total number of households experiencing all impact types may be greater than the actual number of households.

houses can still live in the remaining part of their houses while households with completely affected houses will need to build new houses on the remaining land if possible, otherwise, they will have to move to resettlement areas.

Table 0-4. Statistics of affected land types

No.	Investment category	Area (m^2)											
		Total	**Residential land**	**Garden soil**	**Annual crop land**	**Land for perennial crops**	**Rice land**	**Land for aquaculture**	**Forest land**	**Non-agricultural land**	**Cemetery land**	**Unused land**	**Other land**
1	Coastal road 639, My Thanh - Lai Giang section	1, 26, 0 87	26,865	0	1,854	413	6,154	5,848	1,. 152, 9 00[10]	0	6,981	42,40 9	22,663
2	National Highway 19C connecting Quy Nhon Port	305,175	20,009	28,714	56,828	29,892	90,700	0	0	29,749	8,040	41,24 3	0
Total		**1, 571,2 62**	**46,874**	**28,714**	**58,682**	**30,305**	**96,854**	**5,848**	**1, 152,900**	**29,749**	**15,02 1**	**83,65 2**	**22,663**

Table 0-5 Impact on houses and structures

No.	**Item**	**Unit**	**Quantity**		
			Total	**My Thanh – Lai Giang Road**	**Road 19C – Quy Nhon Port**
1	Home	m2	25,062	9,690	15,372
2	Electric pole	pole	31	30	1
3	Fence	m2	1,846	1,846	0

[10]The data is updated according to the Report on the results of the Project's forest status survey conducted in 2021 and 2022, including 187,600 m2 of protective forests, 100,300 m2 of production forests and land outside the planning of 3 types of forests.

4	Porch	m2	9,872	9,872	0
5	Livestock pen	m2	6,905	6,905	0
6	Tomb	female	353	175	178
7	Well	female	6	6	0

***(Source:** IOL Survey Results, 2021)*

Trees and crops: A total of approximately 44,368 trees will be affected, including timber trees (casuarina, acacia, eucalyptus, etc.) and an area of 155,536 m2 of rice, green onions, peanuts, chili, etc. (See table below).

Table 0-6 Affected trees and crops

No.	Item	Unit	Quantity		
			Total	**My Thanh – Lai Giang Road**	**Road 19C – Quy Nhon Port**
I	**Annual crops**		**155,536**	**8,008**	**147,528**
	paddy	m2	96,854	6,154	90,700
	Crops (onions, peanuts, peppers...)	m2	58,682	1,854	56,828
II	**Perennial plants**		**44,368**	**29,422**	**14,946**
	Casuarina tree	tree	40,476	25,530	14,946
	Acacia tree (diameter: < 10cm)	tree	991	991	0
	Eucalyptus	tree	2,901	2,901	0

***(Source:** IOL Survey 2021)*

Affected businesses and services: According to IOL, 178 households with businesses and services will be affected by land acquisition. These are grocery stores, restaurants, rice mills, motorbike repair shops furniture factories, etc. Most of them are small-scale family businesses. The land acquisition for the project will only affect them temporarily. However, 58 business households (accounting for 32.6%) will have to relocate their combined residential and business houses and production and business establishments. They will re-establish their businesses in resettlement areas after relocation.

d. Affected public assets and cultural heritages

No cultural site is located in the subproject road area at this stage.

Public infrastructure works that are likely to be affected mainly include irrigation canal systems, roads, electricity, and running along or across the route that may be affected.

Specifically for route 19C - Quy Nhon Port: relocate 2 household electricity poles, an 8.1m long concrete bridge, and replace railway rails at the intersection with the railway.

My Thanh - Lai Giang coastal route area: affects 2 ditch sections at km68+167.87 - km68+508.02 (right) and km68+167.87 - km68+518.97 (left).

e. Impact on people's livelihoods

The results of the survey and assessment of the socio-economic situation of people living along

the two routes of DT 639, the My Thanh - Lai Giang bridge section and the route from National Highway 19C connecting Quy Nhon port show that most people have their main income from farming, some households have additional income from trade and services, a few have income from aquaculture and fishing.

The total area of agricultural land permanently recovered to implement the project is 191,689m2 of agricultural land and 195 households will be affected. This impact is assessed as the most immediate and obvious because, within the scope of land recovered for the project, some areas of land are being used for production functions such as agricultural cultivation, aquaculture, etc. When recovered, this production function will be lost due to the conversion of the purpose of use to traffic land. In addition, around both sides of the road along the project route, the productivity of the land may be affected and reduced due to the impact of the route such as the land being buried by substances from the road when it rains heavily or is windy, the ground will be more compacted... The acquisition of rice fields and aquaculture land will reduce the income of households. However, the economy of households is not entirely dependent on agriculture, it only accounts for a part of the income of households, on the other hand, the project will carry out compensation and implement livelihood restoration programs for households that lose their production land, so the impact is only at an average level.

The impacts are considered significant but will be minimized and restored by applying mitigation measures including optimizing the route to reduce land acquisition, compensation, support, resettlement, and livelihood restoration programs according to ESS5.

f. Community separation and access disruption

Relocated households face difficulties such as loss of connection or relationship with neighbors and community, disruption of daily activities, and time to integrate into the host community. For families with school-going children, moving to a new place may affect their children's education due to changes in schools. For businesses that have to relocate, they may lose old customers. The entire project will have 231 affected households that have to move to new places (217 households on route 19C - Quy Nhon Port and 14 households on the coastal route My Thanh - Lai Giang). These are households that have to get used to new activities and new environments.

The My Thanh Lai - Giang coastal route mainly follows the existing route along the coast (near the sea there is no or very little population), avoiding residential areas, the newly opened sections (through Phu Thu Pass, Lo Dieu) are all unpopulated areas. Therefore, the impact on community separation is small.

Road 19C - Quy Nhon Port is a newly opened route passing through residential areas, however, the route forms the main traffic axis of the city, by construction planning, the number of affected households relocated to new residences is small. During the construction phase, the impact on community separation is inevitable, but because this is an urbanized area, there are alternative options for traffic during the construction phase; and can be minimized by rolling construction measures and accelerating construction progress.

Risks and impacts will be minimized through the mitigation measures proposed in the ESMP and RP. Therefore, these impacts are assessed at a medium level.

g. Impact on locally socio-economic conditions

The total land area recovered for the project is 1,571,262 m2, including residential land, agricultural land, protective forest land, planted forest land, and other types of land. This means that the land use structure in the area will have small changes, which may affect the local socio-economic conditions when converting land use purposes.

However, the survey results of the sub-project show that the entire area of recovered land (including rice land, aquaculture land, etc.) has low production value. The current average income of people working in agriculture according to the survey in communes in the sub-project area is about 3.7 million VND/person/month (much lower than the national average in 2020). Therefore, when the sub-project routes are put into operation, economic exchanges will be expanded, and people will have the opportunity to access many new jobs, increase income, and improve local socio-economic conditions. Therefore, the impact is assessed as *low*.

h. Impact on graves

An estimated 353 graves will be potentially affected. These graves are located along the road in Cong Luong village cemetery (Hoai My commune), Van Hoi 1 village (Dieu Tri-town), and hills of wards 2 and 3 (Nhon Phu ward). These graves will be relocated and buried in My Dien cemetery (Dieu Tri-town), Bui Thi Xuan cemetery (Quy Nhon city), and other cemeteries in the same area according to the choice of the owners. The relocation of these graves may have social and spiritual impacts on local people living in the area. However, the impact only lasts for a short time during the subproject preparation phase. On the other hand, the project RP report also proposes compensation options and plans to relocate these graves according to local customs and practices under ESS8, so the impact is assessed as *low*.

3.2.1.2. Environmental risks and impacts during pre-construction

(i) Safety risk relates to unexplored ordnance and Land Mines

The project completed UXO and land mine clearance in 2023 (implemented by Lung Lo Construction Corporation - Ministry of National Defense, costing about 4.7 billion VND). Thus, risks related to mines and explosives are eliminated.

(ii) Impact on underground water due to geological survey

Conduct geological survey drilling to assess the geological structure at each construction location of the proposed roads and bridges for appropriate structural design. If the boreholes are not properly sealed after the survey is completed, runoff carrying pollutants from the ground surface may enter the boreholes and contaminate the groundwater. The impact can be minimized by sealing all boreholes after the completion of the geological survey. The PMU supervised and ensure that the FS consultant completed the sealing of the boreholes immediately after the survey is completed, therefore the impact is considered *low*.

(iii) Impact on ecology and production, clearing and reclaiming forest land

The project will permanently reclaim 187,600 m2 of protective forest land and 200,300 m2 of production forest land. The main forest trees are acacia, eucalyptus, and casuarina. The estimated number of trees cut down due to land reclamation is about 40,476 casuarina trees (density 2 m/tree), 991 acacia trees (diameter <10 cm), and 2,901 eucalyptus trees (density 2 m/tree). In general, except for casuarina trees, these are other trees harvested by people (about 3-5 years of exploitation) and are common species, not ecologically diverse. On the other hand, the forest area with a reserve of about 1228.87 m3/115.29 ha of forest has a reserve, equivalent to a reserve of about 10.6 m3/ha, which is classified as a poor reserve forest (Article 8, Circular No. 34/2009/TT-BNNPTNT of the Ministry of Agriculture and Rural Development, Stipulating criteria for determining and classifying forests). Therefore, the impact on the plant ecosystem is not large. For protective forests (casuarina trees), the function is to block sand, retain water, control erosion and prevent soil degradation, etc. Therefore, when the forest area is lost, it will affect soil protection, prevent erosion, and prevent desertification. These impacts are assessed as average, because: (i) Forest clearing for road construction is only carried out within the scope of land acquisition to

build roads along the coast; (ii) After the road is completed, the road itself will have a higher elevation than the natural elevation on both sides (especially towards the sea), so the road also plays a role in blocking sand. In addition, according to the design documents of the coastal road, the sea-side road will have a 20 cm high sand barrier built to prevent sand from flying into the traffic road; (iii) The project owner will pay for reforestation with an equivalent area. In addition, the recovery of forest land will affect the habitat of some animal species in the area. The results of the investigation and discussion with the Management Board of the protective forest in the project area show that the project area is completely devoid of any species of flora and fauna listed in the Vietnam Red Book or the IUCN List of Threatened Species. Some animals such as birds (e.g. *Pycnonotus jocosus and Passer domesticus*), toads, frogs, and reptiles (snakes, lizards) found in forest areas are commonly found in many other regions of the country.

In addition, the loss of vegetation cover will lead to a reduction in carbon dioxide absorption, climate regulation, and water storage functions, and an increase in soil erosion, flooding, and landslides. It is estimated that a single tree in a tropical forest (including pine and eucalyptus) can absorb up to 33.33 kg of CO2 per year (Myers, N., and T. J. Goreau. 1991). With the total number of trees (including casuarina, acacia, and eucalyptus) cut down by the Project, it is estimated that the impact will reduce the carbon dioxide absorption capacity in the area by about 1,482 tons of CO2 per year.

The acquisition of production forest land will affect the livelihoods of local people who have been allocated forest land by the local government for the main purpose of timber production. The survey results show that 32 households will be affected by the acquisition of production forest land. The area of acquisition is not large, therefore, the impact is considered *moderate*. The local government will have policies to compensate and provide adequate support to affected households to ensure that their lives are not seriously affected, such as compensation for reforestation or support for livelihood changes. Such policies have been mentioned in the Resettlement Plan (RP). The area of protected forest land to be acquired is not large, the subproject is required to compensate for the acquisition of protected forest land by reforestation with an area equivalent to the acquired area according to regulations. In addition, the subproject will have a plan to collect forest products by regulations to minimize negative impacts on the forest ecosystem.

(iv) Solid waste generation during site clearance

Impact source: due to forest product collection, vegetation clearing, and construction demolition.

Scale and level of impact:

- Forest product collection: According to the Report on the results of the forest status investigation in the project area, the total volume of cleared forest (including production forests, protective forests, forestry land planned for other purposes, and land outside the 3 types of forests) is 1,228.87 m3. The main tree species are Eucalyptus, Acacia, and Casuarina. When implementing the Project, the volume of these wood materials will be developed by the Project Owner in coordination with the Department of Agriculture and Rural Development of Binh Dinh province to develop a plan, approve and organize the handling of forest products by the provisions of Circular No. 26/2022/TT-BNNPTNT dated December 30, 2022, of the Ministry of Agriculture and Rural Development regulating the management and traceability of forest products. Therefore, the generated biomass is insignificant. The impact of solid waste generation due to tree cutting is assessed as low.
- Clearing vegetation: The amount of biomass generated due to clearing and clearing vegetation, tree branches, and leaves is difficult to quantify, here it is only estimated based on field surveys and references to some other construction projects. The estimated amount

of vegetation generated per hectare is about 100 m3. For the My Thanh - Lai Giang coastal route, the area is about 119.16 ha, and the amount of vegetation is about 11916 m3. For the National Highway 19C - Quy Nhon Port, the area is about 30.52 ha, and the amount of vegetation is about 3052 m3. The total estimated volume generated is about 14968 m3.

- Solid waste generated from house and building demolition: During the site clearance process, based on the project's statistical results, the project will affect 25,062 m2 of housing. In addition, about 8.1m of the concrete bridge will be demolished, and 2 household electricity poles will be relocated at the railway intersection (Road 19C - Quy Nhon Port). According to the Feasibility Study, the total volume of solid waste generated from the demolition is about 49,424.5 m3 (of which the coastal route is 1,755.5 m3, the QL19C-Quy Nhon Port route is 47,669 m3. The main components of this waste include concrete, broken bricks, mortar, bamboo, wood, iron and steel, metal sheets, broken tiles, doors, power lines, power poles, etc. In general, the amount of waste is not much and the project owner will hire a functional unit to collect and transport according to regulations. Although Vietnam banned the production of roofing sheets made from asbestos materials in 2014, some existing structures were built before that time or used materials produced prior to 2014. Therefore, if asbestos-containing materials are discovered during the demolition of existing structures, they will be treated as hazardous waste. In general, the impact is low.

Impact subjects: protective forests, production forests on the My Thanh - Lai Giang route, workers on the construction site, people in the project area.

Impact time: preparation time, site clearance.

3.2.2. Environmental and social risks and impacts during the construction phase

3.2.2.1. *Impact on air quality*

Source of impact: At construction sites, especially road construction sites, dust, and emissions are closely related to demolition, excavation, and transportation of materials.

Scale of impact: *Dust and emissions from demolition activities:*

Based on the demolition volume, using a 10-ton vehicle for transportation and according to the "air pollution coefficient" based on the World Health Organization (WHO) documents: The dust pollution coefficient is 1.6 kg/1000km.vehicle, CO is 28 kg/1000km.vehicle, SO2 is 20S kg/1000km.vehicle, NOx is 55 kg/1000km.vehicle (sulfur S=0.05%), construction time is 6 months (30 days/month), the estimated discharge load of pollutants from demolition activities is as follows:

Table 0-7 Emission load generated during demolition

No.	Project	Shipping weight (tons)	Construction time (months)	Number of vehicles/ day	ECO (mg/ms)	ESO2 (mg/ms)	ENOx (mg/ms)	E dust (mg/ms)
I	QL19C – Quy Nhon Port	66,736.6	6	37.1	0.036	0.00001	0.071	0.002
II	My Thanh –	2,457.7	6	1.4	0.001	0.0000	0.003	0.0001

No.	Project	Shipping weight (tons)	Construction time (months)	Number of vehicles/ day	ECO (mg/ms)	ESO2 (mg/ms)	ENOx (mg/ms)	E dust (mg/ms)
	Lai Giang							

From the load of pollutants calculated above, based on the Sutton model, calculate the average concentration of emissions generated by transportation activities as follows:

$$C = \frac{0{,}8 * E\left\{\exp\left[\frac{-(z+h)^2}{2\sigma_z{}^2}\right] + \exp\left[\frac{-(z-h)^2}{2\sigma_z{}^2}\right]\right\}}{\sigma_z u} \quad [1]$$

Where*:*

- C: Concentration of pollutants in the air (mg/m^3)
- z: Height of the calculation point z = 1,5
- σ_z : Diffusion coefficient in the z-direction (m) is a function of the distance x in the direction of the wind, determined by the Slade formula: $\sigma_z = 0.53 * \mathbf{x}^{\mathbf{0.73}}$
- x: Distance (coordinates) of the concentration calculation point from the emission source, calculated in the direction of the wind
- u: Average wind speed 2.6 m/s (according to natural conditions in chapter 2)
- h: Height of the vehicle above the surrounding ground (m) 0.5m
- E: Pollutant load from the emission source (mg/ms).

Ignoring the influence of other pollution sources in the area, terrain factors, etc. Based on the calculated pollutant load, substitute the values into the calculation formula into formula [1], the concentration of pollutants emitted during the demolition process is shown in the following table:

Table 0-8. Dust concentration emitted during demolition

No.	Project	Distance x (m)	CO (µg/m 3)	SO 2 (µg/m 3)	NOx (µg/m 3)	Dust (µg/m 3)
	QCVN 05:2023/BTNTM		30000	350	200	300
1	Route 19C – Quy Nhon Port	10	6.71	0.00240	13.18	0.383
		20	4.44	0.00159	8.73	0.254
		40	2.78	0.00099	5.45	0.159
		60	2.08	0.00074	4.09	0.119
2	Coastal Road	10	0.25	0.00009	0.49	0.014
		20	0.16	0.00006	0.32	0.009
		40	0.10	0.00004	0.20	0.006
		60	0.08	0.00003	0.15	0.004

According to the calculation results, the dust and gas emissions are within the allowable limits according to QCVN 05:2023/BTNMT. In general, the amount of dust generated from demolition activities is not much because the demolition volume is not large.

Dust from excavation

The amount of dust and other air pollutants generated from excavation activities and the operation of construction equipment contribute to increasing the dust content in the surrounding air, however, this increase is only temporary and short-term. This amount of dust is estimated based on the dust emission factor as follows:

Table 0-9. Dust emission coefficient on construction sites

No.	Emission source	Coefficient (g/m 3)
1	Dust from excavation activities	1 - 100
2	Dust generated from unloading of materials (sand, stone, etc.)	0.1 - 1
3	Dust generated from material transportation process	0.1 - 1

(**Source:** WHO, 1993)

The maximum emission factor is 100 g/m^3. Based on the excavation volume, with a construction period of 12-36 months, the maximum total dust generated is as follows:

Table 0-10. Dust load generated at the construction site

No.	Construction items	Total excavation & earthwork volume* *(m 3)*	Total dust generated *(kg)*	Construction time (*months)*	Amount of dust generated *(kg/day)*	Dust load generated *(mg/ms)*
I	**Route QL19C – Quy Nhon Port**	**876,436.4**	**66,602.6**		**91.6**	**2,120**
1	Road works	799,589	57,113.5	24	79.3	1,836
2	Truong Uc Bridge	45,119.2	3,222.8	18	6.0	0.138
3	Dinh River Bridge	31,728.2	2,266.3	12	6.3	0.146
II	**Coastal route, My Thanh – Lai Giang**	**4,357,806.6**	**311,271.9**		**295.7**	**5,133**
4	Road works	4,273,763.2	305,268.8	36	282.7	4,907
5	Ha Ra Bridge	55,377	3,955.5	18	7.33	0.127
6	Cong Luong Bridge	28,666.4	2,047.6	12	5.69	0.099
	Total	5,234,243	373,874.5		387.3	7,253

(**Source***: FS, 2021)*

Based on the calculation results, it can be seen that the dust volume generated is relatively large at about 373.9 tons (of which the QL19C-Quy Nhon Port route is 66.6 tons, and the coastal route is 311.3 tons).

Dust from transportation activities:

Based on the method of quickly determining the emission sources of vehicles according to the "air pollution coefficient" based on the documents of the World Health Organization (WHO), the Handbook on Environmental Technology, volume 1: "Assessment of air, water, and soil pollution sources": for diesel vehicles over 3.5 tons, the pollution coefficient is 1.6 kg/1000km.vehicle, CO is 28 kg/1000km.vehicle, SO2 is 20S kg/1000km.vehicle, NOx is 55 kg/1000km.vehicle (sulfur S = 0.05%).

Loading rate (mg/m.s) = Number of vehicles per day * Emission coefficient / Construction time per day.

Based on the volume of raw materials and waste transported, using a 10-ton vehicle for transportation, the load of pollutants emitted by construction vehicles is estimated as follows:

Table 0-11. Emission load generated during construction

	Project	Shipping weight (tons)	Construction time (months)	Number of vehicles/ day	ECO (mg/ms)	ESO2 (mg/ms)	ENOx (mg/ms)	E dust (mg/ms)
I	**QL19C – Quy Nhon Port**	**1,040,151**		**150.2**	**0.146**	**0.0005**	**0.287**	**2,128**
1	Road works	975,680	24	135.5	0.132	0.0005	0.259	1,844
2	Truong Uc Bridge	34,589.17	18	6.4	0.006	0.00002	0.012	0.139

	Project	Shipping weight (tons)	Construction time (months)	Number of vehicles/ day	ECO (mg/ms)	ESO2 (mg/ms)	ENOx (mg/ms)	E dust (mg/ms)
3	Dinh River Bridge	29,881.93	12	8.3	0.008	0.00003	0.016	0.146
II	**My Thanh – Lai Giang**	**3,268,973**		**317.9**	**0.309**	**0.0011**	**0.607**	**5,151**
1	Road works	3,131,378	36	289.9	0.282	0.0010	0.554	4,923
2	Ha Ra Bridge	111,202.8	18	20.6	0.020	0.0001	0.039	0.128
3	Cong Luong Bridge	26,391.96	12	7.3	0.007	0.00003	0.014	0.099
	Total	4,309,124		468.1	0.455	0.0016	0.894	7,279

Calculating the level of dust and emissions spread due to excavation, transportation, and construction activities:

Ignoring the influence of other pollution sources in the area, factors affecting the terrain, etc. Based on the calculated pollutant load, substituting the values into the calculation formula according to the Sutton model (formula [1]), the concentration of pollutants at different distances from the emission source (road center) is shown in the following table:

Table 0-12 Emission concentration during excavation, transportation of waste materials and raw materials in the project area

No.	Project	Distance x (m)	CO (µg/m 3)	SO 2 (µg/m 3)	NOx (µg/m 3)	Dust (µg/m 3)
	QCVN 05:2023/BTNTM		30000	350	200	300
I	**Route 19C – Quy Nhon Port**					
1	Road works	10	24.52	0.088	48.16	343.1
		20	16.25	0.058	31.91	227.4
		40	10.15	0.036	19.93	142.0
		60	7.62	0.027	14.96	106.6
2	Truong Uc Bridge	10	1.16	0.004	2.28	25.8
		20	0.77	0.003	1.51	17.1
		40	0.48	0.002	0.94	10.7
		60	0.36	0.001	0.71	8.0
3	Dinh River Bridge	10	1.50	0.005	2.95	27.2
		20	1.00	0.004	1.95	18.0
		40	0.62	0.002	1.22	11.3

No.	Project	Distance x (m)	CO (µg/m 3)	SO 2 (µg/m 3)	NOx (µg/m 3)	Dust (µg/m 3)
	QCVN 05:2023/BTNTM		30000	350	200	300
		60	0.47	0.002	0.92	8.4
II	**Coastal route**					
1	Road works	10	52.46	0.187	103.04	916.2
		20	34.76	0.124	68.28	607.1
		40	21.71	0.078	42.64	379.1
		60	16.29	0.058	32.00	284.6
2	Ha Ra Bridge	10	3.73	0.013	7.32	23.9
		20	2.47	0.009	4.85	15.8
		40	1.54	0.006	3.03	9.9
		60	1.16	0.004	2.27	7.4
3	Cong Luong Bridge	10	1.33	0.005	2.61	18.5
		20	0.88	0.003	1.73	12.2
		40	0.55	0.002	1.08	7.6
		60	0.41	0.001	0.81	5.7

The results in the above table show:

Dust content within a radius of 40 m from the emission source for construction activities Road construction works are 1.14 to 3.05 times higher than the allowable threshold, at a distance of more than 40 m, it is lower than the allowable threshold according to QCVN 05:2023/BTNMT.

The remaining indicators all have lower levels than the allowable standards.

Thus, pollution caused by transportation and excavation activities mainly causes an increase in dust content. Dust generated will affect the lives of construction workers as well as people living near the road. For bridge construction activities on the route, in general, the amount of dust generated is within the allowable limit. However, the calculation results are only relative because they are averaged over a long construction period. In reality, construction activities may vary depending on the time, so the amount of dust generated at each time may be higher.

Dust and emissions from machinery operations:

Based on the amount of fuel consumed and the WHO emission factor[11] for diesel fuel combustion, the total amount of dust and air pollutants emitted from the operation of construction machinery and equipment can be calculated in the following table:

Table 0-13 Emission concentration during excavation, transportation of waste materials and raw materials in the project area

[11]According to WHO, with diesel fuel, the emission factor per ton of fuel is as follows: CO (28 kg); SO2 (40 kg), NO2 (55 kg), HC (12 kg) and dust (0.12 kg)

No.	Project	Distance x (m)	CO (µg/m 3)	SO 2 (µg/m 3)	NOx (µg/m 3)	Dust (µg/m 3)
	QCVN 05:2023/BTNTM		30000	350	200	300
I	**Route 19C – Quy Nhon Port**					
1	Road works	10	24.52	0.088	48.16	343.1
		20	16.25	0.058	31.91	227.4
		40	10.15	0.036	19.93	142.0
		60	7.62	0.027	14.96	106.6
2	Truong Uc Bridge	10	1.16	0.004	2.28	25.8
		20	0.77	0.003	1.51	17.1
		40	0.48	0.002	0.94	10.7
		60	0.36	0.001	0.71	8.0
3	Dinh River Bridge	10	1.50	0.005	2.95	27.2
		20	1.00	0.004	1.95	18.0
		40	0.62	0.002	1.22	11.3
		60	0.47	0.002	0.92	8.4
II	**Coastal route**					
1	Road works	10	52.46	0.187	103.04	916.2
		20	34.76	0.124	68.28	607.1
		40	21.71	0.078	42.64	379.1
		60	16.29	0.058	32.00	284.6
2	Ha Ra Bridge	10	3.73	0.013	7.32	23.9
		20	2.47	0.009	4.85	15.8
		40	1.54	0.006	3.03	9.9
		60	1.16	0.004	2.27	7.4
3	Cong Luong Bridge	10	1.33	0.005	2.61	18.5
		20	0.88	0.003	1.73	12.2
		40	0.55	0.002	1.08	7.6
		60	0.41	0.001	0.81	5.7

Applying the Sutton model (formula [1]) to calculate emissions from machinery and equipment operations as follows:

Table 0-14 Concentration of emissions emitted from the operation of machinery and vehicles

No.	Project	Distance x (m)	CO (µg/m 3)	SO_2 (µg/m 3)	NOx (µg/m 3)	Dust (µg/m 3)
	QCVN 05:2023/BTNTM		30000	350	200	300
I	**Route 19C – Quy Nhon Port**					
1	Road works	10	41.99	59.99	82.49	0.18
		20	27.83	39.75	54.66	0.12
		40	17.38	24.83	34.14	0.074
		60	13.04	18.63	25.62	0.056
2	Truong Uc Bridge	10	9.42	13.45	18.50	0.040
		20	6.24	8.92	12.26	0.027
		40	3.90	5.57	7.66	0.017
		60	2.93	4.18	5.75	0.013
3	Dinh River Bridge	10	2.95	4.21	5.79	0.013
		20	1.95	2.79	3.83	0.008
		40	1.22	1.74	2.39	0.005
		60	0.92	1.31	1.80	0.004
II	**Coastal route**					
1	Road works	10	45.64	65.21	89.66	0.196
		20	30.25	43.21	59.41	0.130
		40	18.89	26.98	37.10	0.081
		60	14.18	20.25	27.85	0.061
2	Ha Ra Bridge	10	3.50	5.00	6.87	0.015
		20	2.32	3.31	4.55	0.010
		40	1.45	2.07	2.84	0.006
		60	1.09	1.55	2.13	0.005
3	Cong Luong Bridge	10	1.31	1.87	2.57	0.006
		20	0.87	1.24	1.70	0.004
		40	0.54	0.77	1.06	0.002
		60	0.41	0.58	0.80	0.002

The calculation results show that the amount of emissions emitted from equipment operations on route 19C - Quy Nhon Port is about 82.27 kg/day, and on the coastal route is about 51.33 kg/day. Emission concentrations from construction machinery and equipment operations are within the allowable limits. Impacted objects:

The table below shows objects that are likely to be affected by emissions from construction equipment.

Table 0-15. The objects that are likely to be affected by dust and exhaust fumes

Objects	Distance to route (m)
My Thanh – Lai Giang coastal road	
High-tech shrimp farming area of Viet Uc - Phu My Company Limited (Km 45+728 – Km 46 +360)	30
Saigon - Quy Nhon Minerals Corporation Joint Stock Company (Km 46+000)	20
Livestock Joint Stock Company (Km 53+700)	30
My Tho Kindergarten (Km 48+700), My Tho commune	30
My An Border Guard Station (Km 54+750)	30
Thong Thai Restaurant (Km 55+000)	40
Phan Family Temple (Km 55+387)	10
My An Primary School (campus 2) in Xuan Binh village, My An commune, Phu My district (Km 55 +600)	20
My An police station, in Xuan Binh village, My An commune, Phu My district (Km 55 +700)	20
Cultural House of Xuan Binh Village, My An, Phu My (Km 55 +850)	25
Factory and operator of BCG Phu My solar power plant (Km 58+000 – Km 59+000)	25
Hoang Minh Gas Station (Km 61+500)	35
My Thang Primary School No. 1 (campus 2) (Km 62+300)	15
Family Church (Km 62+500)	15
Ban Mai Xanh Private Kindergarten (Km 66+800)	20
Village 9 Market, My Thang Commune (Km 62+150 – Km 62 + 250)	10
My Duc Border Guard Station, My Duc Commune (Km 67+500)	20
Tan Thanh residential area, My Tho commune, Phu My district (Km 50+000)	30
Residential area of Chanh Trach village, My Tho commune, Phu My district (Km 50+500)	37
Residential area of My Tho commune, Phu My district (Km 51+250)	16
Residential area of My An commune, Phu My district (Km 56+500)	23
Xuan Thanh residential area, My An commune, Phu My district (Km 56+900)	20
Village 9, My Thanh Commune, Phu My District (Km 62+000 – Km 63+000)	15
Residential area of Lo Dieu village, Hoai My commune, Hoai Nhon district (Km 75+000 – Km 75+322)	26
Residential area of Kim Giao village, Hoai Hai commune, Hoai Nhon district (Km 79+660)	20
Residential area of Hoai My commune, Hoai Nhon district (Km 81+840 – Km 82+000)	20
Residential area near Lai Giang bridge, Hoai My commune, Hoai Nhon district	17

(Km 83+000 – Km 83+273)	
Road 19C – Quy Nhon Port	
Residential area of Dieu Tri town (Km 00+000)	20
Residential area of Nhon Phu commune, Quy Nhon city (Km 1+300 – Km 1+950)	22
Residential area on Dao Tan street, Nhon Binh commune, Quy Nhon city (Km 4+200)	25
Residential area of Nhon Binh commune, Quy Nhon city (Km 4+450 – Km 4+750)	27
Residential area on Nguyen Man street, Nhon Binh commune, Quy Nhon city (Km 6+350)	17
Family church, Nhon Phu commune, Quy Nhon city (Km 3+800)	20
Long Thanh Pagoda, Nhon Binh Commune, Quy Nhon City (Km 4+400)	20

In general, the objects identified in the above table will be likely to be affected by dust generated from construction activities. Dust and emissions will mainly directly affect the health of workers working on the construction site and local people living in residential areas along the routes and near the construction area.

Impact period: During construction

Impact level: The mitigation measures specified in the report will be applied to minimize the impact of air pollution. In addition, the implementation of air quality monitoring programs must be carried out throughout the construction process to help the Project Owner assess the impact on air quality and take timely remedial actions. Although the construction period is about 12-36 months for each project, the construction activities will be carried out in a rolling manner, so each affected object mentioned above will only be affected for a very short time when the construction route passes through the object. Therefore, the level of impact is assessed as average.

3.2.2.2. Impact by noise and vibration

a. Impact by noise

The potential health risks of environmental noise are gaining increasing attention. WHO defines health as 'a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity' (WHO, 1946). This broad definition enables to consider not only the direct impacts environmental noise has on health, but also its impacts on sleep disturbance, cognitive effects and annoyance. In 2011, WHO quantified the burden of disease due to environmental noise exposure. Health end points included cardiovascular disease, cognitive impairment, sleep disturbance, tinnitus and annoyance.

Scale and scope of impact: The ability of noise in the construction area of the project to spread to surrounding areas is determined by the following formula:

$$Li = Lp - \Delta Ld - \Delta Lc \quad (dBA)$$

Where:

- Li - Noise level at the calculated point, distance d(m) from the noise source,
- Lp - Noise level at the noise source (calculated from a position 15m from the equipment),

- ΔLd - Noise level reduction according to distance d at frequency i, ΔLd = 20 lg [(r2/r1)1+a] (dBA)
- r1 - Distance to the noise source corresponding to Lp(m),
- r2 - Distance to calculate the noise level reduction according to the distance corresponding to Li(m),
- a - Coefficient to take into account the noise absorption effect of the ground terrain. Convention a=0,
- ΔLc - Noise level reduction through obstacles. The convention for project areas is ΔLc=0

From the above formula, referring to the construction equipment of the project that is likely to cause noise, we have the results of noise level assessment for each type of equipment and according to the distance from the source shown in Table 3-16. (in which the level of 15m is the noise level referenced according to the parameters of the equipment)

Table 0-16. Noise levels from construction equipment

No.	Device Type	Noise level at 15 m distance from source (dBA)*	Noise level at 20 m distance from source (dBA)	Noise level at 50 m distance from source (dBA)
1	Excavator	81	78.5	70.5
2	Crane	81	78.5	70.5
3	Bulldozer	81	78.5	70.5
4	Roller compactor	80	77.5	69.5
5	Excavator	89.5	87.0	79.0
6	Wheel loader	80	77.5	69.5
7	Wheel loader head	80	77.5	69.5
8	Scraper	84	81.5	73.5
9	10T dump truck	77	74.5	66.5
10	Drill	80	77.5	69.5
11	Water truck	77	74.5	66.5
12	Asphalt paver	83	80.5	72.5
13	Pile Driver	100.8	98.3	90.3
14	Welding machine	74	71.5	63.5
*Source: *Acoustical measurement in FHWA roadway construction noise model user's guider. FHWA-HEP-05-054, January 2006*				

Note: QCVN 26:2010/BTNMT, common areas: from 6 am to 9 pm is 70 dBA; from 9 pm to 6 am is 55 dBA in normal areas (such as residential areas); from 6 am to 9 pm is 55 dBA in special areas (such as schools). Decision 3733/2002/QD-BYT: Noise in production areas: 8-hour exposure time is 85 dBA; Noise in administrative areas: 8-hour exposure time is 65 dBA; Noise in research and study areas: 8-hour exposure time is 55 dBA.

In general, outside a distance of 50m, most machines have noise levels that meet the permitted standards according to QCVN 26:2010/BTNMT. Compared with Decision 3733/2002/QD-BYT, outside the 20m distance, most noise levels are lower than the standard.

In the case of many different types of construction equipment operating at the same time and in the same location, the total equivalent sound level is calculated according to the following formula (Source: US Department of Transportation - Federal Highway Administration).

$$L_{Aeq,\ total} = 10 \times \log_{10} \sum_{i=1}^{k} [10^{(L_{Aeq,\ i}/10)}] \text{ (dBA)}$$

Where:

- LAeq, total is the total noise level of construction equipment;
- k is the number of different types of equipment; and
- LAeq,i is the equivalent sound level for equipment i

The calculation results of noise levels generated from road and bridge items according to the situation with the highest concentration of construction vehicles and machinery are as follows:

Table 0-17 Total noise levels in construction areas

No.	Category	Total noise level (dBA)		
		Distance 15m	Distance 20m	Distance 50m
I	QL19C – Quy Nhon Port			
	Road works	101.5	99	91.1
	Truong Uc Bridge	101.4	98.9	90.9
	Dinh River Bridge	101.4	98.9	90.9
II	Coastal route, My Thanh – Lai Giang			
	Road works	101.5	99	91.1
	Ha Ra Bridge	101.4	98.9	90.9
	Cong Luong Bridge	101.4	98.9	90.9
	QCVN 26:2010/BTNMT	70		

The table below shows guidelines on noise level limits applicable to a variety of objects including sensitive objects and normal objects.

Table 0-18 National and [12]WHO technical regulations Noise Level Guidelines

Receiver	**National technical regulation (QCVN 26:2010/BTNMT) (LAeq,, dBA)**	
	6:00 – 21:00	**21:00 – 6:00**
Special area [a]	55	45
[Common] area	70	55
	WHO guidelines (LAeq, dBA)	

[12] WBG EHS Guidelines

	7:00 – 22:00	**22:00 – 7:00**
Housing, organization, education	55	45
Industry, trade	70	70

Note: a – health facilities, libraries, kindergartens, schools, churches, temples, pagodas, and other areas with special requirements; b – residential areas, hotels, guesthouses, and administrative buildings.

The subproject has identified the objects that are likely to be affected during the construction process in Table 3-15 above. It can be seen that if all the machinery is operating, the total noise level will exceed the allowable standards. Therefore, the noise will affect workers and local people working on the construction site and living near the construction sites. The objects identified in Table 3-15 are all within the range affected by noise. However, because the project area is quite open, the construction route is long and the construction activities are carried out continuously, the objects affected by noise only occur for a short time. Thus, the impact is considered *moderate.*

Noise impact can be mitigated through mobilizing appropriate types of machines and schedule of machines' operation depending on the civil works' requirements and the specific features of working sites such as confined, narrow or large spaces with or without residential or public areas nearby. Mitigation measures set forth in ESCOP shall also be applied to mitigate noise impact. In addition, a monitoring plan of noise shall be periodically conducted during construction to timely assess impact of noise and based on that corrective actions shall be made in a timely manner.

b. Impact by vibration

Vibration induced health conditions progress slowly. In the beginning it usually starts as a pain. As the vibration exposure continues, the pain may develop into an injury or disease. Pain is the first health condition that is noticed and should be addressed in order to stop the injury. Vibration-induced white finger (VWF) is the most common condition among the operators of hand-held vibrating tools. The symptoms of VWF are aggravated when the hands are exposed to cold. Vibration can cause changes in tendons, muscles, bones and joints, and can affect the nervous system. Collectively, these effects are known as Hand-Arm Vibration Syndrome (HAVS). Workers affected by HAVS commonly report:

- attacks of whitening (blanching) of one or more fingers when exposed to cold
- tingling and loss of sensation in the fingers
- loss of light touch
- pain and cold sensations between periodic white finger attacks
- loss of grip strength
- bone cysts in fingers and wrists

There are three primary types of receptors that can be adversely affected by ground vibration: people, structures, and equipment. Ground vibration can be annoying to people. The primary effect of perceptible vibration is often a concern. However, secondary effects, such as the rattling of a china cabinet, can also occur, even when vibration levels are well below perception. Vibration generated by construction activity has the potential to damage structures. This damage could be structural damage, such as cracking of floor slabs, walls, foundations, columns, beams, or wells, or cosmetic architectural damage, such as cracked plaster, stucco, or tile. Construction equipment and machineries to be used may include pile drivers, bulldozers, and heavy trucks. At 7.62 m,

vibration from pile driver is typical 104 dB, Jackhammer 79 dB, large bulldozer 87 dB, loaded truck 86 dB, Caisson drilling 79 dB and small bulldozer 58 dB (Source: D.J. Martin. 1980, J.F. Wiss.1974, J.F. Wiss. 1967, David A. Towers. 1995). The vibration level at any distance D is computed by the following formula.

$$L_v(D) = L_v(7{,}62) - 20\log(D/7{,}62) \quad \text{(VdB)}$$

Where: $L_v(7.62)$ – the reference vibration level

$L_v(D)$ – the vibration level at any distance D

Table below shows vibration levels of some typical construction equipment to be used in the subproject in distances.

Table 0-19. Vibration level according to distance (VdB)

Construction equipment	Vibration level at 7.62 m	Vibration level at 10 m	Vibration level at 20 m	Vibration level at 30 m
Pile Driver	104	101	95	92
Hammer drill	79	76	70	67
Large bulldozer	87	84	78	75
Truck	86	83	77	74
Caisson Drilling	79	76	70	67
Small bulldozer	58	55	49	46

The results in Table 3-19 show that the pile driver is the equipment that can cause the greatest vibration, within a distance of 30m, all are affected by the vibration from this equipment. The remaining equipment, outside the distance of 30m from the vibration source, is less affected (vibration is less than 75 dB, meeting QCVN 27: 2010/BTNMT - National technical regulation on vibration between 6 am and 9 pm). However, pile driving equipment is only used during the construction of foundation pits for bridges crossing rivers such as Truong Uc, Cay Me, Dinh, and Ha Ra rivers. Survey results in these areas show that these are entirely agricultural areas, without any architectural works or houses. However, during the construction process, the project owner will fully comply with solutions to minimize the impact of noise as mentioned in the environmental management plan. Therefore, this impact is assessed as insignificant.

Within a distance of 15-20m, the vibration level exceeds the standard, but not much. The structures within this distance that may be affected include:

Table 0-20 Some objects affected by vibration

Object	Distance to construction (m)
My Thanh – Lai Giang coastal route	
Saigon - Quy Nhon Mineral Joint Stock Company (Km 46 + 000)	20
Phan Family Temple (Km 55 + 387)	10
My An Primary School (campus 2) Xuan Binh village, My An, Phu My (Km 55 +600)	20

My An Police Station, Xuan Binh Village, My An Commune (Km 55 +700)	20
My Thang 1 Primary School (campus 2) (Km 62 + 300)	15
Family Temple (Km 62 + 500)	15
Ban Mai Xanh Private Kindergarten (Km 66 + 800)	20
Village 9 Market, My Thang Commune (Km 62 + 150 - Km 62 + 250)	10
My Duc Border Guard Station, My Duc Commune (Km 67 + 500)	20
Residential area of My Tho commune, Phu My district (Km 51 + 250)	16
Xuan Thanh residential area, My An commune, Phu My district (Km 56 + 900)	20
Village 9, My Thanh Commune, Phu My District (Km 62 + 000 - Km 63 + 000)	15
Residential area of Kim Giao village, Hoai Hai commune, Hoai Nhon district (Km 79 + 660)	20
Residential area of Hoai My commune, Hoai Nhon district (Km 81 + 840 - Km 82 + 000)	20
Residential area near Lai Giang bridge, Hoai My commune, Hoai Nhon district (Km 83 + 000 - Km 83 + 273)	17
Route 19C – Quy Nhon Port	
Residential area of Dieu Tri town (Km 00 + 000)	20
Residential area on Nguyen Man street, Nhon Binh commune, Quy Nhon city (Km 6 + 350)	17
Family church, Nhon Phu commune, Quy Nhon city (Km 3 + 800)	20
Long Thanh Pagoda, Nhon Binh Commune, Quy Nhon City (Km 4 + 400)	20

Impact level: In general, the impact level is assessed as low

3.2.2.3. Impact due to solid and liquid waste

Construction activities are anticipated to generate solid and liquid waste (also known as construction waste). The waste will cause negative impacts on the surrounding environment and human health if they are not properly managed. The following sections discusses the impacts of these wastes in detail. The impact of construction waste is considered direct, temporary and localized, and can be mitigated. The waste is characterized in the following sections. In fact, the construction solid waste shall be reused and recycled to the greatest extent possible to reduce disposal of and liquid waste shall be treated to meet national standards, ESS3 and WG EHS guidelines.

a. Domestic solid waste

Source of impact: Domestic solid waste generated from workers' camps on construction sites. The main components of domestic waste include packaging, bottles, paper, food containers, leftovers,

etc.

Impact scale: The average amount of domestic solid waste generated in Binh Dinh is about 0.6 kg/person/day (According to 2021 statistics from the Department of Natural Resources and Environment of Binh Dinh province, the amount of solid waste generated in the province is 900 tons/day, with a population of 1,487,009 people (Binh Dinh Statistical Yearbook 2021), the average will be 0.6 kg/person/day). Domestic solid waste generated by workers can be estimated in the following Table.

Table 0-21 Estimated domestic waste generated on the construction site

No.	Construction items	People	Total domestic waste generated (kg/day)
I	Route QL19C – Quy Nhon Port	250	150
1	Road works	130	78
2	Truong Uc Bridge	80	48
3	Dinh River Bridge	40	24
II	Coastal route, My Thanh – Lai Giang	300	180
1	Road works	180	108
2	Ha Ra Bridge	80	48
3	Cong Luong Bridge	40	24
	Total	*550*	330

Impacted objects: Workers on the construction site, people near the construction area, surface water sources (Truong Uc River, Cay Me River, Dinh River, Ha Ra Bridge area flow, Cong Luong bridge)

Impact period: during the entire construction process

Impact level: Solid waste generated if not properly managed can create epidemics and affect human health. Domestic waste is mostly easily decomposable organic matter, packaging, bottles, and food containers, if not collected and treated promptly, will create unpleasant odors. This source of impact is short-term, local, and can be minimized by timely collection and transportation. Low impact level.

b. Domestic wastewater

The estimated number of workers is 550 people. Refer to similar construction projects. Domestic wastewater generated depends on the number of workers on the construction site and is calculated at 100% of the water supply. The water supply needs to comply with construction standards TCXD 33:1985, the amount of domestic water supply is 45 liters/person/day. Domestic wastewater

Table 0-22. Estimate Calculate the volume of domestic wastewater

No.	Construction items	People	Total wastewater generated (m3/day)
I	Route QL19C – Quy	250	11.25

	Nhon Port		
1	Road works	130	5.85
2	Truong Uc Bridge	80	3.6
3	Dinh River Bridge	40	1.8
II	Coastal route, My Thanh – Lai Giang	300	13.5
1	Road works	180	8.1
2	Ha Ra Bridge	80	3.6
3	Cong Luong Bridge	40	1.8
	Total	550	24.75

Workers' domestic wastewater often contains suspended solids (SS), organic substances (BOD, COD), substances containing nitrogen and phosphorus, as well as microorganisms that need to be controlled and treated before being discharged into the environment. Based on the load factor of urban wastewater by WHO, 1993, "Rapid assessment method", the flow and concentration of pollutants in domestic wastewater are as follows:

Table 0-23. Concentration Level of pollutants in domestic wastewater

No.	Pollutants	Emission factor * (g/person/day)	Concentration (mg/l)	QCVN 14:2008/BTNMT – column B	WBG EHS Guidelines
1	BOD5	45 - 54	1000-1200	50	30
2	COD	72-102	1600-2267	-	
3	Suspended solids	70 - 145	1555-3222	100	50
4	Grease	10 - 30	222-667	20	
5	Total nitrogen	6 -12	133-266	-	
6	Total phosphorus	0.6 - 4.5	13-100	6	2
7	Coliforms (MPN/100 ml)	10^6 - 10^9	10^6 - 10^9	5000	

Note: *A - maximum concentration allowed to be discharged into water sources used for domestic*

*water supply purposes; B - maximum concentration allowed to be discharged into water sources not used for domestic water supply purposes. * WHO, 1993: Assessment of air, water and soil pollution*

Calculation results show that the concentrations of pollutants in the case of not being treated through an on-site septic system are all higher than the allowable threshold according to QCVN 14:2008/BTNMT and WHO Guidelines. For example, BOD concentration is 17 to 20 times higher than the threshold, TSS concentration is 20 to 29 times higher than the threshold, ammonium concentration is 5 to 7 times higher than the threshold, and PO43- concentration is 2 to 6 times higher than the allowable threshold. In the case of treatment through the septic system, the wastewater quality still does not meet QCVN 14:2018/BTNMT and the WBG EHS Guidelines. BOD5 concentration is 3 to 8 times higher than the threshold, TSS is 4 to 11 times higher than the threshold, ammonium is 1 to 3 times higher than the threshold, and PO43- concentration is 2 times higher than the threshold.

Impacted objects: Water bodies that are likely to be affected by wastewater include: (i) For the area of Route 19C - Quy Nhon Port and works on the route: Truong Uc River, Cay Me River, Dinh River, (ii) For the My Thanh - Lai Giang coastal route: water bodies where Ha Ra Bridge and Cong Luong Bridge are built.

The table below shows the water bodies identified as likely to be affected by solid waste and wastewater from the construction process or stormwater overflowing through the project area during construction.

Table 0-24. Water bodies likely to be affected by waste from the construction process

Water body	Distance to project (m)
My Thanh – Lai Giang coastal route	
Shrimp pond - My Thang commune, Phu My district (Km 58 + 000 - Km 61 + 400), (Km 64 + 000 - Km 65 + 000)	20
Shrimp pond - My Duc commune, Phu My district (Km 65 + 100 - Km 66 + 800)	15
Shrimp pond - Hoai My commune, Hoai Nhon district (Km 72 + 800 - Km 73 + 000)	20
Shrimp pond - Hoai My commune, Hoai Nhon district (Km 76 + 120 - Km 76 + 500)	20
Coastal water, Lo Dieu, Hoai My commune, Hoai Nhon district (Km 73 + 800 - Km 75 + 238)	70
Ha Ra River (Km 68 + 200)	cross-section
Route QL19C – Quy Nhon Port	
Truong Au River at Km 0 + 515	cross-section
Cay Me River at Km 0 + 975	cross-section
Dinh River at Km 6 +33.95	cross-section

Impact period: during the construction process, temporary, short-term.

Impact level: Due to the nature of the project, the route mostly passes through unpopulated areas and is long, so camps can be set up on vacant land near the construction site or rented houses of local residents near the construction site (where there are full conditions for sanitation, water supply, etc.) to stay. At the left camps, the project owner will install mobile toilets for workers to use during their daily activities. In addition, the amount of wastewater generated at each construction site is not much, only from 1.8-8.1 m3/day, so this impact is assessed at an average level.

c. Construction wastewater

Impact source: Construction wastewater is mainly generated from washing construction materials, vehicles, and equipment. As stated in the technical documents, there will be no concrete mixing station on the construction site, concrete will be purchased from licensed stations, so construction wastewater will only be from washing construction materials and equipment.

Impact scale: The volume of wastewater from washing equipment and vehicles depends on the number of equipment and vehicles used. Construction wastewater often contains high pH, TSS, and no toxic substances. According to experience from similar construction projects, the amount of water used to wash construction equipment is estimated at 100 liters/1 equipment or vehicle. Thus, it is possible to estimate the relative amount of construction wastewater for the construction areas as follows:

(i) Highway 19C - Quy Nhon Port: about 91 vehicles and equipment, the amount of wastewater generated is about 9.1 m3/day

- For road works: about 68 vehicles and other equipment, the maximum amount of washing water is about 6.8 m3/day

- Truong Uc bridge construction area: about 12 vehicles and equipment, the maximum amount of washing water is about 1.2 m3/day

- Dinh River bridge construction area: about 11 vehicles and equipment, the maximum amount of washing water is about 1.1 m3/day

(ii) My Thanh - Lai Giang coastal road: about 143 vehicles and equipment, the amount of wastewater generated is about 14.3 m3/day

- For road works: about 119 vehicles and equipment, the maximum amount of washing water is about 11.9 m3/day.

- Ha Ra bridge construction area: about 13 vehicles and equipment, maximum washing water volume is about 1.3 m3/day

- Cong Luong bridge area: about 11 vehicles and equipment, maximum washing water volume is about 1.1 m3/day

Impact objects: If not collected and treated properly, this wastewater will affect surrounding water bodies and land. Water bodies around the project area that may be affected include Truong Uc River, Cay Me River (19C-Quy Nhon Port, Truong Uc Bridge), Dinh River (19C-Quy Nhon Port, Dinh River Bridge), water bodies at Ha Ra and Cong Luong bridges. Construction wastewater entering water bodies can impact water quality such as reducing dissolved oxygen in water increasing the concentration of pollutants in water and affecting the growth and development of aquatic organism.

Duration of impact: during construction, local, short-term

Impact level: However, in general, the aquatic ecosystem in this area is quite poor, with no endemic species. In addition, the amount of wastewater can be controlled by technical management measures. Therefore, this impact is assessed as low.

d. Stormwater runoff

Impact source: Rainwater is normally clean water, however, when it overflows through construction areas, it creates surface flows and can carry construction materials and waste from the construction site into receiving water bodies and pollute the water bodies. The source of Stormwater runoff through the project area mainly carries debris (sand, concrete, soil, etc.), oil, and grease, spilling into the environment. Therefore, managing construction materials when it rains is extremely necessary.

In addition, if it rains heavily, the large surface overflow creates a rapid flow, which can cause other impacts such as eroding roads and river banks.

Scale of impact: Stormwater runoff is calculated according to the formula

$$W = \psi \times q \times F/1000 \text{ (m3/day)}$$

Where:

- - W: Stormwater runoff, m3;
- - Ψ: Surface runoff coefficient, select ψ = 0,32 for route 19C - Quy Nhon Port (small slope) and 0.4 for the coastal route (large slope) (according to table 5 - TCVN 7957:2008 - Drainage - External network and works - Design standards)
- - q: Maximum daily rainfall in the calculation area, 337.8 mm (Refer to QCVN 02:2021/BXD - National technical regulation on natural condition data used in construction - Quy Nhon station);
- - F: Area (m2)
- Therefore, the total surface flow can reach:
- My Thanh - Lai Giang coastal road: Qmax = 0,4 x 1.467.346 m2 x (337,8/1000) m = 198.268 m3/day = 2294,8 l/s
- QL19C - Quy Nhon Port: Qmax = 0,32 x 218.815,4 m2 x (337,8/1000) m = 23.653 m3/day = 273,8 l/s

Impact objects: For the QL19-Quy Nhon Port route: the amount of rain that flows will cause flooding because this is an area that is often flooded during heavy rains. In addition, rainwater can wash away materials, soil, and sand that spill into the surrounding area because the route passes through the fields, affecting people's production.

For Highway 19C - Quy Nhon Port: rainwater flows naturally to the sea and water bodies along the route, there is no flooding. However, a large amount of rainwater can wash away materials and waste, especially with steep terrain (especially the section through Phu Thu Pass, Lo Dieu) which can cause risks of landslides and accidents for workers. Rainwater can also wash away materials and waste soil into residential areas and planted forests near the route.

Impact time: when there is heavy rain during construction

Impact level: However, the impacts of rainwater runoff can be controlled and minimized through the application of management and mitigation measures. Construction activities mainly take place in the dry season from January to August and construction is limited in the rainy season from September to December. Therefore, the impact is considered *moderate*.

e. Construction solid waste and spoil

Impact sources: Construction solid waste includes i) soil and rock from excavation activities that cannot be used and must be transported to the disposal site; ii) construction materials scattered on

the site (sand, fill, scrap iron and steel, cement, scrap wood)...

Scale and level of impact: The volume of construction solid waste is calculated according to the following table:

Table 0-25. Estimated solid waste volume

No.	Construction items	Volume of waste soil and rock from construction activities* (m 3)	Spilled materials from construction activities (tons)[13]			Construction time	Amount of spilled material generated
			Total materials mobilized on site (tons)	*Low rate (0.005 %)*	*High rate (0.01%)*	*month*	*Ton/day*
I	**Route 19C-Quy Nhon Port**	**80,582**	**263,945.8**	**13.20**	**26.4**		**0.039**
	Road works	73,197	249,778.1	12.5	25.0	24	0.036
	Truong Uc Bridge	4,383	103.99.97	0.52	1.0	18	0.002
	Dinh River Bridge	3.002	3,767.73	0.19	0.4	12	0.001
II	**My Thanh – Lai Giang coastal route**	**1,656,089**	**584,740.4**	**29.2**	**58.5**		**0.061**
	Road works	1,639,155	516,959.5	25.9	51.7	36	0.048
	Ha Ra Bridge	2622	61,425.8	3.07	6.1	18	0.011
	Cong Luong Bridge	14,312	6.355.2	0.32	0.6	12	0.002
Total		**1,736,071**	**848,686.3**	**42.43**	**84.9**		**0.1**

*(**Source:*** *Research and Development Report, 2022)*

If these wastes are not managed, they can spill into the environment or be washed away by rainwater, affecting the water environment, soil environment, and residential areas. In particular, the Lo Dieu Pass and Phu Thu Pass areas (My Thanh - Lai Giang coastal route) have steep terrain, with a large amount of excess materials. If not properly managed, they can cause landslides and burials, affecting workers. However, this impact is considered moderate because:

The amount of spilled materials is not much, only about 100kg/day (of which the 19C - Quy Nhon Port area is 39kg/day and the My Thanh - Lai Giang coastal area is 61kg/day). The spilled materials, scrap iron, steel, and cement... are utilized to the maximum to avoid waste.

Amount of excess soil and rock is quite large, about 1,736,071 m3 (of which the 19C - Quy Nhon Port area is 80,582 m3, including excess soil and rock, and the My Thanh - Lai Giang coastal area

[13]Material loss level according to construction material norms attached to Official Dispatch No. 1784/BXD-VP dated August 16, 2007 and Official Dispatch No. 1776/BXD-VP dated August 16, 2007 of the Ministry of Construction

is 1,656,089 m3, including excess soil and rock from blasting activities). However, all this excess material is used to level the ground for the staging areas (public land managed by the Commune People's Committee, agreed with the locality). In this amount of excess soil dumped, there is about 156,393 m3 of organic soil including the soil layer stripped from the field. This amount of soil is arranged to be dumped on the top layer of the collection sites, good for soil improvement, planting trees, or taking advantage of a part of planting trees along the road. Therefore, the impact of this amount of soil is insignificant.

This impact can be minimized through management measures.

Impacted objects: communities near the construction area, surface water sources near the area (Ha Thanh River, Truong Uc, Cay Me, Dinh)

Impact period: throughout the construction process

e. Bentonite spillage:

Impact source: construction activities of bridge piers and piers.

Impact scale: The amount of bentonite spillage is difficult to quantify regarding volume. According to experience in constructing bridges using bored piles on a similar scale, during the construction of bored piles using bentonite, about 60% of the initial amount of bentonite will be reused (using a pump through a pipe dropped into the borehole), in addition to the small amount that seeps into the soil in the borehole, the remaining nearly 40% is lost in the form of spillage solution.

For the construction of Truong Uc bridge, with 60 bored piles D150, 17-36m long, the amount of bentonite used is 2840 m3; Dinh river bridge, with 18 bored piles D150, 46.5 - 75.5m long, the amount of bentonite used is about 645.8 m3; Ha Ra bridge with 58 D120 bored piles, the amount of bentonite used is about 1808 m3; Cong Luong bridge does not use bored piles.

The amount of spilled bentonite is estimated as follows:

Table 0-26. Spilled bentonite quantity

TT	Category	Bentonite volume ($m^{3)}$	Bentonite spill ($m^{3)}$	Construction time (months)	Amount of Bentonite generated (m^3 /day)
1	Truong Uc Bridge	2840	1136	18	2.1
1	Dinh River Bridge	645.8	258.3	12	0.72
2	Ha Ra Bridge	1808	723.2	18	1.34

Impact objects: Truong Uc river, Cay Me river, Dinh river. Causes increased turbidity and water pollution.

Impact level: Using standard bentonite without additives will not be toxic to the environment, the impact considered *moderate*.

***f*. Hazardous waste**

Sources of impact: For transportation projects, hazardous waste includes waste oil and oil-contaminated waste, batteries, and batteries. The main sources of generation are as follows:

- Waste oil from regular oil replacing of machinery, equipment and vehicle;
- Grease leaks during maintenance of equipment, vehicles, and cleaning of wheels when leaving the construction site;
- Grease leaks due to oil storage and preservation at the construction site;
- Oily rags from construction machinery maintenance;
- Batteries, light bulbs, and batteries from the office at the construction site

Scale of impact: Due to scattered construction activities, estimates of generated hazardous waste are mainly based on experience in generating hazardous waste on similar construction projects that have been implemented. In the case of maintenance of equipment, machinery, and construction vehicles at the construction site: according to experience, equipment will be maintained once every 3 months, each time generating about 7 liters of waste oil/equipment/3 months (about 2.33 liters/month/equipment); the amount of oily rags, batteries, etc. is about 1.6 kg/equipment (about 0.53 kg/month/equipment). Thus, the estimated hazardous waste from equipment and machinery maintenance is as follows:

Table 0-27. Volume of hazardous waste generated

No.	**Category**	**Number of devices***	**Waste oil volume**		**Mass of oily rags, batteries, batteries, etc.** (kg/month)	**Total volume** (kg/month)
			liters/month	Kg/month		
I	Route QL19C – Quy Nhon Port	91	212.3	169.9	48.2	218.1
	Road works	68	158.7	126.9	36.0	163.0
	Truong Uc Bridge	12	28	22.4	6.4	28.8
	Dinh River Bridge	11	25.7	20.5	5.8	26.4
II	Coastal route, My Thanh – Lai Giang	143	333.7	266.9	75.8	342.7
	Road works	119	277.7	222.1	63.1	285.2
	Ha Ra Bridge	13	30.3	24.3	6.9	31.2
	Cong Luong Bridge	11	25.7	20.5	5.8	26.4
III	*Total*	234	546	436.8	124.0	560.8

*(**Source:** Feasibility Study Report, 2022)*

Impact objects: Hazardous waste is estimated to be of small volume, but if not properly managed, it will pollute the air, water, and soil and affect human health. When generated, the project owner will sign a contract with a competent unit to periodically collect and treat it according to regulations. In Binh Dinh province, there are currently facilities that handle hazardous waste licensed by the Ministry of Natural Resources and Environment, so this amount of waste can be

handled.

Time and scope of impact: during the construction process, in the area of the workers' camp.

Level of impact: With the amount of waste generated at the project and the solutions applied, the impact of hazardous waste is considered low..

3.2.2.4. Impact and risks at local material storage sites

Source of impact: transportation and material storage activities

Scale, objects, and level of impact: Specific impacts on material storage sites are as follows:

Table 0-28. Impact on material storage sites

No.	Material storage	Describe	Specific impact and extent
I	***My Thanh – Lai Giang coastal route***		
1	Assembly site in My An commune	At km 56+356.34, My An commune Area 17.35ha, receiving 386,089 m^3 of excavated materials The unused vacant land area is managed by My An CPC. The current elevation of the land is about 2-2.5m lower than the surrounding area and the current residential area.	Currently, the ground elevation is lower than the surrounding area, so filling activities affect natural drainage. Rainwater will no longer accumulate in the low-lying area but may overflow into adjacent areas. Therefore, drainage ditches should be constructed around the base of the stockpiles. Impact on population: Sparsely populated area. Mainly affected by dust (According to Table 3-12. Emission concentration during excavation, transportation of waste materials, raw materials, dust amount exceeds 1.26-3.05 times within 40m). Overall impact is low. Transport: 10-ton trucks to transport 386,089 m3. About 50 trips per day over a period of 36 months can cause local impacts on commune traffic and internal roads. High impact level
2	Site No. 1	At km 69 +414 - km 69 +823 My Duc Commune. The project owner will reclaim and convert the purpose of forest land use, level the ground and hand it over to the locality. Area 3.25ha, waste volume 348,000 m^3 The production forest land area is managed by My Duc CPC, the entire area is planted with eucalyptus trees less than 3 years old. The low-lying land area, the current elevation is about 10-12m lower than the surrounding area, there are no residents around.	Land acquisition: 3.25ha of production forest land managed by the Commune People's Committee will be acquired. 133.9m3 of eucalyptus will be cleared. This biomass will be fully harvested by the forest owner. Low impact Drainage: currently ground elevation is 10-12 m lower than the surrounding area, so filling activities affect natural drainage. Rainwater will no longer accumulate in the low-lying area but may overflow into adjacent areas. Therefore, drainage ditches should be constructed around the base of the stockpiles. Air: According to Table 3-12, the concentration of dusts within diameters of 40 m would be 1.26-3.05 times higher than allowable limits. vegetation in the surrounding areas: Obstructing photosynthesis can negatively impact the growth of vegetation in the surrounding areas.

			Impact on population: non-residential area. Overall impact is low. Traffic impact: the staging area is located right next to the road, a new opening, so transportation does not affect traffic.
3	Site No. 2	At Km 70 +247 - km 70 +500 My Duc Commune. The project owner will be able to reclaim and convert the purpose of using forest land, level the ground and hand it over to the locality. Area 1.23ha, waste volume 149,000 m^3 The production forest land area is managed by the People's Committee of My Duc commune, the entire area is planted with eucalyptus trees less than 3 years old. The low-lying land area, the current elevation is about 12-14m lower than the surrounding area, there are no residents around.	Land acquisition: 1.23ha of production forest land managed by the Commune People's Committee will be acquired. 50.7m3 of eucalyptus will be cleared. This biomass will be fully harvested by the forest owner. Low impact Drainage: currently ground level is 12-14 m lower than the surrounding area, so filling activities affect natural drainage. Rainwater will no longer accumulate in the low-lying area but may overflow into adjacent areas. Therefore, drainage ditches should be constructed around the base of the stockpiles. Air: According to Table 3-12, the concentration of dusts within diameters of 40 m would be 1.26-3.05 times higher than allowable limits. Traffic impact: the staging area is located right next to the road, a new opening, so transportation does not affect traffic. Impact on population: non-residential area. Overall impact is low.
4	Site No. 3	At Km 70 +981 - Km 71 +130 My Duc Commune. The project owner will be able to reclaim and convert the purpose of using forest land, level the ground and hand it over to the locality. Area 1.29ha, waste volume 128,000 m^3 The production forest land area is managed by the People's Committee of My Duc commune, the entire area is planted with eucalyptus trees less than 3 years old. The low-lying land area, the current elevation is about 9-10m lower than the surrounding area, there are no residents around.	Land acquisition: 1.29ha of production forest land managed by the Commune People's Committee will be acquired. 53.1 m3 of eucalyptus will be cleared. This biomass will be fully harvested by the forest owner. Low impact Drainage: This is a coastal area, the current ground is 9-10 m lower than the surrounding area, so filling activities affect natural drainage. Rainwater will no longer accumulate in the low-lying area but may overflow into adjacent areas. Therefore, drainage ditches should be constructed around the base of the stockpiles. Air: According to Table 3-12. According to Table 3-12, the concentration of dusts within diameters of 40 m would be 1.26-3.05 times higher than allowable limits. Impact on population: non-residential area. Overall impact is low. Traffic impact: the staging area is located right next to the road, a new opening, so transportation does not affect traffic.

5	Site No. 4	At km 71 + 765 - km 71 + 812 Hoai My Commune. The project owner will be able to reclaim and convert the purpose of using forest land, level the ground and hand it over to the locality. Area 1.89ha, waste volume 232,000 m^3 The production forest land area is managed by the People's Committee of Hoai My commune, the entire area is planted with acacia trees less than 3 years old. The low-lying land area, the current elevation is lower than the surrounding area by about 12-14m, not adjacent to residential areas.	Land acquisition: 1.89ha of production forest land managed by the Commune People's Committee will be acquired. 126.05 m3 of acacia will be cleared. This biomass will be fully harvested by the forest owner. Low impact Drainage: This is a coastal area, the current ground is 12-14 m lower than the surrounding area, so filling activities affect natural drainage. Rainwater will no longer accumulate in the low-lying area but may overflow into adjacent areas. Therefore, drainage ditches should be constructed around the base of the stockpiles. Air: According to Table 3-12, the concentration of dusts within diameters of 40 m would be 1.26-3.05 times higher than allowable limits. Impact on population: non-residential area. Overall impact is low. Traffic impact: the staging area is located right next to the road, a new opening, so transportation does not affect traffic.
6	Site No. 5	At Con Vang, Kim Giao Nam village, Hoai Hai commune Area 6ha, waste volume 270,000 m^3 This is a planned residential and commercial infrastructure land in Hoai Hai commune, under the management of the People's Committee of the commune. This is currently a low-lying area, the current elevation is about 5m lower than the surrounding area, 6ha wide, and needs to be leveled.	Drainage: the current ground level is 5m lower than the surrounding area, so filling activities affect natural drainage. Rainwater will no longer accumulate in the low-lying area but may overflow into adjacent areas. Therefore, drainage ditches should be constructed around the base of the stockpiles. Impact on population: Sparsely populated area, 60-100m away from the area. According to Table 3-12. The concentration of emissions emitted during excavation, transportation of waste materials, raw materials in the project area, the waste material dumping area is mainly affected by dust exceeding 1.26-3.05 times within a range of 40m. Therefore, the impact of dust on the population is low. Traffic impact: using 10-ton trucks to transport 270,000 m3, 36 months, about 35 trips/day can cause local impact on commune traffic, impact on internal roads. Average impact level

7	Site No. 6	At Yao Quang Village, Huai Hai Area 0.5ha, waste volume 20,000 m^3 This is an empty land under the management of the Commune People's Committee, a low-lying area, the current elevation is about 4m lower than the surrounding area, the commune currently has a need to level the ground. There are no residents around.	Drainage: the current ground level is 4m lower than the surrounding area, so filling activities affect natural drainage. Rainwater will no longer accumulate in the low-lying area but may overflow into adjacent areas. Therefore, drainage ditches should be constructed around the base of the stockpiles. Air: According to Table 3-12. The concentration of emissions emitted during excavation, transportation of waste materials and raw materials in the project area and the waste material dumping area is also mainly affected by dust (exceeding 1.26-3.05 times within a range of 40m). Impact on population: non-residential area. Overall impact is low. Traffic impact: using 10-ton trucks to transport 20,000 m3, 36-month period with about 2.6 trips/day, can cause local impact on commune traffic and internal roads. Low impact level
8	Site No. 7	In the resettlement area of phase 2 of Hoai Hai commune. This is a land under the management of the commune, the current ground is about 2m lower than the surrounding area and the commune needs to level the ground to build a resettlement area. Area 6.18ha, waste volume 123,000 m^3	Drainage: the current ground is 2m lower than the surrounding area, so filling activities affect natural drainage. Rainwater will no longer accumulate in the low-lying area but may overflow into adjacent areas. Therefore, drainage ditches should be constructed around the base of the stockpiles. Air: Mainly affected by dust (According to Table 3-12. Concentration of emissions emitted during excavation, transportation of waste materials and raw materials in the project area, dust exceeds 1.26-3.05 times within a range of 40m). Impact on population: non-residential area. Overall impact is low. Traffic impact: using 10-ton trucks to transport 123,000 m3, 36-month period with about 15.9 trips/day, can cause local impact on commune traffic, impact on internal roads. Low impact level
II	***Route 19C – Quy Nhon Port***		
1	Site No. 1	Area A1 in area 3, Nhon Binh ward Area 1.61ha, waste volume 80,582 m^3 This is an unused vacant land managed by the People's Committee of Nhon Binh Ward. The land is currently about 5m lower than the surrounding area, not adjacent	Drainage: the current ground level is 5m lower than the surrounding area, so filling activities affect natural drainage. Rainwater will no longer accumulate in the low-lying area but may overflow into adjacent areas. Therefore, drainage ditches should be constructed around the base of the stockpiles. so the filling will not affect the drainage. Because it is a low-lying area, it will not spill over into the surrounding area.

		to residential areas, and the commune currently needs to level the ground for this area.	Air: According to Table 3-12. The concentration of emissions emitted during excavation, transportation of waste materials and raw materials in the project area and the waste material dumping area is also mainly affected by dust (exceeding 1.26-3.05 times within a range of 40m). Impact on population: non-residential area. Overall impact is low. Traffic impact: using 10-ton trucks to transport 80,582 m3, over a period of 24 months, the number of trips per day is about 15.7, which can affect traffic. Low impact level

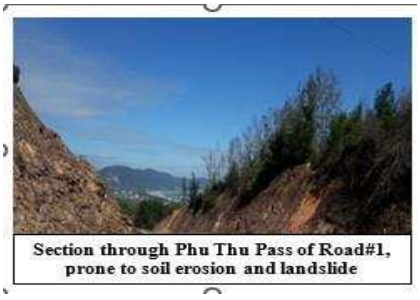
In general, survey results at waste sites show that the terrain of the waste sites is 2-14 m lower than the surrounding area, with no population or a fairly sparse population (60-100 m from the storage site), far from water bodies. However, the storage site area in My Duc and Hoai My communes will need to recover 7.45 ha, including 7.24 ha of production forests. At waste sites in My An, Hoai Hai, and Nhon Binh wards, the number of vehicles transporting waste increased by about 2.6-50 trips/day, which could affect internal traffic in the ward or commune. Therefore, the impacts of dumping waste in this area are assessed at low to moderate levels.

Impact time: during disposal process

3.2.2.5. Impact on groundwater

Construction of bored piles at bridge construction sites such as Ha Ra Bridge (315.92m long); Cong Luong Bridge (113.3m) on the coastal road of My Thanh - Lai Giang; Truong Uc Bridge (674.5m long); Song Dinh Bridge (111.3m) on the National Highway 19C - Quy Nhon Port has the potential to pollute groundwater due to the intrusion of pollutants from the ground surface through boreholes into the groundwater layer. However, the construction of bored piles must be carried out in accordance with TCVN 9395: 2012 (Bored pile – Construction, check and acceptance) and under the close supervision of the construction supervision unit. The construction time of bored piles is short, 2-3 months, so the impact is considered *low*.

3.2.2.6. *Impact on soil environment*


Section through Phu Thu Pass of Road#1, prone to soil erosion and landslide

Soil erosion, sedimentation and landslide: During the construction phase, the earthwork activities shall cause removal of the vegetation cover of the land surface and alter the natural flow regime, especially sections of Phu Thu and Lo Dieu Passes, which is prone to erosion and landslide in the event of heavy rain from September to December because this period is rainy season in Binh Dinh province. However, according to statistical data, no landslides have been reported so far in these two sections of Phu Thu and Lo Dieu Passes.

Agricultural land along the roads can also be silted up and buried by waste. When the soil layer is 10 cm thick, crops, especially young rice, can be damaged or die. Waste intrusion into water sources due to stormwater runoff also affects aquaculture activities along the My Thanh - Lai Giang coastal road.

Paddy soil along Road#1 to be impacted (at the beginning point of Phu Thu Pass of

Construction of bridges over Ha Ra, Duc, and Cay Me and Dinh rivers may cause riverbank and bridge abutment erosion. These are small rivers with low water flow rate and the subproject design will take into account erosion elements to ensure that construction and operation of bridges shall not cause riverbank erosion, and thus the erosion risk is low.

Soil contamination: Construction activities potentially cause soil contamination by waste. Waste can impair soil quality, growth of vegetation and the success of soil organisms, thus increasing the likelihood of soil erosion. The subproject's construction activities will take place on or near some agricultural land areas along both sides of two roads. Impact on soil will result in detrimental effect on agricultural production activities.

Ha Ra river where a new bridge next to the existing bridge will be constructed

The subproject shall apply measures as set forth in ESCOP to avoid or mitigate the impact on soil. Construction activities shall mainly concentrate in months from January to August (dry season). In reality, construction activities are limited in months from September to December as this period is rainy season. Thus, the impacts are considered *moderate.*

3.2.2.7. Impact on aquatic ecosystem

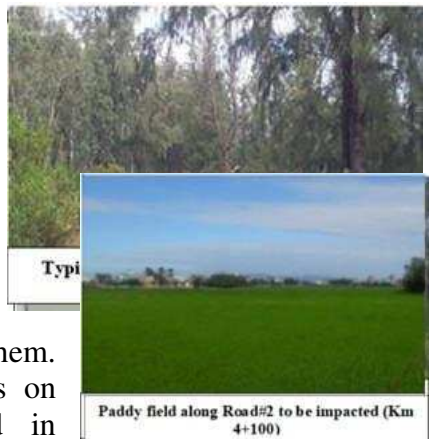
The main aquatic ecosystems in the project-affected area that are likely to be impacted by the project implementation are identified in Table 3-24 above. Some of the water bodies are aquaculture ponds, some are irrigation canals and some are rivers with roads crossing them such as Ha Ra River (Km 68 + 200) of the My Thanh - Lai Giang coastal route; Truong Uc River at Km 0 + 515; Cay Me River at Km 0 + 975; Dinh River at Km 6 +33.95 of National Highway 19C - Quy Nhon Port.

A shrimp pond next to the roadside of Road#1

As discussed above, the aquatic system will be potentially impacted by construction wastes if wastes are not well managed. Wastes may cause detrimental effects on aquatic ecosystem services such as production of fish, shellfish, and algae, control of eutrophication and waste assimilation, and provisioning of freshwater. Aquatic ecosystem can be asphyxiated due to lack of oxygen or poisoning. Waste oil is also a source of toxicity to aquatic species in the water. Throughout the food chain, oil will accumulate from low-level organisms

(algae, zooplankton) to high-level organisms (aquatic species, fish, etc.,).

Construction of bridges over the above-mentioned rivers will cause alteration to water flow regime for which erosion and sedimentation may occur. The water flow often moves faster at bridge abutments. These consequences may impact spawning area of some aquatic species such as fish, crab and shrimp. However, the scale of bridge construction on the river is small (the bridges are from 11.3-675m long, the impact on the aquatic ecosystems is considered *moderate.*



Ecological surveys showed that there is no existence of rare or endangered aquatic species in the above-mentioned aquatic ecosystems. There are no fishing activities in Duc, Cay Me and Dinh rivers where bridges will be built. However, there is a few local households, about 2 households, to go fishing in Ha Ra bridge area, so construction of new Ha Ra bridge would affect them. Construction period of bridge is about 12 months. Policies on assistance for affected households have been discussed in Resettlement Plan in detail.

The risk of water pollution will be minimized by the implementation of good construction practices. In addition, the subproject shall collect and treat waste in compliance with the GoV's regulations on waste management, ESS3 and WBG EHS guidelines to avoid or mitigate negative risks and impacts on the aquatic ecosystems identified in the subproject's area of influence.

3.2.2.8. Impact on terrestrial ecosystem

The area of the sub-project primarily consists of agricultural ecosystems. Humans have settled and managed this area for centuries for agricultural production. Some segments of the road run through and near agricultural land, while others pass through garden land.

In addition, the coastal road from My Thanh to Lai Giang passes through areas of planted forest and protective forest in Phu My District and Hoai Nhon Town. The impacts related to the forest ecosystem have been presented in Section 3.2.1.2 (iii). It should be noted that aside from the area of forest being acquired, the construction activities of the project may also affect adjacent forest areas that are not being acquired due to construction activities and the movement of workers beyond the boundaries of the construction site. Dust, as well as the cutting of trees outside the construction area, may impact the growth of these trees. Additionally, forest fires pose a potential risk due to worker activities, particularly from January to August, as this period is the dry season. However, given the low diversity of the forest ecosystem, which primarily consists of acacia, casuarina, and eucalyptus, and the forest being assessed as having low volume, the overall impact is expected to be *low*.

Grass and bushes near Cay Me river

According to the Project Resettlement Plan (2021), in addition to the above-mentioned cleared forest areas, the Project will need to clear: (i) 58,682 m2 of annual cropland (of which: DT639 My Thanh - Lai Giang coastal road is 1,854 m2, QL19C - Quy Nhon Port road is 56,828 m2); and (ii) 30,305 m2 of perennial cropland (of which: DT639 My Thanh - Lai Giang coastal road is 413 m2, QL19C - Quy Nhon Port road is 29,892 m2) of households in the project area. The flora mainly includes food crops, fruit trees, ornamental plants, shade trees, shrubs, casuarinas, acacias, and eucalyptus. The fauna mainly consists of domesticated animals and some wild species such as birds and reptiles found in rice fields, home gardens, and plantations that are not listed in the Vietnam Red Data Book or the IUCN Red Data Book of Threatened Species. The most important service provided by the agro-ecosystem is the provision of food, raw materials, and fiber. Rice, livestock, animal feed, and other products are used to meet subsistence or market needs. Arguably the most important of these is the maintenance of soil fertility, which is a fundamental factor in maintaining agricultural productivity. These factors are all likely to be affected by the construction activities of the project.

Construction activities will mainly cause impact on the terrestrial ecosystem by removal of vegetation cover due to agricultural and productive land acquisition and clearance which will result in habitat loss, and loss or reduced food supply sources for human and livestock, and other animal species, soil degradation, and reduced carbon dioxide absorption and climate regulation. Construction activities will also cause dust emission which cover leaves of trees and cause disruption to photosynthesis – this would lead to a reduction in productivity and biomass of plants, especially food crops along both sides of roads. Therefore, the impacts on terrestrial ecosystem and services are considered *moderate*. Mitigation measures has been set out in ESCOP to mitigate risk and impact on the terrestrial ecosystem in accordance with ESS6.

3.2.2.9. Waterlogging

Construction activities are possible to obstruct the water drainage system in the subproject's area of influence. At the same time, rain in the construction areas may cause localized flooding on site. If the drainage system on the site is not arranged, localized flooding will occur to directly (i) affect production activities and movement of workers and local people, (ii) cause water pollution and (iii) create favorable environment for development of mosquitoes as vector-born disease of dengue. Thus, the impacts of inundation are considered *moderate*.

An irrigation canal to be cut

Some locations are potentially affected by localized flooding, including (i) Road connecting NH19 – Quy Nhon Port: location of horizontal irrigation canal and drainage system at Km 0+406; Km 1+245, Km 2+226, Km 3+130, Km 3+360, Km 3+420, Km 3+558, Km 3+738, Km 3+839, Km 4+286, Km 4+394, Km 5+007, Km 5+136, Km 5+407, Km 5+632, Km 5+888 and (ii) My Thanh - Lai Giang coastal road: location of horizontal irrigation canal and drainage system at Km 52+058, Km 52+290, Km 53+292, Km 56+292, Km 56+610, Km 57+670, Km 58+786, Km 60+655, Km 62+071, Km 64+088, Km 65+105, Km 65+168, Km 65+912, Km 66+066, Km 66+336, Km 66+588. Impacts will mainly occur during the rainy season (September - December). At these locations, drainage

works will be constructed as per design. Flood risks and impacts can be mitigated by common engineering mitigation measures such as pumping and maintaining existing drainage systems, regular inspection and maintenance of flow clearance, and slope stabilization. In addition, most construction activities will be carried out during the dry season. However, due to extreme weather events due to climate change impacts, extended construction periods may increase flooding.

3.2.2.10. Impact on surface water quality

Excavation, piers, bridge piers as well as construction activities on the river, clearing the riverbed after construction is completed.are directly related to the water area, and will contribute to increasing suspended solid waste in the water, directly affecting the quality of surface water during the construction phase, causing indirect impacts on aquatic flora and fauna in the project area. However, there are no endemic flora and fauna species that need to be protected in the river (details in chapter 2 of the report). These direct and indirect impacts are Low due to: i) small scale at the construction sites of bridges and culverts; and ii) temporary occurrence during construction and can be minimized through good engineering solutions and construction management practices, with close monitoring, inspection, and consultation with the local community.

In addition, as assessed above, surface water flows (during heavy rains), domestic wastewater, and construction wastewater (if not managed well) will spread pollutants, such as TSS, BOD, COD, NH4+... into nearby surface water sources, causing a decline in the surface water quality of the receiving source. Dust dispersed in the air, then deposited on water surfaces, can also cause a decline in surface water quality. These impacts are assessed as low, can be minimized through measures to manage wastewater sources, stormwater runoff, and dust reduction, and occur temporarily during the construction phase.

3.2.2.11. Impact on aesthetics and landscape

Aesthetic and landscape impacts can be expressed as a product of the poor consideration of design principles and resulting lack of harmony between the roads and various features of the landscape such as natural relief and morphology of the landscape, hydrology, vegetation, structure, and pattern of the landscape, urban or village areas, recreational areas, etc.

The My Thanh - Lai Giang coastal route runs parallel to the coast, built on the basis of upgrading the existing coastal provincial road (PR639), with landscape conditions including rice fields, home gardens, planted forests and coastal areas, etc. The upgrading activities will mainly cut down trees and replace part of the agricultural landscape along the road. This will lead to changes in the landscape along both sides of the road, especially in some sections such as near Ha Ra Bridge, Phu Thu and Lo Dieu passes. However, this change will be in a positive direction when the route is put into operation.

Route 19C - Quy Nhon Port is newly built and the route runs through agricultural cultivation areas some developed urban areas and rural residential areas. The construction of the route will significantly change the existing landscape. During construction, the landscape of the area may be negatively affected by the impact of dust, exhaust fumes, solid waste, and wastewater. However, when the project is put into operation, the landscape of the area will change in a positive direction, suitable for modern urban space.

It is not possible to prevent the presence of the roads from affecting the surrounding landscape. To mitigate impacts on aesthetics and landscape, the regional landscape design principles should provide guidance in resolving major issues relating to alignment, landscaping maintenance, landscape restoration, and the provision of user services. These measures have been discussed in ESCOP.

3.2.2.12. Greenhouse Gas emission

Sources of carbon emission during road construction include construction materials, fuel consumed by construction machinery as well as by material and labour transport, and removal of vegetation (Egis, 2010). However, even though there are several tasks included in road construction contributing to GHG emissions such as site clearing, sub-grade preparation, production and transport of construction materials, and construction machinery use, previous studies have estimated that road construction account for only a small proportion of the total GHG emissions produced throughout a road project's life cycle (Park et al., 2003; BIS, 2010).

For construction projects, the main source of carbon emissions is the fuel combustion of construction equipment as well as material transport equipment.

Impact scale:

According to the French Energy and Environmental Management Agency (ADEME) (2009b). User manual for the spreadsheet "Bilan_Carbone_V6_EUK-v.xls", the amount of CO2 emitted when burning 1 liter of DO oil is 2.71 kg CO2/liter of DO oil.

Table 0-29. CO2 emissions generated

Route	Amount of DO oil used (m3)*	CO2 emissions (tons)
Route QL19C-Quy Nhon Port	540.83	1465.6
My Thanh – Lai Giang coastal route	501.97	1384.7

*(*Source: Project Feasibility Study Report, 2022)*

Impact level: In general, the amount of CO2 emitted in the entire project is not large. The impact level is low.

Impact time: throughout the construction process.

3.2.2.13. Impact of climate change and natural disasters

Construction activities are anticipated to be impacted by extreme weather phenomena and natural disasters as a result of climate change. The dry season lasts 8 months, the weather is hot and dry, accompanied by drought. Besides, under the impact of climate change in recent years with prolonged rains and floods, Binh Dinh became a severely flooded locality. Rain causes many residential areas in the districts: Tay Son, An Nhon, Tuy Phuoc, Phu Cat, Phu My, Hoai An, Hoai Nhon, Quy Nhon.... deeply inundated with floods. Many transport and irrigation works were eroded and severely damaged. In Quy Nhon city, many houses were flooded from 1 to 2 meters deep. Typhoon hits Binh Dinh province in the period of from September to December and causes strong wind and heavy rains. For example, typhoon No.12 hit Binh Dinh in November 2020 causing heavy rains in which the districts of Phu Cat, Phu My, Tuy Phuoc, Tay Son, and An Nhon town have a typical rainfall of 200 – 300 mm, some places the rainfall is above. Areas

Flooding in Quy Nhon city due to Typhoon No.12 in November 2020

of districts of An Lao, Hoai An, Vinh Thanh, Van Canh, Hoai Nhon town, Quy Nhon city have a typical rainfall of 300 – 400 mm, some places over 450 mm. Binh Dinh has developed a climate change scenario to 2050 and the vulnerability of the regions to propose appropriate policies. According to the analysis, by 2050, the average monthly temperature may increase by 1.5 degrees and rainfall in the rainy season will increase by 82.2 mm. Flooded area will increase by about 0.7% of the city area, especially in low-lying areas in Nhon Ly and Nhon Hoi communes. In addition, the intensity, frequency and damage caused by natural disasters have all increased, causing greater challenges in the response to climate change. The extreme weather phenomena will affect the subproject progress, the quality of works, and pose threat to workers' health and safety. There will be risk to workers who work under such conditions. Workers working at bridge construction sites and coastal road in rainy season are at risk of injuries or fatalities due to high flood and strong wind. Thus, the impacts of climate change and natural disasters are considered *moderate.*

It is important that the construction period of time is about 24 months, so the subproject needs to prepare a proper construction plan taking into account the elements of climate change impacts as well as measures to response to natural disasters. In fact, construction activities shall only concentrate in months from January to August (dry season), and be very limited in months from September to December (rainy season). Mitigation measures for risks and impacts of natural disasters have been developed in ESCOP.

3.2.2.14. Impacts from blasting

During the construction of the My Thanh - Lai Giang coastal road, blasting will be used to break rocks. It is expected that the blasting method will be differential and directional blasting, with a blast hole diameter of 30 ÷ 50mm and a depth of 2 ÷ 2,5m, with an explosive mass of about 660 tons (according to FS). Blasting locations at the sections through Phu Thu Pass (route: 1. Km68+600 - Km68+707; 2. Km69+181.59 -Km69+526.59; 3. Km69+853.08 - Km72+200) and Lo Dieu Pass (route: 1. Km77+000 -Km78+031; 2. Km78+633.50 - Km79+047.53).

The basis for assessing the impact caused by blasting is based on the reference to the impact of blasting from studies in the stone mining area with the same differential blasting technology.

Blasting will cause vibrations and generate dust and emissions such as CO, CO2, and SO2... which can be referred to in the following table.

Table 0-30 Emission levels after blasting

TT	Measuring area	Dust (mg/m $^{3)}$	Noise level (dB)	Emissions (mg/m $^{3)}$		
				CO	CO_2	SO_2
1	After 40" blasting at a distance of 30-40m	500-600	160	1%	2%	-
2	Excavating rock after blasting	1.6-5	90-110	1.3-2	0.2	0.73
3	1km downwind	0.4-0.6	75-80	-	-	-

*(**Source:** Scientific report: Urgent issues on labor environment in stone mining and processing in Vietnam, 1999)*

The research results shown in the table above show that immediately after blasting, a large amount of dust and exhaust gas will be emitted into the surrounding area. However, this amount of emission is local and the concentration of dust and exhaust gas generated from blasting will gradually decrease as the distance from the center of the blast increases. At a distance of 1km downwind from the center of the blast, the dust and noise content is still higher than the allowable limit and fluctuates from 0,4-0,6 mg/m^3 [14] for dust and 75-80 dB[15] for noise,

One of the important factors when considering the environmental impact assessment of blasting is the minimum safe distance (r_{min}) of air shock waves for people who are required to have maximum access to the blasting site. Referring to the research results of the Dong Nai Department of Industry when studying the quarries, the calculated safe distance for each explosion can be calculated according to the formula:

$$r_{\min} = 15\sqrt[3]{Q} \qquad (m)$$

Where: Q is the mass of explosives used (kg) when simultaneously detonating.

Table 0-31 Calculated safe distance for gas when blasting

NO.	Explosion size Q (kg)	Safe distance r $_{min}$ (m)
1	100	70
2	200	88
3	300	100
4	400	111
5	500	119
6	1,000	150

Along with that, the safe distance of vibration for houses and structures due to the explosion of 1 concentrated mine is calculated according to the formula:

$$r_c = K_c \alpha \sqrt{Q} \qquad (m)$$

Where:

- r_c is the safe distance (m);
- K_c is the coefficient depending on the soil properties of the structure to be protected (K_c=8)
- $\propto$ is the coefficient depending on the explosion impact index (take $\propto$ = 1,2)

[14] QCVN 05:2013/BTNMT-National Standard on ambient air quality limits the average hourly dust concentration to 0,3 mg/^{3}.

[15] QCVN 26:2016/BTNMT- National Standard on noise limits the noise level in normal areas during the day to 70dB.

The calculated safe distance when blasting is calculated as follows.

Table 0-32. Calculation results of safety radius due to vibration according to explosion scale

No.	Explosion size Q (kg)	Safe distance r_c (m)
1	100	96
2	200	136
3	300	166
4	400	192
5	500	215
6	1,000	304

The blast volume is calculated according to the standard, the scale of each explosion depends on the explosion location. At this stage, the specific scale of each explosion has not been determined, but it will be determined when applying for a blasting passport. Here, the report only estimates the safe radius based on the assumption of the scale levels of each explosion. Accordingly, with the amount of explosives used in each explosion being about 1000kg, the safe distance for people nearby is greater than 150m and the safe radius due to the shock of the explosion is greater than 300m from the center of the explosion.

Lo Dieu and Phu Thu passes areas are newly opened routes, not near residential areas or construction works (the nearest house is about 400m from the pass). Therefore, the impact only affects workers at the construction site. Blasting can also cause landslides in this area. Therefore, blasting must be strictly managed by specialized units licensed to blast. In addition, blasting must comply with the safety requirements stated in ESCOP.

3.2.2.15. Landslide risk:

Route 19C - Quy Nhon Port: relatively flat terrain, no landslide risk.

My Thanh - Lai Giang coastal route: the newly opened route at Phu Thu and Lo Dieu passes through steep, high terrain, when constructing, the slope must be leveled to reduce the road slope, which will potentially pose a landslide risk during construction. On the other hand, the use of rock blasting will create vibrations, breaking the structure of the rock layer, and increasing the risk of landslides. However, with the differential blasting technology controlled by each hole, with completely different differential times, it helps reduce the amount of explosives at the same time, reducing the formation of shock waves, thereby significantly reducing aftershocks. In addition, this area is unpopulated and has no traffic activities because it is a newly opened route. However, landslides can affect the safety of workers on the construction site.

Impact level: moderate.

3.2.2.16. Forest fire risk:

The construction of the My Thanh - Lai Giang coastal road passes through forests planted with eucalyptus, casuarina, and acacia at km47+900 - km49+500, km68+169.14 - km72+469.14 and km75+269.14 - km79+669.14. Activities such as using or storing fuel, lighting fires on construction sites during construction, or littering cigarette butts in these areas all pose a risk of causing fires and forest fires, especially during the dry months. The consequences of forest fires can be very serious, causing damage to the ecology, people, and property.

3.2.2.17. Social risks and impacts during construction

(i) Impact on traffic safety

Road Traffic: Construction activities such as truck operations to transport waste soil and construction materials will increase traffic on existing local roads used as access roads to construction sites and lead to direct disruption to the movement of local people, possibly causing traffic congestion and damage to roads. These activities are likely to cause traffic accidents if there is no traffic management plan during transportation. Traffic accidents will create a large social burden and affect the progress and sustainability of the sub-project.

Although the project has arranged the waste dumps right next to the 2 construction routes, so the impacts and safety risks have been somewhat limited, the construction process still has many potential risks of traffic accidents due to the process of transporting raw materials from suppliers to the construction site and from the construction site to the waste dumps.

It is expected that the following road systems will be used:

Construction of My Thanh - Lai Giang coastal road: (i) National Highway 1A - Hoai Thanh T-junction - Provincial Road 639 (the end point of the route), (ii) National Highway 1A, Phu Kim village, Cat Trinh commune, Phu Cat district - Interchange of Provincial Road 635 (km 1196 + 600, National Highway 1A) - National Highway 1A (km 1157+500, National Highway 1A, People's Committee of My Chau Commune, (iii) Quy Nhon Port - National Highway 1 (km 1157 + 500) - People's Committee of My Chau commune - The end point of subproject route (km 83+139), (iv) National Highway 1A (Old Bong Son Bridge) - National Road 1 (km 1139+700) (Ba To T-junction) - DT 639 (the end point of the route), and (v) Quy Nhon City - National Highway 19 (km 17+256) - National Highway 1 (1214+500) (People's Committee of My Chau Commune) - The starting point of the route.

Construction of Road connecting National Highway 19C - Quy Nhon Port: (i) National Highway 19 - National Highway 1A - Dieu Tri Junction - The starting point of the subproject (Le Hong Phong and Tran Phu street), (ii) National Highway 1A - Dieu Tri T-Junction - The starting point of the route (Le Hong Phong and Tran Phu street), (iii) Hiep Canh Communal Road - National Highway 19 C - Dieu Tri T-junction - Project start point (Intersection of Le Hong Phong and Tran Phu street), (iv) Binh Nghi Communal Road - National Highway 19 - National Highway 1A- Dieu Tri T-junction - The starting point of the route, and (v) Quy Nhon Port - Tran Hung Dao (Dong Da street) - Intersection of Dong Da - Nhon Hoi Economic Zone - Le Thanh Nghi street - the endpoint of the route.

According to calculations, the vehicles transporting raw materials and waste for the project have a load capacity of 10 tons. The number of vehicles transporting waste, excavated soil, and construction materials is estimated as follows:

Table 0-33. Calculation of the number of vehicles transported

No.	Category	Shipping weight (tons)	Construction time (months)	Trips (vehicles/day)
I	**Route QL19C – Quy Nhon Port**	**509,036.8**		**76.4**
1	Road works	44.2552.5	24	61.5
2	Truong Uc Bridge	38,192.77	18	7.1
3	Dinh River Bridge	28,291.53	12	7.9
II	**Coastal route, My Thanh – Lai Giang**	**3,059,133**		**294.2**
1	Road works	2,967,499	36	274.8
2	Ha Ra Bridge	65,242.86	18	12.1
3	Cong Luong Bridge	26,391.96	12	7.3

(***Source:*** *FS Report, 2022*)

This means an increase in the number of vehicles on local traffic routes. Normally, the traffic volume on the routes varies depending on the time, low from 9:00 p.m. to 6:00 a.m., peak from 7:00 a.m. to 8:00 a.m. and 4:30 p.m. to 6:00 p.m. The means of transport on these routes are mainly cars, motorbikes and bicycles.

In general, the transport routes have average traffic density and are controlled by the Traffic Police for traffic safety. The project will implement strict traffic management measures as specified in the EIA report to minimize traffic safety risks during the construction period. With a construction period of about 12-36 months, the impact on local traffic safety are considered *moderate*.

The subproject shall implement traffic management measures set forth in ESCOP as part of the environmental and social management plan to mitigate traffic safety risk to workers and local people throughout construction period in accordance with ESS2, ESS4, national laws, and WBG EHS Guidelines.

Furthermore, due to the topographical characteristics of the construction site for the My Thanh - Lai Giang road, which is located near hilly areas with steep slopes and sharp, obscured curves, contractors are required to develop a detailed Traffic Safety Management Plan. This plan must specify the measures to be implemented to manage and mitigate traffic safety risks associated with the transportation of materials to and from the site. The plan shall be submitted to the Project Owner for review and approval prior to implementation.

Railway traffic: The construction of route 19C - Quy Nhon Port will intersect with the Dieu Tri - Quy Nhon railway. Within the scope of the project, there will also be activities to replace the current railway track (from Km3+630.60 - Km3+705.60) and build a railway intersection. These activities will cause temporary interruptions in railway operations. However, this railway route currently has only about 1 trip/day, with a small number of passengers. In addition, the Dieu Tri - Quy Nhon railway route is only about 10.5km long, picking up passengers from Dieu Tri station, passing through 4 wards: Le Hong Phong, Dong Da, Nhon Binh, Nhon Phu. With a short distance, there will be many transportation options to move into the city. Therefore, the impact are considered *low*.

Waterway traffic: There is no waterway traffic in the area where the bridges are built. Therefore, the construction will not affect waterway traffic.

(ii) Risks from raw material supply

The construction of the roads will require the amount of construction materials such as soil and sand for roadbed embankment. It is specified that the subproject shall not exploit raw materials by itself, including soil, sand and stone for construction activities but purchase from licensed suppliers. Likewise, cement, iron and steel are also purchased from licensed enterprises in Binh Dinh province. There would be a likelihood that some contractor may not comply and choose the cheaper material suppliers from the illegal sources. There are some risks and impacts including:

- Supply conditions and properties of materials are not met the standards for construction of work items, or will reduce the work construction quality.
- The supply is not guaranteed in quantity, affecting the implementation progress of work items under the Project.
- No guarantee of environmental conditions during the illegal exploitation of construction materials.
- There are potential risks such as labor accidents due to lack of labor protection equipment, traffic accident during the transportation process of raw materials if it is not appropriate with the proposed route for the subproject.

However, these indirect risk and impact are assessed as "*low*" and can be minimized because (i) all sources of raw materials supplying for subproject shall be verified to ensure they are licensed; and (ii) primary suppliers should conform to ESS2 and ESS6, and (iii) experiments to test mechanical and physical properties of construction materials shall be carried out to ensure meeting technical specifications before construction.

(iii) Impact on culture heritage

According to surveys and consultations with local authorities and people, there is no existence of national or international tangible and intangible cultural heritages in the subproject's area of influence. There are some burial grounds that will be relocated for construction of roads and impacts have been discussed above. There are Long Thanh pagoda located near the route connecting National Highway 19C - Quy Nhon Port (approximately 20m away from the construction site) and a Historical site of the ship without number located at km75+269 along the My Thanh - Lai Giang coastal road in Lo Dieu village which was recognised as tangible heritage at provinical level in 2005 (approximately 30m away from the construction site) will be potentially impacted by construction activities. In addition, there are some worship houses owned by local people located along the routes. Impacts on these structures are mainly due to dust emission, noise, and disruption to access. Thus, the impact is considered *low.*

Mitigation measures have been proposed to mitigate such impacts. During the construction period, excavation activities may potentially find tangible cultural heritages under the ground. However, the subproject's area of influence has been investigated and confirmed that there was no existence of archaeological sites. Road construction activities take place on production areas and areas settled by local communities for a long time so probability of chance find of cultural heritages is *low*. The suproject have developed chance find procedures as part of ESCOP to address chance finds in accordance with ESS8.

(iv) Impact on the existing service infrastructures

It is anticipated that construction activities of two roads may cause damage or interruption to operation of some existing infrastructures such as transmission line, market, local roads, water supply pipeline, telecommuncation line, dyke system, irrigation canal, and drainage systems. Some the existing service infrastructures have been identified to be impacted by the subproject implementation as follows:

Table 0-34. Some existing service infrastructures potentially affected

Item	Describe
My Thanh – Lai Giang coastal road	
Village 9 market, My Thang commune, Phu My district	Be relocated
Medium voltage line at km 55+200 (Xuan Binh village, My An commune, Phu My district)	Be relocated
Inter-village and inter-commune road at Km 48+720 and Km 49+000 in Tan Thanh village, My Tho commune, Phu My district	Possible damage
Water supply pipeline near Ha Ra bridge	Be relocated
Vertical drainage system at Km 61+500	Be relocated
Hiep Hoa Gas Station Km 55+500	Disruption in access
Hoang Minh Gas Station Km 61+500	Disruption in access
Cross irrigation canals and drainage systems at Km 52+058, Km 52+290, Km 53+292, Km 56+292, Km 56+610, Km 57+670, Km 58+786, Km 60+655, Km 62+071, Km 64+088, Km 65+105, Km 65+168, Km 65+912, Km 66+066, Km 66+336, Km 66+588	Possible damage
Road connecting National Highway 19C - Quy Nhon Port	
Telecommunication Center 1 - VNPT in Binh Dinh province is located at the starting point.	Be relocated
Ha Thanh river dike system is located at Km 0+975	Possible damage
Clean water supply station located at Km 0+250	Disruption in access
Cross-irrigation canal system and drainage system at Km 0+406; Km 1+245, Km 2+226, Km 3+130, Km 3+360, Km 3+420, Km 3+558, Km 3+738, Km 3+839, Km 4+286, Km 4+394, Km 5+007, Km 5+136, Km 5+407, Km 5+632, Km 5+888	Possible damage

This impact will cause disruption to the normal life activities of local people. The risks and impacts shall be mitigated through ESCOP, so the risks and impacts are considered *moderate.*

Contractors will discuss with agencies managing the existing infrastrutures about the construction plan and mitigation measures for negative impacts to get a consent as early as possible before commencing construction activities. In principle, any damage or interruption to the existing infrastructures must be immediately repaired and restored in accordance with ESS5.

(v) Split of community

My Thanh - Lai Giang coastal road mainly follows the existing route along the coast (near the sea

there is no or very little population), avoiding residential areas, the newly opened sections (through Phu Thu pass, Lo Dieu) are all unpopulated areas. Therefore, the impact of community separation are considered *low*.

National Highway 19C - Quy Nhon Port is newly constructed, and the road alignment passes through some urban residential areas, consistent with construction planning, the number of households affected and relocated to new residences is small. During the construction phase, the impact of community separation is inevitable, but because this is an urbanized area, there are alternative options for traffic during the construction phase; and can be minimized by implementing construction measures and speeding up the construction progress.

The entire project will have 231 affected households that will have to move to new housing. These are households that will have to get used to new living activities and new environments. The subproject shall pay attention to technical design solutions such as connecting roads and underground crossings to facilitate maintenance of existing patterns of movement and the continued use of existing models of transportation and communication, and ensure safety for locally-affected people in accordance with ESS4.

(vi) Occupational health and safety (OHS) risks

Risk of traffic accidents

High density of vehicles involved in transportation, unsecured vehicles or drivers who do not comply with traffic rules such as overloading, speeding, etc. can all lead to traffic accidents. During the construction phase of the subproject, the volume of vehicles involved in transporting raw materials has a lot of potential for traffic accidents. Therefore, it is essential to regularly check vehicle volumes to minimize accidents on roads. Besides, the PPMU and contractors should regularly propagate and enhance workers' awareness of obeying traffic laws to minimize risks and accidents when driving vehicles. If traffic accidents occur, it will cause significant impacts due to fatalities, injuries, and economic loss and affect the subproject progress. Given the scale of the subproject and construction period of 24 months, the risks and impacts are considered *substantial*. The main transportation routes for materials will be:

Road#1: (i) National Highway 1A – Hoai Thanh T-junction – Provincial Road 639 (the end point of the route), (ii) National Highway 1A, Phu Kim village, Cat Trinh commune, Phu Cat district – Interchange of Provincial Road 635 (km 1196 + 600, National Highway 1A) – National Highway 1A (km 1157+500, National Highway 1A, People's Committee of My Chau Commune, (iii) Quy Nhon Port – National Highway 1 (km 1157 + 500) – People's Committee of My Chau commune - The end point of subproject route (km 83+139), (iv) National Highway 1A (Old Bong Son Bridge) – National Road 1 (km 1139+700) (Ba To T-junction) – DT 639 (the end point of the route), and (v) Quy Nhon City – National Highway 19 (km 17+256) – National Highway 1 (1214+500) (People's Committee of My Chau Commune) – The starting point of the route.

Road#2: (i) National Highway 19 – National Highway 1A – Dieu Tri Junction – The starting point of the subproject (Le Hong Phong and Tran Phu street), (ii) National Highway 1A – Dieu Tri T-Junction – The starting point of the route (Le Hong Phong and Tran Phu street), (iii) Hiep Canh Communal Road – National Highway 19 C – Dieu Tri T-junction – Project start point (Intersection of Le Hong Phong and Tran Phu street), (iv) Binh Nghi Communal Road – National Highway 19 – National Highway 1A- Dieu Tri T-junction – The starting point of the route, and (v) Quy Nhon Port – Tran Hung Dao (Dong Da street) – Intersection of Dong Da – Nhon Hoi Economic Zone – Le Thanh Nghi street - the endpoint of the route.

The contractor shall implement traffic safety management measures set forth in ESCOP in accordance with ESS2, national laws, and WBG EHS Guidelines.

Workplace accidents can occur due to:

Physical Hazards:

- Operating Machinery and Moving Vehicles: Risks from operating heavy machinery and moving vehicles.
- Working at Heights: Risks from working on bridges, culverts, and other elevated structures.
- Falling Objects: Risks from objects falling from heights.
- Noise and Vibration: Exposure to high levels of noise and vibration from construction activities.
- Electrical Hazards: Risks from contact with overhead power lines and other electrical sources.
- Weather Elements: Exposure to extreme weather conditions.
- Eye Hazards: Risks from solid particles, materials, and welding operations.
- Foot Hazards: Risks from penetration of sharp objects.
- Fire Hazards: Risks from fire and explosions.
- Confined Space Entry: Risks associated with working in confined spaces.
- Manual Handling: Risks from manual handling and ergonomics

Chemical Hazards:

- Dust Exposure: Exposure to dust during construction and paving activities.
- Exhaust Emissions: Exposure to exhaust emissions from heavy equipment and motor vehicles.
- Hazardous Dust: Exposure to hazardous dust during earthworks and construction material excavation.
- Asphalt Fumes: Exposure to fumes during asphalt plant preparation.
- Diesel Fuel: Exposure to diesel fuel used as a release and cleaning agent for paving equipment.
- Hazardous Materials: Exposure to hazardous construction materials and chemicals

Biological Hazards:

- Wastewater and Solid Waste: Risks from improper handling of clinical waste, wastewater, and solid waste.
- Communicable Diseases: Risks from diseases such as common cold, influenza, COVID-19, STDs, and HIV/AIDS.
- Stinging Insects and Venomous Animals: Risks from exposure to stinging insects and venomous animals.
- Poisonous Plants: Risks from contact with poisonous plants

Safety Hazards:

- Accidents: Risks from operating machinery, falling in ditches, and other construction-related accidents.
- Poor Hygiene: Risks from poor hygiene in construction camps.
- Traffic Hazards: Risks from traffic accidents and vehicle-related incidents.
- Fire and Explosion: Risks from inflammable, toxic, and explosive substances.
- Community Health and Safety: Risks from dust emissions, ambient air pollution, and water contamination

However, during the construction process, especially the construction of bridges, workers are also trained in labor safety before construction. Therefore, this impact is assessed as controllable and at a moderate level. The contractor must implement the mitigation measures stated in the ESCOP to minimize risks and impacts.

Risk of fire and explosions:

When a fire or explosion occurs, it can lead to property loss or even injury to workers. The specific causes are identified as follows:

- Activities such as cooking, smoking, and burning near temporary gasoline storage areas can cause fires and explosions.
- Fire and explosion during rock blasting at Lo Dieu & Phu Thu passes.
- Fuel Transportation and Storage: Risks from transporting and storing fuel, which can lead to fires and explosions if not handled properly
- Temporary Power Supply Systems: Risks from temporary power supply systems or unsafe use of generators, which can cause electrical problems leading to fires
- Welding and Asphalt Burning Activities: Risks from welding and asphalt burning activities, which can generate fires and explosions [4].
- Gas Leaks During Cooking: Risks from gas leaks during cooking in worker camps [4].
- Faulty Electrical appliances and Poor Wiring: Risks from faulty electrical gadgets, poor electrical wiring, or the use of sub-standard electrical cables
- Ignitable Materials and Cigarette Smoking: Risks from ignitable materials and cigarette smoking, which can start fires
- Old Electrical Connections: Risks from malfunctioning old electrical connections
- Embers from Cooking Activities: Risks from embers from cooking activities in farm areas.
- explosion risks during the Transportation, storage and handling of materials used for blasting

To manage this risk, the project will carry out fire prevention and strictly comply with measures to prevent leaks, fires, and explosions. Fire prevention must be carried out regularly to minimize the possibility of incidents and their impact.

The contractor shall implement the fire prevention and strictly comply with measures to prevent leakage, fire or explosion set forth in ESCOP.

Impact level: Moderate.

Risks of working on water

Risks of working on water surface may occur during the construction of bridges over Duc, Cay Me, Dinh, Ha Ra rivers and Cong Luong Bridge area. A worker is in danger of falling from a height of 2 to 10 m (during construction or operation of machines and equipment) on hard surface or into water, causing injury or even death; or workers working adjacent waterway such Duc, Cay Me, Dinh and Ha Ra rivers, and coastal area might prone to risk of getting swept away by water during storm, flooding causing serious accidents. These risks are originated from:

Hazards:

- Falling into Water: Workers may accidentally fall into the water, which can lead to

drowning, especially during flood seasons.

- Drowning: The risk of drowning is significant if workers fall into the water and are unable to swim or are not wearing life jackets.
- Being Swept Away by Water: Strong currents can sweep workers away, making rescue difficult.
- Weather Conditions: Working in conditions directly affected by weather factors such as sunshine, wind, and waves can impact workers' health and safety.
- Falling from Heights: Risks from working at heights on scaffolds, openings, or temporary structures without proper safety measures.
- Inadequate Illumination: Insufficient lighting during night work can increase the risk of accidents and falls.
- Improper Use of Safety Equipment: Risks from not wearing life jackets, safety belts, or other protective gear.

OHS Risks:

- Drowning and Fatalities: Falling into water can lead to drowning, especially if safety measures such as life jackets are not used.
- Injuries from Falls: Falling from heights or into water can cause serious injuries or fatalities.
- Health Issues from Weather Exposure: Prolonged exposure to harsh weather conditions can lead to health problems such as heat stress, sunburn, or hypothermia.
- Accidents during the operation of hand-held tools and equipment and heavy construction plants (compactors, trucks, bull dozers, cranes etc.

Given the scale of the bridge and construction period of about 12 months, the risks and impacts are assessed as *moderate.* The contractor shall comply with ESCOP to avoid and mitigate the risks and impacts.

Risks of working in hot weather

During the summer associated with the southwest wind, workers are posed at risks of working in hot weather causing common hazards to them, for example, at high temperatures (35°C and above) workers may become drowsy and less aware of dangers. There is also an increased risk of accidents due to slips, trips, falls, poor manual handling, injury from hand tools, etc. Thermal discomfort gives rise to reduced efficiency that can lead to poor decision-making with resultant errors. Other specific issues are likely to occur such as (i) heat stroke, heat stress; (ii) heat exhaustion resulting from high body temperature; (iii) sunburn. Given the scale of the subproject and construction period of 24 months, the risks and impacts are considered *moderate* and they can be mitigated through appropriate construction methods. The contractor shall comply with ESCOP.

Electric shocks

Electric shocks can occur as:

- Construction means can break existing power lines at the construction site;
- Temporary power supply system for machines and equipment during construction cause short-circuit, electric shock, etc.;
- The process of unsafe use of generators. If the incidents affect the health or life of workers and people in the project area, causing damage to property, affecting the psychology of people in the area.

- Given the scale of the subproject and construction period of 24 months, the risks and impacts are considered moderate. The PPMU and the Contractor are required to develop a specific plan for emergency response of short-circuit and electric shock at the site. The contractor will regularly inspect electrical and wiring systems, provide trainings for workers on occupational safety and fire prevention to minimize the possibility of incidents and reduce negative impacts, and apply ESCOP.

Risk of structure collapses

Several structures such as local walls, barriers may exist in the subproject areas, which are not known about their structures. They may suddenly collapse causing a risk of death and serious injuries for workers and communities if the works are required to excavate next to the structures. In addition, high scrap-folders installed for constructing the bridge abutments may also collapse during the construction, which is suffered fatalities or serious injuries for workers and local people. Given the scale of the subproject and construction period of 24 months, the risks and impacts are considered *moderate*. Capacity building for contractors, construction supervision consultants (CSCs) on labor safety before civil works and application of ESCOP will mitigate the risk and impact.

Risks from welding

Welding operations present several hazards to both those undertaking the activity and others in the vicinity including

+ Noise hazards: When carrying out welding activities, workers are likely to be exposed to loud, prolonged noises. A loud noise is considered to be above 85 dB(A), and welding activities such as flame cutting and air arc gouging can produce noise levels of over 100 dB(A). This can be very damaging to the ears and can result in hearing impairment. Regular or immediate exposure to loud noises can cause permanent noise-induced hearing loss.

+ Exposure to UV and IR Radiation: Without appropriate PPE or welding curtains, can result in a painful and sometimes long-lasting condition called arc-eye. Many factors can affect the severity of a flash burn injury, such as distance, duration and the angle of penetration. Long-term exposure to arc flashes could also potentially result in cataracts and lead to a loss of vision.

+ Exposure to Fumes and Gases: Undertaking welding activities will expose you to invisible gaseous fumes, including ozone, nitrogen oxides, chromium and nickel oxides, and carbon monoxide which can easily penetrate into your lungs. Depending on the gas or fume, the concentration and duration of your exposure, the resultant damage can be severe.

+ Burns: The combination of high-temperature welding arcs, UV rays and molten metal means you are susceptible to severe burns when welding.

Given the scale of the subproject and construction period of 24 months, the risks and impacts are considered *moderate*. The risks and impacts are manageable through safety training courses, using proper PPE, and close supervision as part of ESCOP.

Risks of community's health and safety

Accident risks: Construction activities may cause accident risk to local people as construction sites have many potential dangers. Local people may easily enter construction sites if these sites are not carefully protected. Deep manholes and dug holes in construction sites are dangerous areas to cause accidents to local people. Local people may fall into the manholes and dug holes especially in rainy when these holes are often filled up with water, it can cause fatalities due to drowning. The demolition process may generate risks accident risks for local people due to material falling.

Operation of construction equipment and machineries potentially causes accidents to local people. Inadequate lighting and fencing of construction sites can be dangerous for local people movement especially during the night time at intersections with local roads. In addition, local people may pose risk of fire, explosive, and electric shock. In addition, increased vehicle trucks on local roads, which have been mentioned above, may also cause traffic safety risk to local people, especially schools and children. Given the scale of the subproject and construction period of 24 months, the risks and impacts are considered *moderate.* ESCOP and site-specific mitigation measures shall be applied to mitigate accident risks in accordance with ESS4 and WBG EHS Guidelines.

Communicable diseases: Poor management of waste generated from worker's activities on site may create favorable environment for development of vector-born diseases such as flies, rats, cockroaches, and mosquitos that may cause transmission of communicable diseases such as diarrhea and dengue fever. Mobilization of workers to the site may pose risks of communicable diseases such as HIV/AIDS, STD, dengue, and other communicable diseases. The communicable disease transmission would adversely affect local people's health and create the pressure on local healthcare system and economic burden for remedy.

Delivering civil works subproject requires the assembly of a workforce, together with suppliers and supporting functions and services, and may lead to congregations of a large number of people. The subproject may have a workforce from other provinces and require workers to live in site accommodation, lodge within communities close to work sites, and/or return to their homes after works. There may be the regular coming and going of support services, such as catering, cleaning services, equipment, material and supply deliveries, and the interaction with specialist sub-contractors bought in to deliver elements of the works. The potential for the spread of coronavirus infection by the subproject is high. In addition, the subproject may experience large numbers of the workforce becoming ill and will need to consider how they will receive treatment, and whether this will impact on local healthcare services, particularly when subproject are in remote places where local healthcare facilities could be easily overwhelmed. Given the scale of the subproject, construction period of time, and challenge of communicable diseases control especially COVID-19 pandemic, the risks and impacts are considered *moderate.* Mitigation measures has been developed as part of ESCOP in accordance with ESS4, GoV's guidelines, and WBG EHS Guidelines.

Environmental pollution and noise: Construction activities will generate solid and liquid waste, dust, and exhaust gas, which can pollute local water and soil environments, impairing sanitation conditions and affecting public health. Dust and exhaust gas emission from operation of construction equipment and machineries and other earthworks such as excavation, earth moving, blasting etc., will cause air pollution that causes respiratory diseases. Noise generated from construction equipment operation will affect human health as discussed in Chapter 3. Given the scale of the subproject and construction period of 24 months, the risks and impacts are considered *moderate*. Mitigation measures set out in ESCOP shall be applied in accordance with ESS3, ESS4, national laws and WBG EHS Guidelines.

Security personnel: In Vietnam, construction contractors will often retain contracted workers to provide security to safeguard their properties on site only. The experience with the Bank-financed projects in Vietnam is that usually the contractors retain one or two contracted workers at each construction site, mainly at night to safeguard the construction materials and equipment, and no incidents have been reported so far. Therefore, the risks and impacts posed by retaining contracted workers to provide security to safeguard contractor's properties on site to those within and outside of the subproject site are considered *low*. Local authorities shall be responsible for ensuring social order and security in the locality through official security personnel. When contractors are

mobilized to the site, they shall be required to provide the detailed information about their personnel and properties to the local authorities. All information about contractors shall be recorded at commune people's committee (CPC) office to serve management purpose of social order and security. The local authorities can verify the information provided by contractors on their personnel including personal history of every worker through the national database of residents. Contractors are responsible for coordinating with local authorities to ensure social order and security throughout construction period. All workers shall be required to comply with local order and security rules as well as respect affected communities. In order to avoid risks related security personnel, the construction contractors are required to have and maintain an appropriate procedure for verifying, recruiting, and training workers for purpose of providing security to safeguard their personnel and property in accordance with ESS4.

***(vii)* Labor influx and related social risks**

Migrant labor:

The construction activities require a number of 550 contracted workersThere will be no international workers expected to participate in the subproject construction activities as all construction packages are implemented in National Competitive Bidding (NCB). However, there will be mobilization of workers from other provinces given NCB. Supervision consultancy services will use counterpart funds, so it is not expected to mobilise international consultants. Workers shall not be mobilized to the sites at the same time, as construction packages will be implemented at different times. In reality, contractors shall provide accommodations for their workers either on site or at nearby local resiential areas with rented houses from local people.

Thus, social impacts such as social security and order disturbance may occur, especially: i) potential impact of spreading infectious disease from employees to local communities and vice versa; ii) potential impact of prostitution, drugs and gambling; iii) potential conflict between workers and local communities because of differences of culture, behavior; and iv) conflict on the need for using local service infrastructures such as electricity and water supply and traffic system that lead to lack of power and water supply, and traffic congestion in the region. However, local authorities have experience in controlling the influx of immigrated laborers through the security networks of communes for years and the contractors manage the security within their area well. Thus, the risks and impacts associated with labor influx are considered *moderate.*

The contractor will be requested to rent the residents' houses for their workers to stay during the construction time. In case workers' camps must be built, they will be constructed on the places located in approved areas.

Use of child labor and forced labor:

To reduce construction costs, child labors can be used for some jobs 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. However, the impact is assessed to be minor as: (i) The experience with the Bank-financed and state budget projects show no cases of child labor or forced labor; (ii) According to the socio-economic survey results, no case of child labor or forced labor use was recorded; (iii) Bidding and contractual documents cover clauses that require contractors not to hire child labor for the subproject-related jobs; and (iv) The PPMU shall coordinate with local authorities and related agencies to strictly control the contractor's labor use. As mentioned, the Labor Code 2019 (Articles 143- 147) states that it is not allowed to use under 15-year-old employees, except for professions and jobs to be defined by Ministry of Labor - Invalids and Social Affairs. Similarly, ESS2 (para 19) sets out further conditions on the minimum age, stating that a child over the minimum age and

under the age of 18 will not be employed or engaged in connection with the Bank-financed project in a manner that is likely hazardous to or interfere with the child's education or harmful to the child's health or physical, mental and any other relevant development. The national Labor Code as well as ESS2 allow persons under 18 and over 15 to be engaged if the work is non-hazardous and does not interfere with the child's education and not harmful to the child's development (for example, administrative work, site cleaning or rubbish removal).

Labor disputes over terms and conditions of employment:

Possible causes for labor disputes include competition for employment opportunities which is limited; labor wages rates and delays of payment; disagreement over working conditions; and health and safety concerns in work environment. In addition, employers such as contractors/subcontractors may retaliate workers who ask for improved working conditions, or raise concerns regarding unsafe or unhealthy work situations, or bring up grievances. These impacts will be resolved through complaints, grievances, and labor contract terms based on labor law.

Discrimination and exclusion of vulnerable/disadvantaged groups

Vulnerable/ disadvantaged groups of people may be subject to risk of exclusion from employment opportunities under the subproject. Such groups will include women and persons with disabilities. Lack of equal payment for similar work for men and women may happen in the subproject.

Sexual Exploitation and Abuse /Sexual Harassment (SEA/SH)

There might be a risk of sexual abuse and sexual harassment in connection with the recruitment or detention of unskilled female workers or technical female workers under the project. Sexual harassment is forbidden under the Code of Labor (2019). Employers are required by the law to develop and implement the solutions to prevent sexual harassment at workplace as their rights and obligations, and include provisions in employer's labor regulations to prevent and fight against sexual harassment at workplace, including steps and procedure for addressing sexual harassment at workplace in consistent with ESS2.

Gender-based violence (GBV)

Gathering of 50 workers on average at each construction site with about 75% men and 25% women may cause social disturbance, affecting women directly work on the construction site or those living surrounding the subproject area and their families in the course of construction. For the previous similar works, unmarried women may be disadvantaged in getting married or they may become a single mother. Meanwhile, married women can be affected with the happiness of their families. In addition, they may be infectious and communicable diseases, sexually transmitted diseases such as HIV/AIDS, syphilis, etc. (that may affect the next generation).

Additionally, women and girls are disproportionately affected by gender - based violence (GBV) across the globe. This includes acts that inflict physical, sexual or mental harm or suffering, threats of such acts, coercion, and other deprivations of liberty. These acts can occur in public or in private. Moreover, female laborers could be recruited to work together with male workers to ensure their benefit in terms of gender equality at the working field. However, poor physical conditions provided for female workers such as no separate toilets or living rooms for men and women, GBV such as sexual harassment, liberty and mental health of female workers may be occured. These negative impacts could be predictable mitigatable through appropriate mitigation measures which are incorporated into the bidding and contract documents, contractor environmental and social management plan (C-ESMP) and closely monitoring during the construction phase by the PPMU and CSC. Besides, consulting with the representatives of the subproject female labor force and

Vietnam Women Unions of local authorities on the risk of GBV due to the subproject construction should be made to support them in recognizing the risk to protect themselves and identifying where and how to ask for help once the GBV occurs.

Empirical evidence has shown that there is no single driver for GBV. In fact, multiple risks factor exist at various level, such as individual, relationship, community, institutional and policy levels, the affect how a potential risk develops. The same holds true for this subproject. The risks of GBV, for instance, may increase in the presence of subproject's impact, such as workers, those accompanying workers to offer services (labor influx), adverse impact, such as land acquisition, loss of business/income generation activities, physical relocation, combined with the the current local GBV prevalence.

Firstly, as mentioned above, the prevalence of GBV is high in Binh Dinh province, as indicated in the 10 year review of the Binh Dinh province, 10-year review by the Department of Health, and as reflected in the province's continuous commitment to implementing annual plan on prevention and fighting against gender based violence, including sexual harassment. As the subproject in Binh Dinh will engage a large workforce to implement the subproject, the existing risk of GBV at community level may be increased, particularly to households with previous incidences, and even to families with no previous record of domestic violence.

Secondly, although the project encourages recruitment of local workers to reduce the risks, it has not been confirmed at this stage (project preparation) whether local workers could be engaged in large quantity. In addition, due to the nature of the construction works, workers are likely to interact with community members where the subproject are located, to support their daily living activities, such as buying foods and drinks, and other services, risks of GBV may be increased along with their mobility and the way they interact with community people. The risks of SEA/SH will be regularly evaluated over the course of the project life, particularly before the workforce are mobilized to site for the civil works and during the time they are onsite to carry our construction activities for the subproject. The risks and impacts on women are assessed as *moderate.*

According to the socio-economic survey results, no negative impacts related to women were recorded. At the construction sites the number of women workers is not large as local workers are prioritized by the Contractor. Information about social diseases and prevention methods will be provided to workers through training programs and information disclosure. Regulations, penalties for the violated workers at the site shall be developed. The contractor shall closely work with local authorities to manage the number of workers at the construction site in accordance with ESS2 and national law.

Overall, the risks and impacts associated with labor influx are considered *moderate.*

Risk of primary supply workers

The construction activities under the Binh Dinh subproject will require primary supplies including construction materials essential for the functions of the proposed infrastructure, such as aggregates, bitumen and precast concrete interlocking blocks. Some contractors may be able to produce such construction materials by their workforce. However, where the contractor will source (a) essential materials, (b) directly from primary suppliers, (c) on an ongoing basis, the workers engaged by such primary suppliers (that meet all three criteria (a) to (c)) are deemed "primary supply workers", as defined in ESS2. The OHS risks are also deemed to be generally significant in the construction sector. Therefore, the risks and impacts associated with primary supply workers are considered *moderate.* Risk of primary supply workers shall be mitigated through LMP and ESCOP in accordance with ESS2 and national laws.

(viii) Impact on universal access

Construction of the coastal route as well as construction of the connecting route QL19C - Quy Nhon Port will require a part of the existing provincial roads as construction sites.

These construction sites are located in front of residential areas along the upgraded road and the streets intersecting with the construction route, making it difficult to access, even blocking access to houses on some small roads. The impacts will stop after these works are completed.

The impacts are assessed as low because (i) successive construction method is applied, the interruption is localized (according to the scope of households); (ii) the impacts happen in short period (about 2-3 months for each household); (iii) when the work is put into operation, their economic conditions will be promoted due to infrastructure improvement. In addition, the impacts can be minimized through the Project's Resettlement Plan (counting the number of affected households and allocating a budget for compensation and support for damage to affected households).

Additionally, the impacts are definitely mitigable through the subproject's Resettlement Plan in accordance with ESS5.

(ix) Disruption to business activities

The subproject has identified some business activities to be affected by construction activities of My Thanh – Lai Giang Coastal Road, including the market of Village 9 in My Thang commune (Km 62+150 - Km 62+250), Thong Thai Restaurant located on the left side of the route (Km 55 +000), Hiep Hoa gas station located on the right side of the route (Km 55 +500), Hoang Minh gas station located on the left side of the route (Km 61+500). The construction activities will cause impacts on these business activities due to increased levels of dust, noise, and block access roads. Incomes of traders may be reduced or lost if the entrance is blocked or too dusty. Generally, it will be difficult for the affected businesses to attract the customer when construction takes place in front of their shops. Given the construction period of 24 months, the impact is assessed as *moderate*. The rolling construction method is proposed. This method will reduce the impact time (maximum a month for each section) and scope at each construction area. The income loss can be mitigated not only by cast compensation but also livelihood and business restoration programs that are proposed in Resettlement Plan (RP) of the subproject in accordance with ESS5.

(x) Impact on agricultural and aquaculture productions

The site clearance for the construction of the two routes of the Project will reclaim some of the current aquaculture ponds and agricultural land of local people.

According to the RP (2021), the Project will reclaim about 191,689 m^2 of agricultural land. Including 96,854 m^2 of rice land; 58,682 m^2 of color land; 30,305 m^2 of perennial land; and 5,848 m^2 of aquaculture land. The affected aquaculture ponds are currently raising commercial fish and shrimp ponds such as tilapia, grass carp, carp, shrimp, etc., both for food and for sale at local markets.

In addition, the construction of the two routes will have some negative impacts on the water quality and the existing irrigation system for agricultural production and aquaculture in the areas along both sides of the route.

Liquid and solid waste from construction activities can contaminate irrigation water sources and agricultural land quality, causing damage or reducing crop yields as well as affecting livestock health and production. During construction, wastewater leakage and stormwater runoff from adjacent construction sites can flow into surrounding aquaculture ponds and rice fields, degrading water quality and leading to reduced fish/rice yields or fish deaths. In addition, construction activities taking place adjacent to agricultural fields may temporarily requisition these areas for

access, and storage of materials or solid waste, hindering farmers in their production process.

For aquaculture ponds: only affected My Thanh - Lai Giang Coastal Road at km45+728-km46+360.8 (high-tech shrimp farming area), km54+300, km56-km61 and km68+200 (household shrimp farming area). Since these areas are 20-30m away from the construction site, they may be affected by dust during road construction. In addition, stormwater runoff may wash away raw materials into ponds, which may kill shrimp.

Impact level: These impacts are low because income from aquaculture ponds is not the main source of income for affected households and income loss will be adequately compensated not only in cash but also through income restoration programs detailed in RP.

Impact is considered *low* because: (i) necessary construction measures are applied, construction is carried out within the acquired boundary, so the impact is only localized in the construction area: (ii) PMU will build a temporary replacement road if construction activities affect access to agricultural land in the area or trading activities serving production; (iii) Water supply and drainage for aquaculture and agricultural production areas will be planned by the Investor to ensure continuous flows without interruption of production; (iv) Wastewater and waste must be collected daily by workers and local authorities; (v) Construction work must be carried out within a reasonable time and must be notified to the local community, not during the water supply period for agricultural production activities; (vi) Impacts will only occur during the construction period (12-24 months) and will end when the project is put into operation.

Compensation for affected households will be made through RP according to ESS5.

(xi) Risk of exposure during construction

During the construction of the Project, there may be risks of exposure and discovery of archaeological sites, historical relics, remains, and objects including cemeteries and individual graves. In such cases, the Project Owner, Contractor, Construction Supervision Consultant, local authorities, and relevant parties will handle according to the "Exposure handling procedure".

3.2.3. Site-specific impacts

Table 0-35. Specific negative impacts during the construction phase (My Thanh – Lai Giang Road)

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
	Km45+728.25 – Km46 +360.80	30	The high-tech shrimp farming area of Viet Uc - Phu My Company Limited is located on the left side of the road.	Transportation of construction materials and construction activities will cause impacts: - Dispersing dust, solid waste, and overflowing rainwater carrying waste into shrimp farming areas - Traffic accident risk for operating workers. - Obstructing and interrupting access to shrimp farming areas - Road damage - Noise affects workers Considering the construction time and distance to the center of the route, the impact level is considered medium.
	Km46 +000	20	Saigon - Quy Nhon Mineral Joint Stock Company is located on the left side of the road.	Transportation of construction materials and construction activities will cause impacts: - Dust and noise emissions affect workers. - Traffic accident risks for workers - Obstructing or interrupting access to work areas - Road damage Considering the construction time and distance to the center of the route, the impact level is considered medium.

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
	Km48 + 500	70	The cemetery area of My Tho commune is scattered on both sides of the road.	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstructing or interrupting access to the grave area - Road damage - Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics. Considering the construction time and distance to the center of the route, the impact level is considered low.
	Km48 + 600	25	Tan Thanh village cultural house	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Traffic accident risks for people attending community activities - Obstructing and interrupting residents' access to the cultural house area - Road damage - Waste and raw materials scattered near cultural houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people in the cultural house. Considering the construction time and distance to the center of the route, the impact level is considered medium.

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
	Km48 + 700	30	My Tho Kindergarten accepts 25-30 children each year.	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Traffic accident risks for students, teachers and parents - Obstructing or interrupting access to the kindergarten area - Road damage - Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics. - Noise affects teachers and students Considering the construction time and distance to the center of the route, the impact level is considered medium.
	Km53 +700	30	Livestock Joint Stock Company is located on the right side of the road.	Transportation of construction materials and construction activities will cause impacts: - Dust and noise emissions affect workers. - Traffic accident risks for workers - Obstructing or interrupting access to work areas - Road damage Considering the construction time and distance to the center of the road, the impact level is considered medium.

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
	Km54 +300	20	The family shrimp farming area is located on the right side of the road.	Transportation of construction materials and construction activities will cause impacts: - Dispersing dust, solid waste, and overflowing rainwater carrying waste into shrimp farming areas - Traffic accident risk for operating workers. - Obstructing and interrupting access to shrimp farming areas - Road damage - Noise affects workers Considering the construction time and distance to the center of the road, the impact level is considered medium.
	Km54 + 750	30	The border station is located on the left side of the road.	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Traffic accident risks for officers and soldiers - Obstructing or interrupting staff access to the agency - Road damage - Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics. - Noise affects staff working at the office. Considering the construction time and distance to the center of the route, the impact level is considered medium.

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
	Km55 +000	40	Thong Thai Restaurant is located on the left side of the road.	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Traffic accident risks for workers - Obstructing or interrupting customers' access to the restaurant - Reduced income due to dust affecting the restaurant - Road damage - Waste and raw materials scattered near the restaurant cause unsanitary conditions and loss of aesthetics. - Noise affects workers Considering the construction time and distance to the center of the route, the impact level is considered medium.
	Km55 +100	40	Ho family church is on the right side of the road.	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstructing or interrupting access to the church area - Road damage - Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics. Considering the construction time and distance to the center of the route, the impact level is considered low.

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
Medium voltage line 	Km55+200		Xuan Binh village, My An commune, Phu My district, located on the left side of the road	Construction activities may result in (i) relocation of transmission lines, (ii) temporary interruption of power supply and (iii) risk of electric shock. Considering the construction time and distance to the center of the road, the impact level is considered to be medium.
	Km55 +387	10	Phan family church is on the right side of the road.	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstructing or interrupting access to the church area - Road damage - Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics. Considering the construction time and distance to the center of the route, the impact level is considered medium.

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
	Km55 +500	30	Hiep Hoa gas station is on the right side of the road.	The transportation of construction materials and construction activities will cause (i) damage to roads, (ii) impacts of dust, exhaust fumes, noise (iii) risks of traffic accidents and (iv) temporary disruption of business operations. Considering the construction time and distance to the center of the road, the impact level is considered to be medium.
	Km55 +600	20	My An Primary School (campus 2) is located on the left side of the road, in Xuan Binh village, My An commune, Phu My district.	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Traffic accident risks for students, teachers and parents - Obstructing or interrupting access to elementary school areas - Road damage - Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics. - Noise affects teachers and students Considering the construction time and distance to the center of the route, the impact level is considered medium.

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
	Km55 +700	20	My An police station is located on the left side of the road, in Xuan Binh village, My An commune, Phu My district.	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Traffic accident risks for officers and soldiers - Obstructing or interrupting staff access to the agency - Road damage - Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics. - Noise affects officers working at the police station. Considering the construction time and distance to the center of the route, the impact level is considered medium.
	Km55 +850	25	The cultural house of Xuan Binh village, My An, Phu My is located on the right side of the road.	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Traffic accident risks for people attending community activities - Obstructing and interrupting residents' access to the cultural house area - Road damage - Waste and raw materials scattered near cultural houses cause unsanitary conditions and loss of aesthetics. - Noise affects people in the cultural house Considering the construction time and distance to the center of the route, the impact level is considered medium.

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
	Km56+000 – Km61+000	20 - 25	Shrimp farming areas of households are scattered on the right side of the road.	Transportation of construction materials and construction activities will cause impacts: - Dispersing dust, solid waste, and overflowing rainwater carrying waste into shrimp farming areas - Traffic accident risk for operating workers. - Obstructing and interrupting access to shrimp farming areas - Road damage - Noise affects workers Considering the construction time and distance to the center of the route, the impact level is considered medium.
	Km58+000 - Km59+000	25-30	The factory and operator of BCG Phu My Solar Power Plant are located on the left side of the road with a capacity of 330 MW with 03 factories with a capacity of 110 MW.	Transportation of construction materials and construction activities will cause impacts: - Dust and noise emissions affect workers. - Traffic accident risks for workers - Obstructing or interrupting access to work areas - Road damage Considering the construction time and distance to the center of the road, the impact level is considered medium.

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
	Km61+500	35	Hoang Minh gas station is on the left side of the road.	The transportation of construction materials and construction activities will cause (i) road damage, (ii) impacts of dust, exhaust fumes, noise, (iii) risks of traffic accidents and (iv) temporary disruption of business operations. Considering the construction time and distance to the center of the road, the impact level is considered to be medium.
	Km 62+150 to Km 62+250	10	Village 9 market, My Thang commune is located on both sides of the road.	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for customers and traders - Obstructing and interrupting people's access to the market - Impact of reduced income due to dust affecting business - Road damage - Waste and raw materials scattered near the market cause unsanitary conditions and loss of aesthetics. - Noise affects traders and people in the market Considering the construction time and distance to the center of the route, the impact level is considered medium.

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
	Km62+500	15	The church is on the left side of the road.	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstructing or interrupting access to the church area - Road damage - Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics. Considering the construction time and distance to the center of the route, the impact level is considered medium.
	Km62+300	15	My Thang Primary School No. 1 (campus 2) is located on the left side of the road.	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Traffic accident risks for students, teachers and parents - Obstructing or interrupting access to school grounds - Road damage

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
	Km66+800	20	Ban Mai Xanh Private Kindergarten is located on the right side of the road.	- Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics. - Noise affects teachers and students Considering the construction time and distance to the center of the route, the impact level is considered medium.
	Km67+500	20	Border guard station on the left side of the road, My Duc commune	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Traffic accident risks for officers and soldiers - Obstructing or interrupting staff access to the agency - Road damage - Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics. - Noise affects officers working at the police station. Considering the construction time and distance to the center of the route, the impact level is considered medium.

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
	Km68 +200	20	Shrimp farming areas of households are located on both sides of the road. Near Ha Ra bridge	Transportation of construction materials and construction activities will cause impacts: - Dispersing dust, solid waste, and overflowing rainwater carrying waste into shrimp farming areas - Traffic accident risk for operating workers. - Obstructing and interrupting access to shrimp farming areas - Road damage - Noise affects workers Considering the construction time and distance to the center of the route, the impact level is considered medium.
	Km75+269	30	Historical site of the ship without number	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstructing or interrupting access to the memorial area - Road damage - Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics. Considering the construction time and distance to the center of the route, the impact level is considered medium.

Table 0-36. Specific impacts during the construction phase of the road connecting QL19C - Quy Nhon Port

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
	Km0+700	20	Grave and water station on the left side.	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstructing or interrupting access to the grave area - Water supply works are broken, water supply service is interrupted - Road damage - Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics. Considering the construction time and distance to the center of the route, the impact level is considered medium.

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
	Km 1+500 - Km 1+800	Cut through	The dike is located along the Ha Thanh River. The bridge will cross the dike.	Construction works may cause (i) damage to dikes, (ii) risk of traffic accidents and (iii) temporary obstruction of traffic and rescue activities during flood season. Considering the construction time and distance to the center of the road, the impact level is considered to be medium.
	Km2+800	Railroad crossing	The route will intersect the railway at area 3, Nhon Phu ward. This is a sparsely populated area.	Construction work may cause (i) damage to roads and railways, (ii) risk of traffic accidents and (iii) temporary obstruction of traffic. Considering the construction time and distance to the center of the route, the impact level is considered medium.

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
	Km3+800	15	The route passes near the church. This area may be affected by land loss.	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstructing or interrupting access to the church area - Road damage - Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics. Considering the construction time and distance to the center of the route, the impact level is considered medium.
	Km4+400	2 0	The route runs behind Long Thanh Pagoda	Transportation of construction materials and construction activities will cause impacts: - Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstructing or interrupting access to the temple area - Road damage - Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics. - Noise affects people in the temple Considering the construction time and distance to the

Image	Distance (Km)	Distance to route (m)	Describe	Potential Impact
				center of the road, the impact level is considered medium.

3.2.4. Environmental risks and impacts during operation and maintenance

3.2.4.1. Impacts on soil and water

During the project operation phase, no wastewater, solid waste, or hazardous waste is generated.

However, the soil environment on both sides of the road can also be affected by solid waste such as food containers, plastic bags, etc. from passengers and drivers on the road, the extent of which depends largely on the awareness of traffic participants. Oil from vehicles can also leak on the road. However, these types of waste are mostly located on the traffic route and do not spread to land areas along the road. Therefore, the impact on soil environment is considered *low*.

Water quality in water bodies can be affected by the washing away of substances on the road surface along the flow into water bodies, affecting water quality, mainly increasing suspended solids or grease from vehicles leaking on the road. Affected areas include Truong Uc, Cay Me, Dinh Rivers, Ha Ra Bridge area flow, and Cong Luong bridge area. In general, this type of pollutant is difficult to quantify in terms of volume due to its dependence on traffic volume, vehicle conditions, and rainfall. This impact is considered *low*.

3.2.4.2. Impact on air quality

Impact source: due to traffic activities on 2 roads. Forecast of road traffic volume connecting NH19C connecting Quy Nhon port and coastal route (PR639) My Thanh - Lai Giang section, Binh Dinh province)

Table 0-37 Traffic volume forecast for routes

Unit: PCU/day and night

Project	2030	2035	2040	2045	2050
1. Construction of a route connecting National Highway 19C with Quy Nhon port	29,737	32,048	34,538	37,402	40,503
2. Construction of coastal route section My Thanh - Lai Giang bridge (TL639)					
My Thanh Section - TL632	16,609	18,791	21,259	24,075	27,264
Section TL632 - Ha Ra Bridge	10,211	12,825	16,107	20,291	25,563
Ha Ra Bridge - Lai Giang Bridge section	5,513	7,499	10,201	14,003	19,222

*(**Source:** Project Feasibility Study Report)*

Scale, level of impact: Based on the converted number of vehicle trips as in the table above, according to the "air pollution coefficient" based on the documents of the World Health Organization (WHO): The dust pollution coefficient is 1.6kg/1000km.vehicle, CO is 28kg/1000km.vehicle, SO2 is 20kg/1000km.vehicle, NOx is 55kg/1000km.vehicle (S=0.05%), the amount of emissions generated based on the number of vehicle trips in 2030 on the 2 routes is as follows

Table 0-38. Emission load generated

No.	Project	Number of vehicles/ day	ECO (mg/ms)	ESO2 (mg/ms)	E NOx (mg/ms)	E dust (mg/ms)
I	Route QL19C – Quy Nhon Port	29,737	9.64	0.003	0.19	0.55
II	Coastal route, My Thanh – Lai Giang					
	My Thanh Section - TL632	16,609	5.38	0.002	0.11	0.31
	Section TL632 - Ha Ra Bridge	10,211	3.31	0.001	0.07	0.19
	Ha Ra Bridge - Lai Giang Bridge section	5.513	1.79	0.001	0.35	0.10

Based on the calculated pollutant load, substituting the values into the calculation formula (Sutton), the concentrations of pollutants at different distances from the emission source (road center) are shown in the following table:

Table 0-39 Emission content

TT	Project	Distance x (m)	CO (µg/m 3)	SO 2 (µg/m 3)	NOx (µg/m 3)	Dust (µg/m 3)
	QCVN 05:2023/BTNTM		30000	350	200	300
I	Route 19C – Quy Nhon Port					
		10	1793	0.64	35.2	102.5
		20	1188	0.42	23.3	67.9
		40	742	0.27	14.6	42.4
		60	557	0.20	10.9	31.8
II	Coastal route					
1	My Thanh Section - TL632	10	1002	0.4	19.7	57.2
		20	664	0.2	13.0	37.9
		40	415	0.1	8.14	23.7
		60	311	0.1	6.11	17.8
2	Section TL632 - Ha Ra Bridge	10	616	0.2	12.1	35.2
		20	408	0.1	8.01	23.3
		40	255	0.1	5.00	14.6

TT	Project	Distance x (m)	CO (µg/m 3)	SO 2 (µg/m 3)	NOx (µg/m 3)	Dust (µg/m 3)
	QCVN 05:2023/BTNTM		30000	350	200	300
		60	191	0.1	3.76	10.9
3	Ha Ra Bridge - Lai Giang Bridge section	10	332.5	0.119	6.53	19.0
		20	220.3	0.079	4.33	12.6
		40	137.6	0.049	2.70	7.9
		60	103.3	0.037	2.03	5.9

In general, based on the calculation results, the dust and exhaust emissions generated by the vehicle flow are within the allowable limits according to QCVN 05:2023/BTNMT.

Impact time: during the entire operation

Dust entrained from the road: According to the World Health Organization (WHO) (1993), *Assessment of sources of air, water, and land pollution: a guide to rapid source inventory techniques and their use in formulating environmental control strategies,* the emission coefficient of dust entrained from tires is 10 kg/1000km. Thus, based on the traffic volume 2020, the dust load from the road surface on the 2 routes can be calculated. Applying the Sutton model, the dust entrained from the road surface can be calculated as follows:

Table 0-40 Dust content carried from roads

TT	Project	E dust (mg/ms)	Distance(m)	Dust (µg/m 3)
	QCVN 05:2023/BTNTM			300
I	Route 19C – Quy Nhon Port			
		3.44	10	640
			20	424
			40	265
			60	199
II	Coastal route			
1	My Thanh Section - TL632	1.92	10	358
			20	237
			40	148
			60	111
2	Section TL632 - Ha Ra Bridge	1.18	10	220

TT	Project	E dust (mg/ms)	Distance(m)	Dust (µg/m 3)
	QCVN 05:2023/BTNTM			300
			20	146
			40	91
			60	68
3	Ha Ra Bridge - Lai Giang Bridge section		10	119
		0.64	20	79
			40	49
			60	37

Based on the dispersion calculation results, it can be seen that the dust entrained from the road surface on route 19C-Quy Nhon Port exceeds the standard within 20m. For the My Thanh - Lai Giang coastal route, the first section will exceed the standard within 10m. In general, the impact of dust is only within a narrow range, which is not significant. Implementing the sub-project will comply with the national strategy on climate change and the national strategy on reducing 0.6% of greenhouse gas emissions in the transport sector by 2030.

3.2.4.3. Impact on hydrological regime, erosion

This report will consider and assess the impact on hydrological regime, and erosion due to the construction of the longest bridge, the Truong Uc Bridge (total length 675.45m with 20 spans across Truong Uc River).

Conditions of hydrological regime, and hydraulics of Truong Uc River in the bridge area:

- Hydrological data to serve the design of the Truong Uc Bridge presented in the hydrological calculation file of the project are selected based on actual water level measurement documents, hydrological survey data, and data from Binh Dinh province's hydrometeorological station.
- Current status option before the bridge is built: Qmax = 1783,22 m3/s; Htlmax = 7,17m
- Option of selecting 1% and according to basic design: Qmax = 1794,03m3/s; Htlmax = 7,19 m

Development of the hydrological and hydraulic regime in the Truong Uc River section in the project area when there is a bridge project:

Research method:

- Design flow is calculated by FLOWMASTER software (based on the Sedi - Maninh formula)

- General and local erosion are analyzed by the method introduced in the document "Handbook of hydrological and hydraulic calculations of roads and bridges" - Ministry of Transport.

The above research methods are methods that give highly accurate research results, widely used at home and abroad.

Research results: the results of the study of changes in the hydrological and hydraulic regime of

the Phan river section at the proposed bridge construction location show that

- Regarding flow velocity: basically the flow velocity does not change before and after the bridge construction (according to the project's hydrological calculation profile), at about 0.21 m/s
- Regarding the flood level: the flood level at the bridge location is determined according to formula 4-19 of the hydrological calculation handbook:

$$\Delta Z = \eta (V_c^2 - V_0^2)$$

+ η - coefficient determined according to each type of river and the discharge capacity of the beach, can be taken from table 3.1 equal to 0.15

+ Vc – average speed under the bridge (m/s) after the bridge is built = 0.21 m/s

+ V_0 – average velocity in the actual cross-section under the bridge when the flow has not been narrowed, m/s (before the bridge, natural time) = 0.21 m/s

Thus, the flood level is 0, generally not changed when the bridge is built. The design water level due to the influence of rising water remains unchanged (Htlmax=7,19m).

- Regarding the erosion caused by the bridge construction: Because the narrowing of the riverbed is insignificant, the general erosion (narrowing erosion) phenomenon across the entire cross-section is not large, only about 20cm (the average depth of general erosion is 3.68m, the current depth at the narrowed cross-section before general erosion is 3.48m). The local erosion phenomenon at the bridge abutments only occurs during floods with the local erosion depth at the piers in the middle of the flow ranging from 0.29 - 0.47m for the bridge piers. After the flood, the bottom flow will fill the erosion holes with material. This process occurs annually and thus will not cause sedimentation downstream of the bridge.

It can be seen that the appearance of the bridge piers does not affect the flow velocity or the water level; however, it causes general and local erosion at the bridge piers themselves. However, the level of erosion is insignificant (general erosion is about 0.2m and local erosion at the pillars is from 0.29-0.47m)

3.2.4.4. Noise impact

Impact source: In addition to the impact of dust and exhaust fumes, when the road is put into operation, it also increases noise in the area and along the routes. The noise level depends on the traffic volume.

According to the World Health Organization, people who are exposed to traffic noise for a long time can experience difficulty sleeping, fatigue, headaches, high blood pressure, hormonal effects, stress, and increased risk of heart disease. The indicators also show that children exposed to continuous environmental noise are at risk of learning difficulties.

Scale, range of impact:

Considered within a range of 15m from the source, the typical noise level of a car is 77dB (*Source: *Acoustical measurement in FHWA roadway construction noise model user's guider. FHWA-HEP-05-054, 1/ 2006*).

+ For route 19C - Quy Nhon Port: assuming the vehicle speed is 50km/h (road design speed), traffic volume is 29,737 vehicles (table 3-37), the average number of vehicles within 50m is:

MD1 = Number of vehicles per day *50m/ 24 hours/ distance traveled per hour=

29737*50/24/50/1000 = 1,24 (vehicles)

+ For My Thanh - Lai Giang route: assuming the vehicle speed is 80km/h (road design speed), the traffic volume on each section My Thanh - PR632, PR632-Ha Ra Bridge, Ha Ra Bridge - Lai Giang Bridge is 16,069, 10,211, 5,513 vehicles respectively (Table 3-30), the average number of vehicles within 200m is:

MD2 (My Thanh - PR632) = Number of vehicles per day * 200/24/80/1000 = 1.73 (vehicles).

MD3 (TL632-Ha Ra Bridge) = Number of vehicles per day * 200/24/80/1000 = 1.06 (vehicles).

MD4 (Ha Ra Bridge - Lai Giang Bridge) = Number of vehicles per day *200/24/40/1000 = 1.15 (vehicles).

The ability of noise in the construction area of the project to spread to surrounding areas is determined by the following formula:

$$Li = Lp - \Delta Ld - \Delta Lc \quad (dBA)$$

Where:

- Li - Noise level at the calculated point at a distance d(m) from the noise source,
- Lp - Noise level at the noise source (calculated from a position 15m from the equipment),
- ΔL_d - Noise level reduction according to distance d at frequency i, $\Delta L_d = 20 \lg [(r_2/r_1)^{1+a}]$ (dBA)
- r_1 - Distance to the noise source corresponding to Lp(m),
- r_2 - Distance to calculate the noise level reduction according to the distance corresponding to Li(m),
- a - Coefficient to take into account the noise absorption effect of the ground terrain. Conventionally a=0,
- ΔL_c - Noise level reduction through obstacles. Convention for project areas is ΔL_c=0

Total noise level is calculated by the formula[16]: $\mathbf{L\Sigma = 10lg \sum_{i}^{n} 10^{0,1.Li}}$

Where: $L\Sigma$ is the total noise level; Li is the noise level of source i; n is the total number of noise sources.

Applying the noise propagation formula, the noise level can be calculated according to the distance as follows

Table 0-41. Traffic noise (dBA)

NO.	Category	Average number of vehicles	Total noise level (dBA)		
			Distance 15m	Distance 50m	Distance 70m
I	Route QL19C – Quy Nhon Port	1.24	77.9	67.5	64.6
II	Coastal route, My Thanh – Lai Giang				
	My Thanh Section - TL632	1.73	76.4	65.9	63.0

[16] *Pham Ngoc Dang 2003. Air environment. Scientific and Technical Publishing House 2003*

	Section TL632 - Ha Ra Bridge	1.06	77.3	66.8	63.9
	Ha Ra Bridge - Lai Giang Bridge section	1.15	77.6	67.1	64.2
	QCVN 26:2010/BTNMT		70		

Compared to QCVN 26: 2010/BTNT, the noise level meets the allowable standard outside the distance of 50m. The noise impact level is considered low.

3.2.4.5. Vibration impact

Impact source: Traffic vibrations are mainly caused by heavy vehicles such as buses and trucks. Passenger cars and light trucks rarely induce vibrations that are perceptible in buildings. The maximum vibration level will be 128 dB (equal to 2 m/s^2) at distance of 3 meters. The propagation of vibrations decreases with distance, it means that the vibration level at a large distance will be very small.

Scale, range of impact:

Road traffic tends to produce vibrations with frequencies predominantly in the range from 5 to 25 Hz (oscillations per second). The amplitude of the vibrations ranges between 0.005 and 2 m/s^2. The predominant frequencies and amplitude of the vibration depend on many factors including the condition of the road; vehicle weight, speed and suspension system; soil type and stratification; season of the year; distance from the road; and type of building. The effects of these factors are interdependent and it is difficult to specify simple relationships between them. The effect of vehicle speed, for instance, depends on the roughness of the road. Generally, the rougher the road, the more speed affects the vibration amplitude. For suspension systems, the impact of the suspension type is negligible under low-speed and slippery road conditions. The vibration level will decrease with distance from the source (road).

Table 0-42. Comparison of the vibration impact level (mm/s $^{2)}$ caused by buses and trucks, to demonstrate the effect of different suspension systems at different speeds

Location	**25 km/h**		**50 km/h**	
	Bus	***Truck***	***Bus***	***Truck***
House foundation	20.5	19.9	64.5	33.2
Front wall	11.2	10.1	30.9	15.7
Midpoint of the house on the first floor	20.3	20.8	62.9	30.1
Midpoint of the house on the 2nd floor	35.0	37.3	96.2	46.7
* Buses have airbag suspension; trucks have multi-leaf steel spring suspension				

*(**Source:** National Research Council of Canada, 2000)*

The subproject uses the following formula to calculate vibration levels in distances:

$$L = L_0 - 10 \times \log\left(\frac{r}{r_0}\right) - 8{,}7.a\left(r - r_0\right)$$

Where: L - vibration level (dB) from distance r (m) to the source; L_0 – vibration level measured at distance r_0 from the source; a – internal abatement factor of the ground (0.01 for rock ground; 0.1 for sand or sandy clay; and 0.5 for clay).

Assumes that a fleet of vehicles generates the vibration level of 128 dB maximum at distance of 3 meters and a is 0.5, vibration levels at distance of 6, 12, 15, 18, 21 and 24 meters are 112 dB, 83 dB, 68 dB, 54 dB, 41 dB and 28 dB respectively.

Impact level:

Thus, at a distance of 15 meters from the center of the road axis, the vibration level is lower than the allowable standard according to QCVN 27: 2010/BTNMT (the allowable threshold is 75 dB (or 55 mm/s2) applied to normal areas from 6:00 to 21:00 and special areas from 6:00 to 18:00). At night, because the traffic volume is very low, the impact of vibration is considered low.

Impact object: Thus, in general, vibration from road traffic will not significantly affect the works along the routes.

3.2.4.6. Increased Flooding risks

The feasibility and detail design consultants used MIKE FLOOD software, combining MIKE 11 (1-way) and MIKE 21FM (2-way) flood modeling software to assess the level of impact causing increased flooding and to propose the most suitable design solution to minimize the impact. into account The key assumptions and predictions area summarised belowSpecifically as follows:

The model scope mainly takes place on 5 branches of the downstream of Ha Thanh River: (i) The mainstream of Ha Thanh River is 10.08km long; (ii) Truong Uc River branch (Duc River) is 10.94km long; (iii) Cat River branch is 9.83km long; (iii) Cay Me River branch is 7.54km long; (iv) Dinh River branch is 5.20km long,t. To expand the calculation scope, additional branches connecting to the Ha Thanh River system was should be added, including: (i) Bau Lac River branch is 5.80km long; (ii) Thom Mountain branch is 1.07km long; and (iii) Tranh River branch is 1.30km long. 8 scenarios were considered when running this model in 2020 during the feasibility study.

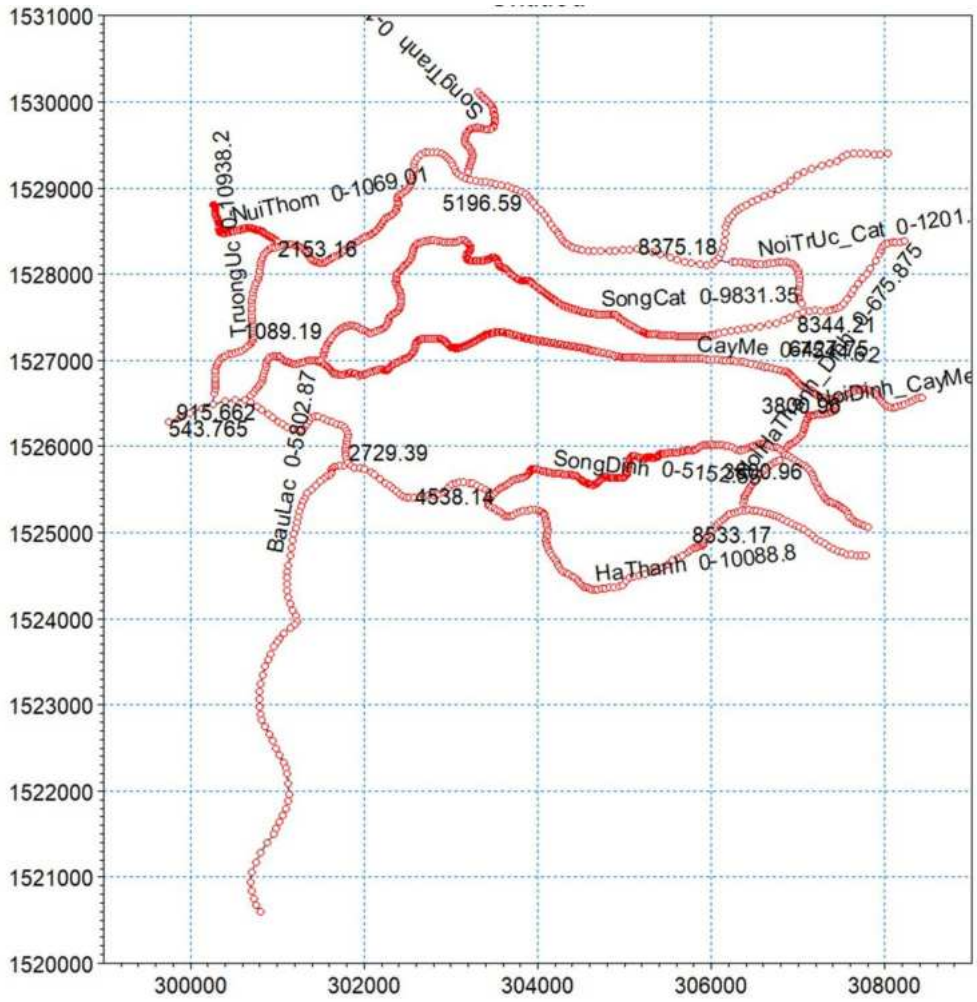


Figure . Hydraulic calculation diagram of Mike 11 model.

In 2024, Binh Dinh province has completed the dredging of the Dinh river (5.2 km long) located south of the NH19-Quy Nhon port to improve flood water drainage in this catchment. The model has not been updated since then to reflect the improved drainage capacity in the Dinh river when predicting the flooding impacts of the proposed road from NH19 to QN port. Nevetheless, the completed dredging works on the Dinh river have shown that the province already implmented a major key mitigation measure for addressing the potential flooding isues during the operation of the proposed road from NH19-QN port

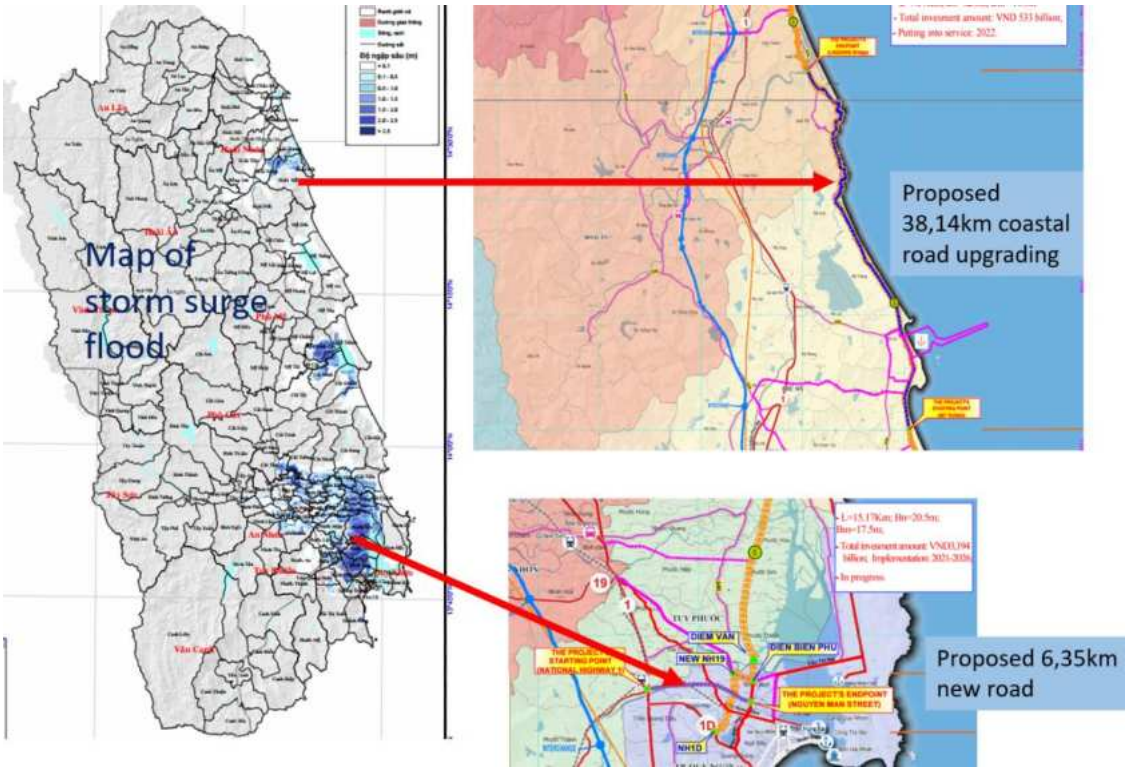


Figure 0-1. The location of the two sub-projects on the flood simulation model.

Figure 0-2. The local drainage hydrological simulation model

3.2.4.7. Impact due to coastal erosion

Coastal erosion, which is the loss of land bordering a body of water, is measured as the rate of change in the position or horizontal displacement of a shoreline over time. It is generally associated with storm surges, hurricanes, windstorms, tsunamis, and flooding hazards, and it can be exacerbated by human activities such as boat wakes, shoreline hardening, artificial water features (e.g., breakwaters). El Niño and climate change effects (e.g., sea level rise) are also contributing factors. The primary concerns with regard to coastal erosion relate to the economic impacts that result in when property and infrastructure located very close to the eroding coasts lose their natural protection from the water and waves or are affected by destabilization of the land upon which they were constructed.

Given that My Thanh - Lai Giang road is located near the coastal line, coastal erosion may spoil the quality of the road and the sustainability of the subproject. In the context of climate change, this phenomenon accelerates in some coastal regions in the province such as villages of Phu Thu, Phu Hoa, Tan Phu, My Thang, My An in Phu My district. However, the road's righ-of-way is outside the coastal protection corridor and coastal erosion impact has been taken into account during subproject design to ensure the sustainability of the subproject. Thus, the impact is considered *low*. Binh Dinh province has been implemeting many measures including planning and technical solutions to cope with coastal erosion situation happening in the province. In addition, the monitoring activities shall be regularly carried out to assess the level of coastal erosion and its impacts not only on the coastal roads but also other socio-economic aspects in the coastal localities and based on that the provincial and local authorities shall make timely decisions.

3.2.4.8. Impact due to division

The two routes cutting through the rice fields will fragment the people's cultivated fields. In general, this impact is unavoidable.

The route connecting NH19C with Quy Nhon Port is an urban route and only has a positive impact on connecting the community without a negative impact on separating the community during the operation phase.

For the coastal route (PR639), is not a highway (residential houses live along the route, there will be many places to turn around, and it is not prohibited to cross the road), so during the operation phase, there will be many positive impacts on connecting the community between areas on the route; the impact on division the community is very low or insignificant

3.2.4.9. Traffic accident

The routes put into operation will increase traffic volume in the areas. Thus, the risk of incidents and traffic accidents is inevitable, the causes can be subjective and/or objective, but the subjective is still the main one. Drivers who do not comply with traffic safety regulations such as speeding, or drinking alcohol while driving... are considered the main causes of traffic accidents. In addition, bad weather conditions and dust caused by the practice of burning straw after harvesting along the route will also contribute to traffic accidents by reducing the driver's visibility.

Therefore, to minimize traffic accidents, drivers must strictly comply with traffic safety regulations. With the increase in traffic volume in the future and routes passing through residential and traffic areas, the risk and impact of traffic accidents are considered *moderate*.

3.2.4.10. Landslide

According to the planning and design of the routes, the My Thanh - Lai Giang coastal route is designed to go through Phu Thu Pass and Lo Dieu Pass, which are steep slopes. With current

weather conditions and future forecasts, due to the impact of climate change, extreme weather events causing heavy, unusual rains will be very likely to occur and the frequency may increase. Therefore, the risk of landslides on slopes is very likely to occur if the design does not take these factors into account and the construction process is not guaranteed.

Landslides not only damage the route but also pose many risks of causing casualties and losses to road users, causing traffic congestion, and burying the area below. Therefore, to prevent and minimize the risk and impact of landslides, the slope stability monitoring work during operation will be regularly monitored and maintained by the operation management unit, especially during the rainy season from September to December. The impact of landslides are considered *moderate*.

3.2.5. Cumulative impact assessment (CIA)

This section discusses the cumulative impact of the subproject. The cumulative impact is defined as the incremental impact of the subproject when added to impacts from other relevant past, present and reasonably foreseeable developments as well as unplanned but predictable activities enabled by the subproject that may occur later or at a different location.

In this ESIA, the Investor considers whether the construction and operation of the subproject along with other current or future development activities in or near the subproject area may cause cumulative impact on the Valued Environmental and Social Components (VECs).

a) Spatial and temporal boundaries for CIA

For the purpose of the analysis of cumulative impact, Binh Dinh PPMU has conducted a screening developments or projects in the past, present and future in the province geographical area to determine whether the these projects or developments can potentially cause E&S risks and impacts added to the subproject's E&S risks and impacts.

Screening showed that there is only one project of upgrading provincial road section Lai Giang to Thien Chanh bridge that may potentially cause E&S risks and impacts added to the subproject E&S risks and impacts when My Thanh - Lai Giang coastal route construction activities take place. In addition, it is anticipated that the development activities along the two roads during operation may have the cumulative impact on VECs.

The details of the project of upgrading the section from Lai Giang to Thien Chanh bridge are summarized as follows:

This road section has a total length of 9.61 km, divided into 2 subsections. Designed according to the standard of grade III plain road, the road bed is 12 m wide. Particularly, the subsection from Thien Chanh bridge intersection to the end of the route is designed according to urban road standards, the road bed is 13 m wide. Binh Dinh Transport Management Unit is the implementing agency. Total project cost is 460 billion VND. Tentative construction time is from the first quarter 2019 to the first quarter 2023. However, the project is currently completed in 2022.

As FS report, the construction activities of the proposed subproject has been planned for 24 months, starting from the third Quarter 2022. However, up to now, the project has not started. Therefore, cumulative impacts during the construction period are unlikely to occur but may occur during the operation phase.

b) Identification of VECs

According to the results of review of the relevant documents and direct consultations with local authorities and affected communities plus field studies, the proposed subproject implementation together with the above-mentioned project will not cause cumulative impacts on soil, water and the biological diversity in the subproject's area of influence. However, air environment, shrimp

farming and traffic safety are considered as VECs for CIA. Future industrial development along the coastal route of the sub-project during operation is expected to have cumulative impacts on the air environment mainly due to gases emission added to emission from road traffic.

c) Present conditions of VECs

The baseline data of air quality in the subproject area showed that the existing air quality in the subproject area is quite good and parameters to be monitored in the air are far below the permissible threshold (see chapter 2). In addition, the construction space is open as it is close to coastal zone.

The exisitng coastal provincial road #639, the My Thanh - Lai Giang section, has the current state of the surface structure of cement concrete, asphalt concrete and earth with a width of 3.5 m - 7.5 m and a roadbase of 6.5 m - 9.0 m. Traffic volume is currently low, with approximately 1,092 trucks, 208 buses and 1,070 cars per day. According to the local authorities, the density of road-users is low because this road mainly passes through rural areas with a low populated density. The situation of road users violating the provisions of the law on traffic safety still takes place disregarding traffic safety regulations. It was reported that from the beginning 2021 to date, traffic accidents have occured causing one dead and 13 injured on this road. The main reason is due to the low awareness of road users to voluntarily comply with traffic laws. Up to 60% of traffic accidents occured between 18 - 24 hours because this is a period of time that the traffic vehicles often run at a speed higher than the limited speed due to very low density of road-users. The main victims of accidents are motorcyclists and vehicle drivers, accounting for 85%. The maintenance and repair of damage to road and traffic warning devices are not timely so potentially leading to traffic accidents. The Chairman of Binh Dinh Provincial People's Committee has requested line departments, agencies, provincial mass organizations, People's Committees of districts, towns, cities and related units to continue strictly implementing the direction of the Provincial People's Committee in Plan No. 03/KH-UBND dated January 12, 2021 on the implementation of the Traffic Safety in the province with the theme "Improving the effectiveness and efficiency of law enforcement to ensure traffic safety" and Document No. 2060/UBND- KT dated April 14, 2021 on strengthening traffic safety in the province. Provincial police, Department of Transport, People's Committees of districts, towns and cities direct functional forces to strengthen inspection and strictly handle violations of traffic safety regulations with focusing on violations that cause traffic accidents such as alcohol and drug abuse, over-speed, and going wrong side of the road or lane.

Currently, there are four shrimp farming facilities along the exsisting coastal road #639 in the subproject area. These facilities mainly produce shrimp seeds. The annual production output includes 6 billion shrimp seeds and 1.9 tons of shrimp meat. The number of people engaged in these farming facilities is about 1,100 people, mainly local people making up about 90%. The engaged people mainly use their own motorbike for travel to/from the shrimp farming facilities. Avergae age of labourers is 35. Average income ranges from 5 to 6 million VND per month per capita (217 to 260 USD). Shrimp farming facilities along the existing coastal provinical road #639 are using this road as the main route for transportation of products and commuting. Transportation of products in and out the farms and commuting is facilitated by this road. Currently, the traffic volume as mentioned above is considered not to adversely affect the production and access to the shrimp farming facilities.

d) Assessment of cumulative impacts on VECs

Air quality: the air environment in the subproject area would be impacted as a result of construction activties from the suproject and the above-mentioned project. Regardless of their

specific locations within the subproject area, dust and exhaust gases generated from the activities of soil excavation, operation of construction equipment and machineries from the the above-mentioned project will contribute to increasing the concentration of dust (TSP, PM_{10}, $PM_{2.5}$), gases (CO, SO_2, NO_2) and GHG emission in the air environment in the subproject area if mitigation measures for dust and gases emission are not effectively applied. As per construction plan, upgrading the provincial road section from Lai Giang bridge to Thien Chanh bridge will be completed before the proposed subproject completion time. However, operation of the provincial road section from Lai Giang to Thien Chanh will be considered to contribute to gases and GHG emission in the region along with the proposed subproject construction and operation activities. The scale of the proposed subproject and the project of upgrading provincial road section from Lai Giang to Thien Chanh is not large, both are provincial roads, construction activities taking place together is short, so the cumulative impact on air quality is considered *low*.

In addition, the development of industrial activities along the two roads of the subproject will likley cause emission of air pollutants and GHG that will be added to gasese emission from the road traffic of two roads operation.

Binh Dinh PPMU shall coordinate with Binh Dinh Transport Management Unit to implement measures for air pollution and GHG emission control as set forth in the ESMP/ESCOP.

Traffic safety: The traffic congestion and accident especially on the potential transportation route of the coastal provinical road 639 (PR639) may increase as a result of an increased traffic volume caused by construction activities from both projects. Both projects will be using the coastal provinical road 639 (PR 639) to serve construction activities at the same time. This road will be mainly used for transporting construction materials to the subproject construction sites and wastes from the sites to materials storage sites. An increase in transportation activities on this road at the same time woud pose a high risk of traffic accident for local people, traffic congestion and road damage. With the current construction progress, the cumulative impact on traffic safety is considered *Substantial* without mitigations measure *and low* when measures are applied.

Shrimp production facilities: It is anticipated that shrimp production and commuting activities shall be adversely affected by construction activities due to an incremental traffic volume of vehicle trucks transporting construction materials to/from construction sites of the project and subproject via the existing PR639 route. As a result, the provision of shrimp product to the market may be interrupted. Overall, with the current implementation progress, the magnitude of the cumulative impact on the shrimp farming facilities is considered *low*. Mitigation measures has been set forth in the ESMP/ESCOP.

3.2.6. Induced impact

The upgrading and new construction of the two roads can lead to the rapid development of service, commercial, industrial and urban areas along the roads.

The development will often cause potential impacts, typically of disfiguration of the landscape of the road and master plan problems, social implication and environmental footprint. The development will inevitably increase the pressure on the existing service infrastructures such as water and electricity supply, sewerage and drainage, waste treatment, health, education, telecommunication, etc., by incremental demand for use of water, engergy and other natural resources, and other services in the subproject areas. At the same time, it may probably cause the conflict over the demand for use of water, energy and other natural resources. The development of industrial, commercial, tourism and service activitiies may potentially result in change in labour structure in the subproject areas with a trend of gradually transferring agricultural labour to industrial, commercial, tourism and service sectors. The development will also attract migrant

employees from other localities that may have social implications such as culture and custom conflicts, and social security and order issues. Waste generation from industrial, commercial, and tourism activities and urban areas may cause pollution to air, soil and water, and risk to human health and ecosystems.

The upgrading and new construction of the roads can also result in encroachment of safety zone by local communities along the road. For example, local peoples can illegally build their houses or shops in the safety zone. Clearly, this action commits regulations of road traffic safety and it has to be banned. To protect the safety zone from encroachment by local communities, local authorities must conduct regularly checking this zone, propagating and educating local peoples on their responsibility for protecting the roads. Otherwise, illegal building activities in the safety zone will have to be punished strictly. However, the encroachment of safety zone and unplanned service devlopment in safety zone still occur in many localities in Vietnam.

The induced impact is considered *moderate.* Overall, this impact will be adequately managed through proper and comprehensive development planning and inspection with the strong engagement of the local authorities from provincial to communal levels, policymakers and planners during the subproject development and operation. Detailed mitigation measures have been set forth in the ESMP.

CHAPTER 4. ALTERNATIVE ANALYSIS

The analysis of alternative options is one of the key principles of EA policies and procedures under ESS1. A comprehensive, objective, and transparent assessment of investment options from an environmental and social perspective (as well as technical and economic viewpoints) is one of the most important contributions that EA can make to improve decision-making. The analysis of alternatives in EA is designed to incorporate environmental and social considerations into project planning, site selection, design, and implementation processes. Without such considerations, a project would only proceed based on technical and economic feasibility, and EA for such a project would tend to support or confirm the project proposal. In this case, EA becomes a damage limitation tool, with benefits limited to identifying mitigation measures. Conversely, early environmental and social analysis could have offered efficient ways to achieve the same project goals at a lower environmental or social cost (measured by the severity of impacts or the cost of mitigating them). However, the likelihood of identifying such alternatives late in the process is very low.

The Binh Dinh sub-project applied this principle to meet ESS1 requirements and thus improved decision-making. The Binh Dinh sub-project includes: 1) upgrading and constructing the coastal road section from My Thanh to Lai Giang Bridge, which is part of the coastal road system from Thua Thien Hue to Binh Dinh under Vietnam's detailed road plan; and 2) constructing a road connecting NH 19C to Quy Nhon Port. This is one of the roads within the urban transportation system according to the general construction planning of Quy Nhon city, which was approved by the Prime Minister in Decision No. 495/QD-TTg dated April 14, 2015. Accordingly, this road will connect the Dieu Tri urban area with Nhon Binh, Nhon Phu, Bui Thi Xuan, and Tran Quang Dieu wards of Quy Nhon city.

The following sections present detailed evaluations and comparisons of alternative options for site location, design, construction methods, including the "with sub-project" and "without sub-project" scenarios, based on assessments of potential environmental and social risks and impacts, as well as the feasibility of mitigating those risks and impacts associated with each alternative option.

4.1. WITH AND WITHOUT SUB-PROJECT SCENARIOS

The "without sub-project" option for the Binh Dinh sub-project means no investment in the two proposed road routes. As a result, there would be no associated environmental and social risks and negative impacts from construction and operation. However, if the sub-project is not implemented, firstly, the overall connectivity of Binh Dinh's road system, where some segments have already been invested in, will not be ensured, and the socio-economic development of coastal provinces utilizing marine and coastal resources will not be enhanced. Secondly, access to emergency infrastructure services in disaster situations, enabled by these roads, will not be maintained or improved in Binh Dinh Province in the context of increased risks from extreme climate events in the province. Thirdly, some key benefits from improved road infrastructure would be missed, including:

- Coastal road connection within the province to the national coastal road system;
- Continuity of traffic flow during disaster events such as floods, erosion, and rescue operations will not be guaranteed;
- Completion of the infrastructure connecting key coastal economic zones, industrial zones, residential areas, urban areas, and inter-provincial coastal ecological tourism zones;
- Sustainable economic and tourism development within the province focusing on climate change adaptation; and

- Improvement in the quality of life for local residents with enhanced traffic conditions and reduced accident risks.

Conversely, if the Binh Dinh sub-project is invested in, it will create environmental and social risks and negative impacts associated with construction and operation. However, these environmental and social risks and impacts will be fully managed through construction activities with management and technical measures and the Environmental and Social Management Plan (ESMP). It is estimated that the sub-project will benefit 422,726 people, including 188,055 direct beneficiaries and 234,671 indirect beneficiaries. Furthermore, the environmental and social benefits from implementing the sub-project will be enhanced with infrastructure improvements such as better access to roads, reduced travel time, improved landscape and road quality, enhanced environment, and the creation of economic, business, and employment opportunities in coastal areas. Table 4-1 details the comparison between the "with" and "without" sub-project options.

Table 0-1. Case analysis "Yes" and "No" subprojects

Factors considered	"with" the sub-project	"Without" the subproject
Environmental aspects	• Environmental sanitation and coastal and urban landscape in the project area are improved. • Flooding at some sections (for example, the section from Dieu Tri town, Quy Nhon city of NH 19C to Quy Nhon Port) will be resolved thanks to the newly built drainage system. • Permanently acquire 187,600 m2 of protective forest land and 200,300 m2 of production forest land along both sides of the coastal road. • Requires the use of local natural resources such as soil, rock, sand for construction activities. • Energy, fuel and water requirements for construction and operation. • Potential for air, soil and water pollution associated with road construction and operation	• The state of road conditions remains unchanged, including poor road quality, localized flooding, limited accessibility and deteriorating drainage systems. • No forest land recovery. • No need to use local natural resources such as soil, rock, sand. • No need to use energy, fuel and water. • No environmental pollution due to road construction and operation.
Traffic Management	• Investment in these projects will facilitate local people's travel, promote urbanization and marine tourism. • Traffic connectivity is improved thanks to new bridges/roads being built and upgraded, traffic congestion is controlled and reduced. • Reduce the risk of traffic accidents. • Route 19C-Quy Nhon Port also shortens travel time from Dieu Tri to Quy Nhon.	• The effectiveness of invested routes in the network has not been fully exploited. • Pressure on road traffic continues and increases. • The risk of traffic accidents remains unchanged, and even increases due to the inevitable trend of increased traffic volume in the future.

Factors considered	"with" the sub-project	"Without" the subproject
Land acquisition and resettlement	• It is estimated that the sub-project will affect 1,065 affected households. Of these, 661 households will be severely affected, including a) 117 vulnerable households losing at least 10% of their total agricultural land area, b) 313 households losing at least 20% of their agricultural land area, c) 231 households having to relocate their houses, and d) 178 business households. • The sub-district will reclaim 46,874 square meters of residential land and 33,720 square meters of temporary land.	• No land acquisition and resettlement.
Social Disturbance	• During the construction of these two routes, the daily life and production of local people will be affected. However, the impact will only be local, short-term and can be minimized through technical management measures. • When the route is operational, it will help develop the local socio-economy.	• There is no social disturbance associated with the sub-project. • However, failure to invest in transport infrastructure will limit local socio-economic development in the future.
Subproject effectiveness	• Maximized connectivity to national, regional and local transport systems • Attracting investment, creating conditions for socio-economic development	• The connectivity of national, regional and local transport systems has not been fully exploited.

4.2. ANALYSIS OF ALTERNATIVES WITH SUB-PROJECT

During the feasibility study report preparation, the Project Owner analyzed alternative options for constructing the two roads based on social and environmental aspects related to route alignment, road type and class, road design, bridge design on the routes, and construction methods for each option.

The selected options, as shown in the sections below, have relative environmental and social advantages compared to the alternatives.

4.2.1. Construction and Upgrade of the Coastal Road Section from My Thanh to Lai Giang Bridge

Two route alignment options were proposed and considered as follows:

- **Option 1:** Starting from Km45, the road runs along Provincial Road 639 with a total length of 39 km. Provincial Road 639 is currently classified as a V-VI grade road in flat terrain.
- **Option 2:** Starting from Km45, the route follows DT639 to Km49+952.40, then follows a new route connecting to DT639 at Km51+900, continues along DT639, crosses the Ha Ra Bridge at Km68+169.14, follows a new route through Phu Thu Pass, reconnects to DT639 at Km72+649.14, continues along DT639 to Km75+269.14, follows a new route through Lo Dieu Pass, reconnects to DT639 at Km82+023.44, and then follows DT639 to the

abutment of Lai Giang Bridge at Km83+139.47. The total length of this option is approximately 38.14 km.

It can be observed that for **Option 1**, the route is longer and, while it utilizes the existing road to minimize land acquisition, it affects more households than **Option 2**. **Option 2** has adjusted the route alignment from Km49+952 to Km51+900 to avoid densely populated areas. The alignment also avoids land acquisition impacts on the border guard station at Km67+500. The section through Lo Dieu Pass from Km81+169.14 to Km81+969.14 was also adjusted to avoid the residential area of Cong Luong hamlet (Hoai My Commune, Hoai Nhon District). These route adjustments minimize the number of households affected by land acquisition and resettlement.

Specific analyses based on technical, environmental, and social aspects are shown in the table below.

Table 0-2. Alternative analysis

Factors considered	Option 1	Option 2 (selected)
Technique	- Take advantage of existing roadbed. - Longer route: 39 km. - Cannot meet grade IV road standards for Phu Thu Pass and Lo Dieu Pass. - The current pass route needs to be demolished.	- The route runs along the coast and is shorter (38.14 km) with a new 8.7 km section. - Existing mountain passes are expanded to meet Class IV road standards. - Create multiple routes to ensure smooth traffic in case of landslides at mountain passes.
Economy	- Economic benefits are low because this route is too far from the coast.	- Maximize economic benefits, especially marine tourism as the route runs along the coast. - Promote production and business activities along the route.
Environment	- The construction volume is smaller than option 2, so it has less negative impact on the environment than option 2.	- Large construction volume will cause more negative impacts on the environment than option 1 during site clearance and construction.
	- This route is near the sea, water from upstream flows down the rivers and then out to sea so there is no flooding.	- This route is near the sea, water from upstream flows down the rivers and then out to sea so there is no flooding.
	- The route follows the existing road, passing through residential areas, so the impact of dust, exhaust gas, wastewater, and solid waste has a relatively large impact on residential areas.	- The adjusted route avoids residential areas at km49+952-km51+900; km81+169.14-km81+969.14, thus minimizing these impacts on residential areas.
	- Traffic flow through here will emit a lot of emissions in general and greenhouse gases in	- Reduced emissions and greenhouse gas emissions as the gradient is reduced and the road length is shorter

Factors considered	Option 1	Option 2 (selected)
	particular when the project comes into operation.	than option 1. Better traffic safety due to straighter and less steep roads.
Society	- The project will reclaim less land and affect more households. It is expected to reclaim about 6.85 hectares of protective forest land and 9.68 hectares of rice land. - Risk of traffic safety when building on existing roads. - There is little incentive to promote socio-economic development for local communities as the route mainly passes through the mountain pass area and is built mainly on the existing road.	- The project will reclaim a lot of land, but the number of affected households will be less than in option 1 due to the adjustment to avoid residential areas. It is expected to reclaim about 18.76 hectares of protective forest land and 9.68 hectares of rice land. - The new 8,700m section will facilitate access to new land for economic development. - Creating many positive impacts on local socio-economic development when bad and narrow roads are expanded and renovated.
Construction costs	- 987,425 billion VND	- 959,451 billion VND
Land acquisition costs	- 195,416 billion VND	- 193,416 billion VND
Conclusion	Compared to Option 1, Option 2 will cause more risks and environmental impacts during the construction period due to the large construction volume (opening 2 new sections through Phu Thu Pass and Lo Dieu Pass). In terms of society, although Option 2 recovers more land, the number of affected households is less, the route is also adjusted to avoid the current residential area, and the compensation cost is less than Option 1. On the other hand, these environmental and social risks and impacts are only short-term and end when the project is put into operation. The impacts will also be managed and minimized through the ESMP established as an integral part of this ESIA. Option 2 will maximize the economic benefits of coastal areas, especially marine tourism, and keep the old route intact to serve the travel and production needs, and rescue in case of natural disasters of local people. When considering all aspects, Option 2 is selected.	

In addition, for the selected option, localized adjustments were made in the Phu Thu and Lo Dieu Pass areas. Environmental and social analyses were conducted and are presented below.

(i) Phu Thu Pass Options (from Km68+169.14 to Km72+469.14)

- **Option 1:** The route follows the existing pass road, from the M2 abutment of Ha Ra Bridge through Phu Ha Market, My Duc Commune, Phu My District, heading north. The route is flanked by acacia and eucalyptus trees. The route will have some localized adjustments to meet the road geometry standards. Design speed: V = 40 km/h. The endpoint of this section connects to Km81+958 of DT639 (northern foot of the pass).
- **Option 2:** A completely new route begins at the M2 abutment of Ha Ra Bridge, turns right through fields for approximately 0.4 km, connecting to the southern foot of the pass, follows the eastern slope of Phu Thu Pass for about 3.6 km, then turns left through a shrimp pond area for about 0.3 km, and connects to the existing DT639 route at Km81+958.

Design speed: V = 40 km/h.

Option 2 was selected as it offers more environmental and project execution advantages. With a maximum design speed of V = 40 km/h, this option ensures traffic safety and aligns with the terrain conditions.

Table 0-3 Route plan through Phu Thu Pass

No.	Standard	Option 1	Option 2 (selected)
I	**Line direction**	Same as DT 639	Open new
II	**Technical aspects**		
1	Route length	4.67km	4.25km
III	**Environment**	- The construction volume is smaller than option 2 so it has less negative impact on the environment than option 2.	- Because it is a new route, the large amount of excavation and filling will cause more negative impacts on the environment than option 1.
		- Traffic flow through here will emit a lot of emissions in general and greenhouse gases in particular.	- Reduced emissions and greenhouse gas emissions as the slope is reduced and the route is shorter than option 1.
		- Landslide risks are less than option 2.	- Because this is a new route, there is a high risk of landslides and burial during construction.
		- The route is longer and farther from the coast, the terrain is not as nice as PA2.	- The route along the coast should have a more beautiful surface, maximizing the economic benefits of the coast, especially sea tourism.
III	**Social aspects**	- The subproject will acquire less land and affect more households. - It is expected to recover about 3.77 hectares of protective forest land. - There is little incentive for local communities to develop their socio-economics because the route mainly passes through the mountain pass area. - Many curves so higher risk of accidents. - Some old overpass sections must be demolished because the new route intersects, resulting in the inability to exploit the old route and easily causing traffic	- The subproject will acquire more land and the number of affected households will be fewer. - It is expected to recover about 6.59 hectares of protective forest land. - Creating many positive impacts on local socio-economic development, bad and small roads will be expanded and renovated. - Better traffic safety due to fewer curves on the road. - Maintain the current status of the pass to ensure traffic on Highway 639 during project construction and future use. - Create multiple routes to ensure traffic is always clear in case of landslides at the pass sections.

No.	Standard	Option 1	Option 2 (selected)
		congestion on Route 639 due to project construction.	
IV	**Expense**		
	Construction costs	Lower than option 2 1 4 billion VND	Higher than option 1 1 4 billion VND
	Land acquisition compensation costs	Higher than option 2 2 billion VND	Lower than option 1 2 billion VND
V	**Conclude**	Through comparing the advantages and disadvantages of the two options, Option 2 was chosen. Although the construction cost is higher than Option 1, after the project is formed, the route ensures the criteria of maximizing the economic benefits of the coastal area, especially sea tourism, and maintaining the old route to serve the travel and production needs of the people in the area. However, it is recommended that the technical design should have solutions to ensure traffic safety during construction and operation.	

(ii) Lo Dieu Pass Route Options (from Km75+269.14 to Km79+669.14)

- **Option 1:** The pass route follows the existing pass road, starting at Km75+269.14 and heading north. Both sides of the route are lined with acacia and eucalyptus trees. The endpoint of this section connects to Provincial Road 639. Design speed: V = 40 km/h.
- **Option 2:** A completely new route. Starting at Km75+269.14, it turns right to the east along a contour line, crossing the pass. The route follows the coast, then connects with the concrete road of Hoai Hai Commune at Km79+669.14. Design speed: V = 40 km/h.

Table 0-4. Alternative analysis for the route through Lo Dieu pass

No.	Standard	Option 1	Option 2 (selected)
I	**Line direction**	Same as DT 639	Open new
II	**Technical aspects**		
1	Route length	7.15km	6.70km
III	**Environment**	- The construction volume is smaller than option 2 so it has less negative impact on the environment than option 2.	Because it is a new route, the large amount of excavation and filling will cause more negative impacts on the environment than option 1.
		Traffic flow through here will emit a lot of emissions in general and greenhouse gases in particular.	Reduced emissions and greenhouse gas emissions as the slope is reduced and the route is shorter than option 1.
		Landslide risks are less than option 2.	Because this is a new route, there is a high risk of landslides and burial during construction.
		The route is longer and farther from the coast, the terrain is not as nice as Option 2.	The route along the coast should have a more beautiful surface, maximizing the economic benefits

No.	Standard	Option 1	Option 2 (selected)
			of the coast, especially sea tourism.
III	**Social aspects**	- The subproject will acquire less land and affect more households. - It is expected to recover about 3.08 hectares of protective forest land. - There is little incentive for local communities to develop their socio-economics because the route mainly passes through the mountain pass area. - Many curves so higher risk of accidents. - Some old overpass sections must be demolished because the new route intersects, resulting in the inability to exploit the old route and easily causing traffic congestion on Route 639 due to project construction.	- The subproject will acquire more land and the number of affected households will be fewer. - It is expected to recover about 5.40 hectares of protective forest land. - Creating many positive impacts on local socio-economic development, bad and small roads will be expanded and renovated. - Better traffic safety due to fewer curves on the road. - Maintain the current status of the pass to ensure traffic on Highway 639 during project construction and future use. - Create multiple routes to ensure traffic is always clear in case of landslides at the pass sections.
IV	**Expense**		
	Construction costs	10 billion VND lower than option 2	10 billion VND higher than option 1
	Land acquisition compensation costs	Higher than option 2 3 billion VND	Lower than option 1 3 billion VND
V	**Conclude**	Through comparing the advantages and disadvantages of the two options, Option 2 was chosen. Although the construction cost is higher than Option 1, after the project is formed, the route ensures the criteria of maximizing the economic benefits of the coastal area, especially sea tourism, and maintaining the old route to serve the travel and production needs of the people in the area. However, it is recommended that the technical design should have solutions to ensure traffic safety during construction and operation.	

4.2.2. Construction of a Road Connecting NH 19C with Quy Nhon Port

The road will be newly constructed, and the route alignment and design were selected based on the following aspects:

- Ensuring internal traffic connectivity between district, provincial, and national roads.
- Compliance with the approved master plan under Decision No. 495/QD-TTg dated April 14, 2015, by the Prime Minister, which approves adjustments to the general construction planning of Quy Nhon City and its vicinity up to 2035, with a vision toward 2050, as well as other relevant plans.
- Cost efficiency and minimal impact on land clearance: Maximizing the use of existing roads and structures to reduce investment costs and ensure reasonable investment phases, with connections implemented at existing traffic intersections along provincial roads.

Two alignment options have been proposed and considered as follows:

- **Option 1:** From Km 0 + 0.00 (intersection with National Road 1A at Km 1220 + 600) to Km 1 + 097.76, the route passes through densely populated areas, rice fields, and crosses the Duc River at Km 0 + 515.00, as well as passing through rice fields and the cemetery of Dieu Tri Town; it crosses the Cay Me River at Km 0 + 975, then continues through rice fields to the Go Tru residential area adjacent (Van Ha Urban Area) at Km 1 + 097.76. The segment from Km 1 + 097.76 to Km 2 + 637.80 overlaps with the main road planned for the Van Ha Urban Area in Nhon Phu Ward, where there are sparsely populated houses interspersed with orchards and rice fields. The section from Km 2 + 637.80 to Km 3 + 122.00 will intersect the Dieu Tri - Quy Nhon railway at Km 2 + 770.00 and pass through sparsely populated areas. The segment from Km 3 + 122.00 to Km 4 + 263.00 will run straight through residential areas interspersed with rice fields to the intersection with National Road 19 at Km 7 + 383.00. The segment from Km 4 + 263.00 to Km 5 + 438.00 will pass through residential areas and rice fields. The section from Km 5 + 438.00 to Km 6 + 414.25 (the junction before Nhon Binh - Nguyen Man Industrial Complex) will traverse rice fields and the Nhon Binh Industrial Complex, intersecting with Nguyen Man Road. The total length of this option is approximately **6.41 km.**
- **Option 2:** From Km 0 + 0.00 (intersection with National Road 1A at Km 1220 + 600) to Km 0 + 288.47, the route passes through densely populated areas and rice fields. From Km 0 + 288.47 to Km 1 + 131.53, the route crosses the Duc River (Km 0 + 515.00) and the Cay Me River (Km 0 + 975.00) to the Go Tu residential area (Van Ha Urban Area). The segment from Km 1 + 131.53 to Km 2 + 637.80 coincides with the main road planned for the Van Ha Urban Area in Nhon Phu Ward, where there are sparsely populated houses interspersed with orchards and rice fields. The route from Km 2 + 637.80 to Km 3 + 0.00 will intersect the Dieu Tri - Quy Nhon railway at Km 2 + 770.00 and pass through sparsely populated areas. The segment from Km 3 + 0.00 to Km 4 + 270.00 will be adjusted to avoid residential houses by about 80 meters to minimize land acquisition. This segment will pass through residential areas interspersed with rice fields, reaching National Road 19 at Km 7 + 383.00. The segment from Km 4 + 270.00 to Km 5 + 438.00 will pass through residential areas interspersed with rice fields. The section from Km 5 + 438.00 to Km 6 + 353.18 (the junction before Nhon Binh - Nguyen Man Industrial Complex) will traverse rice fields and the Nhon Binh Industrial Complex, intersecting with Nguyen Man Road. The total length of this option is approximately **6.35 km**.

Conclusion: Option 2 is recommended as it optimizes environmental benefits and minimizes impacts on the community compared to Option 1. Specifically, the segment from Km 3 + 0.00 to Km 4 + 270.00 has been adjusted to avoid residential areas, shifting northward by approximately 80 meters to mitigate land acquisition and impacts on households.

During the preparation and construction phases of the project, Option 2 requires the acquisition of less land, approximately 9.0 hectares compared to 9.9 hectares for Option 1, and entails compensation support for fewer households, 182 compared to 215 for Option 1. The construction volume for Option 2 is also smaller, involving only the construction of 02 bridges along with box culverts, thereby minimizing negative environmental impacts compared to Option 1, which requires the construction of 05 large bridges with more complex construction methods and higher material demands.

In the operational phase, Option 2 demonstrates distinct advantages, as the connection to the existing transportation system is improved, providing greater convenience, ensuring enhanced traffic safety, and reducing emissions from vehicles. Conversely, Option 1 presents challenges in transportation system connectivity, resulting in safety concerns, increased fuel costs, and higher emissions.

The selection of Option 2 not only optimizes land use and reduces compensation costs but also mitigates environmental impacts during both the construction and operational phases, thus contributing to environmental protection and community welfare.

Further specific analyses are presented in the table below.

Table 0-5. Analysis of the overall plan to connect Highway 19C with Quy Nhon Port

Aspect	Option 1	Option 2 (selected)
Technical	- Longer route: 6.41 km with new section 6.11 km long. - 5 new bridges with a total length of 604.62 m. - 20 new culverts. - The cross-section is calculated and designed in harmony with the terrain, ensuring a uniform vertical slope and the ability to construct works along the line.	- The route is 6.35 km long with the new section being 6.05 km long. - The two new bridges have a total length of 785.75 m. - 22 new culverts. - The cross-section is calculated and designed in harmony with the terrain, ensuring a uniform vertical slope and the ability to construct works along the line. - The design frequency of roadbed, drainage culverts and small bridges is 5% to harmonize with residential areas, intersections with existing roads and to be consistent with the existing planning of projects that have been and are being built in Quy Nhon city and Tuy Phuoc district.
Economic	- This new route will help reduce current traffic pressure on NH 1, where there are many industrial parks, promoting the circulation of goods, services, and tourism for Quy Nhon and neighboring areas.	- Impact and benefits are similar to Option 1.
Environment	- The construction volume is larger than option 2, so it causes more negative impacts on the environment than option 2.	- The smaller construction volume will cause less negative impact on the environment than option 1.
	- The construction of 5 large bridges with complex construction methods, high technical requirements, and large material needs will have a	- Building only 02 bridges with box culverts will have less impact on the water environment than option 1. -

Aspect	Option 1	Option 2 (selected)
	greater impact on the river water environment.	
	- Poor transport system connectivity due to poor quality connections to existing roads causes traffic safety problems, increases fuel costs, wages and greenhouse gas emissions.	- Connecting to the existing transport system is more convenient, ensuring better traffic safety, reducing GHG emissions from vehicles.
	- The construction of NH 19C (according to Scenario 2 [17]) would change the hydrodynamic regime of flood discharge in the area. The construction of the road hinders the water exchange capacity of the Ha Thanh, Dinh and Cay Me rivers, leading to a large difference in water column on the right and left banks of the road, in which the water level on the right bank is higher than the left bank of the road (according to the calculation results, the water level difference is from 1,016m in the area after the confluence of Ha Thanh and Cay Me rivers, a difference of 0.359m at the railway intersection and a difference of 0.049m at the old railway intersection of NH 19). - With the plan to arrange a stormwater drainage system across the road (according to scenario 3 [18]), there has been an effective exchange of water, tending to balance the water level on both sides of the road (according to the calculation results, the difference in water level in the area after the intersection of Ha Thanh River - Cay Me River is 0.302m at the railway intersection and 0.065m	- The selected road surface elevation is equivalent to the planned elevation for filling along both sides of the road, with a stormwater drainage system arranged across the road. In the near future, when the flood drainage plan for the lower reaches of the Ha Thanh River has not been implemented synchronously (according to scenario 3), the first section of NH 19C (upstream of the railway, from Km 2+000 to Km 2+500) will be flooded up to 0.578m deep compared to the road surface, lasting up to 18 hours. - The middle section of the route (downstream of the railway to the old NH 19, from Km 2+500 to Km 4+000) was flooded up to 0.906m deep compared to the road surface, lasting 32 hours, and the last section of the route (downstream of the old NH 19 to the Dien Bien Phu border, from Km 4+000 to Km 5+700) was flooded up to 0.929m deep compared to the road surface, the road surface can withstand up to 25 hours.

[17] Future status - There is a planned road for investment, the road elevation is equal to the planned level, there is no drainage culvert across the road, the embankment is not completed.

[18] Future conditions - There is a planned investment route, the road elevation is equal to the planned level, there is a drainage culvert across the road, the embankment is not yet completed.

Aspect	Option 1	Option 2 (selected)
	at the intersection of existing Road 19).	
Social aspects	- Option C requires more land area and affects more households than Option 2.	- Option C requires less land area and affects fewer households than Option 1.
Construction costs	- 686.89 billion VND	- 679,282 billion VND
Land acquisition costs	- 526.44 billion VND	- 507,467 billion VND
Conclude	- Through the above analysis, it is recommended to choose option 2 because it ensures to limit impacts on the environment and society, ensures better drainage in the future, and construction costs and site clearance compensation are lower than option 1.	

CHAPTER 5. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The Environmental and Social Management Plan (ESMP) is an integral part of the Environmental and Social Impact Assessment (ESIA), comprising a set of mitigation, monitoring, and institutional measures that need to be implemented during the pre-construction, construction, and operational phases to eliminate or reduce environmental and social risks and impacts to acceptable levels. The plan also outlines the necessary actions to implement these measures. It describes the roles and responsibilities of relevant stakeholders and the coordination mechanisms for implementing the ESMP. PPMU Binh Dinh, as the Project Management Unit, is fully responsible for the implementation of the ESMP, including providing sufficient resources to execute the ESMP during the pre-construction, construction, and operational phases. The Environmental ESIA/ESMP was drafted in 2021 in parallel with the prefeasibility (PFS) and submitted to the Bank for review and comments. Subsequently, an Environmental Impacts Assessment (EIA) Report was in parallel with the Feasibility Study (FS), and approved by the Ministry of Natural Resources on 4 October 2022. Subsequently, this ESIA/ESMP is finalized based on the FS and EIA.

5.1. MITIGATION MEASURES

Mitigation measures have been proposed to address environmental and social risks and impacts during the pre-construction, construction, and operational phases.

5.1.1. Mitigation Measures implemented up to detail design stage

Project design takes into account all socio-environmental factors to avoid negative impacts on the natural and socio-economic environment during implementation. Typically, adverse impacts associated with projects include land acquisition and resettlement, ecological impacts, landscape impacts, localized flooding, community fragmentation, and other risks. Some of these impacts can be mitigated through surveys, technical options, and consultation with local authorities during the conceptual design process.

Key measures taken at the conceptual and detail design stage to mitigate the social and environmental impacts of the project include:

- Incorporate topographic, hydrological, planning, and climate change factors into flood model calculations for the area connecting NH 19C - Quy Nhon Port to design the route to ensure sustainable and effective operation, adapt to climate change, and withstand natural disasters such as floods;
- Choose a route that avoids residential areas, minimizes requirements for site clearance, and community separation: For the My Thanh - Lai Giang coastal route, adjusted the route from km49+952-km51+900, km 81+169.14-km81+969.14 to avoid residential areas. crowded ; the route also avoids the impact of land acquisition by the border guard station at km 67+500. For the road connecting QL19C - Quy Nhon Port, the route is adjusted from Km 3 + 0.00 to Km 4 + 270.00 to avoid residential areas.
- Road design also include greening measures such as planting trees on sidewalk and median strips, apply bio-engineering measures where possible for slope stabilization, harmonizing with the surrounding landscape, design retaining walls and slope reinforcements in landslide-prone areas.

Feasibility and Basic Design: the key measures undertaken during the feasibility stage to mitigate the social and environmental impacts of the project include:

- Protect the slope with reinforced concrete panels/plant grass
- Include horizontal drainage and longitudinal stormwater drainage systems to ensure the stability of the project's roads and avoid the risk of local flooding along the roads, and to withstand natural disasters such as storms and floods.
- Design woven panels at the horizontal ditch in front of the house to maintain traffic.
- Traffic Safety Design: Traffic safety structures are designed in accordance with the National Technical Regulation on Road Signs – QCVN 41:2019/BGTVT. The design includes a central median strip, traffic signs, road markings, pedestrian crossings, speed bumps, delineator posts, and wave guardrails to ensure traffic control and safety. A street lighting system is also provided.
- For the section of National Highway 19C connecting to Quy Nhon Port, a 6.5-meter-wide service road for local residents shall be designed and constructed in areas where deep excavation or high embankments pass through residential zones. Key intersections are designed at-grade with simple layouts and lane markings to guide traffic, prioritizing movement along the main road. At the National Highway 1 intersection, the turning radius for the connection branch is 25m, with pavement structures matching the main route. The old National Highway 19 intersection features turning radius of 28–50m, and an additional residential access road is connected elsewhere. The final intersection, a five-way junction, includes turn radii of 15m for planned connections to Road No. 2 and Dien Bien Phu, with upgraded asphalt layers for Nguyen Man street. These designs help maintain smooth traffic flow and enhance road safety.
- For the My Thanh – Lai Giang coastal road, the intersections between the coastal road and the old DT.639 road are designed at grade, ensuring traffic safety through the arrangement of triangular islands for traffic channelization, marked traffic lanes, and widened roadways. At Xuan Thanh intersection (Km55+396.76), the branch length is 107m with a pavement width of 5.5m and turning radii ranging from 20–30m. The intersections at Km68+191.97, Km72+521.89, Km75+397.54, and Km82+007.41 have been widened to accommodate two lanes per direction, each 2.75m wide, with turning radii from 20.5–40m. These design improvements help reduce traffic conflicts and mitigate the risk of traffic accidents along the entire route.
- For the railway intersection on route 19C - Quy Nhon Port: designed barriers, traffic lights for roads and railways. Specifically, at the railway junction at Km3+665.05, the design includes the renovation of the railway information system and the signaling system synchronized with the level crossing. The existing P30 rails will be replaced with P43 rails from Km3+630.60 to Km3+705.60. A new level crossing will be constructed at Km3+665.05 with a width of 59 meters. A guard station will be provided with personnel on duty, electric barriers, and an automatic train warning bell system to ensure safety for road users. The road section crossing the railway will have a width of 40 meters.
- Hydraulic model calculations assess erosion potentials and provide inputs for proper design of 4 bridges including Truong Uc, Dinh River, Ha Ra, Cong Luong.
- Design measures to address the risks of localised flooding: Surface runoff will follow the road's slope toward roadside ditches or the foot of the embankment slope, then naturally flow to low-lying areas or through culverts installed along the route. The stormwater drainage system consists of precast reinforced concrete culverts manufactured at the factory, including both cross-road culverts and culverts placed under sidewalks. The system also features manholes, discharge outlets, and drainage slots at the median strip. In total, 12 new circular culverts with diameters ranging from 120 cm to 150 cm and 5 box culverts with dimensions of 1x3 m, 2x3 m, and 10x4 m (depending on the location) will be constructed.

- Sidewalks and Landscaping: Sidewalks are paved with tiles, and the median strip is filled with a 20 cm layer of organic soil for tree planting. Hopea odorata (Sao Den) trees are planted along the sidewalks at intervals of 10 meters. Tree pits are made from precast reinforced concrete pipes with a diameter of 80 cm and a length of 1 meter, filled with organic soil. The median strip is planted with gừng grass, Phoenix palm trees, and bougainvillea. The spacing and arrangement of the plants are harmoniously designed to ensure urban aesthetics.
- Landslide Prevention Measures for Coastal Road DT639, My Thanh – Lai Giang Section (Road No. 1), Km45+0.00 to Km68+152.98: The cut slopes are reinforced with precast reinforced concrete slabs measuring 50x50x6 cm, with a total length of 4,939.63 meters. Fill slopes are reinforced with 40x40x6 cm precast slabs, with 20 cm-diameter holes reserved for grass planting, covering a total length of 3,700 meters. A sand-blocking wall made of grade 200 concrete (20x30 cm, using 1x2 crushed stone) is constructed. From Km68+191.97 to Km83+139.47, slopes are reinforced with precast concrete facing slabs. Reinforced concrete retaining walls are installed on the cut slope side at 13 locations between Km69+119.77 and Km78+979.31.
- Feeder roads, underpasses will be designed to minimise the fragmentation of agricultural land and residential clusters along the alignment (at sections where the proposed road will pass by closely, or the road will be considerably higher than the existing ground level.
- Traffic control measures are designed for the intersections/junctions with other roads where will be increased traffic safety risks during operation phase
- Ensure that the scope of land acquisition along and at down slope of the bridges' approach roads have considered accessibility, drainage and safety risk during operation phase.
- Consider opportunities for bringing added values for bridges through architectural design incorporating outstanding local cultural features.

UXO detection and clearance. The PMU contracted (at values at 4.7 billion VND) the Lung Lo Construction Corporation which belongs to the Ministry of National Defense to detect UXO in the Project areas. The total areas detected for UXO was 139.18 ha including 134.2 ha on land and 4.98 ha underwater. The UXO Detection Completion Report was dated 14 August 2023, 23 pieces of UXO (bullets 12.7 mm, artillery shells size from 37 to 60 mm, grenade were detected, then transported away and exploded under control safely by the contractor. The project sites had been certified to be safe and construction activities are allowed.

5.1.2. Land Acquisition and Resettlement Plan (RP)

A Resettlement Plan (RP) was developed under the Project in order to address all potential impacts related to compensation, land acquisition, resettlement and grave relocation. The RP was prepared in accordance with the World Bank's Environmental and Social Standard ESS5 on "Land Acquisition, Involuntary Resettlement" as well as Vietnamese laws and regulations. The basic principles of the World Bank's resettlement policy are: where resettlement is unavoidable, resettlement activities will be implemented as sustainable development programs, providing sufficient investment resources so that the Project-affected people share in the benefits. Affected people should be meaningfully consulted and given the opportunity to participate in the planning and implementation of resettlement programs.

The estimated cost of implementing the RP for the Project is approximately VND 699,910,580,000 (equivalent to USD 30,299,159 at the exchange rate of 1 USD = VND 23,100). This cost includes compensation for land, structures, and assets affected by the project, income support and restoration program, monitoring and evaluation, replacement cost survey, and implementation management. The budget for implementing the Resettlement Plan will be part of the Project's

counterpart fund, arranged by the Binh Dinh Provincial People's Committee. The (RP) will be implemented prior to the commencement of civil works by the provincial authorities.

It is estimated that when the Project is implemented, about 231 households will be relocated to a new place and will need resettlement land (the remaining households will be compensated in cash and relocate themselves). The PMB and provincial authorires proposed a plan for resettlement of the for affected households as follows:

- Dieu Tri town resettlement area has a total area of 1.5 hectares including 50 land lots with an area of 4,792.2 m2, the rest is parks, trees, public land and internal roads.
- Nhon Phu ward resettlement area has an area of 4.12 hectares, including 152 land lots with an area of 18,458.3 m2, the rest is infrastructure, public land and internal roads.
- Nhon Binh Ward resettlement area of 2.24ha includes 128 plots of land with an area of 11,645m2, the rest is parks, trees, public land and internal roads.

In addition, the project also prepares 21 plots of land in the existing resettlement area, the Resettlement Area. Dinh Moi Market, Nhon Binh Ward, Quy Nhon City to arrange for households in need of resettlement. 14 households in My Thanh - Lai Giang area will be arranged in local resettlement areas or can be arranged to intersperse in local community residential areas. These resettlement areas are built with full infrastructure including connecting traffic systems, rainwater drainage systems connected to the existing drainage system, domestic wastewater collection systems, electricity supply systems, domestic water supply systems, communication systems... The resettlement areas of Dieu Tri and Nhon Binh towns have basically completed technical infrastructure and can be resettled immediately, the resettlement area of Nhon Phu ward is currently under construction. The three resettlement areas are expected to be completed in the first quarter of 2025 and can be put into use. The compliance assessment and characteristics of these three resettlement areas are shown in Appendix 5.

For power line relocation: Negotiate with the local power management unit and notify people about 2 days before implementing the power outage.

For grave relocation: Before construction, households whose graves must be relocated will be notified 12 months in advance so that they can arrange their own relocation to ensure project progress. The cost of relocation and building new graves will be compensated according to regulations and mentioned in the project's RP report.

- Make agreements with the people on the plan to relocate discovered graves in accordance with current laws.
- Publicly disclose information, plans, and implementation schedules, ensuring seriousness and solemnity;
- Establish, publicize, approve plans for moving graves and pay relocation support according to regulations.
- When discovering a grave while moving a grave that has been identified on the ground or when constructing project items, it is necessary to temporarily stop the construction at the location of discovery and notify the construction supervisor, the Project Management Board, and local authorities. Moving these graves requires:

Case of ownerless graves, the following procedures will be applied:

- Field survey to determine the number of tomb locations /cultural heritages within the construction project's land acquisition and clearance boundary.
- Make a record of the on-site inspection of the number of discovered tombstones with the participation of the Project Management Board, supervision consultant, contractor, local authorities, commune / district Fatherland Front, and Compensation Board.

- Public announcement of tomb relocation on bulletin boards and loudspeakers in the commune.
- Make a record of the scene of moving the tomb (ownerless) confirming the number of tomb locations that need to be moved with confirmation from the local authorities, the Commune Fatherland Front, the Compensation Board, the Project Management Board, the Construction Consultant, the construction contractor, and the Funeral Service Board.
- Contract with the Funeral Committee to move graves according to regulations.
- Make a record of work acceptance after completing the tomb relocation.
- In case the grave has an owner:
- Field survey to determine the number of grave locations within the land acquisition and clearance boundary of the road construction project.
- Publicly announce the relocation of graves on bulletin boards and loudspeakers in the commune/district.
- Make a record of the on-site inspection of the number of discovered tombs with the participation of the Project Management Board, supervision consultant, contractor, local government, commune Fatherland Front, Compensation Board and households.
- Households declare and commit to self-move/keep with confirmation from local authorities.

In the event that any relics or artifacts are discovered during construction, the Chance Find Procedure outlined in this ESIA will be implemented, in full compliance with the applicable laws and regulations of Vietnam.

Management of Demolition materials. Materials generated from demolition of houses and buildings. Solid waste generated during the demolition and site clearance process is approximately 49,424.5 m3 (of which the coastal route is 1,755.5 m3, and the NH 19C-Quy Nhon Port route is 47,669 m3). The main components of this waste include concrete, broken bricks, tiles, mortar, bamboo, wood, excess iron and steel, doors, Part of this waste (such as iron and steel, metal, plastic) is collected for recycling; the remaining part, the project owner will hire a functional unit to collect, transport and process according to regulations.

Livelihoods Restorations

All Project Affected Persons (PAPs) who are engaged in business or farming in the project area prior to the cut-off date will be provided with rehabilitation measures sufficient to enable them to improve or at least maintain their pre-project living standards, incomes and production capacities. For affected crops and trees, regardless of the legal status of the land, households cultivating on the affected land will be compensated in full at replacement cost. For unharvested crops that are moved to another location, compensation will be made for transportation costs and actual damage caused by transportation and replanting. For livestock (including aquatic livestock), PAPs will be compensated in cash at replacement cost at the time of land acquisition. In case aquatic animals are moved to another location, compensation will be made for transportation costs and damage caused by transportation.

In addition, the livelihood restoration program is very important to help severely affected and vulnerable households improve or at least restore their income and living standards to or better than pre-project levels. In addition to financial support, affected households are also provided with vocational training.

5.1.3. Compensation for the Affected Forest

For the 38.58 hectares of plantation forest to be acquired (including 18.76 hectares of protective plantation forest and 19.82 hectares of production plantation forest, of which 12.58 hectares are for road construction and 7.24 hectares are for surplus material storage sites), the Project Owner

shall implement compensatory afforestation with an area equivalent to the area of forest to be acquired for project implementation. This shall be carried out by making a deposit into the Forest Protection and Development Fund of Binh Dinh Province for the purpose of afforestation, in compliance with the provisions of the Law on Forestry 2017, Decree No. 156/2018/ND-CP, and Circular No. 13/2019/TT-BNNPTNT on compensatory afforestation in cases of forest land repurposing for other uses.

The project owner will carry out the following activities to clear vegetation and clear the forest (see details in Annex 4. Vegetation Clearance Management Plan):

5.1.4. Mitigation Measures in the Construction Phase

5.1.4.1. Mitigation Measures for Environmental and Social Impacts

The mitigation measures are developed with reference to relevant Environmental and Social Standards (ESS), the World Bank Group's Environmental, Health, and Safety Guidelines (EHS), and National Regulations and Standards to address common impacts related to construction. These measures are presented in the form of an Environmental and Social Code of Practice (ESCOP). The ESCOP describes the typical requirements that contractors must implement and will be monitored by the Construction Supervision Consultant (CSC) during the construction process. The ESCOP will serve as a reference document for preparing Environmental and Social (ES) requirements according to Section VII – Requirements of the Project for Standard Procurement Documents (SPD).

Based on this ESCOP, the contractor will prepare the Contractor's ESMP, detailing specific mitigation measures suitable for the awarded construction package, which must be reviewed and approved by PPMU before commencing construction activities.

ESCOP addresses the main ES issues as follows: (i) Air pollution (dust and emissions), (ii) Noise and vibration, (iii) Erosion and soil pollution, (iv) Water drainage management and sedimentation, (v) Flood mitigation, (vi) Disaster impact reduction, (vii) Risks from material supply, (viii) Mitigation of social impacts related to labor flows, (ix) Risks of key supplier workers, (x) Waste management (domestic wastewater, construction wastewater, stormwater runoff, management of municipal solid waste, management of construction waste, hazardous waste management), (xi) Management of hazardous materials, (xii) Traffic management, (xiii) Mitigation of landscape impacts, (xiv) Resource utilization, (xv) Ecosystems, (xvi) Water pollution mitigation, (xvii) Disruption of access to services and infrastructure, (xviii) Mitigation of impacts related to aquaculture and agricultural production, (xix) Mitigation of community fragmentation impacts, (xx) Labor management, (xxi) The process for handling the discovery of cultural relics, (xxii) Risks of occupational accidents, public health and safety, (xxiii) Blasting safety and rock demolition, (xxiv) Waste dump management, and (xxv) Mitigation of wildfire risks.

Table 0-1. General Measures to Mitigate Environmental and Social Impacts (ESCOP)

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
Dust and exhaust	- The dust and emission control plan in the Contractor's Environmental and Social Management Plan (C-ESMP) prepared by the Contractor must be approved by the Construction Supervision Consultant (CSC) before the commencement of construction. - Vehicles must be periodically inspected for emissions and certified: "Certificate of conformity on quality inspection, technical safety and environmental protection" according to Circular 31/2011/TT-BGTVT. - All vehicles must be inspected and maintained periodically to ensure that emissions meet TCVN 6438:2018 (Road vehicles - Maximum permissible limits of emissions). - Water spraying vehicles equipped with jet-type spray nozzles shall be used to reduce dust in areas where road excavation, embankment, and paving works are ongoing. Water spraying shall be carried out three times per day, and in areas passing through residential areas, schools, and pagodas, the frequency shall be increased to four times per day. - All vehicles and machinery used shall be properly registered and inspected; all vehicles transporting materials, excavated soil, and construction waste must be fully covered with tarpaulins. - Transport vehicles must comply with legal load limits; soil, sand, and materials spilled along the construction sites and access roads shall be regularly collected and cleaned. A vehicle cleaning system shall be installed at the construction site, and all vehicles must be thoroughly washed of mud and dirt before leaving the site to ensure that the air quality in and around the project area remains within the permissible limits as stipulated by current legislation. <u>For excavation activities:</u> - Spray water to reduce dust 3 times/day, at locations passing through residential areas, schools, and pagodas 4 times/day.	- Law on Environmental Protection No. 72 / 2022 /QH1 4 - TCVN 6438-2005: Road vehicles - Maximum permitted emission limits - Circular 31/2011/TT-BGTVT on quality inspection, technical safety and environmental protection of imported motor vehicles - QCVN 05: 2023 / BTNMT: National technical regulations on ambient air quality; - WBG EHS Guidelines for Construction and Demolition	Contractor	Project Management Board, CSC, Binh Dinh Department of Natural Resources and Environment, local authorities, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Construction activities are carried out in a rolling manner. - Clean up the site before digging and filling in new sections. - Earthworks are carried out by pouring soil to the top, compacting it, and watering it to that point. - Provide full protective equipment (masks to avoid dust) for workers. - For route 19C - Quy Nhon Port: because it is a newly opened route with no traffic, large reflective tapes are installed to prevent people from entering this area and a lighting system is installed at night around the construction site. - For the My Thanh - Lai Giang coastal road: use a lighting system at night around the construction site, a system of construction area warning signs placed at both ends of the construction section ; Construct half of the road surface to ensure that vehicles can still circulate on the road. - Excavated materials are transported to adjacent dump sites for site leveling, not collected on site. <u>For machinery operations, construction and transportation vehicles:</u> - Use vehicles and machinery that are periodically inspected for quality ; - The list of equipment mobilized on the construction site will be submitted to the construction supervision consultant for inspection, review and approval before mobilization to the construction site. - Regularly clean and maintain vehicles and equipment. - Construction within the clearance area. - Do not let the machine run idle. <u>For material and waste transportation activities</u> - Do not overload during transportation; - Construction materials such as cement, sand and aggregates must be covered during transportation and storage at the construction site.	- ESS 3		

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Car wash bridges are located at the entrance/exit gates of construction areas of large bridges and culverts. - Raw materials will be transported to where they are used. - soil or rock is spilled during transportation, it will be cleaned up immediately; - Water the construction sections and along the road about 40m from the construction site three times on sunny days. - Regulations on speed limit for vehicles transporting construction materials on construction sites (5 km/h on construction sites). For the area of Highway DT639 due to construction on the existing route, speed must be reduced by 10 km/h when about 100m away from the construction area. - Regularly clean the construction site every day before and after construction. <u>For activities of storing waste or construction materials on site:</u> - waste rock gathering locations on the construction site will be kept at a distance from surrounding sensitive areas such as: primary schools, kindergartens, family churches, markets (for coastal route DT639 My Thanh - Lai Giang), Long Thanh pagoda area, family churches (route 19C - Quy Nhon Port) ; limit overnight storage on the construction site. - Material storage areas are covered with tarpaulins throughout the storage period to ensure aesthetics and reduce dust emission in the area; - For the T639 route area, due to upgrading the existing route, loading and unloading, transporting materials and waste will be carried out avoiding peak hours with high traffic volume (6-8am, 5-6pm); - Burning of solid waste (e.g. wood, rubber, oil rags, empty cement bags, paper, plastic, bitumen, etc.) is prohibited on site.			
Impact of noise and vibration	- The Contractor is responsible for complying with relevant Vietnamese laws on noise and vibration.	- Law on Environmental	Contractor	PMB, CSC, DAE, local authorities

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Vehicles must have a "Certificate of conformity on quality inspection, technical safety and environmental protection" according to Circular 31/2011/TT-BGTVT, to avoid noise emissions exceeding the permitted level from poorly maintained machinery. - Measures to reduce noise and vibration: ▪ Choose equipment with lower sound power levels ; ▪ Install barriers in areas where loud noise-generating equipment is used; ▪ Install anti-vibration devices on mechanical machines; ▪ Restrict hours of operation of specific equipment or activities, especially mobile sources operating through public areas; ▪ Locate noise sources in less sensitive areas; as far away from residential areas as possible ▪ Reduce traffic flow through residential areas to serve the project; ▪ Build a mechanism for receiving and responding to feedback ▪ Limit the use of multiple devices at the same time when working near sensitive objects. ▪ Turn off machinery and equipment when not needed to limit noise resonance to a minimum. ▪ Construction time is during the day (6am - 6pm), limit construction at night. If construction is at night (9pm - 6am), the construction plan must be reported to the local authorities and residents of the construction area. ▪ Do not transport waste and construction materials through residential areas at night (9pm - 6am). ▪ Workers operating generators and noisy machines (such as concrete breakers, concrete sprayers...) will be fully equipped with labor protection. ▪ Local communities must be informed of construction schedules and times. ▪ The project owner will compensate for damages if caused by construction activities.	Protection No. 72 / 2022 /QH1 4 - QCVN 26:2010/BTNMT: National technical regulation on noise - QCVN 27:2010/BTNMT: National technical regulation on vibration - Decision 3733/2002/QD-BYT on noise levels at workplaces and research and study areas. - WBG EHS Guidelines for Construction and Demolition		and community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	Rock blasting: - Using differential blasting method to reduce shock wave, reduce aftershock to avoid cracking and instability of the area around the explosion location. Differential blasting method significantly reduces aftershock and shock effect compared to instantaneous explosion because each hole is controlled to explode, with completely different differential time to help reduce the amount of explosives at the same time, reduce the formation of shock wave, and reduce elastic energy reserve. - Blasting work is undertaken by a specialized department. trained and certified. Blasting commanders and miners are all trained in safety and certified according to regulations. Therefore, the Investor does not detonate by himself but contracts with a competent unit to carry out the detonation task. - Explosives and explosives used in the mining process are contracted with the supplier for transportation and delivered directly from the supplier's warehouse to the construction site according to each blasting passport and taken away immediately after each blast. - The amount of chemicals in the boreholes must be ensured according to the blasting passport and issued by the Department of Industry and Trade. - Before carrying out blasting at the designated location, If permitted, the blasting unit will notify the local authorities and police and all people living and working in the danger zone of the blasting area and the surrounding area of the location, time of blasting, the limits of the danger zone, the signals and the meaning of the signals when blasting. - A complete and accurate blasting passport according to regulations and must be approved by a competent person. Absolutely comply with the passport. approved			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Blast at the prescribed time during blasting hours, it is absolutely forbidden for unauthorized persons to pass through the blasting danger zone within a minimum radius of 300m from the blasting site. - Regulations on blasting, warning signals and safety measures will be notified by the blasting unit to the local authorities and widely announced to workers and people in the area. At the blasting area, 4 lookouts must be arranged to take on the task of preventing people from approaching when blasting. - Move vehicles, machines and equipment out of danger zones due to flying rocks and air waves during explosions.			
Soil erosion and pollution	- Reduce or prevent erosion by: ▪ Construction schedule avoids periods of heavy rain to the extent feasible; ▪ Create longitudinal grooves and reduce the slope; ▪ Create vegetative cover to stabilize exposed areas; ▪ Timely regeneration of vegetation; ▪ Design of drainage channels; ▪ Use geotextiles to temporarily cover areas of land susceptible to erosion) ; ▪ Arrange settling pits on site. ▪ Roads with longitudinal and transverse drainage systems - Provide short-term solutions for slope stabilization, sediment control and subsidence control until long-term measures for the operational phase can be implemented such as ▪ - The slopes have steps to reduce the steepness of the slope. ▪ - Crushed stone, or stone material is spread along the slope surface, sometimes combined with planting trees. ▪ - Earth retaining structures, such as gabion revetments or other types of barriers and mesh structures, are often built against the slope. ▪ - Retaining walls, stronger engineering structures that are resistant to bending	- Law on Environmental Protection No. 72 / 2022 /QH1 4 - WBG EHS Guidelines on Construction and Demolition	Contractor	PPMU, CSC, DAE, local authorities and the community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	and have foundations designed to withstand pressure at the foot of the slope. - Reduce soil pollution ▪ Segregate or divert stormwater runoff to avoid mixing with water with high solids content, to minimize the amount of water that needs to be treated before discharge. ▪ Do not discharge solid and liquid waste onto cultivated land. ▪ Worker camps, material depots and fuel storage areas must be located sufficiently far from cultivated land. ▪ Conduct soil quality monitoring to ensure that construction activities do not adversely affect soil quality.			
Drainage and sedimentation management	- The Contractor shall comply with the detailed design of the wastewater system in the construction plan to prevent flooding or erosion of hillsides and unprotected areas due to rain and flooding, resulting in industrial waste affecting local water sources. - Domestic wastewater management: Eight mobile toilets with three-compartment septic tanks of approximately 15 m³ each (one toilet per construction site) will be installed at eight construction sites to collect all domestic wastewater generated by the Project. A contract will be signed with a licensed service provider for the regular collection, transportation, and treatment of the wastewater in accordance with regulations. Process: domestic wastewater → mobile toilet → pumping, transportation, and treatment by licensed service provider. - Construction wastewater management: A vehicle washing system and a collection trench system (dimensions: 0.5 x 0.5 m) will be constructed at the construction sites to collect construction wastewater, which will then be directed to an oil separation pit (approximately 1 x 1 x 1 m) and a sedimentation pit (approximately 1 x 1 x 1 m). After oil separation and sand settling, the water will be reused for moistening excavated soil during	- Law on Environmental Protection No. 72 / 2022 /QH13 - QCVN 08: 2023 / BTNMT – National technical regulation on surface water quality	Contractor	PMB, CSC, DAE, local government, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	transportation and for dust suppression at the construction sites. Oil scum will be collected and stored with hazardous waste. A licensed service provider will be contracted to collect, transport, and treat the waste together with other hazardous waste from the Project in compliance with regulations. Process: construction wastewater → collection trench → oil separation pit → sedimentation pit → reused for moistening excavated soil and dust suppression at the construction site. - Ensure that the wastewater system is free of sludge and other obstructions. - Ensure that the status quo of areas where construction is not taking place is maintained. - Carry out earthworks, cutting, and filling properly, comply with construction standards, including measures such as installing wastewater systems and planting trees. - To prevent waste from settling and negatively impacting water resources, a sediment management system should be installed to slow or divert waste and sediment until crop production can begin. Sediment management systems may include clearing canals, canal banks, waste collection basins, use of straw, stormwater infiltration protection systems, or fencing. - Drainage and water supply: In case of construction works that need to be carried out at water sources (e.g. building bridges, building retaining walls, preventing erosion), the area needs to be drained, ensuring dry conditions for construction. After settling, water pumped from the construction area must be discharged into the sediment management system for treatment before flowing into the water source. - Site -specific mitigation measures should be implemented in accordance with the ESMP when water diversion or dam construction is undertaken.			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
Flood control	- Periodically and completely remove soil, rocks and waste from drains in and around construction sites. - Collect materials and waste neatly to limit them from being washed away by rainwater. - Carry out leveling and compaction after dumping materials at the site. - Check the existing drainage system inside and around the construction and renovation site before backfilling to ensure rainwater drainage; - Store construction materials and waste at least 10m away from any existing drainage ditch or water source to minimize material entering the channel which may lead to sedimentation and blockage; - Prepare spare pump on site.		Contractor	PPMU, CSC, DAE and local authorities and the community
Natural disaster risk	- Each construction site needs to determine the common risks in its geographic area with a history of major storms or flooding. - Contractors should engage and discuss with local communities, and then develop emergency response plans to help mitigate the risks associated with these threats. - Construction site managers need to ensure that their team members are fully trained on the actions required in the event of a disaster. - The project owner will prepare an emergency response plan to help minimize the risk of environmental impacts and damage to property and structures when extreme natural disaster conditions occur (storms, floods). - Do not cut down trees or destroy vegetation outside the land acquisition area. - Do not encroach on the protective forest area outside the scope of land recovery for road construction.	- Law No. 33/2013/QH13 on natural disaster prevention and mitigation	Contractor	PPMU, CSC, DAE and local authorities and the community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- For locations that are prone to flooding, especially route 19C - Quy Nhon Port, construction should not be carried out during the rainy and flood seasons and in areas at risk of landslides such as: Pass of Lo Dieu, Phu Thu - Do not encroach or damage dike works. - With these steps, damage caused by natural disasters will be effectively limited and human life and property will be protected.			
Risks from raw material supply	**General reduction** - All materials supplied must meet the required specifications. - Pay attention to sensitive areas such as nature reserves, landscaped areas and areas near receiving waters or other areas near water sources. - The use of additional areas for storage, assembly or extraction of construction materials must be approved in advance by the construction engineer. - Where affected landowners temporarily requisition land for material storage, these landowners must be included in the project resettlement plan. **Minimize risks from raw materials** - Major suppliers must have a license to mine and transport materials. - Priority is given to hiring local workers. - Materials must be tested before construction. - Do not purchase materials from suppliers without environmental protection licenses.	- Law on Environmental Protection No. 72 / 2022 /QH1 4 - Law No. 60/2010/QH12 on Minerals Law	Contractor	PMB, CSC, DAE, local government, community
Labor management	- The minimum age for eligible workers is 18.	- Labor Law No. 45/2019/QH14	Contractor	PMB, CSC, DAE, local

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- The Contractor shall not use child labor or forced labor, including any work or service not performed voluntarily, which is exacted from an individual under the threat of force or punishment, and includes any type of involuntary or involuntary labor, such as indentured labor, bonded labor or similar forms of employment contracts. - To prevent the involvement of underage workers, all contracts must incorporate age-related terms of employment, including penalties for non-compliance. The contractor must maintain a list of contract workers and their ages. - The Contractor shall comply with the Labor Law 45/2019/QH14 dated November 20, 2019. - The contractor shall inform workers of their rights under the labor law. - The contractor will clearly explain the rights and obligations to all workers; respect the terms of the agreement. - The Contractor shall provide reasonable working conditions and terms of employment, which shall at a minimum comply with labor laws. - Workers' representatives will have access to management. - Unions are expected to represent the workforce to ensure fairness. - The Contractor shall establish a transparent process for workers to express concerns and file complaints, including anonymous complaints. - The Contractor shall ensure that there will be no retaliation or discrimination against complainants. - Management will take complaints seriously and take timely and appropriate action. - Any grievance mechanism is not a substitute for other channels provided by law or collective bargaining agreements.	dated November 20, 2019 - Decree No. 145/2020/ND-CP dated December 14, 2020 of the Government detailing and guiding the implementation of a number of articles of the Labor Code No. 45/2019/QH14 - ESS2		government, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- The employment of workers in the project will be based on the principles of gender equality and non-discrimination on the basis of gender in recruitment, conditions of employment (including employment, wages and benefits), termination of contracts and access to training. - To address the risk of excluding vulnerable groups (such as women and people with disabilities) from employment opportunities, Contractors are required to recruit these groups into the unskilled workforce. - Contractors will be required to comply with workplace gender equality requirements, including adequate and appropriate maternity and paternity leave; and toilet facilities must be segregated between men and women. - Contractors will also be required to address potential issues of sexual exploitation or harassment when recruiting or retaining skilled or unskilled female workers to support the project.			
Key Supply Workers Risks	**Selection of key suppliers.** When sourcing construction materials from key suppliers, the contractor will require those suppliers to identify the risk of child labor/forced labor and safety risks in the production of construction materials. The PPMU and construction supervision consultants will review and approve the purchase of key materials from suppliers after identifying/assessing such risks and any other relevant due diligence (such as reviewing material extraction permits). The contractor will be required to include specific requirements on child labor/forced labor and occupational safety issues in all purchase orders and contracts with key suppliers. **Remediation Procedures.** If child labor/forced labor and/or serious safety incidents involving key subproject suppliers are identified, the PPMU and construction supervision consultants will request the contractor to request their key suppliers to take appropriate remedial steps. Such mitigation measures will be periodically monitored to determine their effectiveness. Where mitigation measures are found to be ineffective, the PPMU will, within a reasonable time, replace the key subproject	- Labor Law No. 45/2019/QH14 dated November 20, 2019 - Decree No. 145/2020/ND-CP dated December 14, 2020 of the Government detailing and guiding the implementation of a number of articles	Contractor	PMB, CSC, DAE, local government, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	suppliers with suppliers who can demonstrate that they are meeting the relevant requirements.	of the Labor Code No. 45/2019/QH14 - ESS2		
Waste Management	The Contractor shall prepare a Waste Management Plan as part of the C-ESMP for approval by CSC prior to commencement of construction activities with detailed measures as follows: **<u>Domestic wastewater management:</u>** - Consider hiring local labor to minimize household wastewater. - The Contractor shall be responsible for complying with relevant Vietnamese regulations on discharge of wastewater into the surrounding environment. - Portable toilets or on-site toilets must be provided for construction workers. - For construction sites with construction camps, at these locations, the Project Owner installs mobile toilets with 3-compartment septic tanks with a capacity of about 15 m3 to collect all domestic wastewater (each construction site has 1 toilet at the camp location). The Project Owner contracts with a competent unit to periodically collect, transport, and treat according to regulations. - Workers rent local houses for workers to live in (road construction area), then the domestic wastewater generated will be treated by the septic tank system of the houses. The project owner needs to choose housing areas with good auxiliary works that meet the requirements. The project owner periodically hires a unit with the function of collecting, transporting, and treating - When septic systems are the chosen form of wastewater treatment, they must: - Properly designed and installed in accordance with local regulations and guidelines to prevent any risk to public health or contamination of soil, surface or groundwater - Well maintained to allow efficient operation	- Law on Environmental Protection No. 72 / 2022 /QH1 4 - QCVN 14:2008/BTNMT: National technical regulation on domestic wastewater; - QCVN 40: 2011/ BTNMT: National technical regulation on industrial wastewater - Decree 08/2022/ND-CP on guidelines for environmental protection law - Circular No. 02/2022/TT-BTNMT dated January 10, 2022 of	Contractor	PMB, CSC, DAE, local government, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Installed in areas with stable, nearly flat, well-drained soil. - Domestic wastewater from collection tanks and septic tanks will be safely treated by Binh Dinh Urban Environment Company (URENCO) through the centralized urban wastewater treatment system in Quy Nhon city, invested and put into operation in 2014. Wastewater will be treated at Nhon Binh Wastewater Treatment Plant (capacity 14,000m3 / day and night) and Wastewater Treatment Plant 2A (capacity 2,350m3 / day and night) before being discharged into receiving sources according to regulations. - Wastewater from kitchens, bathrooms, and sinks from worker camps must be collected and treated before being discharged into the local stormwater drainage system. **<u>Construction wastewater management:</u>** - Do not wash your car near water. - Car wash bridges are located at the construction site of the bridges and have a collection ditch system (size 0.5 x 0.5m) to collect all car wash wastewater at the construction site. All car wash wastewater and construction equipment are collected into the drainage system. - On this system, there is 01 oil separation pit (1x1x1m) and 01 settling pit (1x1x1m). The washing water after being separated from oil and settling sand is used to moisten the public road and sprinkle water to suppress dust on the construction site; Oil slick is collected and stored with hazardous waste. Contract with the functional unit to collect, transport, and treat with other hazardous waste of the Project according to regulations. - Cement mixing stations must be installed at least 50m away from water sources. Wastewater from cement mixing stations must be collected in settling ponds for treatment before being discharged into the internal drainage system.	the Ministry of Natural Resources and Environment - QCVN 07:2009/BTNMT – National Technical Regulation on Allowable Limits for Hazardous Wastes. - WBG EHS Guidelines for Construction and Demolition - ESS3		

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Where necessary, testing should be conducted to ensure that wastewater quality meets national standards. - Management process: Construction wastewater →collection ditch (0.5x0.5m), →oil separation pit (1x1x1m), →settling pit (1x1x1m) →used to moisten waste soil materials during transportation and watering to suppress dust at the construction site. **Rainwater runoff:** - construction wastewater to reduce the amount of wastewater that needs to be treated before discharge. - Plan construction properly, avoid excavation activities during the rainy season. - In the case of excavation and earthworks at locations near water sources (for example: bridge construction areas on Truong Uc River, Dinh River, Cay Me River, water areas of Cong Luong Bridge, Ha Ra Bridge, sections of routes near natural drainage areas...), when it rains, waste materials and raw materials will be covered with tarpaulin to avoid being washed away. - The location of worker camps, material storage areas, and material loading and unloading activities must not be located close to surface water sources to avoid spillage of waste or materials into rivers. - Check the condition of equipment and vehicles, do not use vehicles with oil leaks to avoid rainwater washing into water sources, especially in areas near Dinh River, Ha Thanh River, Truong Uc River, Cay Me River, Cong Luong Bridge water area, Ha Ra Bridge. - Do not store fuel such as oil, gasoline, etc. at all construction sites. - At the construction site camp area, arrange enough trash bins to store trash, avoiding rainwater from washing it away.			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	Monitor
	- Waste temporarily stored on the construction site must be removed as soon as possible (within 1-2 days). - Do not clean construction equipment near water bodies to avoid oil from entering and polluting the water environment. - At each construction site, a temporary drainage system is built: rainwater overflows into àa 0.5x0.5m drainage ditch and a 1x1x1(m) àenvironmental settling pit. - Regularly dredge and clear the surrounding drainage system after each heavy rain. - Sludge from stormwater catchments may contain high levels of contaminants and must be disposed of in accordance with local regulations. **Domestic solid waste management:** - For domestic solid waste: 2 to 3 bins of 500 liters each will be installed at each construction site (4 sites along the National Highway 19C – Quy Nhon Port route and 4 sites along the My Thanh – Lai Giang coastal road). This ensures the full collection of domestic solid waste generated at the sites. The project owner will contract a licensed service provider to collect and treat the waste in accordance with relevant regulations. - Prior to construction, all necessary waste disposal permits or licenses must be obtained. - The investor will sign a contract for collection and periodic transportation with a local competent unit to handle domestic waste once a day. - Domestic solid waste generated at the facility is managed according to the following steps: (i) classification, reuse and recycling, (ii) storage in trash bins and (iii) transportation to local landfills/treatment sites under contract with Binh Dinh Urban Environment Company.			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Trash bins must meet the requirements of QCVN 07:2010/BXD of the Ministry of Construction with the following technical parameters: (i) the volume of the trash bin must be at least 100 liters and not more than 1m3; (ii) have a tight lid ; (ii) waste must not be kept in the trash bin for more than 48 hours; and (iii) the trash bin must be cleaned daily. - The investor strictly prohibits the following actions: i) burning, burying, dumping solid waste on site; ii) Disposing of solid waste into canals, ditches, rivers, streams, fields as well as public areas is strictly prohibited. **Construction solid waste management:** - Contractors shall endeavour to minimise construction waste, solid waste and separate collection, reuse of these wastes such as site levelling. - Construction solid waste (unusable cement bags, contaminated soil and other unusable waste) is sorted at the construction site for disposal at local landfills. Scrap wood, steel and used cement bags are sorted for maximum reuse or recycling, otherwise disposed at local landfills. The remaining waste, including clean soil and debris from demolition activities, is used for landfill at the construction sites, or collected, transported and disposed by Urenco Binh Dinh. - Precautions such as tarpaulins will be used to cover waste materials during transportation to the disposal site to avoid spillage on the road. - Burning of waste (both domestic and construction waste) must be strictly prohibited. - Prior to construction, the project owner shall prepare a solid waste control procedure as part of the Construction Site Environmental Management Plan (C-ESMP) (including: storage, provision of containers, site cleaning schedule, etc.) and shall strictly comply during construction activities. - Excess soil and rock mass is transported to designated materials storage sites. agreed to be used for leveling the ground. In which, the amount of soil and			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	rock Coconut shells make up the majority of the volume poured at the bottom, organic soil Part of the area will be used for planting trees, the rest will be covered over 4 material storage site in My Duc and Hoai My communes. The remaining 5 material storage site will only be filled with excess soil and rocks. After leveling the ground, these material storage site areas will be handed over to the local authorities (commune-level authorities) for management and use. - Arrange construction waste containers on the construction site (2 500l containers/site in each construction site area) to contain small sized items such as discarded packaging, iron pieces, broken bricks, etc. - At the end of the construction session, the project owner will clean up the site and collect scattered materials. - Soil mixed with bentonite and spilled bentonite from the construction of bridge substructures will be collected and temporarily stored at designated storage areas located near the construction sites of bridges (Truong Uc Bridge, Dinh River Overpass, Ha Ra Bridge, and Cong Luong Bridge) within the Project implementation area. Each storage site will have dimensions of approximately (3 x 3 x 0.5) meters, with the base and sides lined with geotextile fabric. The project owner will engage a licensed unit to collect and treat bentonite throughout the bridge construction process. - Construction-related scattered waste generated from construction activities, material handling, and transport on site—such as broken bricks, sand, and concrete debris—will be collected and disposed of in accordance with regulations by a licensed service provider under contract with the project owner. - Excavated soil and rock will be reused for embankment filling; any excess will be temporarily stored within the Project area before being transported to designated materials storage sites approved by local authorities. These disposal activities will comply with the requirements of Decree No. 08/2022/ND-CP			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	dated January 10, 2022, and Circular No. 08/2017/TT-BXD dated May 16, 2017, of the Ministry of Construction regarding the management of construction solid waste. - Environmental protection requirements: The collection and treatment of general solid waste generated during Project implementation must meet safety and environmental hygiene standards as prescribed by the Law on Environmental Protection 2020 and Decree No. 08/2022/ND-CP dated January 10, 2022, of the Government detailing the implementation of several articles of the Law on Environmental Protection. **For bentonite spills:** - When constructing bored piles, standard bentonite will be used to avoid the need for additional additives. - Arrange the dike to prevent bentonite from leaking out into the surrounding area. - Handling of soil mixed with bentonite and bentonite spills: collect all soil mixed with bentonite and bentonite spills from the construction of the lower part of the bridge into temporary storage areas located at the construction areas of the bridges (Truong Uc bridge, Dinh river crossing bridge, Ha Ra bridge, Cong Luong bridge) within the scope of the Project. The storage area is about 3x3x0.5 (m) in size, lined with stone and lined with geotextile to avoid spilling into surrounding areas. Hire a unit with the function of collecting and handling bentonite spills during the bridge construction process. After completing the project, the geotextile layer will be collected and the site will be filled. **Hazardous waste management:** **(a) Storage of hazardous waste** - All hazardous waste generated during the construction phase shall be collected and stored in specialized containers with a capacity of approximately 500 liters (about			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	02 containers per construction site), ensuring safe storage without spillage. Hazardous waste shall be kept in temporary hazardous waste storage facilities at each construction site along the route (each facility having an area of about 10 m²), equipped with roofing and warning signs in accordance with regulations. The project owner shall contract a licensed unit to collect and treat the hazardous waste as required by law. Upon completion of construction, the project owner shall dismantle the temporary storage facilities and restore the site. Hazardous waste must be stored in a manner that prevents or controls release into the environment: - Waste is stored in a manner that prevents mixing or contact between incompatible wastes and allows inspection between containers to monitor for leaks or spills.. - The storage facility must be constructed of materials suitable for the waste to be contained and of sufficient strength to prevent loss to the environment. - Collect and temporarily store waste oil, grease, oily rags, batteries in specialized containers with a capacity of about 500L (arrange about 2 containers/construction site) and place them in a storage area of about 10m2 in the camp area at construction sites ensuring: i) a roof; ii) a floor made of waterproof concrete; iii) barriers around to prevent spills ; iv) away from water bodies and areas with high risk of fire and explosion. After completing construction, these storage areas will be dismantled by the project owner and treated as normal solid waste. - weekly statistical reports and inventories of hazardous waste at the construction site ; - Gasoline: Do not store on site. - All hazardous waste containers are in good condition and properly labeled. - not perform maintenance (oil and filter changes) on site or outside of designated areas.			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Safety training programs will be conducted to help workers recognize and respond to chemical hazards in the workplace. - Provide adequate ventilation where volatile waste is stored. **(b) Transportation of hazardous waste** - On-site and off-site waste transportation must be conducted to prevent or minimize spills, releases and exposure to waste to employees and the public. - All waste containers used for off-site transport must be secured and labelled with the contents and associated hazards, properly loaded onto a transport vehicle prior to leaving the site and must be accompanied by transport documentation (e.g. a cargo manifest) describing the consignment and associated hazards, in accordance with the instructions. **(c) Hazardous waste treatment** - The project owner signs a contract with a unit that has the function of transporting and treating these types of waste. The contractor must obtain the necessary treatment certificate. - Hazardous waste disposal must be performed and handled by professionally trained and certified workers. - Used oil, lubricants, cleaning materials, etc. from vehicle and machinery maintenance will be collected in holding tanks and removed from site by a dedicated oil recycling company for disposal at an approved hazardous waste disposal site. - Unused or discarded asphalt or bitumen products will be returned to the supplier's manufacturing plant.			
Hazardous Materials Management	**Hazardous Materials Transfer**	- Law on Environmental	Contractor	PPMU, CSC, DAE, local

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Use specialized fittings, pipes, and hoses specifically designed for the materials in the tank and maintain procedures to prevent the improper addition of hazardous materials to the tank. - Use conveying equipment that is compatible and suitable for the properties of the material being conveyed and designed to ensure safe conveying. - Regularly check, maintain and repair accessories and pipes - Provide secondary containment, drip trays, or other spill and drip containment measures for hazardous material containers at connection points or other potential spill points. - Develop written procedures for transfer operations that include a checklist of measures to be followed during filling and employ filling personnel trained in these procedures. - Install a gauge on the tank to measure the volume inside. - Equip automatic shut-off valves on tanks to prevent overfilling. - Use a catch basin around the filler pipe to catch spills. - Use pipe connections with automatic overflow protection (float valve). - Pump less fuel than the tank can hold. **Fire and explosion prevention** - Store incompatible materials (acids, bases, flammables, oxidizers, reactive chemicals) in separate areas and partition material storage areas. - Provide storage for extremely hazardous or reactive materials. - Equip fire alarms, fire prevention devices, and fire extinguishers in storage areas.	Protection No. 72 / 2022 /QH1 4 - Decree 08/2022/ND-CP on guidelines for environmental protection law - Circular No. 02/2022/TT-BTNMT dated January 10, 2022 of the Ministry of Natural Resources and Environment - WBG EHS Guidelines on Construction and Demolition - ESS3		government, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	Monitor
	- Provide grounding and lightning protection systems for storage tanks, transfer stations and flammable material handling equipment. - Select construction materials compatible with the product stored in all parts of the storage and distribution system, avoiding reusing tanks for different products without testing material compatibility. - Storage areas must be located on impervious, easily cleanable surfaces with drainage channels around them to prevent spillage or leakage. Storage areas must be covered to prevent rainwater from seeping through. - Prohibit all sources of ignition in the vicinity of flammable tanks. **Hazardous materials management training programs should include** - List of employees needing training. - Specific training objectives. - Mechanisms to achieve the goal (e.g. hands-on workshops, videos, etc.). - A means of determining whether a training program is effective or not. - Training process for new employees and refresher courses for current employees. **Community engagement and awareness** - Provide general information to potentially affected communities as well as the prevention and control measures in place to ensure no impact on human health. - The potential for adverse effects on human health or the environment when there is a risk of an accident with a hazardous substance. - Specific and timely information on appropriate actions and safety measures to be taken in the event of an accident - DONRE must be promptly notified of any incident or spill.			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Prepare a plan to respond to and remedy hazardous waste leaks (such as oil or gasoline leaks). - In case of accidental diesel leakage, the investor will take action. ▪ Immediately check if anyone is injured and then notify the Contractor(s), Supervising Engineer and the PMU ; ▪ Assess the extent and impact of the leak; ▪ Arrange for personnel with appropriate protective equipment to clean up the spilled hazardous waste. Sawdust may be used (if the spill / leak is small), or sandbags (if the spill is large); and/or a shovel may be used to remove topsoil (if the spill/leak occurs on bare ground) ; and ▪ Prepare an incident report detailing the incident, corrective actions taken, any contamination issues and recommend measures to prevent similar incidents from occurring in the future. The report will be kept on file. The incident report will also be submitted to the DAE, if requested.			
Traffic safety management	- The Contractor must strictly comply with the Road Traffic Law. - Apply best traffic safety measures in all aspects of subproject activities with the aim of preventing traffic accidents and minimizing injuries to subproject staff and the public. Measures should include: - A construction organization plan shall be developed, including traffic zoning and routing arrangements to ensure road traffic safety, and implemented in accordance with applicable regulations. Personnel shall be assigned to coordinate with local traffic police to guide traffic flow at construction sites throughout the construction period. - Warning signs, traffic diversion signs, and public announcements shall be installed and broadcast via mass media to inform road users about the construction activities. Lighting systems, speed limits, load restrictions, safe distance indicators, guidance	- Law on road traffic order and safety No. 36 / 2024 / QH15 ; - WBG EHS Guidelines for Construction and Demolition	Contractor	PPMU, CSC, DAE and local authorities and the community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	signs, and other traffic safety systems shall be installed in appropriate and visible locations as required. - Temporary roads shall be arranged in cases where construction activities affect access to local residents' agricultural production areas. - Emphasize safety aspects for drivers. - Improve driving skills and apply for a driver's license. - Apply trip time limits and schedule your driving to avoid fatigue. - Avoid dangerous routes and times of day to reduce the risk of accidents. - Use speed control devices on trucks and remotely monitor driver actions. - Regular vehicle maintenance and use of manufacturer-approved parts can help reduce the risk of serious accidents due to equipment malfunction or failure. - Minimize collisions between pedestrians and construction vehicles. - Post construction site signs on roads near schools or other locations where children may be present. - Coordinate with emergency response personnel to ensure appropriate first aid is administered in the event of an accident. - Use local materials, whenever possible, to minimize transportation distances. - The project owner will establish a traffic management plan approved by the traffic management agency before starting construction of traffic routes. - Construction will be carried out in sections. For construction routes on existing roads, the project owner will construct each half of the road to ensure traffic. For sections with limited space, the project owner will arrange detours and guide signs to ensure uninterrupted traffic.			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	Monitor
	- Coordinate with local authorities to implement traffic diversion plans to avoid inconvenience to road users, ensure smooth traffic, avoid or minimize accidents and traffic jams during coastal road construction. - For route 19C - Quy Nhon Port: set up construction site fences according to construction sections. - Limit speed when passing through construction areas to 5km/h - Install and maintain signs, fences, and traffic lights to ensure traffic safety. - Arrange and provide safe and easy alternative access routes for pedestrians especially in areas near schools, markets, households, and shrimp farming areas of local people. - Assign traffic controllers at all construction sites - Cover materials carefully on transport vehicles. Do not stack more than 10cm higher than the truck bed to avoid spilling materials onto the road, causing dust and danger to passersby. - Collect soil and spilled materials at the construction site daily to avoid slippery conditions for vehicles. - Install lighting at night in road construction areas to prevent accidents for traffic participants. - Limit transportation of construction materials during peak hours and use only properly registered vehicles. - To mitigate the risks of traffic congestion and ensure road safety within the scope of the My Thanh – Lai Giang road, which involves the upgrading of approximately 29.44 km of the existing road, the contractor shall implement segmented construction to maintain partial road access, install clear signage and traffic diversion plans, provide adequate barriers and warning lights at construction zones,			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	and coordinate with local authorities to manage traffic flow effectively. Regular communication with the public and timely updates on construction schedules will also help minimize disruptions.			
Impact on the surrounding area	- Carefully study the existing landscape in the area. - Conduct meaningful consultations with relevant authorities, local authorities and residents on the significance of the area's landscape, including environmental, cultural, economic and social aspects. - Announce landscape design options to local authorities and residents. - No gathering of materials, equipment, or construction of temporary camps shall be allowed near riverbanks. - Construction activities must be strictly monitored to ensure they are conducted within the approved boundaries and limits. Supervision shall be strengthened to prevent workers from leveling soil into rice fields, ponds, or cultivated land, especially in areas adjacent to farmland, orchards, and aquaculture ponds. Environmental restoration and riverbed clearance in the Project area shall be carried out immediately after construction is completed. - Only implement approved solutions to change the landscape in the area. - Ensure the harmony of the landscape before and after road construction. - Landscape design must ensure the following aspects: ▪ Identify some urban architectural spatial forms with outstanding characteristics, values in terms of space, architecture and urban landscape, reflecting the historical socio-economic development process, architecture in each period contributing to creating a unique identity for the city. ▪ Identify conservation areas, areas with valuable structures, conservation orientation, zoning according to control and protection levels; regulations on	- Law on Environmental Protection No. 72 / 2020 /QH1 4	Contractor	PMB, CSC, Binh Dinh DAE, local government, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	areas allowed for development (regulations on management, conservation, promotion of area values such as culture, space, architecture, landscape, and appropriate urban amenities). ▪ General architectural and landscape orientation for the entire rural residential area. ▪ The required content of indigenous cultural identity is determined on the basis of characteristics and typical features of local culture; characteristics of natural conditions, economy, culture, customs, practices, traditional architectural values of the locality; use of traditional materials and techniques. - Do not dig or cut down trees outside the construction area; - Fully implement measures for solid waste management, hazardous waste management, and wastewater management ; - Do not encroach or gather construction materials or waste in areas outside the construction site without permission, and do not gather near areas such as schools, pagodas, or churches. - Collect and transport excavation materials and construction waste to Disposal site within 24 hours; - Clean the construction site daily after each construction session; - Vehicles entering and leaving the construction site will be washed to prevent dust from spreading onto the road. - Restoration of environment after construction: ▪ Remove all camps, toilets (if any), collect excess materials such as soil, hardened cement on site, oil tanks, discarded machine parts and barricading materials. ▪ The project owner will proceed to demolish, collect and transport all remaining construction materials out of the project area, clear the flow of canals, clean up steel, wood, planks, and rocks that have fallen into irrigation canals as before construction. ▪ Infrastructure restoration: Local traffic routes and other infrastructure works			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	affected by project construction activities will be restored or compensated for damage by the Project Owner according to the commitment with the locality before handing over the project. ▪ For the area temporarily recovered to make public roads: clean up and restore the original condition as before construction. ▪ Bridge construction area: carry out riverbed clearance, obstacle clearance, garbage collection in the construction area ▪ The types of waste collected during this process will be transported and processed by the investor according to regulations. The waste will be transported immediately and not stored. Environmental restoration work will be carried out immediately after the completion of construction with inspection by local authorities and representatives of local people.			
Resource usage	- Use high energy efficiency equipment and machinery designed and manufactured according to national and international standards on energy efficiency approved by competent authorities. - Apply standards, technical regulations and norms on energy saving and efficiency in construction works. - Use water wisely and for the right purposes. - Have a plan to gradually replace and eliminate outdated, energy-consuming machinery and equipment. - Increase the use of circulating water and water reuse; store rainwater for use. - Apply water-saving and efficient solutions during design and construction.	- Law on Environmental Protection No. 72 / 2020 /QH1 4 - Law on Energy Saving and Efficiency No. 50/2010/QH12 - Law on Water Resources No. 28/2023/QH15 - ESS3	Contractor	PPMU, CSC, Binh Dinh DAE, local government, community
Disruption of terrestrial vegetation and	- The Contractor shall prepare a Site Clearance, Restoration and Re-vegetation Management Plan in accordance with relevant regulations for prior approval by the Construction Engineer. The Site Clearance Plan shall be approved by the	- Law on Environmental Protection No. 72 /	Contractor	PPMU, CSC, Binh Dinh DAE, local

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
ecological resources	Construction Supervision Consultant and the Contractor shall strictly comply with this plan. The number of areas requiring site clearance shall be kept to a minimum. - The Contractor shall maintain the topsoil of all areas where the topsoil will be affected by the Site Clearance Works, including temporary measures such as storage and piling, etc.; the removed topsoil shall be collected in an area agreed with the Construction Supervision Consultant for use in future re-vegetation work and shall be protected. - Prohibit the use of chemicals in vegetation clearance. - Tree cutting is prohibited unless permitted in a vegetation clearance plan. - Erect temporary protective fencing to protect any remaining vegetation if necessary prior to commencing work at the site. - Do not encroach on important ecological resource areas unless permitted by the Construction Supervision Consultant, who shall consult with the PMB, the Independent Environmental Monitoring Consultant (IEMC) and relevant authorities. These areas include areas for bird and animal breeding, fish farming, or areas protected as green spaces. - The Contractor shall ensure that no hunting, trapping, poisoning of fauna or flora shall take place.	2022 /QH1 4 - Law on Biodiversity No. 20/2008/QH12 - ESS6		government, community
Water pollution	- Construction materials must be properly stored to avoid spillage into water sources. - Discharge of any waste into water sources is strictly prohibited. - Set up a temporary drainage system with a settling pit to hold overflow water before discharging it into water sources. - Avoid excavation activities to depths where shallow groundwater aquifers occur.	- Law on Environmental Protection No. 72 / 2020 /QH1 4 - QCVN 08:20 23 /BTNMT – National technical regulation on	Contractor	PPMU, CSC

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Boreholes must be closely managed to prevent the ingress of contaminants from runoff. - Regularly monitor water quality during construction to take timely remedial measures. - scattered materials during the construction of the upper part of the bridge such as mortar scraps, concrete residue, excess steel... into 500l containers at the end of the day and then transfer the containers to the camp (Arrange 2 containers/construction site). The project owner will hire a functional unit to transport and treat them as normal solid waste. - Clearing the riverbed after the end of construction: clearing all temporary structures including steel, enclosures, excess concrete and stabilizing the riverbed and banks to their original state using equipment such as excavators, buckets, cranes... The waste after clearance will be transported and treated by the project owner according to regulations.	surface water quality - QCVN 09: 20 23 /BTNMT – National technical regulation on groundwater quality - ESS3		
Disruption of existing service infrastructure	- Planned and unplanned disruptions to water, electricity and telecommunications services: The Contractor shall conduct prior consultation and contingency planning with local authorities and residents regarding the consequences of loss or disconnection of specific services. - Coordinate with relevant utility providers to establish appropriate construction schedules. - Provide affected households with information about work schedules and expected disruptions (at least 5 days in advance). - The Contractor shall ensure an alternative water supply to affected residents in the event of a water outage lasting more than one day.	- Decree No. 144/2021/ND-CP on administrative sanctions related to security, social order/safety; prevent and control social evils, fire prevention and fighting; rescue; prevention and control of domestic violence	Contractor	PPMU, CSC, Binh Dinh DAE, local government, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Any damage to existing utility systems must be reported to authorities and repaired as soon as possible. - Use low-vibration equipment when working near dike projects, and limit the use of multiple devices at the same time. - Construction only carried out within the land acquisition area	- ESS4		
Aquaculture and agricultural production	- Notify facility owners and farmers of construction plans at least three months before construction activities begin. - Arrange drainage ditches around the construction site to prevent soil erosion and sedimentation into aquaculture ponds, rice fields and neighboring irrigation canals. - Regularly check irrigation channels in the fields to ensure they are not blocked by rocks or construction waste and if affected, provide alternative irrigation water from the channels to locations requested by local people. - Immediately restore irrigation canals and internal roads if they are damaged due to construction activities to ensure water supply to rice fields and farmers' travel are maintained. - During construction, the investor will arrange temporary roads for people to access their production area. - Gather construction materials and waste at least 100m away from shrimp ponds and fertile soil. - Collect and transport waste away from construction site daily. - Close consultation with local authorities and communities to ensure appropriate solutions to problems and satisfactory resolution of farmers' concerns related to construction activities. - Compensation for damage to production activities.	- Law on Environmental Protection No. 72 / 2020 /QH1 4	Contractor	PMB, CSC, Binh Dinh DAE, Department of Agriculture and Rural Development, local government, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
Community division	- Inform the community of construction time and schedule through community consultation or any local people meetings and notice boards. - Provide safe and easy access to homes, shops, offices, schools by installing thick and sturdy wooden boards or steel plates over open ditches for all affected households. - Temporary access roads shall be arranged in cases where road construction affects access to local agricultural production areas. - Place signs near construction sites to direct and guide all households living along construction routes. - Restore access to affected households after completion of construction items in sections requiring excavation and embankment. - Conduct consultations with local authorities and residents on road design options. - Taking into account the movement of local people during the road design stage. - Place signs near construction sites to guide traffic to all households living along roads under construction. - Carry out construction in sections of 1-2 km and immediately restore traffic conditions and entrances to affected households / offices upon completion of each section. - Instructions for traffic regulation to other alternative routes in the area	- Road Traffic Law No. 36/2024/QH15 - Decree No. 144/2021/ND-CP on administrative sanctions related to security, social order and safety; prevention and control of social evils, fire prevention and fighting; rescue; prevention of domestic violence - ESS4	Contractor	PMB, CSC, Binh Dinh Department of Transport, local government, community
Labor camp management	**A. Housing standards for workers** **a.1 National/local standards** - Relevant national and local regulations must be complied with. **a.2 Common living facilities**	- Law on Environmental Protection No. 72 / 2020 / QH14	Contractor	PMB, CSC

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Workers' camps will be built on temporary land acquired by the project or on cleared land. - Shelters must be located away from construction material gathering areas, fuel depots, waste depots, sewage channels, water sources, cultivated land, sensitive locations such as schools, hospitals, churches, pagodas, temples and other dangerous areas such as landslides, land subsidence and erosion. - If possible, the camp should be located at a reasonable distance from the work site. - Safe travel from home to work - The construction area is adequately drained to avoid water stagnation. - Provide suitable living facilities in the camp area. - Provide and maintain natural and artificial lighting in the camp, preferably with window area of not less than 5% to 10% of the floor area. - Provide adequate domestic water supply, meeting national standards. - All drinking water tanks are constructed and covered to prevent the water contained therein from becoming polluted or contaminated. - Wastewater must be collected and pre-treated before being discharged into the environment, complying with local or World Bank standards and not causing any significant impact on workers, the environment or the surrounding community. - Refuse containers are provided and emptied regularly. Standards range from providing an adequate number of receptacles to providing leak-proof, waterproof, rust-proof and corrosion-proof containers that are protected from insects and rodents. In addition, receptacles must be located 30 meters from the camp on wooden, metal or concrete supports. Refuse is collected, transported and disposed	- Labor Law No. 10/2012/QH13 - Decree No. 144/2021/ND-CP on administrative sanctions in the fields of security, social order and safety; prevention and control of social evils, fire prevention and fighting; rescue; prevention and control of domestic violence - Workers' Accommodation: Processes and Standards (IFC and EBRD)		

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	Monitor
	of according to the local collection system to avoid unpleasant odors associated with decomposing organic materials. - Pest control, mosquito control and disinfection are carried out in all living facilities according to local requirements. **a.3 Camp area amenities** - The camp must be set up firmly and solidly. - Toilets are provided separately for men and women. - The density standard per person is 10 to 12.5 cubic meters (volume) or 4 to 5.5 square meters (surface). - Minimum ceiling height is 2.10 meters. - Standards range from 2 to 8 workers/room - All doors and windows must have locks and mosquito nets must be provided where required. - There should be movable partitions or curtains to ensure privacy. - Provide full household items. - Men and women have separate sleeping areas. - Each worker is provided with a separate bed, with a minimum distance of 1 meter between beds. - Double-decker bunk beds are not recommended for fire safety and hygiene reasons, and their use is minimized. When used, there must be sufficient free space between the lower and upper bunks of the bed. Standards range from 0.7 to 1.10 meters. - It may be necessary to provide separate storage areas for safety shoes and other personal protective equipment.			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	Monitor
	- Equip first aid kit, fire extinguisher **a4. Toilet area** - Toilets are cleaned regularly and always in good working condition, ensuring privacy, no shared toilets and bathrooms between men and women. - Provide enough toilets for workers: 6-15 people/toilet. - Toilets are conveniently located and accessible, about 60m from the camp, well lit, ventilated, with adequate sinks. - The bathroom/shower floor is made of hard, non-slip material. - Bathroom/shower is fully equipped with hot and cold water. **a.5 Dining, cooking and laundry** - The dining room, cooking area and laundry are built of suitable and easy to clean materials. - The dining room, cooking and laundry areas are always clean and hygienic, fully equipped with necessary utensils and equipment. - Food preparation areas are designed to ensure good food hygiene, including protection against contamination during and between food preparation operations. - The kitchen is equipped with full personal hygiene facilities. - The wall surface adjacent to the cooking area is made of fire-resistant material. The food preparation table is also equipped with a smooth, durable, washable surface. - All kitchen floors, ceilings and wall surfaces adjacent to or above preparation and cooking areas are constructed of durable, waterproof, easy-to-clean and non-toxic materials.			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Have adequate facilities for cleaning, disinfecting and maintaining cooking utensils and equipment. - Food scraps and other waste should be kept in tightly covered containers and removed from the kitchen regularly to avoid build-up. **a.6 Nutrition and food safety standards** - Apply the WHO's 5 principles (keep clean; separate raw and cooked foods; cook thoroughly; keep food at safe temperatures; use safe water and ingredients) to ensure safer food or adopt an equivalent process. - Food provided to workers is nutritionally appropriate and takes into account religious/cultural background; different food options will be served if workers have different cultural/religious backgrounds. **a.7 Medical facilities** - Have a number of first aid kits available to suit the number of workers. - Have the phone number of the nearest medical facility. - Workers are trained in first aid before construction. **a.8 Entertainment, social and telecommunications facilities** - Use locally available services. - The camp area can be equipped with some common television and radio equipment. **B. Management and Staff** - Have specific management plans and policies in the areas of health and safety (with emergency response), security, workers' rights, community relations - A qualified and experienced person shall be appointed to manage the accommodation for the workers. - If using contractors, there must be clear contract management responsibilities and monitoring and reporting requirements.			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	Monitor
	- Labour may be recruited from the local community for cleaning, cooking and general maintenance work. - Staff have received basic health and safety training. **C. Accommodation and service fees** - When collecting fees, workers are provided with clear information and detailed descriptions of all payments such as rent, deposits and other fees. - Where company housing is considered part of an employee's salary, it is best practice for the employee to be provided with an employment contract that sets out the terms and arrangements for housing, in particular rules relating to payment and fees, facilities and services provided, and notice rules. - When it comes to fees, rental arrangements are fair and only represent a small percentage of the worker's income. - Food and other services are either free or reasonably priced, not higher than local market prices. - The provision of accommodation or other services by an employer as a form of remuneration for work is prohibited. **D. Health and Safety at Construction Site** - Health and safety management plans covering electrical safety, equipment operation, disease prevention and food safety need to be carefully designed and implemented. - It is the duty of the site manager to report to the health authorities any outbreak of infectious diseases, food poisoning and other serious injuries. - Have a fire prevention plan that includes training for fire personnel, regular inspection and monitoring of fire prevention equipment, and regular drills.			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	Monitor
	- Guidance on the harmful effects of alcohol, drug and other potentially harmful substance abuse and risks associated with HIV/AIDS and other health risks is provided to workers. Develop a clear policy on this issue. - Workers have access to adequate preventive measures such as contraception (especially condoms) and mosquito nets. - Workers should have easy access to medical facilities and medical staff. If possible, female doctors/nurses should be provided for female workers. - Health, safety and fire emergency plans are established. Depending on the local context, additional emergency plans are established as necessary to deal with specific incidents (earthquakes, floods, tornadoes). **E. Security of workers' accommodation** - There are clear measures to ensure security of the construction site area, for workers such as arranging 24/7 security. - Security staff are screened to ensure they have no previous involvement in crime or abuse. Where appropriate, security staff of both sexes will be recruited. - Security personnel have clear duties and have received clear instructions on their duties and responsibilities, especially the duty not to harass, intimidate or discriminate against workers - Security staff are fully trained in how to handle domestic violence and use of force. - Security personnel understand the importance of respecting workers' rights and the rights of the community. - Body searches are permitted only in specific circumstances and are conducted by specially trained security personnel using the least intrusive measures possible. Body searches of female workers may only be conducted by female security personnel.			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Security personnel behave appropriately towards employees and the community. - Workers and surrounding community members have convenient ways to voice concerns about safety and staffing issues. **F. Workers' rights, housing regulations for workers** - Restrictions on workers' freedom of movement to and from the site should be limited and in appropriate circumstances or on the basis of fair agreement. It is best to ensure workers have 24/7 access to the accommodation. Any restrictions on security grounds must be balanced against the need to respect workers' freedom of movement. - Retaining workers' identification documents is strictly prohibited. - Provide union representatives with access to workers at their workplace. - Respect the gender, religion, culture and society of workers. In particular, workers should be given the opportunity to celebrate religious holidays and ceremonies. - Workers are informed of their rights and obligations and provided with copies of internal regulations, procedures and sanctions mechanisms for workers in a language or medium they understand. - Do not discriminate between male and female workers or against disadvantaged groups of workers. - Prohibit the use of alcohol and stimulants, arrange separate smoking areas - There should be a fair and non-discriminatory process for implementing disciplinary proceedings including the worker's right to self-defense. **G. Consultation and complaints mechanism** - Design and implement a worker consultation mechanism. Ideally, establish a review board consisting of elected worker representatives.			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Procedures and mechanisms for workers to raise their complaints are provided to workers. - Employees subject to discipline arising from conduct in the workplace must have access to a fair and transparent hearing with the ability to challenge decisions and refer disputes to relevant public authorities. - In the event of a conflict between employees or between employees and employees, employees can easily access a fair conflict resolution mechanism. - In cases of more serious offences, including serious physical or mental abuse, there will be mechanisms in place to ensure full cooperation with police authorities (where applicable). **H. Community Relations Management** - Establishing a community relations plan includes establishing communication mechanisms that allow for regular information exchange and consultation with the local community to identify and respond promptly to any issues and maintain good working relationships. - The site manager is responsible for implementing the community relations management plan and liaising with the community. - The impact of worker accommodation on the local community is considered and minimised. - Community representatives are provided with easy means to express opinions and complaints. - There is a transparent and effective process for resolving community complaints.			
Labor flow management	**Social conflict** - Provide information on the Code of Conduct for employees in Vietnamese;	- Labor Law No. 10/2012/QH13;	Contractor	PMB, CSC, local

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Introduce local community customs to workers. **Public order and security (including prostitution, theft and substance abuse)** - Pay workers fairly to reduce the incentive to steal; - Priority given to using local labor; - Cooperate with local law enforcement; - Apply disciplinary measures (e.g., dismissal) to employees involved in criminal activities or violations of discipline and regulations; - Provides substance abuse management and prevention programs. **Migrant workers** - Temporary residence and temporary absence registration for workers from other places. - Coordinate with local authorities to manage migrant workers **Increased burden on utility services** - The worker camp will include a wastewater collection system and a septic system; - Determine water and electricity supply sources and have agreements with suppliers. - Avoid wasting electricity and water. **Increased risk of infectious diseases (including STDs and HIV/AIDS)** - Vaccinate workers against common and locally prevalent diseases; - Implement HIV/AIDS prevention education program; - Information campaigns on sexually transmitted diseases and other communicable diseases for workers and local communities;	- Decree No. 144/2021/ND-CP on administrative sanctions in the fields of security, social order and safety; prevention and control of social evils, fire prevention and fighting; rescue; prevention and control of domestic violence ; - WBG EHS Guidelines on Construction and Demolition - ESS2		government, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Provide condoms. **Gender-based violence, including sexual harassment, child abuse and exploitation** - Mandatory and regular training for workers on the required legal conduct and legal consequences of non-compliance with laws on gender-based violence, sexual harassment, child abuse and exploitation; - Commitment/policy to cooperate with law enforcement agencies investigating perpetrators of gender-based violence; - Report employee misconduct and complaints/reports of gender-based violence or harassment through the Grievance Redress Mechanism (GRM); - Create conditions for workers to visit their families regularly; - Provide opportunities for employees to take advantage of local community recreational activities. **Child labor and school dropout** - Ensure that children and minors are not recruited directly or indirectly into the project. **Increasing pressure on housing and rents** - Where accommodation is limited, it is necessary to establish work camps with sufficient capacity to accommodate workers - including subcontractors - and associated support staff. **Increased traffic and increased accidents** - Develop and implement traffic management plans for approval by supervising engineers; - Arrange temporary routes for workers and local people; - Have a reasonable construction plan;			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Traffic safety training and defensive driving training for employees; - Penalty for illegal driving. **Wastewater discharge** - Ensure that worker camps and associated facilities are connected to septic tanks or other appropriate wastewater treatment systems of sufficient capacity for the number of workers and local conditions. **Demand for freshwater resources is increasing.** - Use water sparingly, avoid wasting water; - Consider using rainwater where possible; - Avoid polluting fresh water sources. **Land use related to camps, access roads, noise** - Locate worker camps away from environmentally sensitive areas to avoid impacting local wildlife; - Route access routes to worker camps to avoid/minimize environmentally sensitive areas. **Increased deforestation, ecosystem and species degradation** - Prohibit cutting trees and destroying forests outside the project area; - Reduce energy needs, reduce noise and light emissions, reduce and safely use hazardous chemicals. **Increased use/demand for natural resources** - Minimize land use change and use of other natural resources; - Avoid deforestation around the campsite;			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Respond promptly and effectively to environmental and social issues raised by the supervising engineer.			
Chance find procedure	If the Contractor discovers archaeological sites, historical monuments, relics and objects including cemeteries and individual graves during excavation or construction, the Contractor shall: - Stop construction activities in the exposed area; - Delineate the discovered location ; - Secure the site to prevent any damage or loss of movable objects. In case of movable antiquities or sensitive relics, arrange for a security guard until the local authorities or the Department of Culture and Information take over; - Notify the local authorities or relevant departments responsible for Vietnam's cultural assets (within a maximum of 24 hours); - The local authority or relevant department shall be responsible for the protection and preservation of the site before deciding on the appropriate further procedures. - The responsible authorities after taking over will make a decision on how to handle the discovery such as relocating or maintaining the status quo. - If the discoveries are of high value and the experts or cultural relic management agency proposes to preserve the site, the project owner will make the necessary design changes to comply with the requirements and preserve the relic; - Decisions regarding the management of findings will be communicated in writing by the relevant authorities ; - Construction shall only be carried out after obtaining permission from local authorities or relevant units for the exposed area.	- Law on Cultural Heritage No. 28/2001/QH10; - Law on Cultural Heritage, amended and supplemented No. 32/2009/QH12; - Decree No. 98/2010/ND-CP amending and supplementing; - ESS8	Contractor, PMB	PMB, CSC, Binh Dinh Department of Culture and Sports, local government, community
Occupational Health and	The Contractor shall prepare an OHS Management Plan as part of the C-ESMP. See annex 7 of this report for details	- Labor Law No. 10/2012/QH13;	Contractor, PMB	PMB, CSC, local

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
Safety	**Hard labor** - Train workers in lifting and material handling techniques during construction and demolition, including setting weight limits above which assistance from machinery or multiple people is required - Plan the job site layout to minimize the need to manually move heavy objects - Safety training for workers; - Implement administrative controls into work processes, such as job rotation and rest or break times **Slip and fall** - Full protective gear - Limit the creation of steep areas and deep holes on the construction site. - Regularly clean up debris and spills - Locate electrical cords and ropes in common areas and marked hallways - Use non-slip shoes **Working at height** - Provide guardrails or other barriers capable of withstanding heavy weights or use safety harnesses when working at heights of two metres or more or at any height where there is a risk of falling into operating machinery, into water or other liquids, into hazardous substances or through an opening in the work surface. - Provide signs and safety monitoring systems to warn workers of the proximity of fall hazards, as well as guard, mark and warn of, and cover openings in floors, roofs or deep excavations along the way. **Impact**	- Decree No. 144/2021/ND-CP on administrative sanctions in the fields of security, social order and safety; prevention and control of social evils, fire prevention and fighting; rescue; prevention and control of domestic violence - WBG EHS Guidelines for Construction and Demolition - ESS2		government, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	Monitor
	- Limit speed on construction site - Wear appropriate personal protective equipment, such as safety glasses with side shields, face shields, hard hats and safety shoes **Moving machinery** - Plan and direct traffic, set speed limits and have a trained spotter wearing a reflective vest or outerwear to direct traffic. - Use well-maintained and inspected lifting equipment suitable for the load, **Limited space** - Confined spaces should be provided with safety measures such as ventilation and access arrangements for rescue operations, to the extent practicable. The area adjacent to the entrance to the confined space should provide adequate space for emergency and rescue operations. - Safety precautions should include Self-Contained Breathing Apparatus, lifelines and safety personnel positioned outside the confined space, with rescue and first aid equipment readily available. - Before a worker is required to enter a confined space requiring a permit, adequate and appropriate training in confined space hazard control, atmospheric testing, use of required PPE, and the usability and integrity of the PPE must be verified. Additionally, adequate and appropriate rescue and/or recovery plans and equipment must be in place before the worker enters the confined space. - Avoid operating combustion equipment for long periods of time inside confined spaces where other workers must enter. **Electricity** - Mark all live electrical equipment and power lines with warning signs.			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Inspect all power cords, cables and hand tools for fraying or exposed wires and follow the manufacturer's recommendations for maximum allowable operating voltage of hand tools. - Insulate/ground all electrical equipment used in damp or wet environments; use equipment with circuits protected by ground-level circuit breakers. - Protect electrical cords and extension cords from traffic damage by covering or hanging them above traffic areas. - Appropriately label service rooms containing high voltage equipment ('electrical hazard'). - Establish “No Access” zones around or under high voltage power lines. - Carry out detailed identification and marking of all underground wiring before undertaking any excavation work. **Risk to eyes** - Use machine or splash guards and/or face and eye protection, such as safety glasses with side shields, safety goggles and/or full face shields. Specific Safe Operating Procedures (SOPs) may be required for the use of sanding and grinding tools and/or when working around liquid chemicals. It is also a good practice to regularly inspect these types of equipment prior to use to ensure mechanical integrity. - When performing work that may pose a hazard to temporary workers or passersby, additional area protection or access restrictions or PPE may be required. - Support should be provided for people who must wear prescription glasses by using safety glasses over the lenses. **Weld**			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	Monitor
	- Provide appropriate eye protection such as welder's goggles and/or full-face eye shields to all personnel participating in or assisting with welding operations.. - Fire prevention measures such as fire extinguishers, fire prevention and fighting training, and occupational safety training must be taken. **Working environment temperature** - Monitor weather forecasts when working outdoors to get advance warning of inclement weather and plan your work accordingly. - Adjust working and resting time reasonably. - Provide temporary rest during work. - Wear protective clothing. - Stay hydrated with water or electrolyte drinks, and avoid alcoholic beverages. **Fire and explosion** - Store flammables away from sources of ignition and oxidizing materials. Additionally, flammable storage areas must: + Far from residential areas and camps + Have natural or passive ventilation at the floor and ceiling. + Use spark protection. + Equipped with fire fighting equipment. - Identify and label areas with potential fire hazards to warn of special regulations (e.g., no smoking, cell phones, or other potentially spark-generating devices). - Provide specific training to workers on how to handle flammable materials and prevent or extinguish fires. **Corrosive, oxidizing and reactive chemicals**			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	Monitor
	- Corrosive, oxidizing, and reactive chemicals must be segregated from flammable materials and from other chemicals of incompatible types (acids versus bases, oxidizing agents versus reducing agents, water-sensitive versus water-based, etc.), stored in ventilated areas, and in containers of adequate capacity to minimize mixing during spills. - Workers required to handle corrosive, oxidizing chemicals must be thoroughly trained and provided with and wear appropriate PPE (gloves, aprons, wet suits, face shields or goggles, etc.). - When using, handling or storing corrosive, oxidizing or reactive chemicals, adequate first aid must be provided. Suitable first aid stations must be readily accessible throughout the workplace and eyewash stations and/or emergency showers must be located near all work stations, the recommended first aid response being immediate flushing with water. **Personal Protective Equipment (PPE)** - Use active PPE if alternative technologies, work plans, or procedures cannot eliminate or significantly reduce the hazard or exposure. - Identify and provide appropriate PPE to adequately protect workers. - Properly maintain PPE, including cleaning when soiled and replacing when damaged or worn. Proper use of PPE should be part of periodic employee training. **<u>Cracks, breaks, collapses structures</u>** - At each construction site, the contractor must assess the status of neighboring structures at risk of damage or collapse during construction to avoid work accidents due to sudden collapse and serve as a basis for compensation for damages caused by sub-project construction. - The installation of lifting, supporting, shoveling, and transporting systems for construction materials and waste must ensure absolute safety and security for			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	workers, moving, and storing materials, and must be approved by CSC and PPMU before being put into use. - Develop response plans for incidents and occupational accidents; enhance dissemination and provide guidance to technical staff and workers on skills for prevention and response to occupational accidents. **Report a problem** The Contractor shall promptly notify the PPMU and CSC of any alleged incident or accident that has or is likely to cause a significant adverse impact on the environment, affected communities, residents, the Employer's employees or the Contractor's employees. Including but not limited to: - Any incident or accident that results in death or serious injury. - Significant adverse impact or damage to personal property. - Significant negative impacts on air, soil and water environments. - Any allegations regarding SEA and/or SH The Contractor shall, upon becoming aware of any allegation, incident or accident, also promptly notify the Engineer of any such incident or accident at the Subcontractor's or supplier's premises in connection with the Works which has or is likely to cause a significant adverse impact on the environment, affected communities, the public, the Employer's or Contractor's Personnel, Subcontractor's Personnel and suppliers. The Contractor shall require Subcontractors and suppliers (other than the Subcontractor) to notify the Contractor immediately of any incident or accident.			
Code of conduct	This Code of Conduct forms part of the environmental and social risk management measures associated with the Works. This Code of Conduct applies to all employees, workers and other personnel working at the Site or elsewhere where the Works are being carried out. This Code of Conduct also applies to each subcontractor's employees and any other personnel assisting in the execution of the Works. All such persons are	- Labor Law No. 45/2019/QH14 - ESS2	Contractor	PMB, CSC, local government, community

	referred to as "Contractor **'s Personnel"** and are required to comply with this Code of Conduct. Contractor's Personnel shall: 1. Perform your duties competently and diligently; 2. Comply with this Code of Conduct and all other applicable laws, regulations and requirements, including those required to protect the health and safety of other Contractor Personnel and any other persons; 3. Maintaining a safe work environment includes: a. Ensure that the workplace, machinery, equipment and processes under the control of each person are safe and do not pose a health hazard; b. Wear mandatory personal protective equipment; c. Use appropriate measures involving chemical, physical and biological substances and agents; and d. Follow current emergency operating procedures. 4. Report unsafe or unhealthy work situations and remove oneself from work situations that present a serious and imminent risk to life or health; 5. Treat others with respect and do not discriminate against particular groups such as women, people with disabilities, migrant workers or children; 6. Do not engage in sexual harassment ; 7. Not to engage in sexual exploitation, sexual abuse, physical assault or intimidation of a sexual nature by force or under unequal or coercive conditions; 8. Not engage in any form of sexual activity with anyone under the age of 18, unless previously married; 9. Complete relevant training including health and safety issues, Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH); 10. Report violations of this Code of Conduct; and			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	11. Do not retaliate against any person who reports a violation of this Code of Conduct, or who uses the Contractor's Human Resources grievance mechanism or the Project Grievance Redress Mechanism. The following activities are prohibited on or near the project site: 1. Tree cutting for any reason outside of approved construction areas; 2. Hunting, trading of wild animals; 3. Use of unapproved toxic materials, including lead-based paint, asbestos, etc.; 4. Tamper with anything of architectural or historical value; 5. Use of weapons (except by authorized security forces); 6. Use of alcohol during working hours; 7. Gamble. 8. Washing vehicles or machinery in streams or rivers; 9. Perform maintenance (oil change, filter) on cars and equipment outside of permitted areas: 10. Littering in unauthorized places; 11. Unsafe driving on local roads; 12. Keeping wild animals; 13. Working without safety equipment (including shoes and helmets); 14. Causing nuisance or disorder in or near the community; 15. Fishing with explosives and chemicals;			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	16. Toilets outside designated facilities; and 17. Burn waste and/or clear vegetation.			
Public Health and Safety	**A. General hazards of construction sites** - The subproject must implement risk management strategies to protect the community from physical, chemical, or other hazards associated with construction sites. - Restrict access to the site, through a combination of organisational and administrative controls, fencing, signage and risk communication to the local community. - For the sections of the mountain pass where blasting is carried out, safety must be strictly ensured. When blasting, there must be guards at both ends. All vehicles must be completely prohibited from passing through the mountain pass during the blasting process (before closing the road, the contractor must ask permission from the competent authority, and widely notify the local people about the time of the road closure during the day...). After blasting, the contractor must immediately clear all rocks on the road surface and slope to ensure traffic safety. **B. Disease prevention** ***B1. Infectious diseases*** - Provide active monitoring, screening and treatment for workers. - Prevent disease among workers in the local community by: + Conduct propaganda to raise awareness and health education + Implement immunization programs for workers in local communities to promote health and prevent infections. + Regular health check-up	- Law on Protection of People's Health No. 21-LCT/HDNN8 - Decree No. 144/2021/ND-CP on administrative sanctions in the fields of security, social order and safety; prevention and control of social evils, fire prevention and fighting; rescue; prevention and control of domestic violence - WBG EHS Guidelines for Construction and Demolition - Ministry of Health Guidelines	Contractor	PMB, CSC, local government, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	+ Ensure access to appropriate medical treatment, confidentiality and care, particularly for migrant workers. + Prepare an emergency response plan in case of a high risk of an outbreak and strictly follow the instructions of the Ministry of Health during the outbreak. ***B2. Preventing disease outbreaks*** - Prevent the development of larvae and adult flies by improving sanitation and eliminating breeding habitats near human settlements. - Do not let water stagnate. - Consider using pesticides. - Use insect repellents, clothing, netting, and other barriers to prevent insect bites. - Use prophylaxis for non-immune workers and work with public health officials to help eliminate reservoirs of disease. - Monitor and treat circulating and migratory populations to prevent the spread of reservoirs. - Communicate risks, preventive measures and available treatments to staff and workers. - Community surveillance during high-risk seasons to detect and treat cases. - Follow safe storage, transport and distribution guidelines for pesticides to minimize the possibility of misuse, spills and accidental exposure to people. **C. Traffic safety** - The incidence of traffic accidents involving project vehicles during construction should be minimized through a combination of education, awareness raising, and application of the procedures described in the traffic safety management section above.	- World Bank Interim Note on COVID-19 - ESS4		

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
Blasting	As planned, blasting operations will be carried out on the new alignment sections through Lo Dieu Pass and Phu Thu Pass. Safety during blasting is extremely important and will be carried out as follows: - The project owner hired a professional unit with a license to use industrial explosives to carry out the blasting. - Blasting complies with the State's regulations on blasting safety issued under Decree No. 71/2018/ND - CP detailing a number of articles of the Law on management and use of explosives and supporting tools for industrial explosive materials and products. - Blasting will be calculated specifically for each location and geological conditions of the project, construction site, size and shape of the project, to determine the volume of blasting used in one blast. - When blasting, only use explosives and explosive devices permitted by the State. - When in contact with explosives, absolutely do not smoke or create sparks within 100 m of the explosives. - Install steel bars and a system of steel fences about 3m high along the minefield area at the sections passing through Phu Thu Pass (route: 1. Km68 +600 - Km68 + 707 ; 2. Km69+181.59 - Km69+526.59; 3. Km69 + 853.08 - Km72+200) and Lo Dieu Pass (route: 1. Km77 + 000 - Km78+031; 2. Km78+633.50 - Km79+047.53) to prevent rocks from rolling down to the planted forest areas below. Depending on the progress of the blasting, the scale of the blasting, the blasting area according to the blasting passport, the barrier area will be installed appropriately at the site. Before construction, the Project Owner will announce on the mass media about the blasting and ensure compliance with safety regulations in blasting. - Explosives are transported separately; detonators are placed in a sealed box with shock -proof inserts. Vehicle speed must not exceed 20km/h. Vehicles must be at	- Decree No. 71/2018/ND-CP detailing a number of articles of the Law on management and use of explosives and supporting tools regarding industrial explosive materials and products. - Circular No. 32/2019/TT-BCT on national technical regulations on safety in production, testing, acceptance, preservation, transportation, use, destruction and storage of industrial explosives - ESS2	Contractor, PMB	PPMU, CSC, Department of Industry and Trade, local government, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	Monitor
	least 50m apart. Fire-fighting equipment must be installed. - Blasting is only allowed when safety preparations have been completed and a blasting license has been obtained from the competent authorities, including: - Must have a blasting passport and blasting license issued by the Department of Industry and Trade. - Have a detailed plan for blasting: Technical procedures for implementing steps (Drilling, stuffing, placing fuses, slow-burning wires, electric wires, connections, etc.). Arrange a general manager and have specialized miners; - Organize the safe storage and supply of explosives. Explosives are transported using specialized equipment with high safety. Establish a construction logbook clearly recording all processes of importing and exporting explosives and fuses. Specify the location of explosives at the site. When transporting, do not cause collisions, do not smoke, and do not use expired explosives. - Study the scene, people, environment. Closely coordinate with local authorities; Determine the range of warning, watchmen, shelter when the mine explodes. Regulate and announce the time of mine explosion. The radius of the dangerous area must be calculated according to the conditions at the scene and in accordance with safety regulations and the preservation, transportation and use of explosives. - Before blasting, each mine hole, blasting mesh, etc. will be inspected and accepted in accordance with regulations on inspection and acceptance of drilling and blasting work. Signs will be set up to indicate blasting hours and blasting commands, etc. at construction sites. - Organize protection of dangerous areas, with signals, warning signs, monitoring and command stations within the boundaries of the explosion zone. - Notify local authorities and the public before detonation and explain signals. - Clear the site, use manual and chainsaw to cut down trees within the construction			

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	area to ensure the construction process is not interrupted. Prohibit unauthorized persons from entering the blasting area and temporarily interrupt traffic for a short time to ensure absolute safety. - Determine the location that needs to be blasted, use a drill to create a hole with the size according to the construction drawing. - Arrange for a specialist to direct the blasting operation. The blasters must be specialized and trained before the operation. - The commander will personally or assign someone to monitor the number of explosions to know whether all the mines have exploded; In case of a dummy mine, he must signal, continue to be on guard and handle the dummy mine according to regulations before proceeding with the excavation; In all cases, it is forbidden to use hands or any object to dig or pull the cord to get the detonator.			
Waste management	- Large scale material storage site require site specific measures beyond those outlined in this ESCOP. - All locations of use must be identified in approved construction specifications. - Regularly level and compact the ground during the process of dumping excess materials; - During the process of dumping materials, when the material storage site is not yet filled, dig a drainage ditch around the material storage site with a size of 0.5m wide and 0.5m deep, with a 1x1x1m settling pit to prevent natural flow from overflowing the material storage site area. Rainwater generated in the material storage site area will be collected in a preliminary settling pit before being discharged into the surrounding environment to minimize suspended solids spreading along the natural flow into the surrounding surface water environment when there is heavy rain. - When the site is filled to the same level as the surrounding ground, compact it.	- Law on Environmental Protection No. 72 / 2022 /QH1 4 -	Contractor	PMB, CSC, DAE, local government, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Water daily to keep moist (on sunny days) to limit dust spread to surrounding areas; - Do not dump waste outside the approved boundary of the material storage site - Organic strip soil is covered on top of the dump. - If new site requirements arise during construction, they must be approved in advance by the Construction Engineer.			
Communicate with local communities	- Maintain open communication with local authorities and relevant communities; the contractor must coordinate with local authorities (ward, commune, village leaders) to agree on construction activity schedules in areas near sensitive sites or at sensitive times (e.g. religious festivals). - Copies in Vietnamese of this ESCOP and other relevant environmental documents will be provided to the local community and workers at the construction site. - Encroachment on recreational areas and other amenities: early consultation with affected people will provide an opportunity to investigate and develop alternatives. - Disseminate information about the subproject to affected parties (such as local authorities, businesses and affected households, etc.) through community meetings before construction begins. - Provide contact information so that interested parties can receive information about project activities. - Provide all information, especially technical findings, in a language that people can understand through the preparation of fact sheets and press releases when there are important findings during the subproject implementation phase. - Monitor community interest and information needs as the project progresses. - Respond to telephone and mail inquiries promptly and accurately.	- Law on Environmental Protection No. 72 / 2022 /QH1 4 - Decree No. 144/2021/ND-CP on administrative sanctions about security, social order, safety; prevention and control of social evils, fire prevention and fighting; rescue; prevention and control of domestic violence	Contractor	PMB, CSC, DAE, local authorities, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Inform local residents of construction and work schedules, service interruptions, temporary routes, blasting and demolition times and locations, if necessary. - Limit nighttime construction activities. Where necessary, ensure that nighttime work is carefully scheduled and that the community is fully informed so that necessary measures can be taken. - The community must be notified at least 15 days prior to any interruption of services (including water and electricity supply, telephone service, bus service, etc.) through notices at the project site, at bus stops, and at affected homes/businesses. - Provide technical documents and drawings to local authorities and communities, especially construction site plans and ESMPs. - Notice boards will be erected at all construction sites to provide information about the project, as well as contact details for site managers, environmental officers, health and safety officers, telephone numbers and other contact information for any affected residents to contact.			
Forest fire risk	- Prohibit activities involving open flames near forested areas, including discarding embers or cigarette butts in forested zones; do not stockpile flammable materials or store fuel such as gasoline and oil near forest areas. - Establish fire-control boundaries along route sections ; - Workers are strictly prohibited from burning garbage outside the construction site, near areas with many trees; - It is strictly forbidden to store and supply fuel near wooded areas; - Set up a fire watchtower to monitor and detect forest fires during construction through forested sections. The station has staff on duty 24/7, equipped with a communication system and initial fire extinguishing equipment such as fire extinguishers to be able to extinguish forest fires when detected;	- Environmental Protection Law - Forestry Law	Contractor	PMB, CSC, DAE, Forest Protection Management Board, local authorities, community

ES issues	Mitigation measures	Applicable Standards	Responsibility	
			Perform	**Monitor**
	- Do not encroach on surrounding areas outside the construction site ; - Prepare and promulgate the "Code of Conduct" for workers working at the company. - Establish communication lines with local authorities to proactively respond to the risk of forest fires during the dry season.			

5.1.4.2. Gender-Based Violence Management Process

Screening and assessing gender-based violence (GBV) risks at the sub-project level:

To assess the GBV risks of the sub-project, the following factors need to be considered:

❖ Environmental and social impacts of the sub-project

- The nature and scope of impacts, including environmental impacts and social impacts such as land acquisition, temporary impacts affecting income-generating activities, etc.

❖ Labor factors

- Number of workers (including all employees of contractors and subcontractors potentially present at the construction site).
- Number of personnel (from supervising engineers, other consulting firms, individual consultants, etc.) present at the project site.
- Duration of construction work.
- Contractor's history regarding GBV issues.
- Commitment and training of contractors and subcontractors for their workers and suppliers, as necessary, regarding GBV, including harassment and sexual abuse (SEA/SH) and a ban on SEA/SH across the Project.

❖ Contextual factors

- Cultural characteristics, production activities of local residents in the project area and neighboring communities.
- Domestic violence, including a history of physical, emotional, and economic abuse in the local communes where the project is implemented.
- The effectiveness of local authorities and relevant agencies in preventing and controlling domestic violence, SEA/SH.

❖ Community consultation

- General feedback from local authorities, including community organizations and local residents—at the commune and district levels—and residents living in the vicinity and neighboring communities of the sub-project, including the history of interaction between local residents and authorities with contractors and workers in previous civil construction projects.
- Feedback from local authorities and residents regarding the potential social and environmental impacts of the proposed sub-project, as well as the specific social and environmental management plan for the sub-project, including plans for community-involved monitoring and evaluation related to GBV.
- Feedback from local authorities and residents regarding the proposed grievance mechanism and their suggestions on how to make the GBV grievance mechanism accessible and effective for them.

Preparing the Contractor's Environmental and Social Management Plan (C-ESMP)

To address the potential risks associated with GBV/SEA/SH, as identified above, the C-ESMP for the sub-project must include:

- An action plan for preventing and responding to SEA/SH, including an accountability and response framework proposing detailed plans for how the contractor will implement the action plan for preventing and responding to SEA/SH;
- A Code of Conduct (CoC): A unified code of conduct to address behaviors that will be used in the project for the contractor's workers, including subcontractors and suppliers;
- A training plan: A training plan for workers on SEA/SH;
- A community consultation plan: A strategy by which communities adjacent to the project will be informed about project activities, grievance procedures, and available GBV support services; and
- A labor flow management plan: If the project involves labor flow, how this labor flow will be managed to address SEA/SH risks.

A Code of Conduct (CoC) regarding GBV will be developed based on the CoC provided in the World Bank's standard procurement documents. The CoC will be signed by all individuals present at the project site. The CoC will be linked to the GBV/SEA/SH action plan, which will also include an accountability and response framework. The CoC will include provisions to address SEA/SH issues and a ban on sexual activities with anyone under 18 years of age. The age of consent and the minor's status are not justifications for engaging in sexual acts with minors.

Ongoing Monitoring

When ongoing monitoring identifies changes in the SEA/SH risks previously identified and/or actual cases of SEA/SH, the sub-project will adjust the level of SEA/SH risk and mitigation strategies. The following services are available for GBV victims:

- At the national level, the Vietnam Women's Union maintains a hotline (1900969680) that operates 24 hours a day, 7 days a week, to support GBV victims. Additionally, the following hotline is also available (0946833380/82/84). Email: phongthamvan.cwd@gmail.com. A safe shelter is also available free of charge for GBV/SH women and children for three months and for trafficking victims for six months.
- At the community level, in addition to local GBV prevention contacts based at communes, individuals can approach reputable community representatives, commune People's Committees, or commune police to report incidents (as per the provisions of Law No. 13/2022/QH15 on domestic violence prevention). GBV victims have the right to legal aid (Articles 31, 32, 33 of the Legal Aid Law No. 11/2017/QH14). Additionally, there are provisions prohibiting discrimination against GBV victims seeking legal assistance (Article 6 of the Legal Aid Law, Circular No. 11/2014/TT-BTP dated April 17, 2013, by the Ministry of Justice).
- Victims receive medical treatment at various levels, such as commune health stations, district health centers, and provincial general hospitals. Law No. 13/2022/QH15 stipulates that victims must receive counseling regarding health care, family issues, domestic behavior, legal matters, and psychological issues to address domestic violence. Medical facilities, social protection centers, domestic violence counseling centers, and organizations or individuals are obliged to provide appropriate counseling for domestic violence victims.
- Healthcare staff receiving GBV victims are responsible for providing essential information to patients, including available medical services and discounted costs they may offer, and

referring victims to centers or services that support victims and police to extend necessary support to victims (Circular No. 24/2017/TT-BYT).

5.1.5. Specific Mitigation Measures at the Site During the Construction Phase

Table 0-2. Specific Mitigation Measures at the Site During the Construction of My Thanh – Lai Giang Road

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 45 + 728 - Km 46 +360, 30m	High-tech shrimp farming area of Viet Uc - Phu My Company Limited	- Disperse dust, solid waste, and over flowing rainwater carrying waste into company areas - Traffic accident risk for operating workers. - Obstruct, interrupt access to shrimp farming areas - road damage - Noise affects workers	- Inform companies of appropriate construction plans to ensure that company/production facility operations are not affected or at a minimum. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns. - Use a registered vehicle and have it serviced regularly, i.e. every six months. - Cover construction materials and waste during transportation. - Wash the vehicle before moving away from the construction site. - Water the road surface to reduce dust. - Repair any road damage immediately. - Maintain access to the company to avoid or minimize disruption to business operations.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 46 + 000, 20m	Saigon - Quy Nhon Minerals Joint Stock Company	- Disperse dust, solid waste, and over flowing rainwater carrying waste into company areas - Traffic accident risk for operating workers. - Obstruct, interrupt access - Road damage - Noise affects workers	- Inform companies of appropriate construction plans to ensure that company/production facility operations are not affected or at a minimum. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns. - Use a registered vehicle and have it serviced regularly, i.e. every six months. - Cover construction materials and waste during transportation. - Wash the vehicle before moving away from the construction site. - Water the road surface to reduce dust. - Repair any road damage immediately. - Maintain access to the company to avoid or minimize disruption to business operations.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 47+900 - Km 49+500	Protective forests and production forests	- Loss of forest cover due to land clearance for road alignment. - Habitat fragmentation, affecting wildlife movement and ecosystems. - Increased risk of illegal logging and encroachment via new access routes. - Soil erosion and sedimentation impacting forest floor and nearby streams. - Disturbance to biodiversity from noise, dust, and human activity.	- Minimize clearing width and avoid sensitive forest areas during alignment design. - Establish buffer zones between construction sites and forest edges. - Schedule construction to avoid breeding or migration seasons of key species. - Implement erosion control measures such as silt fences and re-vegetation. - Control access to prevent illegal logging or land encroachment.	Contractor	PPMU, CSC, Community
Km48+500, 70m	My Tho commune cemetery	- Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstruct, interrupt access to the grave area - Road damage - Waste and raw materials scattered cause unsanitary conditions and loss of aesthetics.	- The speed limit is 20 km/h. - Cover construction materials and waste during transportation. - Repair any road damage immediately if any. - Remind workers to respect the beliefs of local people. - Workers are not allowed into the cemetery area. - Do not collect garbage or construction materials near the grave area. - Ensure that local people can access the cemetery at any time.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 53 + 700, 30m	Animal Feed Joint Stock Company	- Disperse dust, solid waste, and over flowing rainwater carrying waste into company areas - Traffic accident risk for operating workers. - Obstruct, interrupt access - Road damage - Noise affects workers	- Inform companies of appropriate construction plans to ensure that company/production facility operations are not affected or at a minimum. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns. - Use a registered vehicle and have it serviced regularly, i.e. every six months. - Cover construction materials and waste during transportation. - Wash the vehicle before moving away from the construction site. - Water the road surface to reduce dust. - Repair any road damage immediately. - Maintain access to the company to avoid or minimize disruption to business operations.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 48 + 700, 30m	My Tho Kindergarten, My Tho Commune	- Vibration and impact can cause cracks in the structure. - Traffic accident risks for students, teachers and parents - Obstruct, interrupt access to the kindergarten area - Road damage - Waste and raw materials scattered cause unsanitary conditions and loss of aesthetics. - Noise affects teachers and students	- Notify the school in advance of construction plans. - Avoid or limit travel during rush hours (6-8am and 4-6pm). - Water the road surface to reduce dust. - Arrange traffic control staff when passing through the school area. - Coordinate with local traffic police to regulate fleet when necessary. - Speed limit is 10 km/h. - Limit the use of horns. - Use registered vehicles and maintain vehicles regularly. - Cover construction materials and waste during transportation. - Repair road damage immediately if any. - Do not collect garbage or construction materials around the school area. - Ensure students and teachers have access to the school at all times.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 50 + 000, 30m	Tan Thanh residential area, My Tho commune, Phu My district	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or construction materials around the area. - Make sure local residents can enter and exit the house at any time.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 50 + 500, 37m	Residential area of Chanh Trach village, My Tho commune, Phu My district	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or construction materials around the area. - Make sure local residents can enter and exit the house at any time.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 51 + 250, 16m	Residential area of My Tho commune, Phu My district	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or construction materials around the area. - Make sure local residents can enter and exit the house at any time.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 54 + 750, 30m	My An Border Guard Station	- Vibration can cause cracks in structure. - Traffic accident risks for officers and soldiers - Obstruct, interrupt staff access to the agency - Road damage - Waste and raw materials scattered cause unsanitary conditions and loss of aesthetics. - Noise affects staff at the office.	- Notify border station officers in advance of construction plans. - Ensure that staff can access the agency at any time. - Use appropriate media. - The speed limit is 20 km/h. - Limit the use of horns. - Use registered vehicles and maintain vehicles regularly. - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Do not accumulate garbage or construction materials around the office area.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 55 + 000, 40m	Thong Thai Restaurant	- Disperse dust, solid waste, and over flowing rainwater carrying waste into company areas - Traffic accident risk for operating workers. - Obstruct, interrupt access to shrimp farming areas - road damage - Noise affects workers	- Inform companies of appropriate construction plans to ensure that company/production facility operations are not affected or at a minimum. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns. - Use a registered vehicle and have it serviced regularly, i.e. every six months. - Cover construction materials and waste during transportation. - Wash the vehicle before moving away from the construction site. - Water the road surface to reduce dust. - Repair any road damage immediately. - Maintain access to the company to avoid or minimize disruption to business operations.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km55+100, 40m	Ho family temple	- Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstruct, interrupt access - Road damage - Waste and raw materials scattered cause unsanitary conditions and loss of aesthetics.	- The speed limit is 20 km/h. - Cover construction materials and waste during transportation. - Repair any road damage immediately if any. - Remind workers to respect the beliefs of local people. - Workers are not allowed into the cemetery area. - Do not collect garbage or construction materials near the grave area. - Ensure that local people can access at any time.	Contractor	PPMU, CSC, Community
Km 55 + 387, 10m	Phan family temple	- Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstruct, interrupt access - Road damage - Waste and raw materials scattered cause unsanitary conditions and loss of aesthetics.	- The speed limit is 20 km/h. - Cover construction materials and waste during transportation. - Repair any road damage immediately if any. - Remind workers to respect the beliefs of local people. - Workers are not allowed into the cemetery area. - Do not collect garbage or construction materials near the grave area. - Ensure that local people can access at any time.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 55 +600, 20m	My An Primary School (campus 2) Xuan Binh village, My An, Phu My	- Vibration and impact can cause cracks in the structure. - Traffic accident risks for students, teachers and parents - Obstruct, interrupt access to the kindergarten area - Road damage - Waste and raw materials scattered cause unsanitary conditions and loss of aesthetics. - Noise affects teachers and students	- Notify the school in advance of construction plans. - Avoid or limit travel during rush hours (6-8am and 4-6pm). - Water the road surface to reduce dust. - Arrange traffic control staff when passing through the school area. - Coordinate with local traffic police to regulate fleet when necessary. - Speed limit is 10 km/h. - Limit the use of horns. - Use registered vehicles and maintain vehicles regularly. - Cover construction materials and waste during transportation. - Repair road damage immediately if any. - Do not collect garbage or construction materials around the school area. - Ensure students and teachers have access to the school at all times.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 55 +700, 20m	My An Police Station, Xuan Binh Village, My An Commune	- Vibration and impact can cause cracks in the structure. - Traffic accident risks for officers and soldiers - Obstruct, interrupt staff access to the agency - Road damage - Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics. - Noise affects staff at the office.	- Notify the authority in advance of construction plans. - Ensure that staff can access the agency at any time. - Use appropriate media. - The speed limit is 20 km/h. - Limit the use of horns. - Use registered vehicles and maintain vehicles regularly. - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Do not collect garbage or construction materials around the office area.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 55 +850, 25m	Cultural House of Xuan Binh Village, My An, Phu My	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or construction materials around the area. - Make sure local residents can enter and exit the house at any time.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 56 + 500, 23m	Residential area of My An commune, Phu My district	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or construction materials around the area. - Make sure local residents can enter and exit the house at any time.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 56 + 900, 20m	Xuan Thanh residential area, My An commune, Phu My district	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or construction materials around the area. - Make sure local residents can enter and exit the house at any time.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km58+000 - Km59+000, 25m	BCG Phu My Solar Power Plant	- Disperse dust, solid waste, and over flowing rainwater carrying waste into company areas - Traffic accident risk for operating workers. - Obstruct, interrupt access to shrimp farming areas - road damage - Noise affects workers	- Inform companies of appropriate construction plans to ensure that company/production facility operations are not affected or at a minimum. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns. - Use a registered vehicle and have it serviced regularly, i.e. every six months. - Cover construction materials and waste during transportation. - Wash the vehicle before moving away from the construction site. - Water the road surface to reduce dust. - Repair any road damage immediately. - Maintain access to the company to avoid or minimize disruption to business operations.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 62 + 000 - Km 63 + 000, 15m	Village 9, My Thanh commune, Phu My district	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or construction materials around the area. - Make sure local residents can enter and exit the house at any time.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 61 + 500, 35m	Hoang Minh gas station	- Transportation of construction materials and construction activities will cause (i) damage to roads, (ii) impact of dust, exhaust fumes, noise and (iii) risk of traffic accidents.	- Notify gas station owner in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Repair any road damage immediately. - Do not collect waste and materials near business areas.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 62 + 150 - Km 62 + 250, 10m	Village 9 market, My Thang commune	- Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for customers and traders - Obstruct, interrupt people's access to the market - reduced income due to dust affecting business - Road damage - Waste and raw materials scattered near the market cause unsanitary conditions and loss of aesthetics. - Noise affects traders and people in the market	- Notify businesses in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - There are officers to guide traffic when passing through the market. - The speed limit is 20 km/h. - Limit the use of horns. - Use registered vehicles and maintain vehicles regularly. - Cover construction materials and waste during transportation. - Watering to reduce dust - Repair any road damage immediately. - Establish a temporary market to ensure continuous trading activities of local authorities. - Do not collect waste and construction materials near the market.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 62 + 300, 15m	My Thang 1 Primary School (campus 2)	- Vibration and impact can cause cracks in the structure. - Traffic accident risks for students, teachers and parents - Obstruct, interrupt access to the kindergarten area - Road damage - Waste and raw materials scattered cause unsanitary conditions and loss of aesthetics. - Noise affects teachers and students	- Notify the school in advance of construction plans. - Avoid or limit travel during rush hours (6-8am and 4-6pm). - Water the road surface to reduce dust. - Arrange traffic control staff when passing through the school area. - Coordinate with local traffic police to regulate fleet when necessary. - Speed limit is 10 km/h. - Limit the use of horns. - Use registered vehicles and maintain vehicles regularly. - Cover construction materials and waste during transportation. - Repair road damage immediately if any. - Do not collect garbage or construction materials around the school area. - Ensure students and teachers have access to the school at all times.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 62 + 500, 15m	Family church	- Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstruct, interrupt access - Road damage - Waste and raw materials scattered cause unsanitary conditions and loss of aesthetics.	- The speed limit is 20 km/h. - Cover construction materials and waste during transportation. - Repair any road damage immediately if any. - Remind workers to respect the beliefs of local people. - Workers are not allowed into the cemetery area. - Do not collect garbage or construction materials near the grave area. - Ensure that local people can access at any time.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 66 + 800, 20m	Ban Mai Xanh Private Kindergarten	- Vibration and impact can cause cracks in the structure. - Traffic accident risks for students, teachers and parents - Obstruct, interrupt access to the kindergarten area - Road damage - Waste and raw materials scattered cause unsanitary conditions and loss of aesthetics. - Noise affects teachers and students	- Notify the school in advance of construction plans. - Avoid or limit travel during rush hours (6-8am and 4-6pm). - Water the road surface to reduce dust. - Arrange traffic control staff when passing through the school area. - Coordinate with local traffic police to regulate fleet when necessary. - Speed limit is 10 km/h. - Limit the use of horns. - Use registered vehicles and maintain vehicles regularly. - Cover construction materials and waste during transportation. - Repair road damage immediately if any. - Do not collect garbage or construction materials around the school area. - Ensure students and teachers have access to the school at all times.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 67 + 500, 20m	My Duc Border Guard Station, My Duc Commune	- Vibration can cause cracks in structure. - Traffic accident risks for officers and soldiers - Obstruct, interrupt staff access to the agency - Road damage - Waste and raw materials scattered cause unsanitary conditions and loss of aesthetics. - Noise affects staff at the office.	- Notify border station officers in advance of construction plans. - Ensure that staff can access the agency at any time. - Use appropriate media. - The speed limit is 20 km/h. - Limit the use of horns. - Use registered vehicles and maintain vehicles regularly. - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Do not accumulate garbage or construction materials around the office area.	Contractor	PPMU, CSC, Community
Km 68+167,87 - Km 68+508, 02m	Existing drainage ditch	Cutting off the current flow, affecting the drainage function of the area	Construct and restore the ditch with a width x depth of about (1 x 0.5) m; Complete the construction of the ground filling items before the rainy season; Regularly check and clear the flow, unclog the drainage ditches around the construction site to ensure no stagnant water, causing flooding.	Contractor	PPMU, CSC, Community
Km 68+167,87 - Km 68+518,97, 02m	Existing drainage ditch				

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km67+798.33 - Km68+105.18	Surface water in Ha Ra bridge construction area	- Water pollution from runoff carrying sediment, oil, and chemicals. - Increased turbidity affecting fish and aquatic plants. - Altered flow patterns leading to erosion and sediment buildup. - Loss of riparian vegetation, reducing natural water filtration. - Disturbance to aquatic habitats from noise and vibration. - Higher risk of spills from machinery and construction activities.	- Install silt fences and sediment traps to control runoff. - Cover and store materials properly to prevent leaching. - Limit in-stream work during sensitive periods for aquatic life. - Use containment measures for fuels and hazardous substances. - Restore vegetation along water bodies after construction. - Conduct regular water quality and slope monitoring throughout the project.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 68+169,14 - Km 72+469,14	Protective forests and production forests	- Loss of forest cover due to land clearance for road alignment. - Habitat fragmentation, affecting wildlife movement and ecosystems. - Increased risk of illegal logging and encroachment via new access routes. - Soil erosion and sedimentation impacting forest floor and nearby streams. - Disturbance to biodiversity from noise, dust, and human activity.	- Minimize clearing width and avoid sensitive forest areas during alignment design. - Establish buffer zones between construction sites and forest edges. - Schedule construction to avoid breeding or migration seasons of key species. - Implement erosion control measures such as silt fences and re-vegetation. - Control access to prevent illegal logging or land encroachment.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 75 + 000 - Km 75 + 322, 26m	Residential area of Lo Dieu village, Hoai My commune, Hoai Nhon district	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or construction materials around the area. - Make sure local residents can enter and exit the house at any time.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km75+269,14, 30m	Historical site of the Lo Dieu Ship without number	- Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstruct, interrupt access to the memorial area - Road damage - Waste and raw materials scattered in the surrounding area cause unsanitary conditions and loss of aesthetics.	- The speed limit is 20 km/h. - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Do not collect garbage or construction materials around the relic area. - Ensure visitors have access to the site. - Coordinate with local traffic police to regulate fleet when necessary. - There are officers to guide traffic when passing through the relic site.	Contractor	PPMU, CSC, Community
Km 75+269,14 - Km 79+669,14	Protective forests and production forests	- Loss of forest cover due to land clearance for road alignment. - Habitat fragmentation, affecting wildlife movement and ecosystems. - Increased risk of illegal logging and encroachment via new access routes. - Soil erosion and sedimentation impacting forest floor and nearby streams. - Disturbance to biodiversity from noise, dust, and human activity.	- Minimize clearing width and avoid sensitive forest areas during alignment design. - Establish buffer zones between construction sites and forest edges. - Schedule construction to avoid breeding or migration seasons of key species. - Implement erosion control measures such as silt fences and re-vegetation. - Control access to prevent illegal logging or land encroachment.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 79 + 660, 20m	Residential area of Kim Giao village, Hoai Hai commune, Hoai Nhon district	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or construction materials around the area. - Make sure local residents can enter and exit the house at any time.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 81 + 840 - Km 82 + 000, 20m	Residential area of Hoai My commune, Hoai Nhon district	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or construction materials around the area. - Make sure local residents can enter and exit the house at any time.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km82+423,73	Lai Giang River Branch	- Water pollution from runoff carrying sediment, oil, and chemicals. - Increased turbidity affecting fish and aquatic plants. - Altered flow patterns leading to erosion and sediment buildup. - Loss of riparian vegetation, reducing natural water filtration. - Disturbance to aquatic habitats from noise and vibration. - Higher risk of spills from machinery and construction activities.	- Install silt fences and sediment traps to control runoff. - Cover and store materials properly to prevent leaching. - Limit in-stream work during sensitive periods for aquatic life. - Use containment measures for fuels and hazardous substances. - Restore vegetation along water bodies after construction. - Conduct regular water quality and slope monitoring throughout the project.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 83 + 000 - Km 83 + 273, 17m	Residential area near Lai Giang bridge, Hoai My commune, Hoai Nhon district	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or construction materials around the area. - Make sure local residents can enter and exit the house at any time.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Object	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
	Sections with alignment conscide to existing roads	- Traffic disruption and congestion: Construction can reduce road capacity, causing delays. - Increased risk of accidents: Mixing construction activities with ongoing traffic increases hazards. - Dust, noise, and vibration: These can affect nearby residents and road users. - Access limitations: Entry to local businesses or homes may be temporarily restricted. - Damage to existing infrastructure: Utilities and drainage systems may be affected during excavation.	- Implement traffic management plans to ensure safe and efficient flow, including detours and clear signage. - Schedule construction during off-peak hours to minimize traffic disruption. - Use dust suppression methods such as water spraying and covering soil piles. - Install noise barriers or limit noisy activities to daytime hours. - Coordinate with utility providers to prevent accidental damage and ensure quick repairs. - Ensure safe pedestrian access and temporary paths where needed.	Contractor	PPMU, CSC, Community

	Along the material transportation routes (from and to the construction sites)	- Traffic congestion may increase due to heavy vehicle movement, causing delays for both construction vehicles and local traffic. - Road surface deterioration from the repeated passage of heavy construction vehicles can lead to the need for frequent repairs. - Safety risks for both construction workers and local road users, particularly in areas with narrow roads or poor visibility. - Dust and air pollution generated by construction vehicles transporting materials can affect air quality and local communities. - Noise pollution caused by the movement of trucks and heavy machinery, especially near residential or sensitive areas. - Increased road wear and tear leading to potential damage to the existing infrastructure, requiring maintenance or upgrading.	- Traffic Management: Implement traffic diversion plans, including scheduling material transport during off-peak hours to minimize congestion and delays. - Road Maintenance: Conduct regular road repairs and surface reinforcement on the transportation routes to minimize wear and tear caused by heavy vehicles. - Safety Measures: Install appropriate signage, barriers, and warning signals to improve visibility and safety for both construction workers and road users. Provide safety training for drivers and workers to minimize accidents. - Dust Control: Use water sprays or dust suppressants along material transport routes to reduce dust emissions and improve air quality. - Noise Reduction: Employ noise barriers or enclosures around construction sites, and choose low-noise machinery where possible to minimize the disturbance to nearby residents. - Infrastructure Improvement: Strengthen and upgrade the road surfaces that are frequently used by transport vehicles to withstand heavy loads and reduce the risk of deterioration.	Contractor	PPMU, CSC, Community

Table 0-3. Mitigation measures applied at materials storage sites

No.	Sites	Location	Capacity (m^3)	Describe	Potential Impact	Mitigation measures
I. Coastal road DT639 (section from My Thanh - Lai Giang Bridge)					The Storage sites for excess excavated materials are all low-lying areas with lower elevations than the surrounding areas. The dumping of materials is only stopped when the level is equal to the surrounding area or the planned construction elevation of the area. Therefore, the impacts of dispersal causing pollution to the surrounding area have been basically limited to a low level. On the other hand, except for dump No. 5 (on Road No. 2) in Kim Giao village, which has a few households within a radius of 60-100 m, all the remaining dumps are located far from residential areas. Therefore, the	- Regularly level and compact the ground during the process of dumping excess materials; - Construct drainage ditches around the landfill to prevent natural runoff from overflowing the landfill area. Rainwater generated in the landfill area will be collected in a preliminary settling pit before being discharged into the surrounding environment to minimize suspended solids from spreading along natural flows into the surrounding surface water environment during heavy rains. - Water daily to keep moist (on sunny days) to limit dust spread to surrounding areas; - Do not carry out any other activities (cooking, cutting down trees, hunting, gathering
Route from km 45+00 to km 68+169.14						
# 0	km50 +375 to km 50 +950	Located on the left side of the route. At Sub-area 162, My Tho commune	386,089	The area is public production forest land with sparse casuarina and young eucalyptus plantations, about 2.2 meters lower than surrounding areas, which will be reclaimed for leveling and returned to the locality.		
Route from km 68+169.14 to km 83+139.47						
# 1	km 69 +414 - km 69 +823	Located on the right side of the line, belonging to My Duc commune	348,000	This area, currently production forest land with young eucalyptus trees and managed by the People's Committee of My Duc Commune, will be reclaimed and leveled for land use conversion, then handed back to the locality; the site lies 10–12 meters below surrounding areas and has no nearby residents.		

No.	Sites	Location	Capacity (m^3)	Describe	Potential Impact	Mitigation measures
# 2	Km 70 +247 - km 70+500	Right side of the line, belongs to My Duc commune	149,000	This low-lying area (12–14m below surroundings), currently eucalyptus-planted production forest managed by My Duc Commune, will be reclaimed and leveled by the investor, then handed over to the locality for use; it is not adjacent to residential areas.	affected subjects are very few.	machinery and equipment...) outtside the approved sites boundary
# 3	Km 70 +981 - Km 71 +130	Right side of the line, belongs to My Duc commune	128,000	This low-lying area (9–10m below surroundings), currently a eucalyptus-planted production forest managed by the My Duc Commune People's Committee, will be reclaimed and leveled by the investor for land use conversion, then handed over to the locality; it is not adjacent to residential areas.		
# 4	km 71 + 765 - km 71 + 812	On the left side of the route, in Hoai My commune	232,000	This low-lying area (12–14m below surroundings), currently planted with acacia trees under 3 years old and managed as production forest by the Hoai My Commune People's Committee, will be reclaimed and leveled by the investor for land use conversion, then handed over to		

No.	Sites	Location	Capacity (m^3)	Describe	Potential Impact	Mitigation measures
				the locality; it is not adjacent to residential areas.		
# 5	km 78+ 232 - km 78 +613	On the left side of the route, belongs to Con Vang, Kim Giao Nam village, Hoai Hai commune	270,000	This is a planned residential and commercial infrastructure land in Hoai Hai commune, under the management of the People's Committee of the commune. The current status is a low-lying area, about 5m lower than the surrounding area, 6ha wide, and in need of leveling.		
# 6	km 78+ 232 - km 78 +613	Dieu Quang Village, Hoai Hai	20,000	This is an empty land under the management of the Commune People's Committee, a low-lying area about 4m lower than the surrounding area, currently the commune needs to level the ground.		
# 7	km 78+ 232 - km 78 +613	Resettlement area phase 2	123,000	This is land under the management of the commune, used as a resettlement area in phase 2. It is currently a low-lying area about 2m lower than the surrounding area and the commune needs to level the ground.		
II. Route from National Highway 19C connecting to Quy Nhon port						

No.	Sites	Location	Capacity (m^3)	Describe	Potential Impact	Mitigation measures
# 1	Km 1 + 081.9- km1+245.48	Area A1 in area 3, Nhon Binh ward	80,582	This is an unused vacant land managed by the People's Committee of Nhon Binh Ward. The land is currently about 5m lower than the surrounding area, not adjacent to residential areas, and the commune currently needs to level the ground for this area.		

Table 0-4. Mitigation Measures applied to blasting process

Location	ES potential impacts/ Risk	Mitigation measures
Blasting locations on sites	- Ground vibration: Blasting may cause strong vibrations, potentially damaging nearby structures and underground utilities. - Flyrock: Rock fragments can be propelled far from the blast site, posing serious risks to workers, equipment, and nearby communities. - Airblast overpressure: Shock waves generated by blasting can cause noise pollution, break windows, and disturb wildlife and residents. - Dust generation: Large amounts of dust released during blasting can impact air quality and pose health risks. - Slope instability: Improper blasting may lead to landslides or rockfalls, threatening construction safety and surrounding areas. - Water contamination: Blasting near water bodies may	- Hire a licensed professional blasting contractor. - Blasting must comply with Government Decree No. 39/2009/ND-CP on industrial explosives. - Each blast must be specifically calculated based on geology, construction site, and structure dimensions. - Only State-approved explosives and blasting equipment are permitted. - Smoking and any actions that may create sparks are strictly prohibited near explosives. - Install steel bars and fences to prevent rockfalls. - Publicly announce blasting schedules via mass media and ensure full compliance with safety regulations. - Explosives and detonators must be transported separately, at speeds under 20 km/h, with a minimum 50m distance between vehicles, and fire safety equipment must be available.

Location	ES potential impacts/ Risk	Mitigation measures
	release sediments and pollutants, affecting water quality. - Safety hazards: Handling explosives involves high risk of accidental ignition or mishandling, endangering workers. - Disruption to local communities: Blasting can cause anxiety, temporary evacuations, and disrupt daily life activities. - Impact on fauna and flora: Blasting noise and vibration may disturb or harm local wildlife and vegetation. - Traffic disruption: Blasting activities near roads can require temporary traffic closures, affecting transportation.	- Obtain blasting permits; blasting engineers must be certified by the Department of Labor, War Invalids, and Social Affairs. - Develop a detailed blasting procedure (drilling, loading explosives, placing detonators, connecting fuses, etc.) with assigned supervisors and trained blasters. - Ensure safe storage, transportation, and record-keeping of explosives; expired explosives must not be used. - Study local conditions, cooperate with local authorities, and establish security perimeters, warning signs, and shelters. - Calculate and announce blasting times and danger zones based on site conditions and safety standards. - Inspect and approve each drilled hole and blasting setup before detonation; post warning signs and commands. - Protect hazardous areas with signals, signs, and monitoring stations. - Notify local authorities and residents before blasting and explain warning signals.

Table 0-5. Specific Mitigation Measures at the Site During the Construction of National Route 19C - Quy Nhon Port

Location, distance to construction sites	Objects	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 00 + 000	National Highway 1A 600 (Dieu Tri intersection - Dieu Tri town, Tuy Phuoc district)	- Traffic disruption: Temporary traffic congestion or detours may occur, affecting local mobility. - Increased accident risk: Construction activities at intersections can raise safety risks for vehicles and pedestrians. - Dust and noise pollution: Machinery operation near existing roads can cause environmental nuisances. - Access limitations: Restricted access to homes, businesses, or public facilities during construction.	- Set up temporary traffic control systems: Use signage, signal lights, and traffic personnel at intersections. - Implement phased construction: Divide construction into segments to maintain partial traffic flow. - Upgrade temporary detour roads: Provide alternate routes to ensure uninterrupted traffic. - Work during off-peak hours: Schedule construction at night or during low-traffic periods. - Install dust and noise control measures: Use dust screens, regular water spraying, and noise barriers.	Contractor	PPMU, CSC, Community
Km 00 + 000, 20m	Residential area of Dieu Tri town	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly - Cover construction materials and	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Objects	Potential Impact	Mitigation measures	Responsibility	
				Perform by	**Monitor by**
			waste during transportation. - Water the road surface to reduce dust. - Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or construction materials around the area. - Make sure local residents can enter and exit the house at any time.		
Km0+515	Duc river	- Water pollution from runoff carrying sediment, oil, and chemicals. - Increased turbidity affecting fish and aquatic plants. - Altered flow patterns leading to erosion and sediment buildup. - Loss of riparian vegetation, reducing natural water filtration. - Disturbance to aquatic habitats from noise and vibration. - Higher risk of spills from machinery and construction activities.	- Install silt fences and sediment traps to control runoff. - Cover and store materials properly to prevent leaching. - Limit in-stream work during sensitive periods for aquatic life. - Use containment measures for fuels and hazardous substances. - Restore vegetation along water bodies after construction. - Conduct regular water quality and slope monitoring throughout the project.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Objects	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km0+975	Cay Me River	- Water pollution from runoff carrying sediment, oil, and chemicals. - Increased turbidity affecting fish and aquatic plants. - Altered flow patterns leading to erosion and sediment buildup. - Loss of riparian vegetation, reducing natural water filtration. - Disturbance to aquatic habitats from noise and vibration. - Higher risk of spills from machinery and construction activities.	- Install silt fences and sediment traps to control runoff. - Cover and store materials properly to prevent leaching. - Limit in-stream work during sensitive periods for aquatic life. - Use containment measures for fuels and hazardous substances. - Restore vegetation along water bodies after construction. - Conduct regular water quality and slope monitoring throughout the project.	Contractor	PPMU, CSC, Community
Km 1 + 300 - Km 1 + 950, 22m	Residential area of Nhon Phu commune, Quy Nhon city	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly - Cover construction materials and waste during transportation. - Water the road surface to reduce dust.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Objects	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
			- Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or construction materials around the area. - Make sure local residents can enter and exit the house at any time.		
Km1+131 - Km2+637	The main axis of the planning of Van Ha Urban Area, Nhon Phu Ward, a sparsely populated area with many gardens interspersed with rice fields.	- Traffic disruption and congestion: Construction can reduce road capacity, causing delays. - Increased risk of accidents: Mixing construction activities with ongoing traffic increases hazards. - Dust, noise, and vibration: These can affect nearby residents and road users. - Access limitations: Entry to local businesses or homes may be temporarily restricted. - Damage to existing infrastructure: Utilities and drainage systems may be affected during excavation.	- Implement traffic management plans to ensure safe and efficient flow, including detours and clear signage. - Schedule construction during off-peak hours to minimize traffic disruption. - Use dust suppression methods such as water spraying and covering soil piles. - Install noise barriers or limit noisy activities to daytime hours. - Coordinate with utility providers to prevent accidental damage and ensure quick repairs.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Objects	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
			- Ensure safe pedestrian access and temporary paths where needed.		
Km2+770,00	Dieu Tri – Quy Nhon Railway	- The construction work will cause (i) damage to roads and railways, (ii) risk of traffic accidents and (iii) obstruction of traffic.	- Notify local authorities, communities and railway stations of construction plans at least 2 weeks in advance - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Use registered vehicles and maintain vehicles regularly. - Clean up waste and rocks scattered on the railway - Ensure railway safety corridor.When crossing the railway, you must obey railway safety signals.	Contractor	PPMU, CSC, Community
Km3+000 - Km4+270	Residential area interspersed with rice fields	- Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstruct, interrupt access - Road damage - Waste and raw materials scattered cause unsanitary conditions and loss of aesthetics.	- The speed limit is 20 km/h. - Cover construction materials and waste during transportation. - Repair any road damage immediately if any. - Remind workers to respect the beliefs of local people. - Workers are not allowed into the cemetery area. - Do not collect garbage or construction materials near the grave	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Objects	Potential Impact	Mitigation measures	Responsibility	
				Perform by	**Monitor by**
			area. - Ensure that local people can access at any time.		
Km 3 + 800, 20m	Family church, Nhon Phu commune, Quy Nhon city	- Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstruct, interrupt access - Road damage - Waste and raw materials scattered cause unsanitary conditions and loss of aesthetics.	- The speed limit is 20 km/h. - Cover construction materials and waste during transportation. - Repair any road damage immediately if any. - Remind workers to respect the beliefs of local people. - Workers are not allowed into the cemetery area. - Do not collect garbage or construction materials near the grave area. - Ensure that local people can access at any time.	Contractor	PPMU, CSC, Community
Km 4 + 200, 25m	Residential area on Dao Tan street, Nhon Binh commune, Quy Nhon city	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Objects	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
			- Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or construction materials around the area. - Make sure local residents can enter and exit the house at any time.		
Km4+270,00 đến Km5+438	Residential area and rice fields	- Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstruct, interrupt access - Road damage - Waste and raw materials scattered cause unsanitary conditions and loss of aesthetics.	- The speed limit is 20 km/h. - Cover construction materials and waste during transportation. - Repair any road damage immediately if any. - Remind workers to respect the beliefs of local people. - Workers are not allowed into the cemetery area. - Do not collect garbage or construction materials near the grave area. - Ensure that local people can access at any time.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Objects	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
Km 4 + 400, 20m	Long Thanh Pagoda, Nhon Binh Commune, Quy Nhon City	- Vibration and impact can cause cracks in the structure. - Risk of traffic accidents for visitors - Obstruct, interrupt access - Road damage - Waste and raw materials scattered cause unsanitary conditions and loss of aesthetics.	- The speed limit is 20 km/h. - Cover construction materials and waste during transportation. - Repair any road damage immediately if any. - Remind workers to respect the beliefs of local people. - Workers are not allowed into the cemetery area. - Do not collect garbage or construction materials near the grave area. - Ensure that local people can access at any time.	Contractor	PPMU, CSC, Community
Km 4 + 450 - Km 4 + 750, 27m	Residential area of Nhon Binh commune, Quy Nhon city	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly - Cover construction materials and waste during transportation. - Water the road surface to reduce dust.	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Objects	Potential Impact	Mitigation measures	Responsibility	
				Perform by	**Monitor by**
			- Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or construction materials around the area. - Make sure local residents can enter and exit the house at any time.		
Km 6 + 350, 17m	Residential area on Nguyen Man street, Nhon Binh commune, Quy Nhon city	- Vibration can cause cracks the structure. - Traffic accident risks for people - Obstruct, interrupt residents' access to the housing areas - Road damage - Waste and raw materials scattered near houses cause unsanitary conditions and loss of aesthetics. - Noise and dust affect people.	- Notify local communities in advance of construction plans. - Use appropriate media. - Coordinate with local traffic police to regulate fleet when necessary. - The speed limit is 20 km/h. - Limit the use of horns when passing through this area. - Use registered vehicles and maintain vehicles regularly - Cover construction materials and waste during transportation. - Water the road surface to reduce dust. - Wash the vehicle before moving away from the construction site. - Repair any road damage immediately if any. - Do not collect garbage or	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Objects	Potential Impact	Mitigation measures	Responsibility	
				Perform by	**Monitor by**
			construction materials around the area. - Make sure local residents can enter and exit the house at any time.		
Km6+353,03	Nguyen Man Street	- Traffic disruption: Temporary traffic congestion or detours may occur, affecting local mobility. - Increased accident risk: Construction activities at intersections can raise safety risks for vehicles and pedestrians. - Dust and noise pollution: Machinery operation near existing roads can cause environmental nuisances. - Access limitations: Restricted access to homes, businesses, or public facilities during construction.	- Set up temporary traffic control systems: Use signage, signal lights, and traffic personnel at intersections. - Implement phased construction: Divide construction into segments to maintain partial traffic flow. - Upgrade temporary detour roads: Provide alternate routes to ensure uninterrupted traffic. - Work during off-peak hours: Schedule construction at night or during low-traffic periods. - Install dust and noise control measures: Use dust screens, regular water spraying, and noise barriers.	Contractor	PPMU, CSC, Community
Km7+383	National Highway 19	- Traffic disruption: Temporary traffic congestion or detours may occur, affecting local mobility. - Increased accident risk: Construction activities at intersections can raise safety risks for vehicles and pedestrians. - Dust and noise pollution: Machinery	- Set up temporary traffic control systems: Use signage, signal lights, and traffic personnel at intersections. - Implement phased construction: Divide construction into segments to maintain partial traffic flow. - Upgrade temporary detour roads: Provide alternate routes to ensure	Contractor	PPMU, CSC, Community

Location, distance to construction sites	Objects	Potential Impact	Mitigation measures	Responsibility	
				Perform by	Monitor by
		operation near existing roads can cause environmental nuisances. - Access limitations: Restricted access to homes, businesses, or public facilities during construction.	uninterrupted traffic. - Work during off-peak hours: Schedule construction at night or during low-traffic periods. - Install dust and noise control measures: Use dust screens, regular water spraying, and noise barriers.		

Table 0-6. Mitigation Measures along the material transportation route

No.	Source of Construction Materials	Transportation Route	Total Distance (km)	Impact	Mitigation measure
I. Coastal Road from My Thanh to Lai Giang				- The operation of transport vehicles may generate significant amounts of dust and particulate matter, adversely affecting ambient air quality and the living environment of communities along the transportation routes. - Increased vehicle movements, particularly during peak hours, may lead to serious traffic congestion, higher risk of traffic accidents, and	- Roads shall be regularly cleaned and sprayed with water 2–3 times per day, especially before peak traffic hours and after material transportation. - Transportation routes, schedules, and vehicle movements shall be informed in advance to local authorities, schools, medical centers, and relevant agencies for coordination and safety awareness.
1.1	Binh De Quarry	National Route 1 - Hoai Thanh Intersection - Provincial Route 639 (end point)	21.8		
1.2	Cement	National Route 1A, Phu Kim Hamlet, Cat Trinh Commune, Phu Cat District - Provincial Route 635 Junction (km 1196 + 600, National Route 1A) - National	50.5		

No.	Source of Construction Materials	Transportation Route	Total Distance (km)	Impact	Mitigation measure
		Route 1A (km 1157 + 500, National Route 1A, My Chau Commune People's Committee)		disruption of daily activities in residential areas, especially near sensitive receptors such as schools, hospitals, and markets. - Heavy truck operations may cause deterioration of road surfaces, leading to the formation of potholes, cracks, and unsafe travel conditions for other road users. - Transportation of loose construction materials without appropriate containment may result in spillage onto roads, causing environmental pollution, traffic hazards, and public dissatisfaction. - Noise and vibration from transportation activities may disturb the daily lives of local residents, especially in densely populated or sensitive areas. - Improper maintenance and operation of vehicles may lead to oil leaks, increased exhaust emissions, and additional pollution affecting the surrounding environment. - Drivers lacking appropriate training on traffic safety regulations and environmental protection policies may	- Appropriate traffic signs, warning boards, and flagmen shall be deployed along transportation routes. - Transportation activities shall be scheduled reasonably to avoid peak hours, school times, rush hours, and night-time disturbances. All vehicles must have valid registration, inspection certificates, and comply with the permitted load capacity. - Materials must be properly covered with tarpaulins to avoid spillage during transportation. - Drivers and transportation workers shall be trained on traffic safety regulations, environmental protection policies of the Government and the World Bank, and emergency response procedures. - Vehicles must display driver identification information visibly during each shift for monitoring purposes. - Transportation activities shall maintain a logbook recording driver names, transported material types, time, and routes for traceability.
1.3	Steel and Iron	Quy Nhon Port - National Route 1 (km 1157 + 500) - My Chau Commune People's Committee - Project end point (km 83 + 139)	83.6		
1.4	Bong Son Sand Quarry	National Route 1A (Old Bong Son Bridge) - National Route 1 (km 1139 + 700) (Ba To Intersection) - DT 639 (end point)	16.7		
1.5	Asphalt	Quy Nhon City - National Route 19 (km 17 + 256) - National Route 1 (km 1214 + 500) (My Chau Commune People's Committee) - Start point of the route	83.6		
II. Road connecting 19C Highway - Quy Nhon Port					
2.1	Soil purchased from Quarry 209 (Canh Vinh Commune, Van Canh District)	Following QL19C - QL1A - Project location	10.6		

No.	Source of Construction Materials	Transportation Route	Total Distance (km)	Impact	Mitigation measure
2.2	Thuan Duc Quarry	National Route 1A - Dieutri Intersection - Start point of the route (Le Hong Phong and Tran Phu Streets)	6.4	contribute to unsafe driving practices and increased accident risks. - Insufficient communication and coordination with local authorities and communities may cause delays in emergency responses and escalate community grievances. - Transportation activities carried out without adequate scheduling and control may conflict with local traffic patterns, resulting in avoidable traffic jams and increased safety risks. - The absence of clear driver identification and transport records may hinder incident investigations and accountability in case of accidents or complaints.	- Vehicles must be maintained regularly to avoid oil leakage, exhaust emissions, and noise pollution. - Emergency contact points shall be established to promptly address incidents or complaints from communities along transportation routes.
2.3	Van Canh Sand Quarry -04 (Canh Vinh Commune)	Canh Vinh Commune Road - National Route 19C - Dieutri Intersection - Project starting point (intersection of Le Hong Phong and Tran Phu Streets)	23.4		
2.4	Thu Thien Thuong Sand Quarry, Binh Nghi Commune	Binh Nghi Commune Road - National Route 19 - National Route 1A - Dieutri Intersection - Start point of the route	30.9		
2.5	Other Material Sources	Quy Nhon Port - Tran Hung Dao (Dong Da Road) - Dong Da Junction - Nhon Hoi Economic Zone - Le Thanh Nghi Road - Project end point	5.4		

5.1.6. Mitigation Measures for Cumulative Impacts at the Project Level

To mitigate cumulative impacts, the People's Committee of Binh Dinh Province, the Project Management Unit (PPMU) of Binh Dinh, relevant departments, consulting units, contractors, local authorities, and affected communities must collaborate to implement the following measures:

- Develop, approve, and implement a Dust and Emission Control Plan as part of the Contractor's Environmental and Social Management Plan (ESMP).
- Inspect and ensure that trucks used in the project comply with TCVN 6438:2018 (Road Vehicles – Maximum Allowable Limits for Emissions).
- Establish and implement a program for regular monitoring of ambient air quality as part of the project's ESMP.
- Develop, approve, and implement a Traffic Safety Management Plan as part of the Contractor's ESMP.
- Implement the National Strategy on Climate Change and the National Strategy for Greenhouse Gas Emission Reduction in the Transport Sector.
- Implement measures to mitigate adverse impacts.

5.1.7. Mitigation Measures During the Operation and Maintenance Phase

Table 0-7. Mitigation Measures During the Operation and Maintenance Phase

ES Issues/Activities	Mitigation measures	Responsibility	
		Perform	**Monitor**
Minimize the impact of dust and exhaust fumes	- Regular maintenance of road surface quality: during the operation phase, periodic maintenance of road surface and bridge deck will be carried out to minimize damage to the road surface. The operation and maintenance plan will be planned and implemented by the operating unit. - Tree planting: completed before handover of project + NH 19C connecting Quy Nhon Port: planting trees on sidewalks and median strips. Designing pumping wells on the median strip with an average distance of 500m/well. Specifically as follows: - Sidewalk trees: plant Black Star trees at a distance of a = 10m/tree - Trees on the median strip: grass, date palms, bougainvillea. Plant ginger grass with a density of 60 plants/m2 ; Middle Eastern date palms with a distance of 6m/plant; bougainvillea with a distance of 5m/plant, row to row 2.4m/plant. The types of trees are arranged alternately. + Coastal route DT639, My Thanh - Lai Giang section: Plant trees on the median strip at the road section with B = 20.5m. Design pumping wells on the median strip with an average distance of 500m/well. Trees are arranged interwoven inside the median strip along the route: - Planting Areca palm: Height including leaves ≥ 1m, base diameter (3-:- 5) cm, distance 5m per cluster (3 trees). - Planting bougainvillea: Tree height ≥ 0.5m, root diameter (0.8-:- 1)cm; Plant in 2 rows (distance between rows and trees is 1m) When repairing roads: Use machinery and equipment that are periodically inspected for quality. Repair and maintenance locations in residential areas will be fenced off to limit the impact of dust on residents' lives. Water the repair and maintenance areas to reduce dust to limit dust spreading to the surrounding	Operating unit	Department of Construction, Traffic Management Department

	environment.		
Reduce noise and vibration	- Traffic participants comply with traffic safety laws. - When repairing the road: + Except in necessary cases, arrange machinery and vehicles that generate noise away from residential areas and agency headquarters (ensuring noise levels are not greater than 70dBA), schools, and medical stations (ensuring noise levels are not greater than 55dBA); + Turn off machines when not needed to minimize accumulated noise levels; + All equipment and machinery on site will be periodically checked for noise levels and necessary repairs and adjustments made to ensure safety; + During and after the completion of bridge and road repair and maintenance activities, waste will be collected and transported for disposal at licensed construction waste sites.	Operating unit	Department of Construction, Traffic Management Department
Minimize the impact of flooding	Design stormwater drainage lines as follows: <u>For route 19C connecting Quy Nhon Port</u> + Longitudinal stormwater drainage: round stormwater drainage Ø60cm - Ø100cm arranged on 1 side (right side), inside the sidewalk. At curved sections with super elevation, arrange drainage slots at the median strip with a distance of 20m/slot + Cross-drainage system: based on the results of flood model calculations, hydrological model of the Project, the design of technical parameters and construction location of the cross-drainage system for the route QL19C - Quy Nhon Port are selected as follows: (i) New construction of 12 culverts Þ120cm; 1 culvert Þ150cm; 1 culvert 2Þ150cm; (ii) New construction of 03 small box culverts (at Km0+406.90 size 2x(3x3)m; at Km2+509.29 size 1x(3x2)m; and at Km5+510.60 size 1x(3x2)m); (iii) New construction of 2 large box culverts at Km4+114.10 and Km4+756.00: size 10x(4x2)m. <u>For the coastal route section My Thanh - Lai Giang</u> + Surface drainage: Longitudinal ditches through residential areas and restoration of old ditches: arrange rectangular ditches 60cm wide. For sections passing through hills and non-residential areas, arrange a system of vertical ditches in the	Operating unit	Department of Construction, Traffic Management authorities

	shape of a trapezoid with a small bottom 40cm wide and 40cm high. + Super high drainage: arrange drainage slots at the median strip with a distance of 20m/slot + Horizontal drainage culverts: (i) From km45+00-km68+169.14: build 33 horizontal drainage culverts Þ100-120cm, 1 square culvert (1x0.5)m; (ii) From Km68+169.14 to Km83+139.47: build 71 new horizontal drainage culverts D600-D2000, 08 box culverts with dimensions 2x(6x4.5)m, 6x4m, 6x4.3m, 2x(6x4.3)m, 3x(6x2.1)m, 3x(6x4)m, 4x(6x3.4)m, 5x3m ; (iii) Ditch improvement: restore 2 sections of earthen ditch at km68+167.87 – km68+508.02 (right) and km68+167.87 – km68+518.97 (left), ditch bottom is 1m wide, 0.5m deep, ditch roof is 1:1. For bridges, to minimize the impact of erosion, sedimentation, and changes in flow, construction must comply with approved designs.		
Minimize the impact of incidents	Traffic safety: - Vehicles participating in traffic must have full registration. - Arrange warning signs in areas prone to landslides and areas prone to accidents such as Phu Thu Pass and Lo Dieu (My Thanh - Lai Giang coastal route). For the railway intersection on route 19C - Quy Nhon Port: designed barriers, traffic lights for roads and railways	Operating unit	Department of Construction, Traffic Management authorities

5.1.8. Mitigation of Residual Impacts

Residual impacts are defined as the final or anticipated impacts that occur after the proposed mitigation measures have been implemented. The sub-project has identified and assessed all potential negative environmental and social impacts associated with its activities during the pre-construction, construction, and operation phases. Generally, these impacts are considered direct, temporary, and localized, with the level of impact ranging from low to moderate.

Mitigation measures have been developed in the form of Environmental and Social Codes of Practice (ESCOP) and specific site-sensitive mitigation measures outlined in the previous sections to reduce negative impacts in accordance with the Environmental and Social Framework (ESF), relevant Environmental and Social Standards (ESS), environmental protection laws, and the World Bank Group's EHS Guidelines. The residual impacts are deemed insignificant. Therefore, the sub-project will not be associated with any significant residual impacts that require compensation or further mitigation under ESS1.

5.1.9. Labor Management Procedure (LMP)

The Labor Management Procedure is an independent document prepared for the sub-project to meet the requirements of ESS2. The purpose of this Labor Management Procedure (LMP) is to facilitate the planning and implementation of the sub-project by identifying key labor requirements and associated risks while determining the necessary resources to address labor-related issues relevant to the sub-project. The LMP provides general guidelines concerning different forms of labor.

5.2. INSTITUTIONAL ARRANGEMENTS

5.2.1. Implementation Arrangement

The tables and figures below summarize the roles and responsibilities of key parties and their relationships concerning the implementation of the ESMP.

- The contractor shall be responsible for implementing mitigation measures. These measures will be included in the bidding documents and contract.
- The Construction Supervision Consultant (CSC) will be responsible for overseeing the daily implementation of mitigation measures by construction contractors.
- The Independent Environmental Monitoring Consultant (IEMC), directly hired by the Binh Dinh Project Management Unit (PPMU), will be responsible for overall environmental supervision, including assisting PPMU in monitoring the implementation of environmental impact mitigation, building capacity for CSC and contractors, and reporting on implementation through regular monitoring reports.
- The project management board is responsible for overseeing the overall project implementation, including compliance with environmental regulations. The project management board will commit to implementing the Environmental Management Plan (KHQLMT) and the environmental operational frameworks of the project during the construction phase.

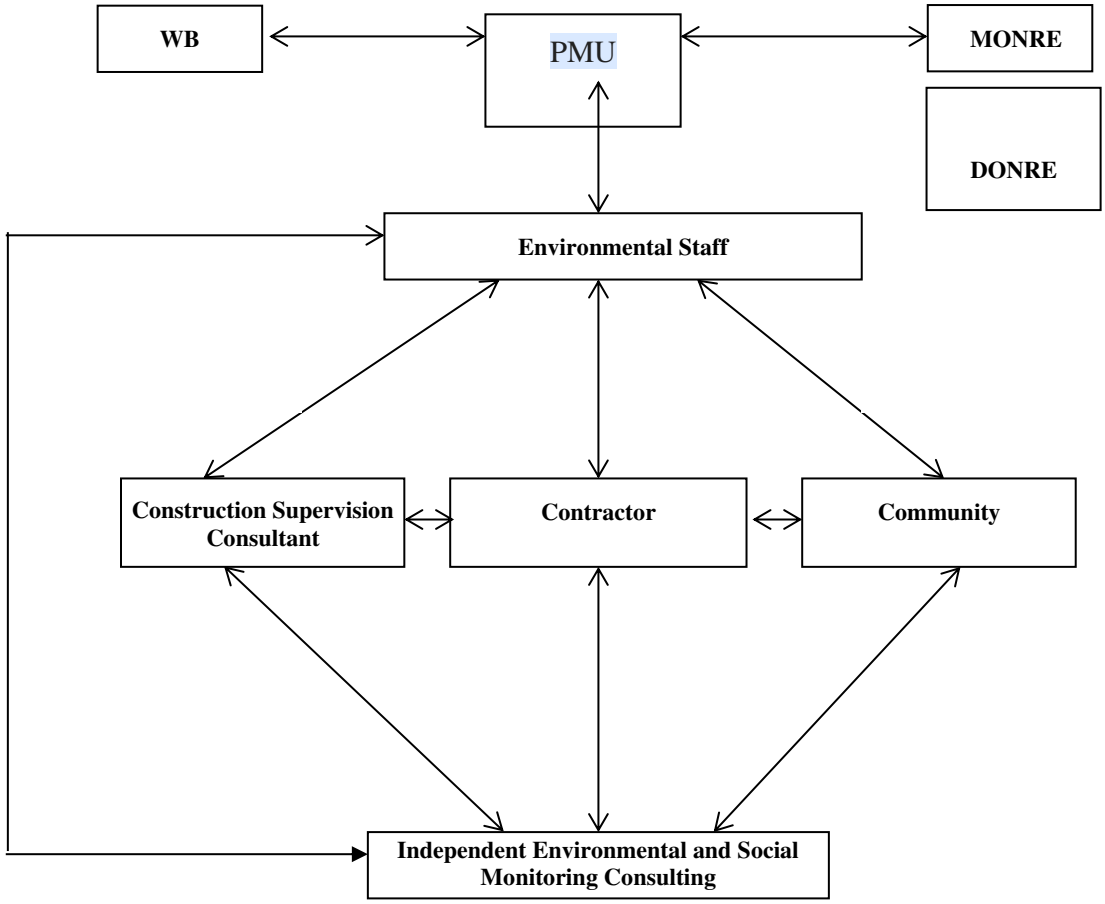


Figure 5 -1. Organizational Diagram for ESMP Implementation

Table 0-8. Roles and Responsibilities of Key Stakeholders

Community/Agency	Responsibility
PMB	- PMB will be responsible for monitoring the entire subproject implementation process, including the environmental compliance of the subproject. PPMU will be ultimately responsible for the implementation of ESMP and environmental quality of the subproject during the construction and operation phases. - Specifically, PPMU will: (i) closely coordinate with local authorities and people in community participation during subproject preparation and implementation; (ii) monitor and supervise the implementation of ESMP including the inclusion of ESMP in detailed technical designs and bidding and contract documents; (iii) ensure that the environmental and social management system is established and functioning properly; and (iv) be responsible for reporting on ESMP implementation to MONRE/DONRE and the World Bank.

Community/Agency	Responsibility
	- For effective implementation, PPMU will assign an Environment and Social (E&S) officer to monitor the implementation of environmental and social impact mitigation of the subproject right from the early stages of subproject preparation.
PPMU Environment and Social Officer	- The E&S staff is responsible for monitoring the implementation of the World Bank's environmental and social policies at all stages of the subproject. Specifically, the E&S staff will be responsible for: (i) supporting the PPMU to integrate the ESMP into the detailed engineering designs and bidding documents and construction contracts; (ii) supporting the PPMU to integrate the ESMP implementation responsibilities into the terms of reference, bidding documents and contracts for the Construction Supervision Consultant (CSC) as needed; iii) providing relevant input to the consultant selection process; (iv) reviewing reports submitted by the CSC and safeguard policy monitoring consultants; (v) conducting periodic site inspections; (vi) supporting the PPMU to develop solutions to address environmental and social issues of the subproject; and vii) support PPMU in preparing internal environmental and social monitoring reports for submission to the Ministry/DoNRE and the World Bank.
Construction Supervision Consultant (CSC)	- CSC will assign an Environmental and Social Officer who will be responsible for the regular supervision and monitoring of all construction activities and ensuring that the Contractor complies with the requirements of the contract and the C-ESMP. CSC will employ a sufficient number of qualified staff (e.g. Environmental Engineers) with sufficient knowledge of environmental protection and construction project management to carry out the required tasks and monitor the Contractor's performance. - CSC will also support PPMU in: (i) reporting and maintaining close coordination with local communities and (ii) strengthening ES risk and impact management capacity for construction contractors.
Bidder	The Contractor shall submit to PPMU the following additional documents in his Bid Document: **Code of Conduct for Contractor Employees (ES)** - The Contractor shall submit a Code of Conduct applicable to Contractor Personnel to ensure compliance with the Contractor's Environmental and Social (ES) obligations under the Contract. **Management Strategy and Implementation Plan (MSIP) for Risk Management (ES)** - The Bidder shall submit a Management Strategy and Implementation Plan (MSIP) to manage the following key Environmental and Social risks: • Traffic management plan to ensure safety of local communities from construction traffic; • Water resources protection plan to prevent water pollution;

Community/Agency	Responsibility
	• Receive handover of GPMB landmarks for mobilization and construction to prevent negative impacts outside the construction site; • Strategy to obtain approval/permit before starting related works such as waste disposal, electricity, water supply… • Action plan for prevention and response to sexual abuse and exploitation (SEA) and sexual harassment (SH).
Contractor	- Environmental Safety Monitoring Officer to implement measures to minimize environmental and social impacts proposed in the Environmental and Social Management Plan (ESMP). - Comply with the contractor's ES obligations set out in the Particular Conditions of Contract in the tender documents and contract. - Ensure all employees and workers understand the process and their responsibilities in managing ES risks and impacts. - Apply environmentally friendly construction technologies wherever possible. - Take all necessary measures to: • Environmental protection (both within and outside the Area); and • limit damage and nuisance to people and property due to pollution, noise and other impacts from the Contractor's activities and/or operations - Ensure that emissions, construction waste, wastewater and any other pollutants from the Contractor's activities do not exceed the values specified in the Specifications or the values prescribed by applicable Laws. - In the event of any damage to the environment, property and/or human nuisance, on or off the Site, as a result of the Contractor's activities, the Contractor shall agree with the PPMU/CSC on appropriate actions and timeframes to remedy, if possible, the damaged environment to its original condition. The Contractor shall carry out such remedial measures at its own cost after obtaining the approval of the PPMU/CSC. - Report to PPMU and CSC any difficulties and solutions. - Report to local authorities, PPMU and CSC if environmental incidents occur and coordinate with local responsible agencies and relevant parties to resolve these issues promptly.
Independent Environmental Monitoring Consultant (IEMC)	- The IEMC hired by PPMU will, within the scope of the contract, assist PPMU in establishing and operating the environmental and social management system, make recommendations for ES capacity building and adjustment for CSC and contractors during subproject implementation, and monitor the implementation of ESMP. - IEMC will conduct periodic environmental quality monitoring. - IEMC is also responsible for assisting PPMU in preparing periodic monitoring reports on ESMP implementation for submission to the

Community/Agency	Responsibility
	World Bank and relevant government agencies.
Local Community Oversight Board	- Community: According to Vietnamese practice, the community has the right and responsibility to regularly monitor the implementation of environmental and social impact mitigation measures during construction to ensure that their rights and safety are fully protected and that the mitigation measures are effectively implemented by the contractor and PPMU. If any unexpected incidents occur, they will report to the CSC and PPMU.
Ministry of Natural Resources and Environment and DAE	- Appraisal and approval of environmental impact assessment reports prepared by Binh Dinh Provincial PMB in accordance with the provisions of the current Law on Environmental Protection. - Monitor and supervise the compliance of PPMU Binh Dinh's ESMP as an integral part of the EIA approved by the Government of Vietnam.

5.2.2. Environmental Compliance Framework

5.2.2.1. Environmental Responsibilities of PPMU/Design Consultants

During the preparation of the Terms of Reference (TOR) for consulting services and construction bidding documents, PPMU will work closely with consultants to ensure that: i) the bid package and contract cost estimates include the implementation of the ESMP, which encompasses independent safety monitoring services, environmental sampling/monitoring, compliance monitoring, reporting, etc.; ii) the Environmental and Social Code of Practice (ESCOP) and general as well as site-specific mitigation measures are included in the bidding documents; and iii) environmental monitoring and training are incorporated into the scope of work assigned to the construction supervision consultant.

During the feasibility study/detailed technical design phase, PPMU will closely collaborate with feasibility study consultants and detailed design engineers to ensure that green solutions/landscaping, environmentally friendly measures, and related mitigation measures proposed in the Environmental and Social Impact Assessment (ESIA)/ESMP are appropriately reviewed and incorporated into the technical design.

In the construction phase, PPMU will work closely with the supervision consultant to monitor contractor compliance and report to relevant authorities. PPMU will also direct the supervision consultant and contractors on actions to be taken in case of issues, incidents, or accidents, etc. Additionally, PPMU is responsible for ensuring the effective implementation of the Labor Management Procedure (LMP) during construction.

PPMU will assign at least one suitably qualified staff member as the Environmental Officer (EO) and one suitably qualified staff member as the Social Officer (SO) throughout the project implementation period. The EO will oversee environmental issues and monitor compliance with the subproject's protective measures. The EO will be supported by the Independent Environmental Monitoring Consultant, environmental officers from the construction supervision team, as well as contractors. The SO will oversee and coordinate the social/resettlement aspects of the Project, with support from the Independent Resettlement Monitoring Consultant and social staff from the construction supervision team/contractors.

5.2.2.2. Preparation of Contractor's Environmental and Social Management Plan (C-ESMP)

The C-ESMP is part of the contract between PPMU and the contractor. Contractually, the contractor must comply with the C-ESMP, making it essential to ensure that the C-ESMP is based on findings and proposed measures identified in the ESIA and ESMP of the subproject. Before commencing construction, the contractor must prepare and submit the C-ESMP to PPMU and CSC for approval.

The objective of the C-ESMP is to provide information for environmental management during the implementation of proposed construction activities at the subproject site. This ensures that the contractor (and any subcontractors) has no or minimal impact on the environment. The C-ESMP provides detailed explanations of how the contractor will comply with the subproject's ES documents, such as the ESMP, and demonstrate that adequate funding has been allocated for these purposes. The C-ESMP includes specific mitigation measures based on the ESMP, final design, proposed implementation methods, site characteristics, etc. It also includes specific management plans for: (i) implemented activities; (ii) traffic management; (iii) occupational health and safety; (iv) environmental management; (v) social management; and (vi) labor flow.

The contractor will review the C-ESMP periodically (but no less than every six (6) months) and update it as necessary to ensure it contains measures appropriate to the project. The updated C-ESMP will be submitted to PPMU and CSC for review.

5.2.2.3. Contractor's Environmental Responsibilities

The contractor must first comply to mitigate the risks and impacts regarding environmental and social (ES) issues that may arise from the subproject's construction activities and secondly, implement the mitigation measures outlined in the C-ESMP to prevent impacts on local communities and the environment due to construction activities.

Remedial measures that cannot be effectively implemented during construction must be carried out upon project completion (and prior to the final acceptance of the work).

The contractor's responsibilities include, but are not limited to, the following:

- Compliance with legal requirements related to environmental protection, public health, and safety;
- Operating within the requirements of the contract and other bidding conditions;
- Designating a representative from the construction team to participate in joint inspection teams at the site conducted by the environmental department of CSC;
- Implementing any remedial actions as directed by the Environmental Officer of PPMU and CSC;
- In the event of non-compliance/discrepancies, conducting investigations and proposing mitigation measures, while also implementing remedial actions to reduce environmental impact;
- Stopping construction activities that cause negative impacts when directed by the Environmental Officer of PPMU and CSC. Proposing and implementing remedial actions and alternative construction methods, if necessary, to mitigate environmental and social

risks and impacts; non-compliant contractors will have their work suspended and face other penalties until the non-compliance is resolved with the approval of the Environmental Officer of PPMU and CSC.

- If the contractor proposes to use raw materials not mentioned in the ESIA of the subproject, the contractor will report to CSC and PPMU and coordinate with them to conduct an environmental assessment of these raw materials to assess compliance with national environmental requirements. Only compliant sources may be used in this project.
- The contractor is responsible for implementing remedial measures at their own expense. The contractor will also bear the cost of damages resulting from non-compliance with the C-ESMP and/or current environmental regulations.

The contractor must not commence any construction activities, including mobilization and/or pre-construction activities (e.g., temporary land clearing for access roads, site entry, and site establishment), unless PPMU approves the measures taken to address environmental, social, health, and safety risks and impacts. At a minimum, the contractor must implement the Management Strategies and Implementation Plans and Code of Conduct, submitted as part of the bidding process and agreed upon as part of the contract. The contractor must submit any necessary additional Management Strategies and Implementation Plans for PPMU's approval to manage the ESHS risks and impacts of ongoing works. These Management Strategies and Implementation Plans collectively form the Contractor's Environmental and Social Management Plan (C-ESMP). The C-ESMP must be approved before construction activities begin.

5.2.2.4. Contractor's Safety, Social, and Environmental Officer (SSEO)

The contractor must designate a competent staff member as the on-site Safety, Social, and Environmental Officer (SSEO). The SSEO must receive appropriate training in environmental management and possess the necessary skills to communicate environmental management knowledge to all staff involved in the contract. The SSEO will be responsible for monitoring compliance with the requirements of the ESMP and the contractor's environmental specifications. The SSEO's responsibilities include, but are not limited to, the following:

- Conducting environmental inspections at the site to assess and audit site practices related to pollution control and the adequacy of implemented measures to mitigate environmental impacts;
- Monitoring compliance with environmental protection measures, preventative measures, pollution control, and contractual requirements;
- Monitoring the implementation of measures to mitigate environmental impacts;
- Preparing environmental monitoring reports for the site;
- Investigating complaints and proposing any necessary remedial actions;
- Advising the contractor on environmental improvements, raising awareness, and proactive pollution prevention measures;

- Proposing appropriate mitigation measures for the contractor in case of non-compliance. Conducting additional monitoring of non-compliance as directed by the environmental staff of PPMU and CSC;
- Notifying the contractor and environmental officers (of PPMU and CSC) of environmental issues, submitting the contractor's ESMP Implementation Plan to the environmental officers of PPMU and CSC, and relevant authorities if requested;
- Maintaining detailed records of all activities at the site related to the environment.

5.2.2.5. Independent Environmental Monitoring Consultant (IEMC)

To mitigate environmental and social impacts during the construction of the project, the Project Owner must ensure the establishment of specific monitoring and compliance requirements for the project. Monitoring will be carried out by an Independent Environmental Monitoring Consultant designated by PPMU, with the main responsibilities of the IEMC including:

- Assisting the Project Management Unit (PMU), Construction Supervision Consultant (CSC), and contractors in carrying out environmental tasks at the site, including providing technical advice and guidance documents;
- Conducting regular on-site monitoring to verify compliance with relevant environmental policies and mitigation measures from stakeholders, including environmental procedures, reporting systems, resource allocation, training activities, and on-site environmental management practices;
- Monitoring environmental conflicts at the site, developing additional mitigation measures, and planning responses as necessary;
- The IEMC will be responsible for environmental sampling, monitoring, and reporting throughout all phases of the project. Environmental quality monitoring will be reported periodically to the PPMU and the World Bank (specifically every six months for both the PMU and WB during the construction phase); and
- The IEMC will also provide technical support to the PMU and Environmental Specialist (ES) on environmental issues.

The PPMU must ensure that the aforementioned responsibilities of the IEMC are incorporated into the relevant Terms of Reference (TOR) for the IEMC during project implementation.

5.2.2.6. Environmental and Social Monitoring During Construction

During the construction phase, the CSC will appoint environmental and social staff responsible for inspecting and supervising all construction activities to ensure that mitigation measures outlined in the Construction Environmental and Social Management Plan (C-ESMP) are properly implemented and that the risks and negative environmental and social impacts of the sub-project are minimized. The CSC will hire a sufficient number of environmental supervising engineers with adequate knowledge of environmental protection and construction project management to perform the required tasks and monitor contractor performance. Specifically, the CSC environmental staff will:

- Review and assess whether the construction design meets the requirements for mitigation and management measures of the C-ESMP;
- Supervise the contractors' environmental management system on-site, including performance, experience, and handling of environmental issues, while providing corrective guidance;
- Organize and implement training to raise awareness about HIV/AIDS for all workers;
- Review payment requests related to environmental mitigation costs, if applicable;
- Assess the contractors' implementation of the C-ESMP, verify and confirm the environmental monitoring processes, parameters, monitoring locations, equipment, and results;
- Report the implementation status of the C-ESMP to the PPMU and prepare environmental monitoring reports during the construction phase.

The PMU must ensure that the aforementioned responsibilities of the CSC are included in the relevant TOR for the CSC during project implementation.

5.2.2.7. Compliance with Legal and Contractual Requirements

Construction activities must comply with environmental protection and pollution control requirements according to the contractual Environmental and Social Framework (ESF) and Environmental and Social Commitment Plan (ESCP), as well as national laws. All construction method statements submitted by the contractor to the CSC and PPMU for approval must ensure that adequate environmental protection and pollution control measures are incorporated.

The CSC and PPMU will also review progress and implementation plans to ensure that ESF and national environmental regulations are not violated and to prevent any potential breaches of the ESF and national environmental regulations. The contractor must provide relevant documents to the Social Environmental Officer (SEO) and environmental staff of the CSC and PPMU. These documents must include, at a minimum, updated work progress reports, updated implementation measures, and applications for various permits/licenses as required by environmental protection law and all valid permits/licenses. The SEO and environmental staff of the CSC must also have access to the site logbook upon request.

After reviewing the documents, the SEO or environmental staff will inform the PPMU and the contractor of any non-compliance with contractual and legal environmental protection and pollution control requirements, so they can take further action. If the SEO or environmental staff conclude that the status of the permit application and any environmental protection and pollution control preparations may not comply with construction measures or may lead to violations of environmental protection and pollution control requirements, they will notify the contractor and the PPMU.

5.2.2.8. Environmental and Social Violations and Remedial Measures

The PPMU and CSC will be responsible for monitoring and supervising the contractor's performance to ensure full compliance with Environmental and Social (ES) obligations as outlined in the relevant Environmental and Social Standards (ESS) in their respective contracts. If any violations of these ES obligations are detected, the PPMU and CSC will promptly require or request the contractor to take immediate action to rectify the situation or correct the work.

If the contractor has not fulfilled any ES obligations or work according to the contract, the value of that work or obligation, as determined by the PPMU and CSC, may be withheld until the work or obligation is completed and/or remedial or replacement costs, as determined by the PPMU and CSC, may be withheld until such remedial or replacement actions are completed in accordance with the contract terms. Non-compliance includes, but is not limited to, the following:

- Failure to comply with any ES obligations or work described in the Work Requirements, which may include: work outside site boundaries, dust pollution, road damage, destruction of vegetation outside the site, water pollution from oil or sedimentation, soil pollution from oil, human waste, damage to archaeological sites or cultural heritage, air pollution;
- Failure to regularly review the C-ESMP and/or timely update it to address emerging ES issues or anticipated risks or impacts;
- Failure to implement the C-ESMP;
- Lack of appropriate consent/permits prior to carrying out the works or related activities;
- Failure to submit ES reports or to submit them on time;
- Failure to implement remedial measures as instructed by the engineer within the stipulated timeframe (e.g., remedial measures addressing non-compliance issues).

The contractor must immediately undertake work or obligations, and/or remedial or replacement actions to rectify/address violations within the timeframe set by the PPMU and CSC. If the contractor fails to successfully complete those remedial or corrective actions within the specified timeframe, the PPMU and CSC will hire another person or contractor to perform the remedial actions and require the contractor to pay for the costs of the remedial actions.

If the contractor fails to implement remedial measures and the withheld amount is insufficient to cover the costs of rectifying the violations, the PPMU and CSC will deduct that amount from any other payments owed to the contractor. The contractor may also face penalties and additional sanctions imposed by the relevant government authorities under current law.

In cases where the PPMU and CSC determine that the contractor has seriously violated ES obligations under the contract and has not taken full and timely actions to rectify/address the violations/non-compliance, the PPMU and CSC will terminate the contract and concurrently confiscate the Performance Guarantee and the ES Performance Guarantee (if required under the contract).

Furthermore, the contractor's violations/failure to fulfill ES obligations will be recorded in the government procurement system and the World Bank's system, which may serve as grounds for disqualifying the contractor in future bidding processes.

5.2.2.9. Reporting

Monitoring and performance reporting requirements related to environmental and social aspects are summarized in the table below.

Table 0-9. Reporting Requirements

No.	Report prepared by	Sent to	Reporting frequency
1	Construction contractor	CSC	Immediately if any incident or accident related to the project has or is likely to have a significant negative impact on the environment, affected communities, the public or workers. Weekly and monthly related to Environmental and Social Risk and Impact Management.
2	Construction Supervision Consultant (CSC)	PPMU	Immediately if any incident or accident related to the project has or is likely to have a significant negative impact on the environment, affected communities, the public or workers. Weekly and monthly related to Environmental and Social Risk and Impact Management.
4	Local community	PPMU	When local communities have complaints about the ES performance of the subproject.
5	PPMU	DAE	Every six months
6	PPMU	World Bank	Immediately if any incident or accident related to the project has or is likely to have a significant negative impact on the environment, affected communities, the public or workers. Every six months.

5.3. GRIEVANCE REDRESS MECHANISM (GRM)

5.3.1. Subproject-Level GRM

The objective of the Grievance Redress Mechanism (GRM) for the sub-project is to provide complainants with an accessible mechanism to raise concerns and complaints related to the project. The GRM of the sub-project provides information on how complaints can be submitted, including forms, communication channels, and the steps for resolution along with the timelines for each step, such as acknowledgment of receipt, notification of resolution decisions, and stipulated deadlines. During the grievance resolution process, dialogues will be organized between the designated GRM staff and complainants, as needed, to foster mutual understanding and collaboration for effective resolution. The sub-project also includes an appeals process that complainants can utilize if they are dissatisfied with the proposed grievance resolution.

The project-level GRM is based on existing formal grievance mechanisms as mandated by law. In addition to the formal mechanism, informal grievance channels that are culturally appropriate and recognized by the government are available in communities. All complaints will be received and documented by grievance reception bodies. The Project Management Unit (PMU) will maintain records of all complaints received under the project and monitor the entire resolution process to ensure timely resolution. Collective grievances will be accepted through group representatives. To ensure that everyone, including vulnerable individuals and women, can express their concerns, the GRM will be publicly displayed at local government offices and distributed to all affected parties in the form of project flyers during project implementation. Additionally, all project GRMs will

be posted on the PMU's website. The principles and procedures of the project-level GRM are as follows:

- The project-level GRM will be publicized in public domains (e.g., PMU website, notice boards at local government offices) and will be explained and provided (in hard copy, e.g., project information flyers) to all affected households and interested parties during consultation meetings. Contact details for the GRM focal point of the PMU will also be provided in the project information flyers as an alternative channel for submitting complaints.
- Complaints can be submitted in writing or verbally, and through various channels such as direct submission (hand delivery), mail/email, and phone. Verbal complaints are useful for those who have difficulty writing formal complaints (e.g., the elderly, disabled). These individuals will receive assistance from government officials at local government offices when making verbal complaints.
- Complainants may authorize representatives. Complainants may ask family members or trusted individuals to help document their complaints and represent them in presenting or submitting the complaints.
- Anonymous complaints are accepted and will be considered through all project grievance reception channels. Anonymous complaints will be processed if sufficient information is provided to allow for investigation.
- Complaints will be logged by the receiving parties. The resolution of complaints will be monitored by the parties responsible for handling the grievances. A complaint database will be established and maintained by the PMU (through the GRM focal point of the PMU).
- Complainants will receive written acknowledgment. For all levels (commune, district, province), within 10 days of receiving a complaint, the authority responsible for resolving the complaint must notify the complainant in writing and commence the grievance resolution procedures. The authority must send the resolution decision to the complainant within 3 days of issuing the initial resolution decision and within 7 days of issuing the second resolution decision.
- A designated timeframe for grievance resolution is set for each step/level, including stipulated deadlines.
- The resolution decision will be issued and sent to the complainant and stakeholders within the specified timeframe.
- Affected parties will not incur any costs related to the grievance resolution process. Costs associated with grievances arising from project impacts will be borne by the project.
- The resolution decision will be publicly disclosed after anonymizing the complainant's identifying information to protect their identity.

Complaint Resolution Steps:

- **Step 1 - Commune People's Committee (CPC):** Affected households can raise complaints to any member of the commune's CPC, through village leaders or directly to the CPC, either

in writing or verbally. The CPC member or the village leader will inform the CPC of the complaint. The CPC will work directly with the affected household and decide on the grievance resolution within 10 working days from receiving the complaint. The CPC office is responsible for documenting and recording all grievances it handles. The first resolution timeframe shall not exceed 30 days from the date of complaint acceptance. For complex cases, this timeframe may be extended but not more than 45 days from acceptance. If the initial complaint is not resolved within 30 days of the stipulated resolution period, or if the complainant disagrees with the initial resolution decision, they have the right to appeal to the district or provincial CPC.

- **Step 2 - District People's Committee (DPC):** Upon receiving the household's complaint, the DPC has 10 days from the date of complaint acceptance to resolve it. The DPC is responsible for documenting and keeping records of all complaints it processes. The second resolution timeframe shall not exceed 45 days from the date of acceptance. For complex cases, this timeframe may be extended but not more than 60 days from acceptance. If the complaint remains unresolved after the stipulated timeframe, or if the complainant disagrees with the second resolution decision, they may appeal to the provincial CPC or file a lawsuit in the district court as per the Complaint Law.
- **Step 3 - Provincial People's Committee (PPC):** Upon receiving the household's complaint, the PPC has 10 working days to resolve the matter. The PPC is responsible for documenting and storing records of all complaints submitted. The second resolution timeframe shall not exceed 45 days from acceptance. For complex cases, this timeframe may be extended but not more than 60 days from acceptance. If the complaint is still unresolved or if the complainant disagrees with the second resolution decision, they may file a lawsuit in the provincial people's court as per the Complaint Law. For all levels, a resolution decision must be issued within 7 working days from the conclusion of the grievance, sent to the complainant, stakeholders, and publicly posted at the office of the competent CPC.
- **Step 4 - Provincial People's Court:** After 45 days from submitting the complaint to the PPC, if the complainant has not received feedback or is dissatisfied with the PPC's resolution decision, they may take the matter to court. The court's decision will be final. The resolution decision must be sent to the complainant and stakeholders and must be posted at the office of the CPC where the complaint was resolved. The decision/results must be published at the commune level within 3 days and at the city/district level within 7 days.

❖ **Contractors and Construction Supervisors:** During construction, the GRM will also be managed by contractors under the supervision of the Construction Supervision Consultant (CSC). Contractors will inform affected communities and communes about the availability of the GRM to address complaints and concerns regarding the sub-project. This will be done through community consultation processes and information disclosure, whereby contractors will regularly communicate with affected communities and relevant authorities. Meetings will be held at least quarterly, announcements will be made in local media, and notifications about planned upcoming activities will be published. All complaints and corresponding actions taken by contractors will be documented in the sub-project safety monitoring reports. Complaints and compensation requests may be submitted as follows:

- Verbally: directly to the CSC and/or the contractor's safety staff or representative at the construction site office;

- In writing: by directly submitting or sending written complaints to designated addresses;
- Via phone, fax, email: to the CSC, contractor's safety staff, or representative.

Upon receiving a complaint, the CSC, contractor's safety staff, or representative will log the complaint into the complaint records and maintain a log of events related to the complaint until it is resolved. Immediately upon receipt, four copies of the complaint will be prepared. The original will be kept on file, one copy will be used by the contractor's staff, one copy will be sent to the CSC, and the fourth copy to the PMU within 24 hours of receiving the complaint.

The information recorded in the complaint log will include:

- Date and time of the complaint;
- Name, address, and contact information of the complainant;
- Brief description of the complaint;
- Actions taken to resolve the complaint, including contacts and results at each step in the grievance resolution process;
- Date and time of contact with the complainant during the resolution process;
- Final resolution of the complaint;
- Date, time, and method of notifying the complainant about the resolution;
- Signature of the complainant upon obtaining a resolution.

Minor complaints will be resolved within one week. Within two weeks (and weekly thereafter), a written response will be sent to the complainant (by hand, mail, fax, email) outlining the procedures taken and progress thus far.

The primary goal is to resolve issues as quickly as possible with the simplest measures, involving as few people as possible and at the lowest possible level. Only when the issue cannot be resolved at the simplest level and/or within 15 days will other authorities become involved. Such situations may arise, for example, when compensation claims cannot be settled or when the cause of damage is determined.

5.3.2. World Bank Grievance Redress Service (GRS)

The Grievance Redress Service (GRS) is a channel through which individuals and communities can submit complaints directly to the World Bank if they believe that a World Bank project has caused or has the potential to cause negative impacts on them, their communities, or their environment. The GRS enhances the World Bank's responsiveness and accountability to communities affected by projects by ensuring that complaints are considered and addressed in a timely manner. Complaints must be submitted in writing to the GRS. For information on how to submit a complaint to the World Bank Grievance Redress Service (GRS), please visit www.worldbank.org/grs.

5.3.3. World Bank Inspection Panel

The Inspection Panel serves as an independent complaint mechanism for individuals and communities who believe that they have been or may be adversely affected by a project funded by

the World Bank. The Panel has the authority to review projects funded by the World Bank and to determine whether the Bank Management has complied with the World Bank's operational policies and procedures established to promote economic and social benefits while avoiding harm to people or the environment. For information on how to submit a complaint to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

5.3.4. Grievance Mechanism for Workers

General Principle: While the subproject will have a grievance mechanism to address the concerns of parties affected by the subproject, the nature of workplace concerns for workers often varies. Typical workplace complaints may include demands for employment opportunities, wage levels, payment delays, disagreements regarding working conditions, and health and safety concerns in the workplace. Therefore, a separate grievance mechanism will be established for project workers (both direct employees and contracted workers) in accordance with ESS2.

Complaints must be handled objectively, promptly, and must address the needs and concerns of affected workers. Workers should be allowed to submit complaints in various ways, such as in person, via telephone, text message, mail, or email. Complaints raised must be recorded and acknowledged within one day. While the timeline for resolution will depend on the nature of the complaint, health and safety issues in the workplace or any other urgent matters must be addressed immediately. If a complaint cannot be resolved within a reasonable timeframe, the affected worker must be notified in writing so they may consider pursuing a labor inspection through the State (see below for further details). This mechanism will also allow for anonymous complaints to be raised and addressed. Individuals submitting their concerns or complaints may request to keep their identity confidential.

Direct Workers: The PPMU will hold regular group meetings to discuss any workplace concerns. Complaints raised by direct workers will be recorded along with the actions taken by the unit. A summary of complaint cases will be reported to the World Bank as part of the regular reporting process. If direct workers wish to elevate their issues or raise concerns anonymously and/or with someone other than their direct supervisor/recruiting unit, they may present their issues to relevant city authorities (e.g., DOLISA), if applicable.

Contract Workers: The site management and OHS personnel (or any other relevant staff) of the contractor will hold daily group meetings with all contract workers present on site at the end of each workday to discuss any workplace issues or complaints. Complaints raised will be recorded along with the actions taken by the contractor. Summaries of complaint cases will be reported to the PPMU and construction consultancy as part of the contractor's regular reporting. When appropriate, contract workers should be allowed to utilize existing grievance mechanisms within the contractor's organization. If contract workers wish to elevate their concerns anonymously and/or with someone other than their direct supervisor, they may present their issues to the PPMU and/or the construction consultancy. Contract workers will be informed about the grievance mechanism before starting work. Contact information for the PPMU and/or construction consultancy will be shared with contract workers.

State Labor Inspectorate and Labor Law Violations: Labor inspectors are responsible for addressing complaints and denunciations from workers regarding violations of labor laws and for receiving and resolving complaints and denunciations about violations of labor laws as prescribed by law.

Complaint Resolution Process: A step-by-step complaint resolution process is established for both direct and contracted workers, outlining the responsibilities associated with addressing labor-related issues. The primary purpose of this document is to present the GRM in an effective and user-friendly manner.

The principles are as follows:

- Complaints will be resolved promptly, fairly, and transparently.
- Complaints may be submitted in writing, verbally, directly by the complainant, or by an authorized representative.
- Complaints will be recorded and confirmed in writing upon receipt.
- The complaint resolution process will specify the parties responsible for addressing the complaints, the timeframe for each level, and the rights of the complainant to take legal action at any level.
- In addition to the legally mandated authorities for addressing complaints, the PPMU serves as an alternative channel for submitting complaints.
- Collective complaints may be made through a representative of the group of complainants.

GRM Disclosure: The PPMU and the contractor will be responsible for disclosing the GRM to direct workers and contract workers and ensuring that the GRM is explained to them at the time of recruitment and is available at the PPMU office and the contractor's office. The contact number for the GRM liaison will also be provided to the workers.

The grievance resolution process for contract workers and the designated worker grievance resolution process is detailed in the LMP.

5.4. ESMP IMPLEMENTATION PLAN

Contractor's ESMP Implementation Plan

Immediately after the contract is signed, based on the approved ESMP of the subproject and the construction measures, the construction plan approved by the CSC and PPMU, the contractor will prepare the Contractor's ESMP (C-ESMP) for the bidding package and submit it to the PPMU/CSC for review and approval. The C-ESMP must provide a detailed explanation of how the contractor will comply with the ES documents of the subproject such as the ESMP and demonstrate that sufficient funding is available for this purpose. The C-ESMP must include specific mitigation measures based on the ESMP, final design, proposed working methods, project site nature, etc. Specific management plans should include: (i) work activities; (ii) traffic management; (iii) occupational health and safety; (iv) environmental management; (v) social management; and (vi) labor flow.

Once the C-ESMP is approved by the PPMU/CSC, the contractor will disclose it at the workers' camp and on-site office to disseminate information about the mitigation measures to workers and at community offices where local authorities and affected residents can access it.

The contractor will assign personnel responsible for managing ES at the site.

The contractor will implement the ES management measures as agreed in the C-ESMP. The contractor will review the C-ESMP periodically (but not less than once every six (6) months) and

update it as necessary to ensure it contains measures relevant to the works. The updated C-ESMP will be submitted to the PPMU/CSC for review.

The contractor must cooperate with the PPMU and CSC to timely address local community complaints regarding the risks and ES impacts of the bidding package.

The contractor must report on the implementation of the C-ESMP to the PPMU/CSC on a monthly basis.

Personnel

The contractor's ES management personnel must have a foundational knowledge of environmental issues and/or relevant disciplines, OHS risk management certification, and work full-time on-site.

The contractor must provide OHS compliance training for workers before starting work and conduct regular health checks for workers.

5.5. CAPACITY DEVELOPMENT AND TRAINING

5.5.1. Capacity Assessment of PPMU

The Binh Dinh Project Management Unit (PPMU) will be the implementing agency. PPMU Binh Dinh has undertaken several projects funded by the World Bank. PPMU Binh Dinh has assigned two staff members, one responsible for environmental aspects and the other for social aspects of the sub-project. These two environmental and social (ES) officers are familiar with the World Bank's safety policy requirements as they have participated in several training sessions organized by the World Bank and have worked on projects that apply the World Bank's safety policies. However, since the sub-project will be implemented under the World Bank's Environmental and Social Framework (ESF), there will be new policy requirements that the designated ES officers of PPMU Binh Dinh may not be aware of. Therefore, the designated ES officers need to be trained on the ESF and actively engage with World Bank safety/standards experts to understand the new ESF requirements and receive timely support. The ES officers of PPMU Binh Dinh will need to actively participate in ESF training organized by the World Bank whenever possible.

The ES officer designated by PPMU Binh Dinh will be responsible for coordinating with the Independent Environmental Monitoring Consultant (IEMC) to enhance ES management capacity for the Construction Supervision Consultant (CSC) and contractors. The CSC and IEMC's ES officers will be responsible for coordinating and providing Occupational Health and Safety (OHS) training for new staff and basic OHS training in accordance with the World Bank Group's Environmental, Health, and Safety (EHS) Guidelines.

OHS Training

There is a need to provide OHS training for all new staff to ensure they are informed about the basic rules of work at the construction site as well as personal protection measures and injury prevention for their colleagues. The training should include basic awareness of hazards, specific site hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disasters, if applicable. Any specific site hazards should be thoroughly considered as part of the training.

Orientation for Visitors

If visitors to the site may access areas that could have hazardous conditions or substances, regulations and guidelines must be established to ensure that visitors do not enter hazardous areas without supervision.

Training for New Staff and Contractors

Employers must ensure that workers and contractors receive comprehensive training and information before commencing new work, helping them understand the hazards in their tasks and protect their health from potential hazards in the surrounding environment. The training content must include:

- Knowledge of materials, equipment, and tools
- Known hazards associated with activities and how to control them
- Potential health risks
- Preventive measures to avoid exposure
- Hygiene requirements
- Wearing and using protective equipment and clothing
- Appropriate responses to extreme situations, incidents, and accidents

Basic OHS Training

A basic vocational training program and specialized courses must be provided as necessary to ensure workers are oriented to the specific hazards of each task. Training is typically provided for management, supervisors, workers, and occasionally for visitors in high-risk areas. Workers assigned to rescue and first aid duties must receive specialized training to avoid inadvertently worsening exposure and health risks for themselves or colleagues. The training will include risks of exposure to bloodborne pathogens through contact with body fluids and tissues. Through appropriate contract terms and oversight, employers must ensure that service providers as well as contract and subcontract workers are fully trained before commencing work.

5.5.2. Strengthening Environmental and Social Capacity

The capacity of PPMU, CSC, and contractor staff responsible for implementing and monitoring the Environmental and Social Management Plan (ESMP) will be enhanced. All parties involved in the implementation and monitoring of the ESMP must understand the project's environmental and social management objectives, methods, and practices. The sub-project will address capacity and expertise gaps in environmental and social management through (i) institutional capacity building and (ii) training.

Institutional Strengthening

The capacity of PPMU to coordinate environmental and social management will be enhanced through a series of measures. Appointing qualified environmental and social experts within PPMU to coordinate the ESMP, including the Grievance Redress Mechanism (GRM) and coordinating environmental impact monitoring, training, reporting, etc., will be directly supported by the World Bank or IEMC.

Training

As the sub-project will implement new environmental and social standards of the World Bank, the World Bank will conduct annual conventional safety policy training for all funded PPMUs. Therefore, all training related to the implementation of the World Bank's new ES policy will be provided to the environmental and social staff of PPMU, CSC, and contractors' OHS staff as soon as they are mobilized. Additional training will also be provided for relevant stakeholders during the construction phase, which can be summarized in the table below.

Table 0-10. Training Program for Strengthening Capacity in ESMP Implementation

Training objects	**PPMU staff**
Training course	WB ESF and ESMP
Participants	Designated ES Staff
Training frequency	Immediately after the subproject comes into effect, but at least one month before the first tender package is tendered. Further training will be scheduled as required.
Time period	2 days
Content	WB ESF policy requirements, implementation process, approved ESMP implementation, monitoring of implementation by stakeholders. Overall environmental management related to the subproject includes requirements from the World Bank, DAE, coordination with competent authorities and stakeholders. Environmental monitoring for the sub-project includes: - Environmental monitoring requirements; - Monitor and implement mitigation measures; - Community participation in environmental monitoring; - Guide and supervise contractors, CSCs and community representatives in conducting environmental monitoring; - Forms used in environmental monitoring; - Risk response and control; - How to receive and submit forms; and - Other issues need to be identified.
Responsibility	IEMC and PPMU with the support of World Bank ES experts
Training objects	**CSC, contractor, local government representative (ward/commune), community, Community Monitoring Board**
Training course	ESMP implementation and monitoring
Participants	Contractor's site manager and ES officer; CSC's ES officer and site engineer; relevant local government officer (if any), Community Monitoring Board
Training frequency	Immediately after awarding contracts to contractors Follow-up training based on training needs
Time period	Two-day training for CSC and contractors, and one-day training for others

Content	- Environment and related processes. - Principles of environmental management - Overview of environmental monitoring in general; - Environmental monitoring requirements; - Roles and responsibilities of contractors and CSC; - Content and methods of environmental monitoring; - Risk response and control; - Introduce monitoring forms and instructions on how to fill out forms and report incidents; - Other issues to be identified - Prepare and submit reports
Responsibility	PPMU and IEMC
Training objects	**Worker**
Training course	Implement ESMP and OHS training
Participants	Workers' representative (team leader) working directly for project components and all workers at the construction site
Training frequency	Prior to commencement of construction activities and periodically every two years during construction Internal team meeting to remind OHS compliance daily before starting work.
Time period	One day of presentation and one day of on-site presentation
Content	• All requirements stated in the approved ESMP and the contractor's ESMP; • Duties of workers on site; • Potential OHS risks and measures to avoid or mitigate them • Code of conduct for employees • Emergency Preparedness Plan
Responsibility	Contractor's ES Officer, ES Officer appointed by PPMU with support from IEMC

5.6. ENVIRONMENTAL AND SOCIAL MONITORING PLAN

5.6.1. Monitoring Compliance with Mitigation Measures

The Binh Dinh Project Management Unit (PPMU) and the Construction Supervision Consultant (CSC) will conduct regular compliance monitoring. PPMU and CSC will be responsible for daily monitoring of the contractor's adherence to agreed-upon mitigation measures. The results will be reflected in the monthly progress reports. Local authorities and the community, including the Community Monitoring Board and the DAE (DONRE), will carry out independent monitoring as per government regulations. Additionally, the Environmental, Health, and Safety (EHS) staff of the contractor will be responsible for daily monitoring of occupational safety and environmental hygiene at the construction site and will report to PPMU and CSC. A detailed monitoring plan will be established during the detailed design phase. Estimated costs for monitoring will be included in

the implementation costs of the Environmental and Social Management Plan (ESMP).

5.6.2. Monitoring Ambient Environmental Quality

(a) Periodic Monitoring

Construction Phase

The ambient environmental quality monitoring program, which includes air, soil, and water quality, will provide information that can be used to assess the effectiveness of pollution management strategies. The ambient environmental quality monitoring program will consider the following factors:

- Monitoring Parameters: Selected monitoring parameters must reflect pollutants of concern related to the sub-project processes.
- Baseline Calculation: Before the sub-project is implemented, ambient environmental quality monitoring must be conducted at and in the vicinity of the site to assess major pollution levels, distinguishing between current environmental conditions and impacts related to the sub-project.
- Type and Frequency of Monitoring: Data on ambient environmental quality generated through the monitoring program must represent pollutants emitted by the sub-project over time. The frequency and duration of monitoring may vary from continuous to less frequent intervals, such as monthly, quarterly, or annually.
- Monitoring Locations: The locations of monitoring stations must be determined based on results from scientific methods and mathematical models to estimate potential impacts on receptors from emissions sources, taking into account the location of communities that may be affected.
- Sampling and Analysis Methods: Monitoring programs must apply national or international methods for collecting and analyzing samples, such as methods published by the International Organization for Standardization (ISO). Sampling must be conducted by or under the supervision of trained individuals. Analysis must be performed by licensed or certified organizations for this purpose.

PPMU Binh Dinh will be responsible for monitoring ambient environmental quality. Details are presented in the tables below.

Table 0-11. Environmental Monitoring Plan during the Construction Phase

Environmental components	Location monitoring	Regularity	Parameters to monitor	Applicable national technical regulations
Air quality	My Thanh – Lai Giang Road: 4 locations Road 19C-Quy Nhon Port: 3 locations	Every three months	SO2, CO, NO2, TSP, PM_{10}, PM 2.5	QCVN 05:2023/BTNMT

Environmental components	Location monitoring	Regularity	Parameters to monitor	Applicable national technical regulations
Noise and vibration	Like air sampling sites	Every three months	LA_{eq} and VdB for vibration	QCVN 26:2010/BTNMT on noise and QCVN 27:2010/BTNMT on vibration
Surface water quality	My Thanh – Lai Giang Road: 2 locations Road 19C-Quy Nhon Port: 3 locations	Every three months	pH, DO, TSS, BOD_5, COD, NH_4^+, total fat & oil, total coliform	QCVN 08:2023/BTNMT
Soil quality	My Thanh – Lai Giang Road: 2 locations Road 19C-Quy Nhon Port: 1 location	Every three months	Cd, As, Zn, Pb, Cu	QCVN 03:2023/BTNMT
Construction wastewater	8 positions	Every three months	Temperature, grease, pH, COD, TSS	QCVN 40:2011/BTNMT

Note:

- Estimated construction time is 24 months.
- The monitoring position is also the position in the pre-construction stage.

Operational Phase

Monitoring for Erosion:

- Monitoring Location: Coastal areas along the river at the locations of bridges within the project scope.
- Monitoring Frequency: Periodic during the operational phase as per regulations.

(b) Monitoring Environmental Incidents

Monitoring must be conducted immediately when an environmental incident occurs. The purpose of this monitoring is to assess the level of pollution to air, soil, and water caused by the spill and dispersal of hazardous waste and toxic chemicals into the air and nearby water and land, allowing for timely decisions regarding pollution control to mitigate environmental and health risks. The environmental incident monitoring plan will be developed by the IEMC for PPMU's review and approval prior to the commencement of construction activities and will be shared with CSC and contractors. This plan will identify potential environmental incident risks due to spills and dispersals of hazardous waste and toxic chemicals into the air and nearby water and land. The plan will also outline how this monitoring will be conducted, including qualified personnel, equipment, locations, monitoring parameters, analysis methods, specialized laboratories, and estimated costs.

5.6.3. Estimated Costs for Implementing ESMP

(a) Environmental Monitoring Costs

Environmental monitoring costs are estimated in accordance with Decision No. 79/2020/QD-UBND dated December 16, 2020, of the Binh Dinh Provincial People's Committee regarding environmental monitoring and analysis fees in Binh Dinh Province.

Table 0-12. Estimated Environmental Monitoring Costs

Environmental components	Quantity (sample)	Cost (VND)
Construction phase		
Air quality	56 (My Thanh – Lai Giang Road: 32 and Road 19C – Quy Nhon Port: 24)	169,288,056
Noise	56 (My Thanh – Lai Giang Road: 32 and Road 19C – Quy Nhon Port: 24)	7,448,000
Vibration	56 (My Thanh – Lai Giang Road: 32 and Road 19C – Quy Nhon Port: 24)	6,160,000
Surface water quality	40 (My Thanh – Lai Giang Road: 16 and Road 19C – Quy Nhon Port: 24)	87,022,040
Waste water	64	78,549,632
Land	24 (My Thanh – Lai Giang Road: 16 and Road 19C – Quy Nhon Port: 8)	39,230,152
Total		**368,082,804**

(b) Estimated Costs for Building ES Capacity

The following table presents estimated costs for training activities aimed at building environmental and social capacity for key stakeholders.

Table 0-13. Estimated Costs for Building ES Capacity

Training items	Object	Unit	Quantity	Price	Total	
				VND	*VND*	*USD*
A. Capacity building program on E&S standards (trained by IEMC)						
I. WB ESF, E&S standards and ESMP implementation						
PPMU	Designated ES Staff	course	2	20,000,000	20,000,000	864
II. ESMP implementation and monitoring						
Total number of work items	Contractor's site manager and ES officer; CSC's ES officer and site engineer	course	2	10,000,000	20,000,000	864
III. Health, Safety and Environmental Hygiene						

Training items	Object	Unit	Quantity	Price	Total	
				VND	***VND***	***USD***
Total number of work items	All workers	course	6	35,000,000	210,000,000	9,077
Subtotal (A)					*250,000,000*	*10,806*
B. IEMC HIV/AIDS and GBV Training						
Total number of work items	All contractors, workers and CSC team	course	1	50,000,000	50,000,000	2.161
Subtotal (B)					*50,000,000*	*2.161*
Total: (A)+(B)					**300,000,000**	**12,967**

(Exchange rate: 1 USD = 23,135 VND)

(c) Estimated Costs for Implementing Mitigation Measures during Construction

Costs for implementing mitigation measures during construction are included in the construction costs and will be allocated appropriately in the detailed design phase.

(d) Estimated Reforestation Costs

PPMU paid 4,353,089,000 VND (equivalent to 188,445 USD) to the Binh Dinh Forest Development and Protection Fund for reforesting (According to Document No. 48/BQL-TCKT dated February 5, 2025, issued by the Project Management Unit of Agriculture and Rural Development).

(e) Estimated Costs for IEMC Services

According to the procurement plan, the cost of this consulting service is 5,000,000,000 VND (equivalent to 216,123 USD).

(f) Estimated Costs for Compensation during Land Acquisition and Resettlement

These costs have been estimated and detailed in the Resettlement Plan. The following table presents estimated costs for each item and the corresponding funding sources.

Table 0-14. Estimated Costs for Implementing ESMP

Item	Cost estimate	Funding Sources
Implement mitigation measures during construction	Included in construction costs	World Bank
Land compensation and resettlement	In the Resettlement Plan	Counterpart
Bomb and mine clearance	4.7 billion	Done

Item	Cost estimate	Funding Sources
Environmental quality monitoring	368,082,804 VND (equivalent to 15,910 USD)	Counterpart
Capacity development and training	300,000,000 VND (equivalent to 12,967 USD)	Counterpart
IEMC ES Performance Compliance Monitoring	5,000,000,000 (equivalent to 216,123 USD)	Counterpart
Reforestation (According to Document No. 48/BQL-TCKT dated February 5, 2025, issued by the Project Management Unit of Agriculture and Rural Development)	4,353,089,000 (equivalent to 188,445 USD)	Counterpart

CHAPTER 6. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

6.1. SUMMARY OF THE PUBLIC CONSULTATION PROCESS

Community consultation is a two-way process that allows stakeholders to express their views on the risks and impacts of the sub-project as well as on mitigation measures, while also enabling PPMU Binh Dinh to review and respond to feedback. Public consultation is conducted continuously throughout the project lifecycle. PPMU Binh Dinh has engaged in community consultation with key stakeholders to ensure that their perspectives are considered in the design of the sub-project and in the environmental and social performance in accordance with ESS1, ESS5, ESS8, and ESS10.

During the preparation of the sub-project, PPMU Binh Dinh developed a Stakeholder Engagement Plan (SEP) tailored to the nature and scale of the sub-project as well as its potential risks and impacts. The purpose of this SEP is to identify stakeholders capable of participating in the planning and implementation of the sub-project, thereby facilitating their involvement in the ongoing and iterative consultation process throughout the sub-project's lifecycle. The SEP identifies opportunities for stakeholders to engage in community consultations, provide feedback, especially regarding activities of the sub-project that affect them. Specifically, the SEP establishes agreements through which stakeholders of the sub-project will be informed about the project's details, such as potential risks and impacts, and explains how stakeholder feedback will be collected. This promotes stakeholder participation and enables the timely collection of their opinions, evaluation, and integration of this feedback into the design and implementation of the sub-project. The SEP also outlines the grievance mechanism of the sub-project and how stakeholders can access this mechanism to provide comments, which is particularly beneficial for those who may be adversely affected by the sub-project. The SEP will enable the implementing agency (PPMU Binh Dinh) to take timely and appropriate actions based on current stakeholder feedback to effectively manage the environmental and social risks and impacts of the sub-project.

The SEP is an independent document, and the draft SEP was publicly disclosed at local sites of the sub-project on March 10, 2021, prior to the sub-project assessment, to solicit stakeholder opinions on the SEP, including the identification of stakeholders and proposals for the future.

PPMU Binh Dinh has conducted community consultations and provided information to those affected by the sub-project and other interested parties during the implementation of the sub-project in accordance with the SEP. The community consultations during the ESIA process have also complied with the requirements of the Law on Environmental Protection and Decree No. 08/2022/ND-CP dated January 10, 2022, detailing several provisions of the Law on Environmental Protection.

Community consultations were conducted twice. Two methods were employed for community consultation in the context of the COVID-19 pandemic at the time of consultation, including:

- PPMU Binh Dinh organized direct consultations with key stakeholders, including leaders of the district and commune People's Committees, affected local residents, and local political and social organizations in the sub-project area after the COVID-19 pandemic was brought under control.
- PPMU Binh Dinh sent relevant documents regarding the sub-project to consulted parties, such

as the district People's Committee, the commune People's Committees in the project area, and the management board of the protective forest in Hoai Nhon town and Phu My district for review and feedback. Responses from the consulted parties were submitted to PPMU Binh Dinh in writing. This method avoided large gatherings, minimized direct contact, and ensured social distancing in the context of the COVID-19 pandemic.

Additionally, PPMU Binh Dinh conducted surveys using questionnaires to understand local residents' views on the risks and impacts of the sub-project related to its implementation.

In accordance with Decree No. 08/2022/ND-CP, the project investor also submitted a request to the appraisal authority for the Environmental Impact Assessment (EIA) to the Ministry of Natural Resources and Environment to conduct consultations by publishing on the Ministry's electronic information page for a period of 15 days (March 7, 2022 – March 23, 2022) as stipulated.

The project investor received Document No. 219/VP-CTTDT regarding the results of the EIA consultation for the Integrated Resilience Development Project in Binh Dinh Province, dated March 28, 2022, from the Ministry of Natural Resources and Environment. Accordingly, the EIA report for the project received zero (0) feedback from the public and businesses.

6.2. CONSULTATION RESULTS

6.2.1. Results of the Initial Public Consultation with Affected Local Residents and Local Political-Social Organizations through Direct Meetings

The Binh Dinh Provincial PMB (PPMU) coordinated with the People's Committees of districts, towns, and communes to jointly lead community opinion-gathering sessions from February 1 to 4, 2021, in five communes of Phu My District and two wards of Hoai Nhon Town, Binh Dinh Province, and from March 30 to 31, 2021, in two wards of Quy Nhon City and one town of Tuy Phuoc District.

PPMU Binh Dinh provided a summary of information about the sub-projects, including project descriptions, objectives, potential impacts, and preliminary mitigation measures to stakeholders. The consultation with key stakeholders included local residents, the Women's Union, the Veterans' Association, the Youth Union, the Farmers' Union, and the Fatherland Front Committee to seek feedback. The community consultation allowed stakeholders to voice their opinions, particularly regarding the design of the sub-project, and enabled PPMU Binh Dinh to respond to their viewpoints. The table below summarizes the community consultation process, including the time, location, participating stakeholders, discussion points, stakeholder opinions, and PPMU feedback on those opinions.

Table 0-1. Summary of Community Consultation Results

No.	Stakeholder comments	Content of reception and explanation	Attendant
1	Phu My District People's Committee (DPC) (February 4, 2021, at Phu My DPC Office)		
	1) Agree on project implementation 2) During project construction, the PMB (PMB) and contractors need to take appropriate measures to protect the environment and community in the project area. 3) Arrange suitable construction time, do not work at night. 4) Arrange suitable time and routes for material transportation and these routes do not pass through residential areas. 5) Project material transport and dumping vehicles must not be overloaded with materials/soil and rock, as this may result in spillage along transport routes. Cover trucks carrying waste and loose materials before leaving the construction site, quarry and borrow pit to avoid spillage along transport routes.	1) No comments 2) Project owner commits to properly implement environmental management measures 3) The report recommends avoiding construction at night. In case of night construction, the plan will be announced to the community and local authorities. 4) The contents related to minimizing the impact of material transportation are shown in the environmental management plan. 5) Take this feedback and incorporate it into the Environmental and Social Management Plan of this report.	PMB Representative District/Town People's Committee (D/TPC) District Women's Union Representative of D/T Council Department of Labor, War Invalids and Social Affairs (DOLISA) DAE (DONRE) Environmental and Social Consulting; Total number of participants: 1 6 (Female: 5, Male: 11)
2	Hoai Nhon Town People's Committee (February 2, 2021, at Hoai Nhon Town People's Committee)		
	1) People are very supportive of the project; 2) Proposal to build a wastewater collection pipe on the existing road. 3) In case temporary land acquisition affects the production and business activities of households, the project needs to have a reasonable support plan. 4) Meaningful participation of local authorities and citizens should be maintained throughout the planning, design and construction and operation phases of the project.	1) No comments 2) Investment in wastewater collection system will be solved by another project. 3) The project's site clearance is carried out in accordance with Government policies, donor regulations and the project's Resettlement Plan report, ensuring maximum benefits for the people. Any impacts on people's land and property are compensated at replacement cost. 4) The project owner will closely coordinate with local authorities and people during project implementation.	PMB Representative D/TPC District Women's Union Representative of District/Town People's Council DOLISA DONRE Urban Management Department Environmental and Social Consulting; Total number of participants: 10 (Female: 4, Male: 6)

No.	Stakeholder comments	Content of reception and explanation	Attendant
3	People's Committee of My Thang Commune (February 2, 2021, at People's Committee of My Thang Commune)		
	1) Currently, there is no drainage system along Provincial Road 639. Furthermore, rural roads have been concreted, so when it rains, the water flows rapidly, causing flooding in downstream areas. Therefore, the project needs to build a drainage system for the local community. 2) There needs to be a resolution system to avoid social conflicts. 3) Project owners should implement mitigation measures to avoid dust and noise in public areas.	1) Accepted. Details of piping arrangement are described in chapter 1 of the report. 2) Social impact mitigation measures are described in the environmental and social management plan, including introducing local customs, managing labor flows, etc. 3) Mitigation measures related to air quality and noise are described in the project's environmental and social management plan.	Representative of the CPC. Representatives of local departments and organizations: Women's Union, Fatherland Front, Veterans Association, Youth Union, Land officials. Representatives of affected households and beneficiaries in the project area. Total number of participants: 13 (Female: 5, Male: 8)
4	My Duc Commune People's Committee (February 5, 2021, at My Duc Commune People's Committee)		
	1) Provincial Road 639 passes through 4 villages of My Duc commune including Tan Phu, Phu Hoa, Phu Ha and Phu Thu village. The project will reclaim residential land (fences, gates), agricultural land and forest land. 2) Currently, water is only supplied to 3 villages (Phu Ha, Phu Hoa and Phu Thu) while Tan Phu village has not been supplied with water. 3) During construction, the project owner must take appropriate measures to avoid affecting irrigation and drainage canals. 4) The elementary school is located near provincial road 369, so the project owner needs to take mitigation measures to ensure traffic safety for students. 5) Phu Ha village market may be affected during construction, so the project owner needs to implement mitigation measures such as traffic safety... 6) During construction, the project owner must strictly comply with mitigation measures to ensure that irrigation channels of rice fields are not affected.	1) The impacts related to land acquisition are mentioned in the report. 2) The project only builds roads, water supply for the village will be done by other projects. 3) Affected irrigation channels will be restored prior to construction. During construction, the project also proposes measures to minimize impacts on the irrigation system in the environmental and social management plan. 4) Measures to mitigate impacts on school areas are addressed in the environmental and social management plan. 5) Measures to mitigate impacts on market areas and traffic safety are addressed in the environmental and social management plan.	Representative of the Commune People's Committee. Representatives of local departments and organizations: Women's Union, Fatherland Front, Veterans Association, Youth Union, Land officials. Representatives of affected households and beneficiaries in the project area. Total number of participants: 26 (Female: 5 ; Male: 2 1)

No.	Stakeholder comments	Content of reception and explanation	Attendant
5	People's Committee of My An Commune (February 2, 2021, at People's Committee of My An Commune)		
	1) Construction activities can cause dust and noise, affecting household business operations. 2) The route passes through schools, so the project owner needs to pay due attention to ensure traffic safety for students and the community in the project area. 3) Compensation price needs to be agreed upon.	1) Mitigation measures related to air quality and noise are described in the project's environmental and social management plan. 2) Measures to mitigate impacts on school areas are addressed in the environmental and social management plan. 3) The project's site clearance is carried out in accordance with the Government's policies, donor regulations and project guidelines (Resettlement Policy Framework and Resettlement Plan), ensuring maximum benefits for the people. Any impacts on people's land and assets are compensated at replacement cost.	Environmental and Social Consultant PMB Representative Representative of the CPC. Representatives of local departments and organizations: Women's Union, Fatherland Front, Veterans Association, Youth Union, Land officials. Representatives of affected households and beneficiaries in the project area. Total number of participants: 33 (Female: 15, Male: 18)
6	People's Committee of My Tho Commune (February 1, 2021, at People's Committee of My Tho Commune)		
	1) Project The project should implement mitigation measures to reduce the impact of noise during construction. 2) Mitigation measures must be strictly adhered to. 3) The cooperative's irrigation canal needs to be synchronized with the project's infrastructure. 4) Need relocation plan and reasonable compensation	1) Noise mitigation measures in environmental and social management plans 2) The project owner commits to strictly comply with the proposed measures. 3) Affected irrigation channels will be restored prior to construction. During construction, the project also proposes measures to minimize impacts on the irrigation system in the environmental and social management plan. 4) site clearance is carried out in accordance with the Government's policies, donor regulations and project guidelines (Resettlement Policy Framework and Resettlement Plan), ensuring maximum benefits for the people. Any impacts on people's land and assets are compensated at replacement cost.	Environmental and Social Consultant. PMB Representative. Representative of the Commune People's Committee. Representatives of local departments and organizations: Women's Union, Fatherland Front, Veterans Association, Youth Union, Land officials. Representatives of affected households and beneficiaries in the project area. Total participants: 37 (Female: 15, Male: 22)
7	Hoai Hai Commune People's Committee (February 3, 2021, at Hoai Hai Commune People's Committee)		

No.	Stakeholder comments	Content of reception and explanation	Attendant
	1) The proposed road passes through vacant land along the coast so that construction and operation activities do not affect the environment. The project route should be arranged in an easterly direction so as not to affect people's land. There are many vacant lands on the eastern slope. 2) Schools and clinics are located far enough away from the project road so that these locations will not be affected by construction activities. 3) Project owners should take mitigation measures to avoid dust and noise to the community area.	1) The route is designed to minimize resettlement and land acquisition, avoiding residential areas at km49+952-km51+900. 2) No comments 3) Measures to minimize impacts due to noise and dust in environmental and social management plans	Representative of the Commune People's Committee. Representatives of local departments and organizations: Women's Union, Fatherland Front, Veterans Association, Youth Union, Land officials. Representatives of affected households and beneficiaries in the project area. Total number of participants: 9 (Female: 2; Male: 7)
8	Hoai My Commune People's Committee (February 2, 2021, at Hoai My Commune People's Committee)		
	1) The project shall implement mitigation measures to avoid dust and noise in the community area. 2) During the construction of the project, it is recommended to have works to minimize environmental impact. 3) Construction plans must comply with approved EIA reports.	1) Measures to minimize impacts due to noise and dust in environmental and social management plans 2) Environmental impact mitigation works are described in the environmental and social management plan. 3) The proposed EMP to mitigate risks and negative impacts is disclosed to local affected people and local authorities for monitoring and supervision. The project will comply with the approved report.	Representative of the CPC. Representatives of local departments and organizations: Women's Union, Fatherland Front, Veterans Association, Youth Union, Land officials. Representatives of affected households and beneficiaries in the project area. Total number of participants: 10 (Female: 4; Male: 6)
9	Tuy Phuoc District People's Committee (March 30, 2021, at Tuy Phuoc District People's Committee)		
	1) Agree on the implementation of the project a n 2) During project construction, the PMB and contractors need to take appropriate measures to protect the environment and community in the project area. 3) Compensation for site clearance needs to pay attention to: specific survey of route direction; resettlement area arrangement; arrangement of reburial location of Thong My Dien cemetery; Agricultural land needs to be arranged to review public land for "land for land"	1) No comments 2) The proposed EMP is intended to mitigate risks and negative impacts, and is disclosed to local affected people and local authorities for monitoring and oversight. 3) The project's site clearance is carried out in accordance with the Government's policies, the sponsor's regulations and the project's policies (Resettlement Policy Framework and Resettlement	Representative of District People's Committee. Representatives of the Department of Labor, War Invalids and Social Affairs; Department of Economic Infrastructure; DAE. Total number of participants: 5 (Female: 2; Male: 3)

No.	Stakeholder comments	Content of reception and explanation	Attendant
	according to demand or compensation in cash.	Plan), ensuring maximum benefits for the people. Any impacts on people's land and property are compensated at replacement cost.	
10	Quy Nhon City People's Committee (March 31, 2021, at Quy Nhon City People's Committee)		
	1) Agree on the implementation of the project a n 2) During project construction, the PMB and contractors need to take appropriate measures to protect the environment and community in the project area. 3) For households whose rice-growing land is recovered, if the remaining land is too small to grow rice, this remaining land must also be recovered. 4) Gender equality is of great concern to local people. Currently, there is no gender equality in the locality. When the number of male labor force increases, social problems may also arise. Therefore, the Project Owner needs to coordinate with the Commune Women's Union to monitor and supervise workers as well as propagate to the community in the project area.	1) No comments 2) The proposed EMP is intended to mitigate risks and negative impacts, and is disclosed to local affected people and local authorities for monitoring and oversight. 3) The project's site clearance is carried out in accordance with Government policies, donor regulations and project guidelines (Resettlement Policy Framework and Resettlement Plan), ensuring maximum benefits for the people. Any impacts on people's land and assets are compensated at replacement cost. 4) Gender equality measures are reflected in the project's environmental management plan, whereby the project will ensure fair policies towards female workers. During the project implementation, the Investor will coordinate with the Women's Union to implement gender equality promotion measures with workers and contractors.	Representative of the City People's Committee Representatives of local departments and organizations: Women's Union, Fatherland Front, Veterans Association, Youth Union, Land officers, Labor, War Invalids and Social Affairs. Total number of participants: 5 (Female: 1 ; Male: 4)
11	People's Committee of Dieu Tri town (March 31, 2021, at People's Committee of Dieu Tri town)		
	1) Everyone is very supportive of the Project; 2) Regarding compensation price: people want to receive a price that reflects the replacement price at the time of compensation payment; 3) Coordination and support from local authorities/agencies to ensure smooth and timely site clearance is very important. 4) People want to be fully informed about the Project at	1) No comments. 2) The project's site clearance is carried out in accordance with Government policies, donor regulations and project guidelines (Resettlement Policy Framework and Resettlement Plan), ensuring maximum benefits for the people. Any impacts on people's land and assets are compensated at replacement cost.	Representative of the Town People's Committee Representatives of local departments and organizations: Women's Union, Fatherland Front, Veterans Association, Youth Union, Land officials. Representatives of affected households and

No.	Stakeholder comments	Content of reception and explanation	Attendant
	any time or when there are any important changes. 5) Support screening of affected households. 6) Hope to build a people's cemetery to relocate.	3) The project owner commits to coordinate with local agencies/authorities to ensure site clearance takes place smoothly and promptly. 4) Project information is made public to the public throughout implementation phase. 5) The policy to support affected households is stated in the resettlement plan (RAP). 6) This item is not within the scope of the project.	beneficiaries in the project area. Department of Land and Construction Total number of participants: 30 (19 males, 11 females)
1 2	Nhon Binh Ward People's Committee (March 30, 2021, at Nhon Binh Ward People's Committee)		
	1) Agree on project implementation 2) During project construction, the PMB and contractors need to take appropriate measures to protect the environment and community in the project area. 3) For households whose rice-growing land is recovered, if the remaining land is too small to grow rice, this remaining land must also be recovered. 4) The project route passes through the Ha Thanh River basin, where flooding often occurs during the flood season. Therefore, it is required that project activities do not affect agricultural production and contribute to further flooding. 5) It is necessary to upgrade infrastructure synchronously such as dredging Ha Thanh river to ensure flood drainage. 6) During the rainy season, area number 6 is often damaged, houses and rice fields are affected.	1) No comments 2) The project owner is committed to taking appropriate measures to protect the environment and community in the project area. 3) The project's site clearance is carried out in accordance with Government policies, donor regulations and project guidelines (Resettlement Policy Framework and Resettlement Plan), ensuring maximum benefits for the people. Any impacts on people's land and assets are compensated at replacement cost. 4) Mitigation measures related to inundation and flooding are presented in the project's environmental management plan. 5) item is not within the scope of the project. 6) The project proposes measures to minimize impacts on rice fields and people's houses, limit construction during heavy rains, and arrange drainage systems across and along the road.	Representative of the Ward People's Committee. Representatives of local departments and organizations: Women's Union, Fatherland Front, Veterans Association, Youth Union, Land officials. Representatives of affected households and beneficiaries in the project area. Total number of participants: 30 (Female: 7; Male: 23)
13	Nhon Phu Ward People's Committee (March 30, 2021, at Nhon Phu Ward People's Committee)		
	1) Agree on project implementation 2) During project construction, the PMB and contractors	1) No comment 2) The project owner is committed to taking appropriate	Representative of the consultant Representatives of local departments and

No.	Stakeholder comments	Content of reception and explanation	Attendant
	need to take appropriate measures to protect the environment and community in the project area. 3) The project passes through the following areas: KV2, KV3, KV4. Types of land include cemetery, residential and agricultural land. There needs to be a plan to relocate graves. 4) The project needs to carefully calculate drainage for the flood drainage system.	measures to protect the environment and community in the project area. 3) The plan for relocating graves and compensation and support measures for people are presented in the project's RP report and described in the project's environmental management plan. Basically, the Project Owner will notify households whose graves are subject to relocation about the implementation plan before starting construction so that people have time to prepare and people are supported with relocation costs. 4) The project has calculated flood models according to scenarios taking into account hydrological factors, climate change and future flood drainage plans. Horizontal and vertical drainage lines are also arranged along the route to ensure drainage and limit the impact of floods.	organizations: Women's Union, Fatherland Front, Veterans Association, Youth Union, Land officials. Representatives of affected households and beneficiaries in the project area. Total number of participants: 30 (Female: 12; Male: 18)

The sub-project also conducted surveys using questionnaires to gather local residents' views on the risks and impacts related to the implementation of the sub-project. The results are presented in the following table.

Table 0-2. Local Residents' Views on Risks and Impacts of the Project

Risks and impacts	Households	Percent (%)
Environmental pollution (soil, water, air)	216	83.1
Physical resettlement due to loss of residential land/housing	200	76.9
Noise	182	70.0
Traffic disruption	167	64.2
Job loss	137	52.7
Loss of productive land	119	45.8
Disruption of traffic and production (agriculture, fisheries, etc.), business	79	30.4
Loss of income due to loss of income generating activity	75	29.2
Social risks (gambling, drug addiction, prostitution, gender-based violence, labor flows...)	45	17.3
Risk of disease (HIV/AIDS, COVID-19, sexually transmitted diseases...)	41	15.8
Loss of habitat for some species of animals and plants	34	13.1
Impact on cultural, spiritual and social life	27	10.4
Impact on cultural heritage and public works	6	2.3

Regarding the above-mentioned risk and impact mitigation measures, the top three solutions proposed by local residents included scheduling construction work to avoid disruption to local residents' daily activities (86.5%, 225 respondents), accelerating the construction progress (69.2%, 180 respondents), and training contractors' staff and workers on HIV/AIDS, sexually transmitted diseases, and social evils prevention (63.5%, 165 respondents). All survey participants expressed their support for the implementation of the sub-project, believing it would promote socioeconomic development for the locality in particular and the province in general.

6.2.2. Results of the Second Community Consultation

Due to the outbreak of the COVID-19 pandemic, direct consultation meetings could not be organized. Therefore, PPMU Binh Dinh sent a summary of the ESIA to the People's Committee of Quy Nhon City, Tuy Phuoc District (Document 386/BQL-VP), the Management Board of Protective Forests in Phu My District (Document 383/BQL-VP), the Management Board of Protective Forests in Hoai Nhon Town (Document 384/BQL-VP), and the People's Committees of Nhon Binh, Nhon Phu, Dong Da, and Dieu Tri towns (Document 385/BQL-VP). Simultaneously, PPMU Binh Dinh also published the draft ESIA report at public locations such as the commune offices to allow affected residents and local political-social organizations to provide input. The following table summarizes the feedback from the consulted units.

The People's Committees of the communes in the project area provided written responses to the PMB with feedback regarding the environmental impact assessment of the project, summarized as follows:

Table 0-3. Summary of Feedback from the People's Committees of Communes

No.	Local	Document sent (by Project Owner)	Response text	
			Symbol	Time
1	People's Committee of Hoai Nhon town	No. 50/BQL-VP dated January 28, 2021	No. 211/UBND-VP	02/03/2021
2	People's Committee of Phu My district		No. 1 2 6/UBND-NN	02/03/2021
3	Tuy Phuoc District People's Committee	No. 386/BQL-VP dated June 22, 2021	No. 917/UBND-TNMT	01/07/2021
4	Quy Nhon City People's Committee		No. 1790/UBND-TN	01/07/2021
5	Phu My District Forest Protection Management Board	Work directly	No. 01/CV-BQL	02/02/2021
6	Hoai Nhon Town Forest Protection Management Board	Work directly	No. 21/YK-BQLR	02/02/2021
7	People's Committee of Nhon Binh Ward	No. 385/BQL-VP dated June 22, 2021	No. 180/UBND-DC	12/07/2021
8	People's Committee of Nhon Phu Ward		No. 247/UBND -DCXD	11/08/2021

Table 0-4. Summary of Results from the Second Consultation

No.	Stakeholder comments	Feedback and explanation	By
1	People's Committee of Hoai Nhon town		
	1) Agree with the project implementation policy, agree with the impact assessments on the natural environment, economy, society, public health and measures to minimize and monitor environmental safety as stated in the report. 2) The project must fully comply with the legal regulations issued by the government and local authorities, ensuring construction is carried out on schedule. 3) Compensation and site clearance work complies with regulations, limiting the recovery of residential land and high-yield production land. 4) Fully implement committed environmental protection measures	1) No comments 2) The project owner commits to fully comply with the legal regulations issued by the government and local authorities, ensuring construction is carried out on schedule. 3) Compensation and site clearance work is carried out according to regulations. During the design process, the alignment is selected to minimize the area of land acquired. Details of the measures are explained in the project's resettlement plan report (RAP). 4) The project owner commits to fully implement environmental protection measures and environmental monitoring work stated in the report, and closely coordinate with local authorities during the implementation process. 5) The project owner commits to regularly coordinate with the People's Committee	People's Committee of Hoai Nhon town

No.	Stakeholder comments	Feedback and explanation	By
	5) Regularly coordinate with Hoai Nhon Town People's Committee and authorities of communes where the project passes through during the preparation and construction of the project. 6) Strictly implement environmental monitoring throughout the project implementation process. 7) Coordinate the implementation of local infrastructure to avoid local flooding during operation and implementation of surface water collection systems.	of Hoai Nhon town and the authorities of the communes where the project passes through during the preparation and construction of the project. 6) The project owner is committed to strictly implementing environmental monitoring throughout the project implementation process. Detailed regulations on environmental monitoring are explained in the Environmental and Social Management Plan of this report. 7) Surface drainage systems have been calculated and designed in the project documents.	
2	People's Committee of Phu My district		
	1) Agree with the project implementation policy, agree with the impact assessments on the natural environment, economy, society, public health and measures to minimize and monitor environmental safety as stated in the report. 2) The project must fully comply with the legal regulations issued by the government and local authorities, ensuring construction is carried out on schedule. 3) Compensation and site clearance work complies with regulations, limiting the recovery of residential land and high-yield production land. 4) Fully implement committed environmental protection measures 5) Regularly coordinate with Phu My District People's Committee and authorities of communes where the project passes through during the preparation and construction of the project. 6) Strictly implement environmental monitoring throughout the project implementation process. 7) Coordinate the implementation of local infrastructure to avoid local flooding during operation and implementation of surface water collection systems.	1) No comments 2) The project owner commits to fully comply with the legal regulations issued by the government and local authorities, ensuring construction is carried out on schedule. 3) Compensation and site clearance work is carried out according to regulations. During the design process, the alignment is selected to minimize the area of land acquired. Details of the measures are explained in the project's resettlement plan report (RAP). 4) The project owner commits to fully implement environmental protection measures and environmental monitoring work stated in the report, and closely coordinate with local authorities during the implementation process. 5) The project owner commits to regularly coordinate with the People's Committee of Hoai Nhon town and the authorities of the communes where the project passes through during the preparation and construction of the project. 6) The project owner is committed to strictly implementing environmental monitoring throughout the project implementation process. Detailed regulations on environmental monitoring are explained in the Environmental and Social Management Plan of this report. 7) Surface drainage systems have been calculated and designed in the project documents.	People's Committee of Phu My district
3	Tuy Phuoc District People's Committee		

No.	Stakeholder comments	Feedback and explanation	By
	1) Assess the impact on drainage capacity. There needs to be a solution to level the ground in a suitable sloping direction to control the slope, ensure drainage and flood control. 2) Regularly clear the flow, limit turbidity, affect surface water quality and cause blockage of drainage ditches. 3) Collection, storage and treatment of hazardous waste: arrange closed, covered containers, store in covered storage facilities, label containers, and have hazardous waste warning signs on vehicles.	1) The project has calculated flood drainage when constructing the route based on the hydraulic calculation model and proposed cross drainage culverts in the design documents to ensure flood drainage. The drainage impacts are mentioned in the report. 2) Measures to minimize flow dredging, minimize impacts on surface water quality, and manage hazardous waste are proposed and supplemented according to comments in the environmental and social management plan. 3) The project will arrange hazardous waste storage tanks to ensure compliance with regulations (details in the environmental and social management plan).	Tuy Phuoc District People's Committee
4	Quy Nhon City People's Committee		
	1) Review the structure of the EIA report according to Decree 40/2019/ND-CP; Correct the order of missing or duplicated items, rearrange the content of some items. 2) Additional reserves of materials storage sites, volume of raw materials 3) Unify data on the number of mobilized workers, the basis for calculating the amount of domestic waste generated. 4) Specify each type of hazardous waste, the amount generated, and the code. 5) Additional impacts such as surface water pollution, groundwater, air, noise, bentonite collection measures 6) Arrangement of drainage ditches for domestic wastewater collection. Construction wastewater, car wash water through 3 settling pits. Drawing of settling pit dimensions 7) Adjust the name of Quy Nhon Urban Environment Joint Stock Company to Binh Dinh Environment Joint Stock Company, clearly stating the frequency of household waste collection. 8) Editing the symbols and citing the	1) report is carried out in accordance with Vietnam's regulatory structure. 2) Additional Disposal site reserves, raw material volume, soil volume in base 3) The number of mobilized workers has been agreed upon, and the basis for calculating the amount of domestic waste in the report has been agreed upon. 4) Hazardous waste: supplemented according to comments in the hazardous waste impact assessment 5) Impacts on surface water, groundwater, air, noise pollution, and bentonite collection measures are added in chapter 3 of the report. 6) For construction wastewater, car wash water is proposed to be routed through 1 oil separator, 1 settling tank and 1 storage tank for reuse in road irrigation. The dimensions of the settling tank, oil separator, collection ditch and storage tank are described in the environmental and social management plan of the report. 7) Supplement according to comments 8) Receive and accurately edit the names of units, agencies, names and symbols of technical standards in the report. 9) The environmental monitoring program is revised in chapter 5 of the report. 10) Check spelling in report	Quy Nhon City People's Committee

No.	Stakeholder comments	Feedback and explanation	By
	names of technical regulations 9) Revise the environmental monitoring program according to the instructions. 10) Correct spelling errors		
5	Phu My District Protective Forest Management Board and Hoai Nhon Protective Forest Management Board		
	1) Agree with the content of the EIA report prepared by the project owner. 2) Agree on project implementation policy 3) The project owner complies with and fully implements the proposed mitigation measures and implements a reforestation program when converting the purpose of forest land use. 4) During implementation, the project owner needs to closely coordinate with the protection forest management board and local authorities.	1) No comments 2) Reviewed and agreed on policy 3) The project owner commits to fully implement measures to minimize environmental impacts and will closely coordinate with local authorities and the Forest Protection Management Board during project implementation. 4) The project owner will carry out replacement forestation with an equivalent area (submit the replacement forestation area to the Forest Protection and Development Fund of Binh Dinh province)	Phu My District Protective Forest Management Board and Hoai Nhon Protective Forest Management Board
6	People's Committee of Nhon Binh Ward		
	1) Agree with the environmental impact assessment contents and mitigation measures proposed in the report. 2) The project owner needs to coordinate closely and promptly with local authorities and related units, properly resolve environmental incidents caused by project activities. Limit impacts on people's rights and interests. Limit dust, noise, wastewater, and waste generation. Have construction measures when bad weather occurs. 3) Publicize the project's address and contact information; inspect workers' activities to ensure security and order, prioritize the use of local labor, and publicly post the environmental protection plan so that people know. 4) Do not pump wastewater or let wastewater overflow into the environment, restore the site and take measures to repair damaged areas due to construction, and properly distribute traffic. 5) Transport vehicles must be	1) No comments 2) The project owner will closely coordinate with local authorities during project implementation. Measures to minimize environmental impacts, limit noise, dust, wastewater, waste, and environmental incidents are proposed in the environmental and social management plan. 3) The requirements have been reflected in the environmental and social management plan of the report. 4) The project owner accepts recommendations on mitigation measures related to not pumping wastewater or spilling wastewater into the environment, restoring the site and taking measures to repair damaged areas due to the construction process, properly diverting traffic and adding to the environmental and social management plan. 5) The project owner accepts recommendations on mitigation measures related to the transport vehicles must be covered, avoid spillage affecting people's traffic, conduct cleaning and collection, limit wind blowing that affects people's lives or	People's Committee of Nhon Binh Ward

No.	Stakeholder comments	Feedback and explanation	By
	covered to avoid spillage that affects people's traffic, and must be swept and collected to limit wind- driven debris that affects people's lives or causes accidents. Water the transport routes that generate a lot of dust and minimize noise, dust, and waste during transport.	causes accidents. Water the transport routes that generate a lot of dust and minimize noise, dust, and waste during the transport process and add to the environmental and social management plan.	
7	People's Committee of Nhon Phu Ward		
	1) Agree with the environmental impact assessment contents and mitigation measures proposed in the report. 2) Implement compensation and support policies correctly according to regulations. 3) Comply with environmental protection laws, decrees, circulars, and current legal documents related to project preparation and construction activities. Strictly implement the environmental monitoring and management program proposed in the report. 4) Ensure drainage requirements, avoid local flooding, maintain traffic in the area, ensure labor safety, security and order in the area. 5) Implement periodic environmental monitoring programs as prescribed.	1) No comments 2) The project owner commits to properly implement compensation and support policies according to regulations. 3) The project owner accepted the opinions of Nhon Phu Ward People's Committee, committed to fully implementing environmental mitigation measures, environmental monitoring, and ensuring security and order. 4) The project design includes horizontal drainage lines based on hydraulic modelling to ensure drainage in the area. Details of relevant mitigation measures are included in the environmental and social management plan. 5) A periodic environmental monitoring program is proposed in the environmental and social management plan of the report. The project owner commits to fully implement it during the project implementation.	People's Committee of Nhon Phu Ward

6.3. INFORMATION DISCLOSURE

The draft ESIA, RP, LMP, SEP, and ESCP in Vietnamese were disclosed at the offices of the communes within the project area, at the People's Committee office of Binh Dinh Province, and at the PPMU Binh Dinh office on March 26, 2021.

The final reports and all updated version before appraisal of the ESIA, RP, LMP, SEP, and ESCP in Vietnamese will be disclosed locally to affected residents, local political and social organizations, and other interested parties before the project appraisal.

The draft and final reports of the ESIA, RP, LMP, SEP, and ESCP in English will be published on the external website of the World Bank before the appraisal of the sub-project.

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APPENDIX

APPENDIX 1. IMAGES FROM THE PUBLIC CONSULTATION MEETING

Consultation at the People's Committee of Hoai Nhon town

Consultation at Phu My District People's Committee

Consultation at the People's Committee of My Tho commune, Phu My district

Consultation at the People's Committee of My An commune, Phu My district

Group consultation with affected households in Tan Thanh village - My Tho commune

Group consultation with aquaculture households and traders in Xuan Binh village - My An commune

 Consultation at the People's Committee of My Thang commune - Phu My district	 Consultation at the People's Committee of My Duc commune - Phu My district
 Consultation at the People's Committee of My Thanh commune - Phu My district	 Consultation at the People's Committee of Hoai Hai commune - Hoai Nhon town
 Consultation at the People's Committee of Hoai My commune - Hoai Nhon town	 Consultation at the People's Committee of Nhon Phu Ward - Quy Nhon City
 Consultation at the People's Committee of Nhon Binh Ward - Quy Nhon City	

APPENDIX 2. LIST OF PERSONNEL INVOLVED IN PREPARING ESIA

No.	Name	Location	Work unit	Responsibility
I	**PPMU Binh Dinh**			
1	To Tan Thi	Manager	Binh Dinh Department of Agriculture and Rural Development (DARD)	- Overview of issues related to subproject design and implementation.
2	Nguyen Nhat Tien	Technical staff	Binh Dinh Department of Agriculture and Rural Development	- Provide technical support and coordinate with relevant agencies. - Coordinate the work.
II	**ESIA Consulting Group**			
1	Le Van Tuan	General Director	Vietnam Clean Water and Environment Joint Stock Company (VIWASE)	General management. Manage and coordinate all environmental and social consulting services
2	Nguyen Le Phu	Team Leader/ Master of Environmental Ecology	Team Leader - VIWASE	- Team Leader - General reporting management
3	Tran Thien Cuu	PhD in Environmental Science	Expert - VIWASE	Environmental impact assessment and pollution calculation. Synthesize and finalize all chapters in the report
4	Cao Thi Thu Huong	Master of Environmental Science	Expert - VIWASE	- Conduct field surveys and write chapters 1 and 2 of the report.
5	Tran Minh	Master of Environment and Sustainable Development	Expert - Vietnam Clean Water and Environment Joint Stock Company	Conduct field surveys, analyze alternatives and assess cumulative impacts. Participate in writing chapter 3
6	Pham Hung Son	Master of Environmental Science	Expert - VIWASE	- Conduct field surveys and write chapters 1 and 2 of the report.
7	Nguyen Quoc Huan	Master of Environmental Science	Expert - Vietnam Clean Water and Environment Joint Stock Company	- Participate in community consultation and develop chapter 6, participate in writing chapter 5
8	Thu Nguyet 's gift	Master of Sustainable Development	Resettlement Specialist - VIWASE	- Survey and assess social status, social impact and measures to minimize social impact
9	Hoang Hoa	Master of Social Sciences	Gender Expert - VIWASE	Responsible for gender balance issues and enhancing the role of women in the implementation of the subproject
10	Nguyen Tuan Anh	Bachelor of Social Sciences	Expert - VIWASE	Conduct social surveys and community consultations
11	Bui Ngoc Ha	Bachelor of Social Sciences	Expert - VIWASE	- Survey and assess social status, social impact and measures to

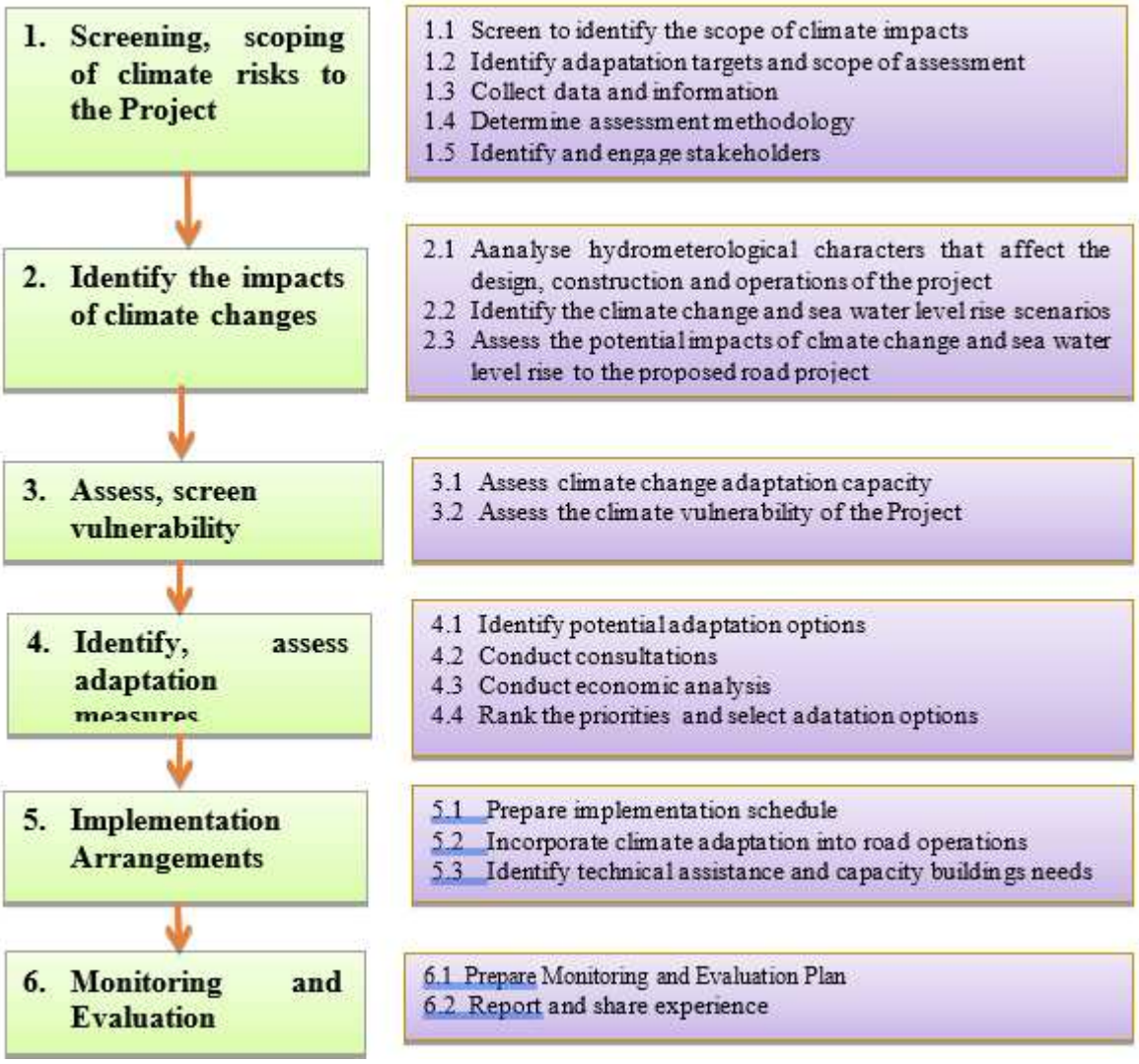
No.	Name	Location	Work unit	Responsibility
				minimize social impact

APPENDIX 3. GUIDELINES FOR INTEGRATING CLIMATE CHANGE ISSUES INTO ROAD PROJECT DESIGN

The guidelines for integrating climate change issues into the design and implementation of road projects have been developed as part of the "Guidelines for the Rehabilitation and Restoration of Local Roads." This document serves as technical support provided under the Local Road Asset Management Program funded by the World Bank (LRAMP). The PMBs for Transport in Quang Nam and Binh Dinh (distinct from the IRDP PMB) are among more than 50 entities implementing LRAMP projects at the central and provincial levels. These guidelines have been officially endorsed by the Directorate for Roads of Vietnam (DRVN) and must be applied in the implementation of the IRDP. Below are some key contents of the guidelines.

The main steps of the process for incorporating climate change issues into project design and implementation are illustrated in the diagram below, with detailed explanations provided in Section 4 of the guidelines.

Steps for Integrating Climate Change Aspects into Transport Projects



These guidelines apply to roads, bridges, tunnels, and bypasses. Climate aspects addressed in these guidelines include sea level rise, storms and tropical cyclones, changes in precipitation related to flood risk, landslides, increasing ambient temperatures, extreme weather events, and earthquakes. The socio-economic and domestic context is considered in this process. Examples of the impacts of climate change on proposed road projects include:

- Reduced road safety and connectivity due to prolonged landslides and flooding.
- Disruption of connectivity between project areas and other regions due to severe road damage.
- The unsustainability of certain routes requiring high costs for upgrading or repairs, such as degraded and ineffective drainage systems after heavy rains during peak days.
- Increased repair and maintenance costs due to landslides.

According to the guidelines, the vulnerability of local communities to climate change may arise from the following causes, considering their likelihood:

- Increased flooding in the area due to reduced permeable surface area.
- Enhanced access to ecologically sensitive sites leading to environmental degradation and threats to buffer zones that provide flood or drought mitigation functions.
- Deterioration of drinking water supply and environment, and ecosystems associated with population growth along the proposed route.
- Changes in microclimate.

To establish adaptation objectives, the following aspects may be considered:

- Temperature fluctuations: increases in ambient temperatures during hot seasons and decreases in cold seasons, extreme temperatures, or the frequency of heat waves may affect construction schedules, reducing the durability and lifespan of road structures (deformations due to materials/thermal expansion of connections).
- Changes in precipitation (increases during the rainy season) leading to intensified flows may result in prolonged and deeper flooding, slowed construction progress, and increased risks of erosion and landslides. Consequences may threaten the stability of roadbeds, road infrastructure, and traffic disruptions.
- Increased intensity and frequency of extreme weather events, including flooding, will affect drainage systems, damaging roads and bridges and causing traffic disruptions.
- Rising sea levels may increase the risk of flooding and inundation in riverside areas, reducing drainage capacity and increasing saltwater intrusion. These factors affect road structure, leading to corrosion of steel reinforcements in reinforced concrete. As a result, roads may degrade or sustain damage earlier.
- Faster and stronger flows may impact bridge abutments and piers, increasing the risk of riverbank erosion.

The guidelines propose three types of climate change adaptation solutions, including (i) Technical solutions (selection of applicable design standards, design of roadbed and pavement structures, material standards and specifications, size and cross-sectional design, drainage, and protective structures); (ii) Non-technical solutions: establishment and implementation of maintenance and early warning plans, disaster prevention and emergency response, adjustments to road alignments, overall planning or land use planning, environmental management; and (iii) Non-intervention solutions: applicable when the impacts of climate change exceed project parameters and the nature of changes is unclear or costs exceed adaptive benefits.

The guidelines regard consultation and awareness-raising as essential steps in this process. The final step is to prepare an implementation schedule and arrange institutional arrangements.

APPENDIX 4. VEGETATION CLEARING MANAGEMENT PLAN

1. Introduction

During the preparation of the site for the coastal road construction, approximately 38.79 hectares of protective and productive forest land will be reclaimed. Therefore, this vegetation clearing management plan has been developed to manage any potential impacts and risks that may arise during the vegetation clearing process to prepare the site for the coastal road construction. This plan will ensure that (i) the area of forest cleared will be within the approved boundaries, (ii) the clearing activities will not adversely affect the surrounding ecosystem, and the health and safety risks to workers and the local community, and (iii) the biomass generated from the clearing process will be managed in accordance with regulations. This plan will be modified or updated by the contractor as necessary, pending approval from the Project Management Unit (PPMU) / Construction Supervision Consultant (CSC) before clearing begins.

This plan is applicable to watershed protection forest only, in which vegetation clearance will be implemented by the contractors. For the production forest, vegetation clearance and collection of timbers will be implemented by forest owners in accordance with Decree xxx. (add inform in page 25 EIA)

2. Location, Characteristics, and Status of the Forest

The upgrade of the coastal provincial road 639 will impact the forest distributed along the route in Phu My district and Hoai Nhon town. According to the results of surveys and consultations with the Forest Management Board in Phu My and Hoai Nhon, the ecosystem affected by the subproject includes protective and productive forests with species such as acacia, eucalyptus, and casuarina. The total area of forest affected is 38.79 hectares, comprising 18.7 hectares of protective forest and 20.03 hectares of productive forest, with a tree density of approximately 1,200 trees per hectare and heights ranging from 3 to 5 meters. The casuarina protective forest in Phu My district primarily functions as a windbreak and prevents sand from blowing during rainy and stormy seasons.

Consultations with local residents, authorities, and stakeholders such as the Forest Protection Sub-department and the Departments of Natural Resources and Environment of the districts have indicated that there have been no forest fires along the route; however, some trees have been knocked down by storms and waves, and a few trees have been damaged by pests. Due to the effective management of this forest area, there has been no indiscriminate deforestation or poaching. However, due to the pressure of building several projects such as coastal resorts or creating shrimp farming ponds, some areas of protective forest have been diminished.
The agency/organization managing the forest in the area is as follows:

- **Decentralization of Management**: The entire forest area in the district has been entrusted to the district for protection, which designates communes to manage areas within the boundaries of each commune.
- **Forest Management and Reforestation Policy**: Implemented in accordance with Decree No. 119/ND-CP dated August 23, 2016.

3. Processes, Methods, Machinery, and Materials Used

Before clerance, conduct a pre-construction site survey to document valuable and sensitive areas, including access to the site; identify valuable flora and fauna that need protection and their habitat characteristics, if any. Notify local authorities of the implementation time so that people can collect forest products and Provide information to the implementation team on the extent of clearance and necessary management measures near sensitive areas and areas identified as native vegetation

The land clearance process will be conducted in the following steps: (i) Preparation for felling, delimiting boundaries, and preparing the site; (ii) Mobilizing machinery, tools, and workers on-site; (iii) Cutting and sawing trees; (iv) Collecting, transporting, and processing chipped biomass.

- **Step 1**: Site preparation for excavation. Notify the local People's Committee and surrounding residents at least two weeks prior to clearance. All crops are harvested before clearing. Shrubs, plant roots, grass, etc. are gathered at the site and transported to a transport unit for treatment as with normal waste. If stored overnight, they must be covered and kept away from areas with fire to minimize the risk of fire. Delimit the boundaries to be cleared based on existing reference markers and coordinates to determine the area to be cleared.
- **Step 2**: Erect fencing to demarcate the clearance area. As clearance will be conducted using both machinery and manual labor, machinery, tools, and workers will be mobilized to the site, including fencing, flags, ropes, whistles, saws, chainsaws, crowbars, knives, hammers, shovels, cables, and trucks to transport materials/waste generated from the clearance process. The removed organic soil layer is concentrated at the location agreed with the construction supervision consultant for use in future re-vegetation work and needs to be protected ;
- **Step 3**: Cut trees, relocate, and excavate soil. Clearing will be performed following the principle of cutting branches from bottom to top, removing tree trunks from top to bottom, and only cutting trees when the trunk height does not exceed 3-4 meters. Identify the space and direction for trees to be felled; the length and width of the area where the trees will fall and where wood and fuel can be easily collected and transported. If the space is insufficient for the trees to fall, the trunks must be cut into shorter sections to avoid danger to people and property. If possible, large trees with a diameter of 20cm within the right-of-way will be retained (with advice from arborists where necessary). During the clearing process, vegetation must be cleared and collected near the clearing area to avoid dispersion. Clearing vegetation will avoid encroaching on adjacent living vegetation outside the acquired area; When clearing and cleaning trees, be careful of animals living in trees or crevices to avoid harming wildlife.
- **Step 4**: Collect branches, uproot roots. All objects such as tree trunks, roots, grass, waste, and other objects must be removed, cleaned, and transported out of the site for reuse or disposal at local landfills. Roots in the excavated area will be uprooted to a depth of at least 50 cm below the natural ground level. In the excavated roadbed, all roots and trunks will be uprooted to a depth of at least 50 cm below the roadbed.
- **Step 5**: Remove, transport, and collect materials. Identified materials to be reused for other constructions or sold to recycling facilities (trunks, branches) will be collected at designated locations. All waste and hazardous materials will be transported to designated landfills/treatment areas by licensed units for transportation and treatment.

4. Mitigation and Safety Measures

These requirements will be incorporated into the construction contract during the preparation of the bidding documents.

General Requirements

- Delimit the clearance area, boundaries, and mark points to determine the area to be cleared;
- Erect mobile fencing and/or stretch ropes to separate the removal boundary to prevent clearing vegetation beyond the approved boundaries.
- Trees may not be cut or pruned outside the approved area for any reason.
- Burning, smoking, or igniting vegetation within the clearance area and surrounding areas is strictly prohibited.
- Temporary fuel storage in the vegetation clearance and cleanup area is not allowed.
- Manual removal is to be performed. The use of chemicals to clear vegetation is prohibited.

- No collection of vegetation or uprooted tree trunks outside the designated boundaries is permitted.

Measures to Mitigate Impact on Wildlife

- Vehicles and machinery must be registered and possess Quality Control, Technical Safety, and Environmental Protection certificates in accordance with Circular No. 31/2011/TT-BGTVT; avoid using low-quality vehicles that exceed noise limits.
- Communicate and require workers to strictly adhere to the Code of Conduct for Workers to ensure that no trees are cut outside the approved area. Hunting of animals within the area is prohibited. No harm, trapping, or injury to any animals such as birds, frogs, snakes, etc., is allowed; no wildlife trade; no caging of birds or any animals at worker camps; and avoid harming animals encountered during the vegetation clearing process.
- Additionally, it is necessary to enhance communication and training to raise awareness and responsibility among staff, workers, and local residents in forest protection.

Measures to Mitigate Impact and Risks to Workers

- Identify health service units to be used in the event of an accident (due to machinery cutting trees, workers being injured by insect attacks, etc.) during the felling, clearing, and transporting process.
- Provide first aid kits at the work site.
- Establish worker camps for rest and drinking water.
- Assign personnel to monitor and warn of landslides.
- Provide adequate clothing and personal protective equipment (masks, hard hats, shoes/boots, gloves, etc.) as required for each task to workers and mandate their use during land clearance.

Measures to Mitigate Impact and Risks to the Community

- PPMU will notify local authorities and the community of the land clearance schedule at least two weeks in advance.
- Install adequate warning signs and hazard signs throughout the vegetation clearing process to minimize incidents such as accidents and traffic safety that affect the local community.
- Only authorized personnel are allowed on-site during the relocation process. If the impact area of the relocation includes existing local roads, fences must be erected before tree cutting until the site is cleared.
- Use mobile fencing to delineate the clearance area to prevent unnecessary tree cutting beyond the approved boundaries.
- Collaborate with local health units to develop and implement disease prevention plans (dengue fever, infectious diseases, etc.) for workers to avoid outbreaks in the community.
- Do not conduct land clearance activities under adverse weather conditions such as unusually hot weather or during rainstorms.
- Workers may only operate machinery and tools for which they possess operating certificates/licenses or have been trained.
- Clear any obstacles within the area where trees will fall before cutting.
- Cover and collect branches and trunks to prevent them from falling into nearby aquaculture ponds, if any.
- Secure biomass on moving vehicles to prevent spillage during transport.
- Collect and transport cleared vegetation and trunks out of the clearance area as soon as possible.

5. Implementation Arrangement

The arrangement for the implementation of the Vegetation Clearance Management Plan will follow the proposed procedures. Given the specific characteristics of vegetation clearance management and the restoration of protective and production forests, the stakeholders involved include:

Binh Dinh PPMU

- Develop and implement the land clearance management plan after approval from the competent authority;
- Based on the land clearance management plan, the PPMU will sign contracts with service providers for land clearance or integrate this task into the Terms of Reference for selecting construction contractors;
- Prepare an implementation plan and allocate budget resources within the overall timeline of the sub-project;
- Inspect, supervise, and accept the results of the plan's implementation, including monitoring environmental and social impacts;
- Mobilize the participation of stakeholders, including the Department of Agriculture and Rural Development/Forest Protection Sub-department/Forestry Management Unit/District Working Group and Commune Working Group, to ensure the project is executed in accordance with the established objectives and to guarantee project effectiveness.

Department of Agriculture and Environment (DAE)/Forest Protection Sub-department/County Management Unit

- Collaborate in the implementation of the sub-project, arrange land resources for forest restoration, restore the site, and work with contractors to carry out the project components.

District Working Group

- Guide and assist the district working group in developing a forest development plan based on community consultation as directed by the PPMU;
- Organize and supervise the project's execution in the district according to the agreed timeline, ensuring compliance with current financial management regulations;
- Inspect and monitor the vegetation clearance and forest restoration activities of the project (if applicable) in the district;
- In case of complaints from local residents that cannot be resolved by the commune People's Committee, the district working group will be responsible for convening meetings with local residents to explain, listen, and address their concerns to understand their needs and interests. If their views differ/conflict with the project's content, the district working group will report to the PPMU; appropriate approaches must align with the grievance redress mechanism.

Community Working Group

- Coordinate with the commune People's Committee, relevant agencies, and local communities, as well as organizations and enterprises to implement deforestation and reforestation (if applicable) in the commune;
- In cases of complaints from residents, the commune People's Committee must receive and address these complaints; if unable to resolve, it will report to the district People's Committee for resolution according to current regulations and in accordance with the grievance redress mechanism;
- Follow PPMU guidelines, collaborate with safety officers and monitoring and evaluation personnel from the PPMU, as well as community working group members to collect and provide data related to monitoring and assessing the impacts of deforestation and reforestation in the communes;

- Safeguard, manage, use, and mobilize local residents and communities to maintain and protect the forest area after handover for use.

6. Reforestation

Reforestation will be conducted in accordance with current regulations on forest replanting management, specifically: the Forestry Law of 2017, Decree No. 156/2018/ND-CP, and Circular No. 13/2019/TT-BNNPTNT dated October 25, 2019, by the Ministry of Agriculture and Rural Development regarding reforestation when changing forest use purposes.
The cost for forest restoration is 4,353,089,000 VND (equivalent to 188,445 USD). According to Document No. 48/BQL-TCKT dated February 5, 2025, issued by the Project Management Unit of Agriculture and Rural Development.

7. Monitoring and Reporting Mechanism

The monitoring and reporting mechanism will comply with the monitoring framework of the ESMP for the sub-project (Chapter 5, ESIA).

APPENDIX 5. DUE DILLIGENCE FOR THE THREE RESETTLEMENT AREAS AND THE BORROW PIT FOR FILL MATERIAL EXTRACTION

I. THREE RESETTLEMENT AREAS

The affected households under the Binh Dinh Province Resilient Integrated Development Project will be relocated to three resettlement areas funded by the state budget, including:

(i) The resettlement area in Nhon Phu Ward, Quy Nhon City.
(ii) The resettlement area at the West of the Nhon Binh subsidized housing area, Quy Nhon City.
(iii) The resettlement area at the North of Dieu Tri Bridge (referred to as the Dieu Tri Resettlement Area) in Tuy Phuoc District.

The three resettlement areas will be developed with complete infrastructure, including the construction of transportation systems, stormwater drainage systems connected to the existing drainage network, domestic wastewater collection systems, electricity supply systems, water supply systems, communication systems, and other essential infrastructure. The construction is expected to be completed and operational by 2025.

The Environmental Impact Assessment (EIA) report for the three resettlement areas has been prepared and submitted to the Binh Dinh Provincial People's Committee and approved by Decision No. 3801/QD-UBND dated November 17, 2022, by the People's Committee of Binh Dinh Province. The environmental and social impacts of the project, along with necessary mitigation measures, have been proposed in the report and are summarized in the sections below.

Details of the Project are as follows:

a. Project Scale

- **The resettlement area in Nhon Phu Ward, Quy Nhon City.**

The project will develop complete infrastructure, including the construction of a transportation system with 06 internal roads paved with asphalt concrete. A stormwater drainage system will be constructed with diameters of D600 and D800, with a total length of approximately 1,319 meters, connected to the drainage system of the Van Ha urban area, discharging at the outlet to the west and flowing into a tributary of the Ha Thanh River. A domestic wastewater collection system using HDPE D280 pipes, with a total length of approximately 1,043 meters, will collect all domestic wastewater from the project and connect it to the wastewater collection system of the Van Ha urban area infrastructure project, where it will be pumped to the wastewater pumping station of the Van Ha Urban Area Project. The power supply system, water supply, and fire prevention system will include D110 and D63 pipelines, with a total length of 2,026 meters, sourced from the existing D80 pipeline at the intersection of Ho Dac Di Road Extension and the planned Road No. 5. The communication system will also be installed. The elevation of the land grading will range from +5.22 to +3.07 to ensure protection against flooding.

- **The resettlement area at the West of the Nhon Binh subsidized housing area, Quy Nhon City.**

The project will develop complete infrastructure, including the construction of a transportation system consisting of 03 internal roads and 01 connecting road to National Route 19, paved with asphalt concrete. A stormwater drainage system will be constructed with diameters of D600 and D800, with a total length of approximately 543 meters, connecting to the D1500 drainage inlet on National Route 19, which has already been constructed. The domestic wastewater collection system will utilize HDPE D200 pipes, with a total length of approximately 1,015 meters, collecting all domestic wastewater from the project to a pumping station with a capacity of 1,800 m³/day belonging to the technical infrastructure project of the residential area in Ward Nhon Binh, Phase 2, which will pump wastewater to the Nhon Binh wastewater treatment station. The power supply system, water supply, and fire prevention system will include D110 and D63 pipelines, with a total length of 1,542 meters, sourced from the existing D110 pipeline running along the

southern road of the project. A communication system will also be installed. The elevation of the land grading will range from +3.30 to +2.60 to ensure protection against flooding.

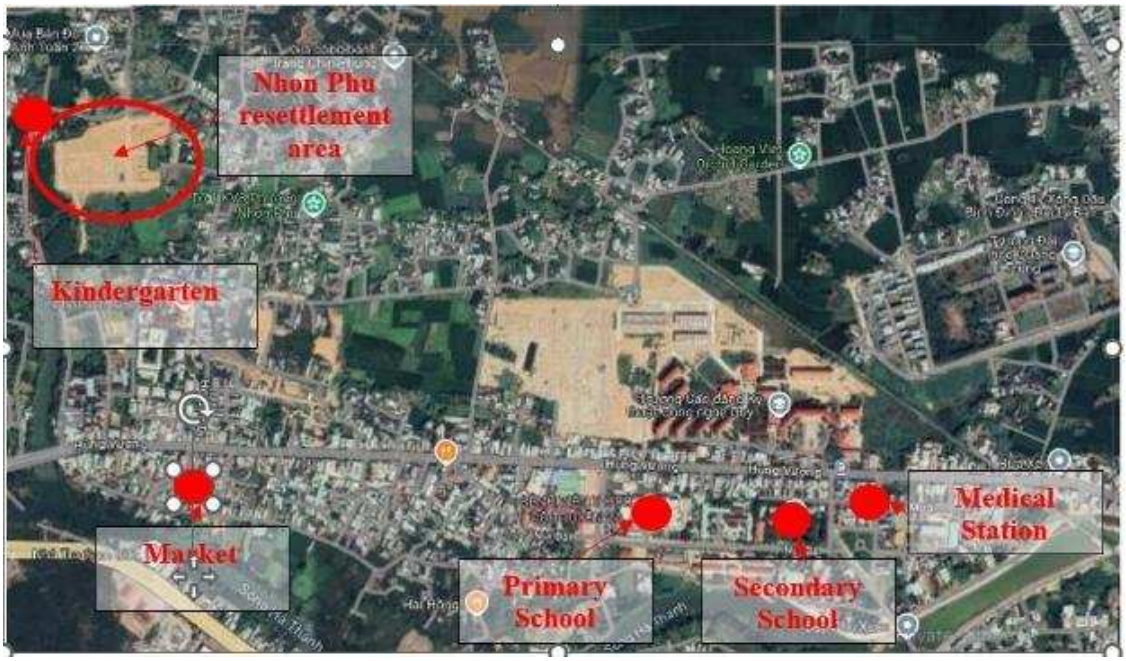
- **Dieu Tri Resettlement Area**

The project will develop complete infrastructure, including the construction of a transportation system consisting of 04 internal roads paved with asphalt concrete. A stormwater drainage system will be constructed with diameters of D600 and D800, with a total length of approximately 399 meters, discharging into the Ha Thanh River. The domestic wastewater collection system will utilize HDPE D200 pipes, with a total length of approximately 387 meters, collecting all domestic wastewater from the project and awaiting connection to the collection system of the Bac Dieu Tri wastewater treatment station. The power supply system, water supply, and fire prevention system will include D110 and D63 pipelines, with a total length of 783 meters, sourced from the existing D110 pipeline running along National Route 1A. A communication system will also be installed. The elevation of the land grading will range from +7.80 to +6.90 to ensure protection against flooding.

b. Public Amenities

- **The resettlement area in Nhon Phu Ward**

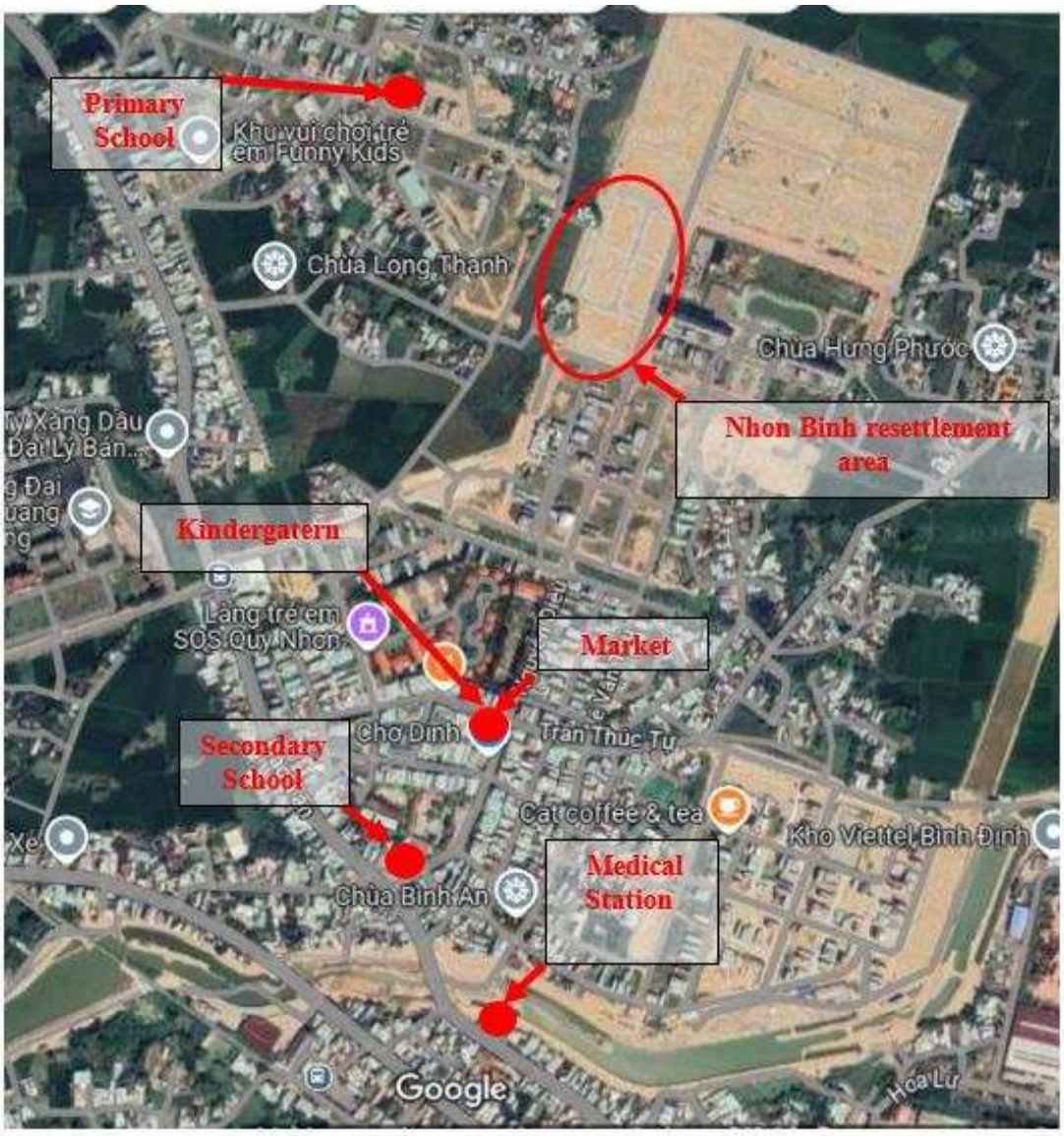
The project area is equipped with a full range of services, including An Thanh Market (approximately 1.2 km by road), Nhon Phu Kindergarten (approximately 230 m by road), Nhon Phu Primary School No. 1 (approximately 2.2 km by road), Nhon Phu Secondary School (approximately 2 km by road), and the Nhon Phu Health Station (approximately 2.4 km by road). Overall, when relocating to this area, the living conditions regarding the environment and social services are ensured.



Location of the Resettlement Area in Nhon Phu Ward and Surrounding Public Amenities

- **The resettlement area at the West of the Nhon Binh subsidized housing area, Quy Nhon City.**

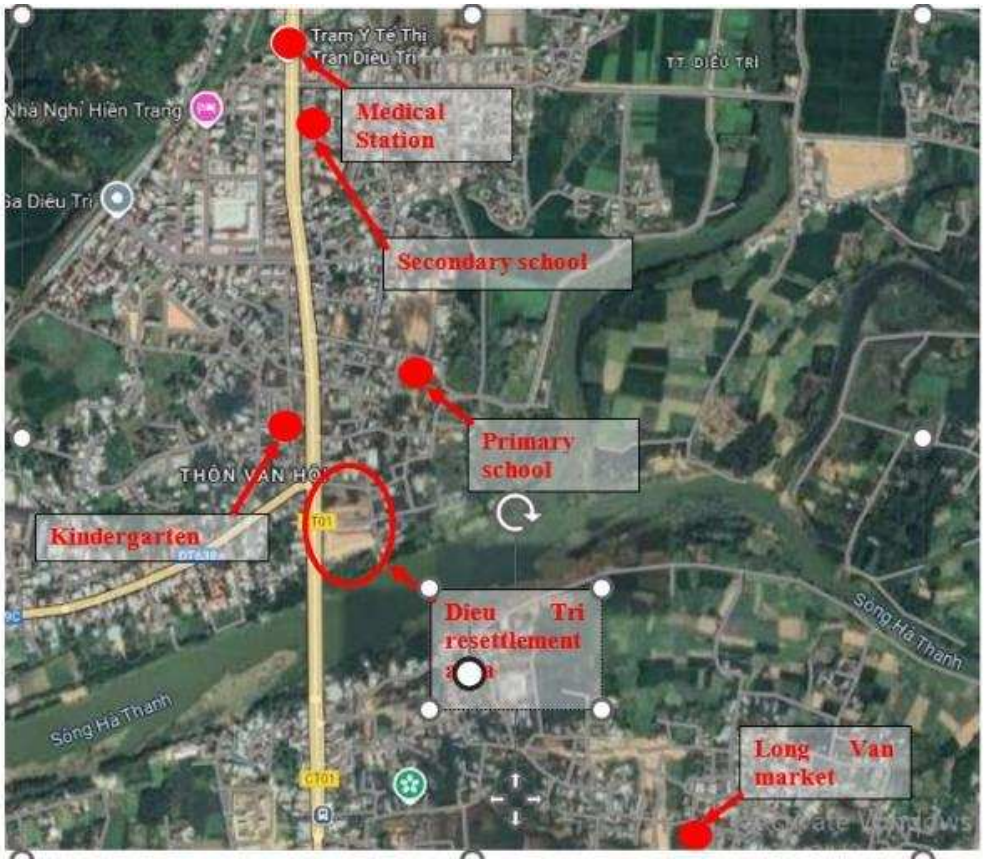
The area is equipped with a full range of services, including Dinh Market (approximately 650 m away), Nhon Binh Primary School No. 2 (approximately 1.5 km by road), a Kindergarten (approximately 600 m by road), Nhon Binh Secondary School (approximately 1 km by road), and the Nhon Binh Health Station (approximately 1 km by road). Overall, when relocating to this area, the living conditions regarding the environment and social services are ensured.



Location of the Resettlement Area at the West of the Nhon Binh Subsidized Housing Area, Quy Nhon City, and Surrounding Public Amenities

- **Dieu Tri Resettlement Area**

The area is equipped with a full range of services, including Long Van Market (approximately 1.9 km away), Dieu Tri Town Primary School No. 1 (approximately 700 m by road), a Kindergarten (approximately 500 m by road), Tran Ba Secondary School (approximately 850 m by road), and the Dieu Tri Town Health Station (approximately 3.2 km by road). Overall, when relocating to this area, the living conditions regarding the environment and social services are ensured.



Location of the Dieu Tri Resettlement Area and Surrounding Public Amenities

c. Current Conditions Regarding the Environment and Society

- **The resettlement area in Nhon Phu Ward**

The total land area of the project is 41,122.77 m². Within the project area, there are 03 houses, primarily single-story houses, 04 temporary structures, and approximately 40 graves. The agricultural land that must be cleared is estimated at 23,480.5 m², including 1,427.3 m² of rice cultivation land. The project will also need to conduct unexploded ordnance (UXO) clearance.

The environmental quality criteria (air, surface water, and groundwater) in the project area are within acceptable limits. There are no rare plant or animal species listed in the Red Data Book found within the project area.

- **The resettlement area at the West of the Nhon Binh subsidized housing area, Quy Nhon City.**

The total land area of the project is 22,445.31 m². Within the project area, there are 15 residential houses and 03 other structures. The agricultural land that must be cleared is estimated at 18,435.4 m², including 1,782.5 m² of rice cultivation land. The project will also need to conduct unexploded ordnance (UXO) clearance.

The environmental quality criteria (air, surface water, and groundwater) in the project area are within acceptable limits. There are no rare plant or animal species listed in the Red Data Book found within the project area.

- **Dieu Tri Resettlement Area**

The total land area of the project is 15,087.40 m². Within the project area, there are 04 residential houses that will be completely affected, 05 residential houses that will be partially affected, as well as 13 temporary structures, a post office, Ba Ga Temple, and utility poles. There is no agricultural land that needs to be cleared within the project scope. The project will also need to conduct unexploded ordnance (UXO) clearance.

The environmental quality criteria (air, surface water, and groundwater) in the project area are within acceptable limits. There are no rare plant or animal species listed in the Red Data Book found within the project area.

d. Environmental Impacts and Mitigation Measures

Pre-Construction Phase:

The project will recover approximately 7.87 hectares of land, including about 4.2 hectares of rice cultivation land, 0.16 hectares of residential land, and other types of land, affecting 36 households, with 6 households losing their residential land. To manage potential impacts during the preparation phase of construction, the project has allocated funding for compensation, land clearance, and resettlement, which includes total costs for compensation, vocational training support for job transition, job search assistance, and stabilization of living conditions and production. Households that lose their residential land will be resettled on-site or compensated with cash as agreed.

Regarding unexploded ordnance: The project owner will sign a contract with a licensed military unit to conduct UXO clearance before construction begins.

The significant potential impacts during the construction phase identified in the Environmental Impact Assessment (EIA) report include:

- **The resettlement area in Nhon Phu Ward**

The significant potential impacts during the construction phase identified in the Environmental Impact Assessment (EIA) report include: i) dust and emissions from land clearance, excavation, and material transportation; ii) noise and vibration from construction activities; iii) generation of approximately 9.2 tons of solid waste from land clearing and site preparation, along with 123-206 kg of solid waste from construction activities and 54 kg of solid waste from domestic activities daily from worker camps; iv) oil-soaked rags and batteries, amounting to approximately 35 kg per month; v) generation of 2.16 m^3 of domestic wastewater and approximately 2 m^3 of construction wastewater daily; vi) impacts on local traffic and traffic safety risks; vii) safety risks for the community and workers during construction; and viii) issues related to security and social order.

- **The resettlement area at the West of the Nhon Binh subsidized housing area, Quy Nhon City.**

The significant potential impacts during the construction phase identified in the Environmental Impact Assessment (EIA) report include: i) dust and emissions from land clearance, excavation, and material transportation; ii) noise and vibration from construction activities; iii) generation of approximately 11.7 tons of solid waste from land clearing and site preparation, along with 67.2-122 kg of solid waste from construction activities and 45 kg of solid waste from domestic activities daily from worker camps; iv) oil-soaked rags and batteries, amounting to approximately 30 kg per month; v) generation of 1.8 m^3 of domestic wastewater and approximately 2 m^3 of construction wastewater daily; vi) impacts on local traffic and traffic safety risks; vii) safety risks for the community and workers during construction; and viii) issues related to security and social order.

- **Dieu Tri Resettlement Area**

The significant potential impacts during the construction phase identified in the Environmental Impact Assessment (EIA) report include: i) dust and emissions from land clearance, excavation, and material transportation; ii) noise and vibration from construction activities; iii) generation of 45-75 kg of solid waste from construction activities and 27 kg of solid waste from domestic activities daily from worker camps; iv) oil-soaked rags and batteries, amounting to approximately 20 kg per month; v) generation of 1.08 m^3 of domestic wastewater and approximately 2 m^3 of construction wastewater daily; vi) impacts on local traffic and traffic safety risks; vii) safety risks for the community and workers during construction; and viii) issues related to security and social order.

Most environmental and social impacts during the construction phase are localized, short-term, and of low to medium severity, manageable through various management measures: watering to reduce dust, requiring contractors to use low-emission equipment and maintain it regularly; installing signs, barriers, and traffic

guides, regulating traffic flow, limiting transport during peak hours, and washing vehicles before leaving the site; hiring local labor and providing adequate living conditions for workers, including housing, clean water, and sanitation in worker camps; providing personal protective equipment for workers, such as masks, gloves, helmets, and first aid kits on-site; treating construction wastewater, stormwater runoff, and vehicle wash water through sedimentation before discharging into the local drainage system; collecting domestic wastewater using portable toilets with a capacity of 500 liters at the resettlement site, with a contract for regular collection and treatment by a qualified service provider; collecting solid domestic waste in bins, transported and treated by Binh Dinh Urban Environment Joint Stock Company; collecting organic sludge and biomass transported by the contracted contractor to treatment facilities; reusing or selling certain types of construction waste; storing hazardous waste in separate containers and treating it according to the regulations in Decree No. 08/2022/ND-CP dated January 10, 2022, of the Prime Minister, detailing certain provisions of the Environmental Protection Law. Social impacts will be managed by registering temporary absences for workers, limiting affected areas, prohibiting land use outside the project boundaries without the consent of the community and local authorities, establishing codes of conduct for workers that prohibit gambling, drinking, drug use, fighting, or other activities affecting security and order, and promoting HIV/AIDS prevention awareness.

The potential environmental and social impacts and issues during the operation of the road are also considered, including:

- **The resettlement area in Nhon Phu Ward**

i) Domestic wastewater of 58.36 m³/day; ii) noise and emissions from traffic activities; iii) household waste of 547.2 kg/day; iv) septic tank sludge generated at 58.25 tons every six months. To mitigate these impacts, the following measures will be implemented: planting greenery in residential areas; for short-term wastewater management, the investment in constructing one five-chamber septic tank with a capacity of 60 m³/day to treat wastewater before discharging it into the existing drainage ditch south of the resettlement area (via a HDPE pipe D500 approximately 80 m in length). In the long term, wastewater from the resettlement area will be connected to the drainage and treatment system of the Van Ha urban infrastructure project. Solid waste will be collected and managed by local services. Hazardous waste will be handled in accordance with the provisions of Decree No. 08/2022/ND-CP dated January 10, 2022, issued by the Prime Minister - detailing certain provisions of the Environmental Protection Law.

- **The resettlement area at the West of the Nhon Binh subsidized housing area, Quy Nhon City.**

i) Domestic wastewater of 49.15 m³/day; ii) noise and emissions from traffic activities; iii) household waste of 460.8 kg/day; iv) septic tank sludge generated at 49.08 tons every six months. To mitigate these impacts, the following measures will be implemented: planting greenery in residential areas; connecting the domestic wastewater pipeline to the pumping station with a capacity of 1,800 m³/day, part of the technical infrastructure project for residential area 6 in Nhon Binh Ward, phase 2, to pump wastewater to the Nhon Binh wastewater treatment station; and solid waste will be collected and managed by local services. Hazardous waste will be handled in accordance with the provisions of Decree No. 08/2022/ND-CP dated January 10, 2022, issued by the Prime Minister - detailing certain provisions of the Environmental Protection Law.

- **Dieu Tri Resettlement Area**

i) Domestic wastewater of 16 m³/day; ii) noise and emissions from traffic activities; iii) household waste of 180 kg/day; iv) septic tank sludge generated at 19.17 tons every six months. To mitigate these impacts, the following measures will be implemented: planting greenery in residential areas; connecting the wastewater from the resettlement area to the centralized wastewater collection system of the Bac Dieu Tri wastewater treatment station, with a capacity of 2,100 - 3,800 m³/day; and solid waste will be collected and managed by local services. Hazardous waste will be handled in accordance with the provisions of Decree No. 08/2022/ND-CP dated January 10, 2022, issued by the Prime Minister - detailing certain provisions of the Environmental Protection Law.

e. Environmental Monitoring and Management Plan

A comprehensive monitoring plan has been proposed to ensure environmental compliance during the construction phase. This plan includes the monitoring of air quality with key indicators such as noise levels, vibration, CO, NO2, and SO2, conducted quarterly. Additionally, it encompasses the oversight of conventional solid waste and hazardous waste collection, focusing on the quantity generated, collection frequency, and proper storage practices. Monitoring activities have confirmed that sanitary conditions are upheld and that no pollution has occurred. Furthermore, throughout the project implementation, no complaints from the local community have been recorded.

f. Public Consultation

During the preparation of the Environmental Impact Assessment (EIA) report, the project team consulted with the People's Committees and the Fatherland Front Committees of Nhon Phu, Nhon Binh, and Dieu Tri Town, as well as the local communities in these areas. The feedback received was overwhelmingly supportive of the project implementation, with unanimous agreement on the identified impacts and the proposed mitigation measures outlined in the report.

g. Issues regarding compensation, support, and resettlement for the three resettlement areas.

Land Acquisition Scale and Impacts due to Land Acquisition:

The Dieu Tri Town Resettlement Area covers a total area of 15,000 m². In the first phase, 9,469.9 m² of land has been cleared, including 322.5 m² of irrigation land and 9,174.4 m² of unused flat land. The remaining 174.5 m² of land, which is owned by a household and lies within the construction boundary of the road connecting NH 19C to Quy Nhon Port, is pending clearance. This area will be cleared when the land acquisition for the road construction project begins. An additional 5,033.1 m² is existing traffic land, which does not require compensation. The total number of affected entities includes one household and two organizations: the Dieu Tri Town People's Committee and the Binh Dinh Water Supply and Drainage Joint Stock Company. The cleared area has been developed with complete infrastructure, ready to accommodate resettlement households for the project.

The Nhon Binh Resettlement Area covers a total area of 22,400 m², all of which has been cleared. This includes 21,634.40 m² of rice paddy land, 421.70 m² of other annual crop land, and 413.9 m² of unused flat land. A total of 14 households are affected, including 13 households affected by agricultural land loss, 14 households impacted by crop loss, and 2 households affected by structures on their land. The infrastructure of this resettlement area has been completed and is ready to accommodate the resettlement households.

The Nhon Phu Resettlement Area spans 41,200 m². Of this, 34,900 m² has been cleared, while 6,300 m² remains uncleared. The cleared portion was acquired by the Quy Nhon City Investment, Construction, and Land Development PMB (previously the Quy Nhon City Construction PMB) to compensate affected households as part of the Vân Hà Urban Area Infrastructure Project in Nhon Phu Ward, Quy Nhon City. Land acquisition took place between 2017 and 2018. The 6,300 m² of uncleared land is primarily residential land, which will be acquired by the Agriculture and Rural Development PMB after the infrastructure for the Nhon Phu Resettlement Area is completed and ready for resettlement of affected households. The infrastructure in the Nhon Phu Resettlement Area is largely complete, with only asphalt surfacing of the roads remaining.

Review and Evaluation of Compensation, Support, and Resettlement Work:

Out of the four resettlement areas intended for use in the Binh Dinh Adaptive Development Project, the Dong Cho Dinh Resettlement Area has been completed and is operational. Therefore, the review and evaluation of compensation, support, and resettlement work focuses on the remaining three resettlement areas: Dieu Tri, Nhon Phu, and Nhon Binh, which are part of the sub-project for constructing resettlement areas for the road connecting NH 19C to Quy Nhon Port. To facilitate the evaluation of compensation, support, and resettlement work, consultants have collected documentation and regulations related to compensation and support work carried out by the Quy Nhon City Investment, Construction, and Land Development PMB and the Agriculture and Rural Development PMB. Additionally, the consultants have collaborated with relevant units such as the aforementioned management boards, local ward/town

representatives, and randomly interviewed affected households to verify the resettlement processes and completion of the sub-project's compensation and resettlement work.

The review of the relevant documents and materials indicates that the compensation and resettlement work has been carried out as follows:

(i) Organizational Structure:

- The compensation, support, and resettlement activities for resettlement area construction projects involve the participation of local authorities and organizations. The Binh Dinh Provincial People's Committee and Quy Nhon City People's Committee are responsible for overseeing the compensation, support, and resettlement work for these projects.
- Participating entities include: (1) Binh Dinh Provincial People's Committee, (2) District People's Committees, (3) PMBs of construction projects in Phu Yen Province, (4) Department of Finance, (5) DAE, (6) Department of Agriculture and Rural Development, (7) Land Management Division, (8) Department of Construction, (9) Ward/Town People's Committees where the resettlement areas are located, and (10) representatives of the affected communities.
- The Agriculture and Rural Development PMB collaborates with compensation and resettlement councils to carry out the compensation, support, and resettlement for affected households and organizations, in accordance with the provisions of Decree No. 43/2014/ND-CP.
- The Quy Nhon City Investment, Construction, and Land Development PMB and the Agriculture and Rural Development PMB assign staff to receive and respond to queries from affected residents regarding compensation, support, and resettlement, promptly addressing any issues or complaints.

(ii) Key Activities in the Compensation, Support, and Resettlement Process:

- Based on the detailed technical design of the project, the design consulting unit and the PMB (PMB) will hand over the land clearance boundary markers to the Compensation, Support, and Resettlement Council (CSC) to identify affected entities and carry out detailed inventory (DI) of the affected assets.
    - Land Acquisition Notification: The PMB coordinates with the CSC and the People's Committee of the ward/town to send land acquisition notifications to each affected household before holding a meeting with affected individuals to disseminate information and plans for conducting the DI.
    - Project Information Dissemination: Before the DI is conducted, the PMB, in collaboration with the CSC and the People's Committee of the ward/town, organizes meetings with affected individuals to share information about the project, including its objectives, benefits, positive and negative impacts, mitigation measures, methods for asset valuation, compensation amounts, allowances, rehabilitation, and grievance redress mechanisms.
    - Detailed Inventory (DI): The detailed inventory of affected household assets involves the participation of representatives from affected households. The DI record is signed by the head of the household, and a copy is provided for comparison with the compensation plan. The DI results are publicly posted to gather feedback from affected individuals.
- Compensation Policy and Unit Prices: The compensation, support, and resettlement work follows the policies stipulated in Decision No. 04/2019/QD-UBND dated February 14, 2019, by the People's Committee of Binh Dinh Province.
    - Dieu Tri Resettlement Area: The unit prices for housing, structures, and crops are applied according to Decision No. 21/2023/QD-UBND dated May 14, 2023, by the People's Committee of Binh Dinh Province regarding the issuance of unit prices for housing, structures, and graves in the province. The unit prices for trees and crops are stipulated in Decision No. 09/2021/QD-UBND of Binh Dinh Province, regarding compensation for trees and crops when the state acquires land in Binh Dinh Province.
    - Nhon Binh Resettlement Area: Land compensation follows Decision No. 65/2019/QD-UBND dated December 18, 2019, concerning the issuance of the land price table for a five-year period

(2020-2021) in Binh Dinh Province, and Decision No. 2616/QD-UBND dated August 16, 2022, concerning the approval of land price adjustment coefficients and specific land prices for compensation plans, land clearance for the construction of the Nhon Binh social housing resettlement area, as part of the project: Connecting NH 19C to Quy Nhon Port, within the Integrated Climate Resilience Project - Binh Dinh Province. Compensation unit prices for houses and structures follow Decision No. 52/2022/QD-UBND dated August 17, 2022. Compensation for trees and crops is based on Decision No. 09/2021/QD-UBND of Binh Dinh Province.

- Nhon Phu Resettlement Area: Compensation, support, and resettlement policies follow Decision No. 13/2015/QD-UBND dated July 7, 2015, of the People's Committee of Binh Dinh Province. Compensation for agricultural land follows Decision No. 8119/QD-UBND dated November 2, 2017, concerning the approval of land price adjustment coefficients for compensation in Quy Nhon City. Compensation for assets follows Decision No. 54/2017/QD-UBND dated September 21, 2017. Compensation for trees and crops follows the unit prices issued in Decision No. 21/2017/QD-UBND dated May 18, 2017. Support for livelihood restoration and job creation follows Decision No. 32/2016/QD-UBND dated June 15, 2016.

- Preparation and Approval of Compensation Plan: The compensation plan must comply with all current government regulations and the provisions of the People's Committee of Binh Dinh Province.

- Before submitting the compensation plan to the provincial or city People's Committee for approval, the Compensation Council, in collaboration with the ward/town People's Committee, will organize direct meetings with affected individuals to gather feedback on the plan. The plan will also be publicly posted at the People's Committee office and in residential areas for at least 20 days from the date of posting.
- Once the compensation and resettlement plan are approved, the Compensation Council will post the approval decision publicly at the People's Committee office and in residential areas, and send notifications to affected households, specifying compensation amounts and the locations for receiving compensation (Appendix 4).

  - Dieu Tri Resettlement Area: The compensation, support, and resettlement process was approved by Decision No. 2248/QD-UBND dated June 21, 2023, of the People's Committee of Binh Dinh Province, approving the compensation and support plan for organizations and individuals affected by site clearance for the construction of the resettlement area in the northern part of Diu Tri Bridge, Tuy Phuoc District, under the sub-project for constructing resettlement areas, a component of the road project connecting NH 19C to Quy Nhon Port, part of the Integrated Adaptive Development Project in Binh Dinh Province (Phase 1). The total compensation, support, and costs for site clearance (2%) amount to VND 167,433,000.
  - Nhon Binh Resettlement Area: The compensation, support, and resettlement process was approved by Decision No. 3036/QD-UBND dated September 19, 2022, of the People's Committee of Binh Dinh Province, approving the compensation and support plan for 14 households and 1 organization affected by site clearance for the resettlement area at the site west of Nhon Binh Social Housing Apartment Complex, under the sub-project for constructing resettlement areas, a component of the road project connecting NH 19C to Quy Nhon Port, part of the Integrated Adaptive Development Project in Binh Dinh Province (Phase 1). The total compensation, support, and site clearance costs (Phase 1) amount to VND 9,105,537,050.
  - Nhon Phu Resettlement Area: The compensation, support, and resettlement process was approved by the following: Decision No. 9895/QD-UBND dated December 15, 2017, of the People's Committee of Quy Nhon City, approving the compensation and support plan, site clearance, and resettlement, as well as the estimated costs for compensation and support to carry out site clearance for the Technical Infrastructure Project of Van Ha Urban Area, Nhon Phu Ward, Quy Nhon City (Phase 1); Decision No. 3174/QD-UBND dated May 21, 2018, of the People's Committee of Quy Nhon City, approving the compensation, support, and site clearance plan for the same project (Phase 2); and Decision No. 9838/QD-UBND dated November 22, 2018, approving the

compensation, support, and site clearance plan for the same project (Phase 3). The total compensation and support amount as per the approval of Decisions No. 9895/QD-UBND dated December 15, 2017, No. 3174/QD-UBND dated May 21, 2018, and No. 9838/QD-UBND dated November 22, 2018, is VND 12,973,518,745.

- Payment of Compensation and Support: Compensation and support must be disbursed within 30 days from the date of the compensation decision. If the beneficiary authorizes someone else to receive the compensation, legal authorization documents must be provided.
- After receiving compensation, affected households and individuals due to land recovery must take responsibility for relocating graves, structures, clearing crops, and handing over the recovered land to the State within the specified time frame, which should not exceed 10 days for crops and vegetation. The PMBs, in coordination with the People's Committees of wards and towns, are responsible for preparing the land recovery dossiers and submitting them to the DAE. This department will then advise the People's Committees of cities and districts to issue the land recovery decisions. Upon receiving the land use rights certificate, it will be transferred to the land registration office of the city or district for adjustment and management according to regulations.
- GRM: Officials from the PMB have closely monitored and coordinated with relevant agencies during the complaint resolution process. At present, there are no remaining cases of unresolved complaints or petitions.

h. Conclusion

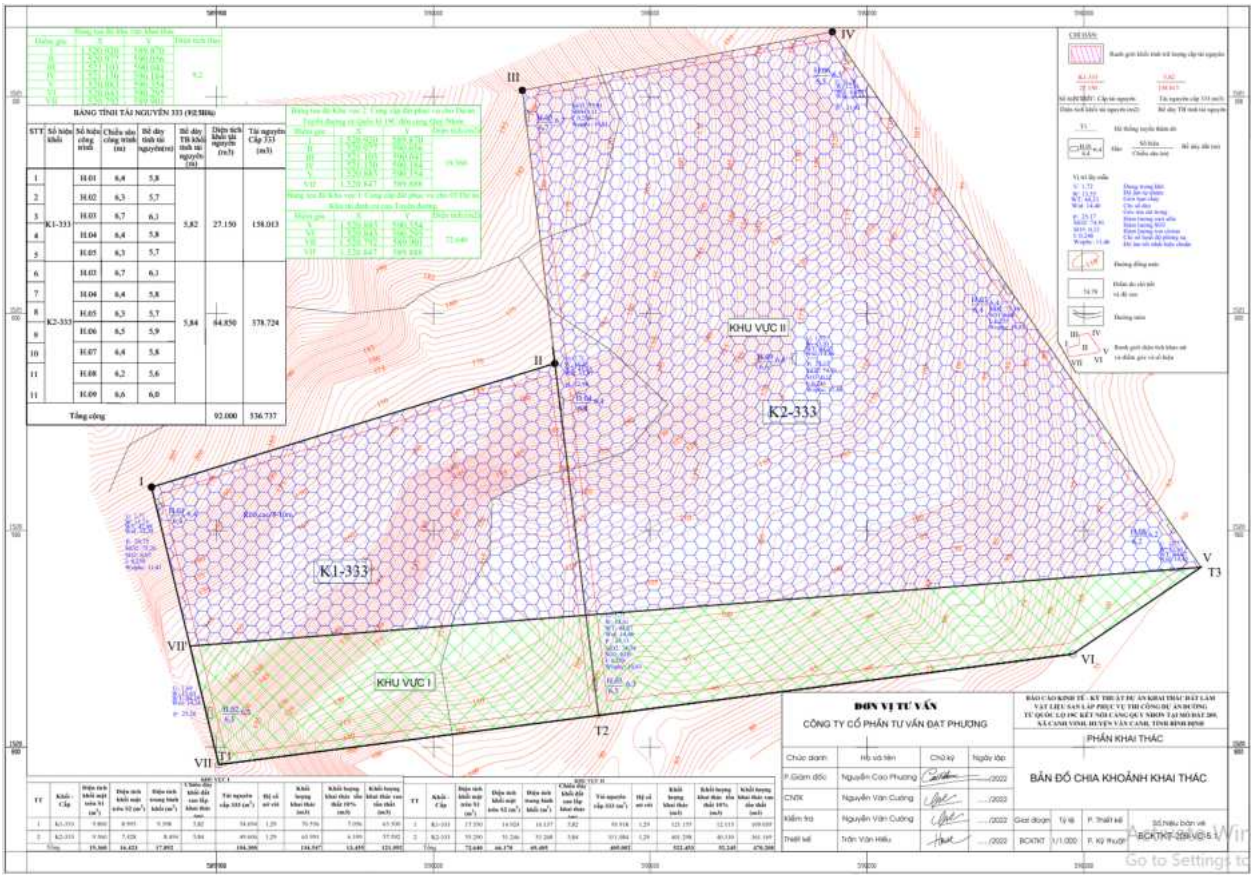
In conclusion, the Environmental Impact Assessment (EIA) for the project complies with the legal requirements of Vietnam and aligns with the environmental protection policies of the World Bank. This resettlement area is capable of meeting the environmental and social needs of the individuals affected by the project, ensuring conditions at least equivalent to those in their previous locations.

Regarding the implementation of compensation, support, and resettlement: The compensation, support, and resettlement process for the Diu Tri Resettlement Area and Nhon Binh Resettlement Area was carried out by the PMB of Agriculture and Rural Development. Meanwhile, the compensation, support, and resettlement process for the Nhon Phu Resettlement Area (under the Van Ha Urban Area) was carried out by the Quy Nhon City Investment and Urban Development PMB (formerly the Quy Nhon City Investment and Construction PMB). The compensation and support for the affected households to implement the technical infrastructure project for the Van Ha Urban Area in Nhon Phu Ward, Quy Nhon City, were conducted in accordance with the procedures and policies of the Government (Land Law 2013) and the regulations and policies of the People's Committee of Binh Dinh Province at the time of implementation.

II. THE BORROW PIT FOR FILL MATERIAL EXTRACTION

To serve the construction of Sub-project 1, the Road from National Highway 19C connecting to Quy Nhon Port, the People's Committee of Binh Dinh Province has approved the project for extracting soil for filling material (covering an area of 9.2 ha) to serve the construction of Sub-project 1 at Mine 209, Canh Vinh Commune, Van Canh District.

The Environmental Impact Assessment (EIA) report for the three resettlement areas has been prepared and submitted to the Binh Dinh Provincial People's Committee and approved by Decision No. 2775/QD-UBND dated August 26, 2022, by the People's Committee of Binh Dinh Province. The environmental and social impacts of the project, along with necessary mitigation measures, have been proposed in the report and are summarized in the sections below.



The exploitation design of the material extraction project.

Details of the Project are as follows:

1. General Information

- Project location: Mine 209, Canh Vinh Commune, Van Canh District, Binh Dinh Province.
- Investor: Project Management Board of Agriculture and Rural Development of Binh Dinh Province.
- Project area: 9.2 ha, divided into 02 areas: Area 1 with an area of 1.936 ha to serve the construction of 03 resettlement projects and Area 2 with an area of 7.264 ha to serve the construction of the road from National Highway 19C connecting to Quy Nhon Port.
- Exploitation duration: 04 years (conducted according to the construction schedule of Sub-project 1).
- Working hours: 08 hours per day (from 7:00 to 11:30 and from 13:30 to 17:00).

Exploitation volume: 458,372 m³ of geological soil (equivalent to 591,300 m³ of raw soil); of which, 93,870 m³ of geological soil is for the construction of 03 resettlement projects, and 364,502 m³ of geological soil is for the road construction from National Highway 19C to Quy Nhon Port.

Extraction capacity:

- Year 1 (2022): 3,406 m³ of geological soil/year.

- Year 2 (2023): 86,208 m³ of geological soil/year.
- Year 3 (expected in 2024): 298,991 m³ of geological soil/year.
- Year 4 (expected in 2025): 69,767 m³ of geological soil/year.

Exploitation procedure and method:

- Exploitation procedure: Soil extraction and environmental restoration will be carried out progressively (after the completion of annual extraction, leveling, tree planting for restoration will be done).
- Extraction method: The initial extraction site will be at an elevation of +150m at the southwestern part of the mine (near corner point VII). In the second year, the extraction site will be at +160m in the western part of the mine (near corner point I). The extraction direction will be from South to North and from West to East. Excavators (with a bucket capacity of 1.25 m³) will be used for extraction, and 12-ton trucks will be used to transport the soil to the construction site (trucks and extraction equipment must have full information about the company name, project name, and mine name as per the Binh Dinh Provincial People's Committee's directive in Document No. 3296/UBND-KT dated May 22, 2020).

2. Project components and activities

- Environmental protection works: 01 two-chamber sedimentation pond (southeast of the mine), a system of collection ditches, and stormwater drainage.
- Temporary road in the mine (combined with drainage ditches along the road) about 846 m in length.
- Wheel washing area for soil-carrying trucks at the junction between the dirt road and the existing concrete road at the southeast of the mine (dimensions: 4.0m length x 3.0m width x 0.5m depth).
- Auxiliary area at the southeast (within the mine area), covering about 1,700 m² to arrange temporary shelters, mobile toilets, vehicle parking area, and a temporary soil storage area of about 200 m².
- Environmental sensitive factors: The project requires a forest land use change of 9.2 ha.

3. Environmental Impacts and Mitigation Measures

a. Project components and activities that may cause adverse environmental impacts

- Soil extraction process: Rainwater runoff may carry sediment, solid waste, hazardous waste, dust, and emissions from extraction equipment, increasing the risk of landslides during rainy seasons and siltation in waterways.
- Transport activities may cause dust emissions, road damage, and traffic safety risks.

b. Forecasted environmental impacts and waste generation during the operational phase of the project

The borrow pit for fill material extraction is expected to generate various environmental impacts. Domestic wastewater (approximately 3.28 m³/day) with high organic and microbiological content and stormwater runoff (approximately 13,574.97 m³/day on peak rainfall days) mixed with soil and silt are key concerns. Dust and emissions will be produced during soil excavation and transport to Sub-project 1 (the road connecting National Highway 19C to Quy Nhon Port). Solid waste includes about 24.6 kg/day of domestic waste with a high organic content, and hazardous waste such as used fluorescent lamps (approx. 5 kg/year) and

oily rags (approx. 30 kg/year). Noise and vibration will occur during soil extraction and transport. Additional non-waste-related impacts include potential landslides during the rainy season affecting nearby infrastructure (such as resettlement areas 1A and 1B of the Becamex Binh Dinh project, Minh Du Poultry Breeding Company, and a cemetery south of the site), sedimentation of drainage ditches, damage to roads due to transport activities, and traffic safety risks.

c. Environmental protection works and measures for the project

To minimize adverse environmental impacts during project implementation, a series of environmental protection works will be put in place.

Domestic wastewater generated from construction activities will be collected through septic tanks or mobile biotoilets before being discharged into the environment. These systems will be designed to ensure compliance with QCVN 14:2008/BTNMT standards on domestic wastewater. Temporary toilets or mobile sanitary facilities will be installed at worker camps and construction sites to ensure hygienic conditions and prevent environmental contamination.

Stormwater drainage ditches will be constructed around materials storage sites and excavation areas to control runoff and prevent flooding. Rainwater falling within the construction zones will be directed to sedimentation pits to allow suspended solids to settle before the water is released into surrounding water bodies. This helps to reduce the dispersion of silt and suspended matter, especially during heavy rains.

To control dust and maintain air quality, water will be regularly sprayed on transport routes, disposal areas, and other dust-prone locations, particularly during dry and windy conditions. Trucks transporting materials such as soil or sand will be required to use canvas covers and undergo cleaning before leaving the site to prevent dust generation and material spillage.

Domestic solid waste, such as plastic packaging and food leftovers, will be collected in designated bins and transported daily to authorized collection points managed by local sanitation units. Hazardous waste, including used oil-contaminated rags and spent fluorescent bulbs, will be properly classified, stored in sealed and labeled containers, and transferred to licensed hazardous waste treatment facilities. It is estimated that approximately 5 kg/year of spent fluorescent bulbs (Code: 16 01 06) and 30 kg/year of oil-contaminated rags (Code: 18 02 01) will be generated.

Noise and vibration will be mitigated by limiting construction activities to permitted hours and ensuring all machinery and equipment are properly maintained to reduce emissions. Where necessary, noise barriers or buffers will be established near sensitive receptors.

To prevent soil erosion and slope instability, land excavation and filling activities will follow the approved engineering design. Temporary barriers and slope stabilization measures will be installed at high-risk locations, particularly those near the 1A and 1B resettlement areas, the Minh Du Poultry Breeding Company, and the southern cemetery. These measures are especially important during the rainy season to prevent landslides and infrastructure damage.

All disposal and borrow sites will be clearly marked and fenced, with appropriate signage to prevent unauthorized access and encroachment. Where feasible, green buffer zones will be planted to create visual and environmental separation between the project area and nearby communities or sensitive land uses.

The project will also comply with regulations on compensatory afforestation in accordance with the Law on Forestry 2017, Decree No. 156/2018/ND-CP, and Circular No.

13/2019/TT-BNNPTNT. This includes registration of afforestation land, implementation of planting plans, and handover of reforested areas for sustainable forest development.

d. Restoration and rehabilitation plan

The annual environmental restoration and rehabilitation activities for the quarry area will include the following key tasks:

Before starting the extraction activities and throughout the project implementation, warning signs will be installed at the quarry area to ensure safety. A total of 10 signs will be set up and maintained until project completion.

Upon completion of each annual extraction cycle, the quarry surface will be leveled. Approximately 8,280 cubic meters of soil will be used to create a flat surface sloping toward the southeast to facilitate drainage and prepare the area for reforestation.

Drainage ditches and sedimentation ponds will be filled using about 5,906 cubic meters of material. This task will be implemented and completed within 10 days from the end of the annual mining period.

Temporary structures, including mobile toilets and temporary shelters, will be dismantled to return the site to its original condition.

Reforestation with hybrid acacia trees will be carried out to restore green cover in the former mining area. A total area of 9.2 hectares (equivalent to 34,000 square meters) will be reforested, contributing to the rehabilitation of the landscape and environmental recovery. This activity will also be completed within 10 days following the annual extraction period.

Topographical surveying will be conducted over the entire 9.2-hectare mining area to monitor excavation depth and ensure compliance with design and safety standards. This activity will take place after the completion of leveling each year.

The total cost for environmental restoration and rehabilitation is 1,065,098,000 VND, which will be deposited in four installments of 266,275,000 VND each. The first installment is due before the commencement of the mine construction, and the subsequent installments will be made within 7 days following the announcement of the consumer price index for the previous year. The deposit will be managed by the Binh Dinh Environmental Protection Fund. The amount does not include any inflation adjustments after 2022.

e. Environmental incident response and prevention plan

Excavation will be carried out progressively, with the topsoil being removed as excavation advances. A green belt will be maintained, and a stop-bank will be created along the southern boundary of the mine to minimize downstream erosion during the excavation process. Additionally, a metal fence will be installed along the boundary adjacent to the 1A and 1B resettlement areas of the Becamex Binh Dinh Industrial Zone to the south of the project, with water spraying measures to reduce dust and minimize its impact once residents move in. Another metal fence will be installed at specific locations along the road from the mine to National Highway 19C to reduce dust emissions caused by transport activities. Regular dredging of the sedimentation ponds and stormwater drainage channels will be performed to minimize the risk of siltation and ensure effective drainage in the area. Finally, a designated area will be set up to regulate the flow of vehicles entering and exiting the mine, ensuring that vehicles are not concentrated on National Highway 19C, thereby promoting road safety.

4. Environmental management and monitoring program

Monitoring of wastewater quality will be conducted at the outlet of the sedimentation pond, measuring parameters such as pH, total suspended solids, and mineral oil. The results will be compared with Column B of QCVN 40:2011/BTNMT – National Technical Regulation on Industrial Wastewater (with Kq coefficient = 0.9, Kf coefficient = 0.9). Monitoring will occur every 3 months.

Monitoring of suspended dust (TSP) will be conducted at three locations: one at the residential area near the intersection of National Highway 19C and the access road to the project, one at the Minh Du Poultry Breeding Facility, and one at the resettlement area (if residents are living there). The dust levels will be compared with QCVN 05:2013/BTNMT – National Technical Regulation on Ambient Air Quality. The monitoring frequency will be every 6 months.

5. Conclusion

In conclusion, the Environmental Impact Assessment (EIA) for the project complies with the legal requirements of Vietnam and aligns with the environmental protection policies of the World Bank. The assessment has carefully considered the potential environmental impacts of the project, and it has been determined that these impacts are minimal in nature. The proposed mitigation measures, when implemented correctly, will effectively reduce any adverse environmental effects. Additionally, the project has outlined a comprehensive plan for environmental restoration and compensation, ensuring that any unavoidable impacts will be addressed and that the environment will be rehabilitated to its pre-project condition, where possible. These proactive steps reflect the project's commitment to sustainable development and environmental stewardship.

APPENDIX 6. INSTRUCTIONS ON LABOR HYGIENE, SAFETY AND HEALTH

1. Introduction

This document provides guidance on occupational health, safety, and hygiene at construction sites to ensure the health and safety of all workers involved. These regulations apply to all workers and subcontractors operating on the site.

2. Assessing the characteristics of the workforce

The construction workforce includes a variety of groups such as direct workers, contract workers, community workers, and workers of key suppliers. The workforce may include migrant workers. Assessing the characteristics of the workforce will help determine appropriate safety and health measures, including:

- The contractor should maintain detailed records of workers involved in the project, work schedules, and employment contracts.
- Minimizing frequent changes in construction site labor by extending the contract period and using local workers.
- Migrant workers should be accommodated on-site to limit travel and contact with the outside community.
- Workers from the local community must comply with health screening procedures and may be required to stay on-site if necessary.

3. Guidelines for hygiene, safety, and occupational health for workers when working at construction sites

3.1. Requirements for worker camps on construction sites

3.1.1. Installation location

- Site layout: Potential locations for worker camps must be discussed, proposed, and approved by the community and local authorities before establishment.
- Construction sites, including concrete batching plants and asphalt plants, must be located in pre-approved areas and away from residential areas.
- Distance from residential areas: Offices and worker camps must be located at least 100 meters from existing residential areas and not on steep slopes.
- Distance from water sources: Camps must be located at least 100 meters from any water source and operated in such a way that no pollutants enter the watercourse. Camp areas must be arranged to allow for effective natural drainage.
- Zoning: All construction camp areas, including worker camps, toilets, offices, etc., must be zoned according to their intended use.

3.1.2. Provision of accommodation and facilities

- Safe accommodation: The workforce shall be provided with safe, suitable, and comfortable accommodation, maintained in a clean and hygienic condition.
- Laundry area: A suitable laundry area and laundry area shall be provided and maintained for workers.
- Clean water: Clean water shall be provided for domestic use in camps, offices, medical facilities, and other areas. Clean water shall comply with the regulations on domestic water quality (QCVN 01-1: 2018/BYT - National technical regulation on water quality for domestic use).
- Drainage and waste treatment systems: Drainage, wastewater, and solid waste treatment systems shall comply with national regulations and mitigation measures as outlined in the Contractor's Waste Management Plan.

3.1.3. Sanitary Facilities

- Sanitary Facilities: Each campsite must have separate and adequate sanitary facilities for the use of male and female workers, including toilets and washing areas, with an adequate supply of running water, soap, and toilet paper. Sanitary facilities must be accessible, clean, and hygienic.

- Distinguishing Signs: Where both male and female workers are employed, signs must be posted outside each toilet facility in a language understood by the majority of workers (e.g., "Men Only" or "Women Only").
- Number of Toilet Facilities: Where female workers are employed, there must be at least one toilet for every 25 or fewer female workers. Where male workers are employed, there must be at least one toilet for every 25 or fewer male workers.
- Portable Toilets: Each construction campsite must have at least one portable toilet. Wastewater from septic tanks must not be discharged into any water source and must be periodically transported to the nearest treatment plant. Wastewater tanks must be designed and installed according to standards.

3.1.4. Medical and safety equipment

- First aid kit and emergency telephone number: Each camp area must have a first aid kit, medicine cabinet, condoms, emergency telephone number, telephone number of the safety officer, chief construction supervisor, and hotline. Consumables in the first aid kit must be checked and replenished regularly.
- Fire fighting equipment: Fire extinguishers must be provided in camp areas and fire safety instructions and emergency telephone numbers must be established at the camp office.

3.2. Safety instructions for workers at construction sites

The Contractor shall ensure that all workers and employees participating in the construction comply with the following safety measures:

3.2.1. Entry/exit of the construction site and inspection upon commencement of work

- All workers must undergo a health check and clean protective equipment before entering the construction site. The health check includes taking the temperature, checking for symptoms of infectious diseases, and checking personal hygiene conditions.

3.2.2. Personal protective equipment (PPE)

- All workers must be fully equipped with personal protective equipment (PPE) such as construction helmets, gloves, safety shoes, safety glasses, protective clothing, and reflective vests.
- Workers working at heights must use safety belts and comply with fall prevention measures.

3.2.3. Work area management:

- The construction area must be demarcated and have safety warning signs, and speed limits for vehicles onsite.
- Walkways and work areas must be cleared to avoid the risk of slipping or colliding with construction materials.

3.2.4. Use of tools and machinery:

- All machinery and tools must be inspected and maintained periodically to ensure safety when used.
- Machine operators must be qualified and trained to operate the equipment safely.
- When using electrical equipment, workers must ensure that they do not come into contact with exposed electrical sources or wet environments to avoid the risk of electric shock.

3.2.5. Fire prevention

- The construction site must be fully equipped with fire prevention equipment such as fire extinguishers, fire hoses, and fire alarm systems.
- The Contractor shall ensure that workers are trained in fire prevention and emergency response measures.

3.2.6. Safety at height

- Workers working at height must be provided with safety harnesses and scaffolding systems must be securely installed to ensure compliance with safety standards.

- When working on roofs or areas with a risk of falling, workers must be trained in the use of safety harnesses and other fall protection equipment.

3.2.7.Safety when working in confined spaces

- Before working in confined spaces (such as tunnels, tanks, or enclosed areas), the contractor must assess the risks and ensure that there is adequate ventilation.
- Workers must be provided with respiratory protection and supervised when working in confined spaces.

3.2.8.Measures to minimize the risk of accidents

- The contractor must have a specific plan to minimize the risk of work accidents, including providing protective equipment, warning of hazards, and arranging safe exits.
- All accidents or incidents at the construction site must be reported and thoroughly investigated to determine the cause and take preventive measures.

3.2.9.Infectious diseases

- When any suspected case of an infectious disease is detected, workers must be isolated immediately and reported to the health authority. Disease control measures include disinfection of work areas, isolation of close contacts, and suspension of activities in the relevant area.

3.2.10. Safety training:

- Workers must be fully trained in occupational safety procedures before starting work.
- Training must include safe use of equipment, hazard identification, and emergency response.

3.2.11. Periodic safety inspections and monitoring

- The Contractor must regularly inspect safety measures at the site and adjust measures as necessary.
- Safety officers must be deployed to monitor compliance with occupational safety regulations at the site.

3.2.12. Adjustment of work procedures:

- Work procedures must be adjusted to include flexible shift arrangements to ensure workers have adequate rest periods and do not overwork.

3.2.13. Accident and Incident Reporting

- All work accidents or safety incidents must be reported immediately to the site manager and the safety team.
- Accident reports must clearly state the cause and provide corrective measures to prevent similar incidents.
- Construction work must be suspended until the cause of the incident is found and corrected.

3.2.14. Compliance with regulations and laws

- All regulations on occupational safety and hygiene, environmental protection, and related legal regulations must be strictly followed.
- Violations of site regulations will be subject to disciplinary action according to the contractor's regulations and current laws.

3.3. Guidelines for on-site Code of Conduct

The Contractor shall ensure that all workers and employees involved in the construction comply with the following Code of Conduct:

(1) Obligations of workers

- Receipt of a copy of the Code: Each worker shall receive a copy of the Code of Conduct.
- Explanation of the Code: Workers shall be fully explained the contents of the Code.

- Acknowledgement: Workers shall sign a copy of the Code to confirm receipt, understanding, and agreement to comply.
- Consequences of violation: Workers shall understand that violations of the Code may result in serious disciplinary action, including dismissal or referral to legal authorities.

(2) Training and awareness raising

- Ongoing training: The Contractor shall provide ongoing training and awareness-raising activities to ensure compliance with the Code of Conduct by workers.
- Community Notification: Local communities must be informed of the Code and have the ability to report non-compliance.

(3) Compliance with Laws and Regulations

- Compliance with Laws: All workers must comply with applicable laws, regulations, and rules of the jurisdiction relevant to the project.

(4) Prohibition of Using Banned Substances

- Banned Substances: Prohibition Use of Illegal Substances, including drugs and alcohol, is prohibited on the site.

(5) Non-Discrimination

- Equal Treatment: Prohibition of discrimination based on family status, ethnicity, race, gender, religion, language, and marital status, place of birth, age, disability, or political affiliation.

(6) Communication with Local Communities

- Respect for the Community: Interactions with community members must be respectful and non-discriminatory.

(7) Prohibition of Sexual Harassment

- Prevention of Harassment: Prohibit all acts of sexual harassment, including the use of inappropriate language or conduct, especially toward women and children.

(8) Prohibit Violence and Exploitation

- Prevention of Violence: Prohibit all acts of violence, exploitation, and acts of exchanging money, work, goods, or services for sex.

(9) Children protection

- Protection of Children: Prohibit abuse or unacceptable conduct toward children. Interaction with children should be limited and children should be kept safe in the project area.

(10) Hygiene Requirements

- Use of Toilet Facilities: Workers should use toilet facilities provided by the employer and not use open areas.

(10) Avoid Conflicts of Interest

- Avoid Conflicts of Interest: Avoid financial, family, or personal connections that could give rise to conflicts of interest or preferential treatment.

(11) Protection of Assets

- Use of Assets: Theft, carelessness, or waste of project assets must be prevented.

(12) Reporting Obligations

- Reporting Violations: Workers must report violations of the Code of Conduct.

- Protection of Reporters: Any form of retaliation against workers who report violations, if the report is made in good faith, is prohibited.

3.4. Local health services and other services

The contractor shall liaise with local health facilities to ensure the best health care for workers when needed. Other services such as environmental protection, sanitation, and waste management shall also be implemented closely.

3.5. COMMUNITY COMMUNICATION AND ENGAGEMENT

The contractor shall coordinate with local authorities and communities to ensure that safety measures are followed and that impacts on public health are minimized. Communication shall be transparent and continuous to build trust and cooperation in the community.

Workers shall be introduced to local customs and practices before starting work.

Workers from other places shall make temporary residence and temporary absence declarations with local authorities.

APPENDIX 7. OCCUPATIONAL HEALTH AND SAFETY (OHS) PLAN (GUIDANCE)

1. Introduction.

The ESIA is the key document in assessing and managing environmental and social risks and impacts associated with the project. The key output of the ESIA is the Environmental Social Management Plan (ESMP) which aims to provide high level mitigation measures and actions for managing E&S and Occupational Health and Safety (OHS) risks and impacts. Throughout project preconstruction, construction and operations the OHS plan should be implemented. The OHS plan should be site specific, developed by the contractor and guided by the requirements of the ESMP. This annex to the ESIA acts as a guidance to the development and implementation of all site specific OHS plans. The OHS plans will be designed to ensure the highest standards of health and safety for all personnel involved in the project. The OHS plan should address the unique challenges and risks associated with large-scale construction activities, and the construction of bridges, roads, and bypass canals.

1.1 Aim.

The aim of this annex is to guide on the development of specific Occupational Health and Safety (OHS) Plans that will identify, assess, and manage occupational health and safety risks, ensuring a safe working environment for all workers.

1.2 Objectives

The objectives of this Annex OHS plan are to guide the contractors on:

a. Risk Mitigation. To identify and control hazards to ensure a safe working environment.

b. Risk control. To provide risk control measures based on the hierarchy of controls

c. Regulatory Compliance. To assess and plan for compliance with all relevant OHS regulations and standards including World Bank Environmental Safety Health Guidelines (ESHGs) and Good Industrial International Practice (GIIP)

d. Monitoring and Emergency Preparedness. To assess and plan for continuous OHS monitoring, reporting, and emergency response plans.

e. Health and Community Safety. To assess and plan for worker health and welfare, and mitigate impacts on community safety.

2. Project description

The Binh Dinh province is planning to propose investment in several infrastructure projects, including the construction of a road connecting National Highway 19C to Quy Nhon Port and a coastal road section from My Thanh to Lai Giang. These projects are part of the Integrated Adaptation Development Project in Binh Dinh, funded by a World Bank loan, and will be implemented from 2022 to 2027. The proposal was submitted to the Prime Minister and approved in December 2020, which enabled the Provincial People's Committee to proceed with further discussions with the World Bank and other central authorities to finalize negotiations and sign the project agreement. The project was officially approved for investment by the Prime Minister's Decision No. 2265/QD-TTg on December 31, 2021.

This project falls under the transportation sector, involving both the construction of roadways and the improvement of existing roads. During its implementation, the project is expected to have environmental and worker health impacts. To comply with environmental protection regulations, the Project Management Board for Agriculture and Rural Development of Binh Dinh has prepared an Environmental Impact Assessment (EIA), which was submitted to the Ministry of Natural Resources and Environment for approval. The EIA outlines the construction and operation of two road sections: the 6.35 km road connecting National Highway 19C to Quy Nhon Port and the 38.14 km coastal road

from My Thanh to Lai Giang, along with associated infrastructure. The scope of the project does not include activities such as land excavation for filling materials or the construction of resettlement areas. Affected households will be relocated to designated resettlement areas under a different project.

3. Roles and responsibilities

Roles and Responsibilities for Implementing the OHS Plan

Stakeholder	Roles and Responsibilities
Contractor	- Implement and maintain OHS measures on site. - Ensure workers comply with safety regulations and use PPE. - Provide safety training and supervision. - Ensure equipment is safe and regularly maintained.
Construction Supervision Consultant (CSC)	- Monitor OHS compliance during construction. - Identify and report potential hazards. - Provide recommendations to improve safety measures.
Independent EHS Consultant	- Conduct independent assessments of OHS and EHS compliance. - Monitor legal compliance and provide improvement suggestions.
PMU (Project Management Unit)	- Ensure all stakeholders follow the OHS plan, monitor and evaluate implementation. - Provide resources and support for OHS execution. - Organize regular meetings to assess safety status on site.
Regulatory Authorities	- Supervise and ensure legal compliance with OHS regulations. - Provide guidance and corrective actions if non-compliance is found.
Community/Workers	- Comply with OHS regulations and safety measures. - Participate in OHS training and report any safety hazards or incidents.

4. Regulatory compliance and WB requirements.

In Vietnam, Occupational Health and Safety (OHS) regulations are primarily governed by the Labor Code (Law No. 45/2019/QH14), which outlines the basic principles for ensuring the health and safety of workers in the workplace. This code stipulates the responsibilities of employers to prevent

accidents and occupational diseases, as well as the protection of workers' rights to a safe and healthy working environment. Specifically, it requires employers to establish, implement, and maintain safety measures to minimize risks to worker health.

Additionally, the Decree No. 39/2016/ND-CP provides more detailed guidelines on the management of occupational health and safety, including the roles and responsibilities of employers and employees in ensuring workplace safety. It also specifies the conditions for issuing safety certifications, the organization of health checks, and the requirements for reporting accidents and incidents.

The Circular No. 04/2014/TT-BLDTBXH elaborates on the details for the implementation of occupational safety, including specific requirements for hazardous work environments, the use of personal protective equipment (PPE), and the establishment of emergency response procedures. It also outlines the qualifications and training requirements for safety officers and managers.

In addition to Vietnamese national regulations, the implementation of OHS in projects, especially those involving international partners or financing, must also align with international safety standards. The World Bank's Environmental, Health, and Safety Guidelines (ESHGs) serve as a crucial framework, offering detailed guidance on how to manage environmental and health risks in a way that complies with global best practices. The ESHGs cover various sectors, including construction, manufacturing, and infrastructure development, ensuring that safety measures are applied consistently and effectively across diverse project types.

Furthermore, Good International Industry Practice (GIIP) refers to internationally recognized standards and procedures that guide the implementation of safety and health measures. GIIP includes practices such as conducting thorough environmental and safety risk assessments, adopting precautionary principles, ensuring continuous training and education on health and safety, and maintaining open communication channels with affected communities.

Together, compliance with Vietnam's local OHS regulations, along with adherence to the World Bank’s ESHGs and GIIP, ensures that projects not only meet the legal and safety requirements of Vietnam but also align with global standards, enhancing safety for workers, minimizing environmental impacts, and promoting sustainable development.

5. Risk assessment hazard identification, risk analysis and risk control.

a. Hazard identification and risk assessment are essential for project safety, involving the identification of potential harm sources, risk analysis, and control measures. This process should start early in planning and be revisited during design stages, equipment introduction, task initiation, worksite changes, inspections, near misses, periodically, and after incidents. Hazard information can be obtained from safety data sheets, manufacturer instructions, exposure monitoring, job safety analyses, worker experience, site inspections, accident investigations, and various publications. Hazards are categorized into biological (e.g., bacteria, viruses), chemical (e.g., fuels, dust), ergonomic (e.g., repetitive movements), physical (e.g., temperature extremes, noise), psychosocial (e.g., stress, violence), safety (e.g., slipping/tripping hazards), and other types such as working alone or at night.

b. The contractor is legally required to protect employees and others from harm by assessing the likelihood and severity of identified hazards and determining appropriate control measures. While it is impossible to eliminate all risks, it is crucial to manage the main risks effectively, balancing the level of risk against the measures needed in terms of money, time, or effort. Risk assessments should be regularly reviewed, at least every three months, or when new equipment, improvements, unidentified hazards, accidents, incidents, near misses, or new substances and procedures are introduced. The risk assessment process involves identifying potential hazards, evaluating the likelihood and severity of harm, and taking action to eliminate or control the risks.

c. Risk controls. Risk controls should be considered using the OHS hierarchy of controls.

Elimination involves physically removing the hazard to prevent exposure. Substitution entails replacing the hazard with safer equipment or tools. Isolation separates the hazard from people by marking off areas or installing barriers. Engineering controls use machinery or devices to remove the hazard, such as mechanical aids, guards, safety switches, production line adjustments, or sound dampening measures. Administrative controls involve changing processes or task methods, relying on workers to follow safety procedures. Personal Protective Equipment (PPE) is the last line of defense, providing protection but often being forgotten, ill-fitting, or inadequate.

d. Before starting any high-risk activities, arrangements must be documented in writing, typically through a method statement generated from a risk assessment. This statement addresses identified risks and communicates the safe system of work, especially for complex or unusual tasks (e.g., using hazardous substances, operating near overhead lines, blasting, confined spaces). It outlines the job's execution in a logical sequence, ensuring health and safety by including all control measures and necessary resources. While similar operations may use similar statements, significant changes (e.g., in blasting) require revisions. Method statements effectively inform employees about work execution and safety precautions. Risk assessments should be reviewed regularly, incorporating information from previous tasks, accident records, and investigations to ensure adequate precautions.

6. OHS targets.

To maintain momentum in health and safety, set measurable objectives and targets, and outline actions, responsibilities, and dates. Continuously strive to achieve these targets and measure performance against them. Implement new initiatives, such as rewards for good safety actions or setting a maximum number of days between accidents, to maintain high standards. Use risk control measures to achieve targets like minimal or zero accidents and incidents. Track accidents and incidents using site data, designate responsible persons, and set specific dates to ensure accountability and progress.

7. Other considerations.

a. The work permit system supports method statement actions and serves as a risk control measure for activities like hot works, excavations, and confined space work.

b. Management of sub-contractors' OHS involves detailing how to achieve compliance with risk assessments and supervision of sub-tasks.

c. Health and Safety management at the project site includes managing hazardous materials by listing and assessing risks, identifying control measures, and allocating responsible persons. Access and site security require risk assessments for encroachment and equipment security. Site safety rules should be based on risk assessments and included in the annex. Workplace inspections need to specify what, when, how, and who will inspect, with checklists in the annex. First aid provisions should address minor and major injuries. Worker welfare facilities must include sanitation, washing facilities, shaded areas, and drinking water. Site induction and training should be based on a training gap analysis and documented. Emergency and incident management should refer to the CESMP plan. Road safety and traffic management plans should be based on risk assessments and identified deficiencies.

d. Communication and information sharing involve establishing HS meetings/committees, conducting inspections, and using reports, toolbox talks, signage, and notice boards to review and improve OHS performance. Internal GRM and external consultations with media, WB, RDA, road safety authorities, and the local population are essential. Workforce consultation should address employee representatives' questions and concerns on HS. Accident, incident, and near miss reporting and investigation procedures should include templates in the annex, with data analysis to prevent future incidents and improve safety

culture.

e. Incidents to be reported include HS hazards, near misses, injuries, illnesses, diseases, environmental incidents, equipment damage or loss, community complaints, corporate image impacts, and non-compliance issues. Incident reports should include the time, date, location, and name of the person who identified the incident; a description and investigation of the incident; the cause; actual and potential impacts; and corrective actions to prevent recurrence. Identifying and eliminating unsafe acts, and reporting near misses and minor injuries, are crucial to preventing lost time injuries and fatalities.

f. Audit and Monitoring: Project files and records should include H&S meeting minutes, weekly inspection reports, work permits, HS site reports, incident and accident investigation reports, training records, site induction records, vehicle inspections, driver licenses, and toolbox talks records. These documents should be filed appropriately and accessible for audits. Regular audits and monitoring should be conducted through weekly inspections and independent monitoring consultant reports.

g. Revisions of OHS Plan: Regularly update the OHS plan with the date of revision, the person responsible, and details of the revisions made.

h. **Annexes Templates/Guidance/References:** Suggested annexes include:

Annex A: Management plans (e.g., traffic management plan, road safety plans)

Annex B: Site induction brief

Annex C: Site induction and training register (e.g., first aid training, toolbox talks, fire prevention training, induction, flagmen training)

Annex D: Hazardous materials register

Annex E: Permits to work (e.g., for excavations, hot works)

Annex F: Risk assessments (e.g., Traffic Management Risk Assessment)

Annex G: Site safety rules/regulations

Annex H: Workplace inspection form

Annex I: Equipment inspection form

Annex J: Vehicle inspection form

Annex K: Driver license and training register

Annex L: Driver rules and regulations

Annex M: Accident and incident reporting and investigation form

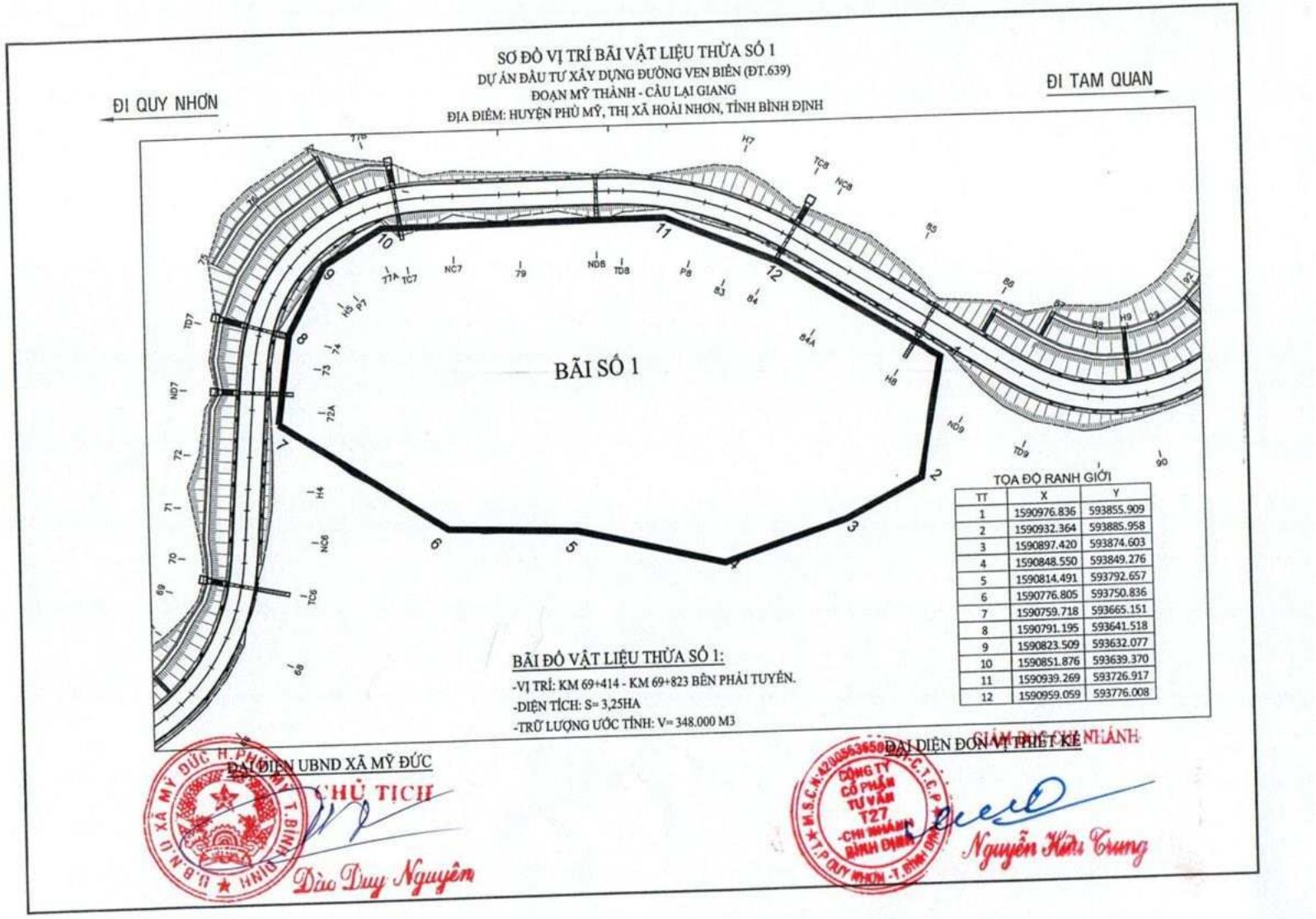
Annex N: Emergency procedures checklist

Annex O: PPE register (issue and accountability)

Annex P: OHS rewards program

Annex Q: Signage (e.g., road, safety signs)

APPENDIX 8. DRAWING OF MATERIAL STORAGE SITES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ĐOẠN MỸ THÀNH - CỒU LẠI GIANG
ĐỊA ĐIỂM: HUYỆN PHÙ MỸ, THỊ XÃ HOÀI NHƠN, TỈNH BÌNH ĐỊNH
ĐI QUY NHƠN
ĐI TAM QUAN
BÃI SỐ 1
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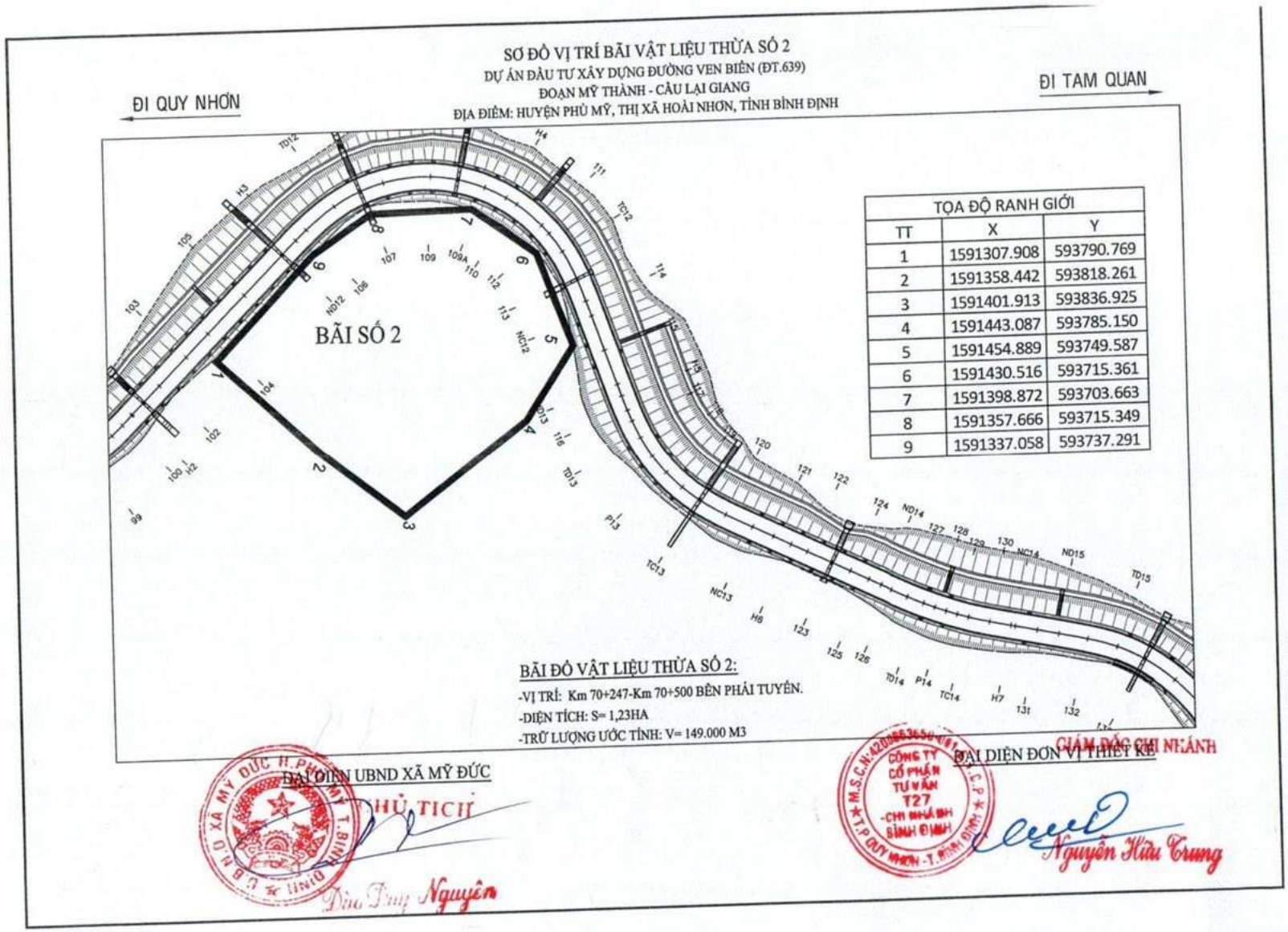
CHỦ TỊCH
Đào Duy Nguyên
ĐẠI DIỆN ĐƠN VỊ THIẾT KẾ
GIÁM ĐỐC CHI NHÁNH
Nguyễn Hữu Trung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ĐOẠN MỸ THÀNH - CẦU LẠI GIANG
ĐỊA ĐIỂM: HUYỆN PHÙ MỸ, THỊ XÃ HOÀI NHƠN, TỈNH BÌNH ĐỊNH
ĐI QUY NHƠN
ĐI TAM QUAN
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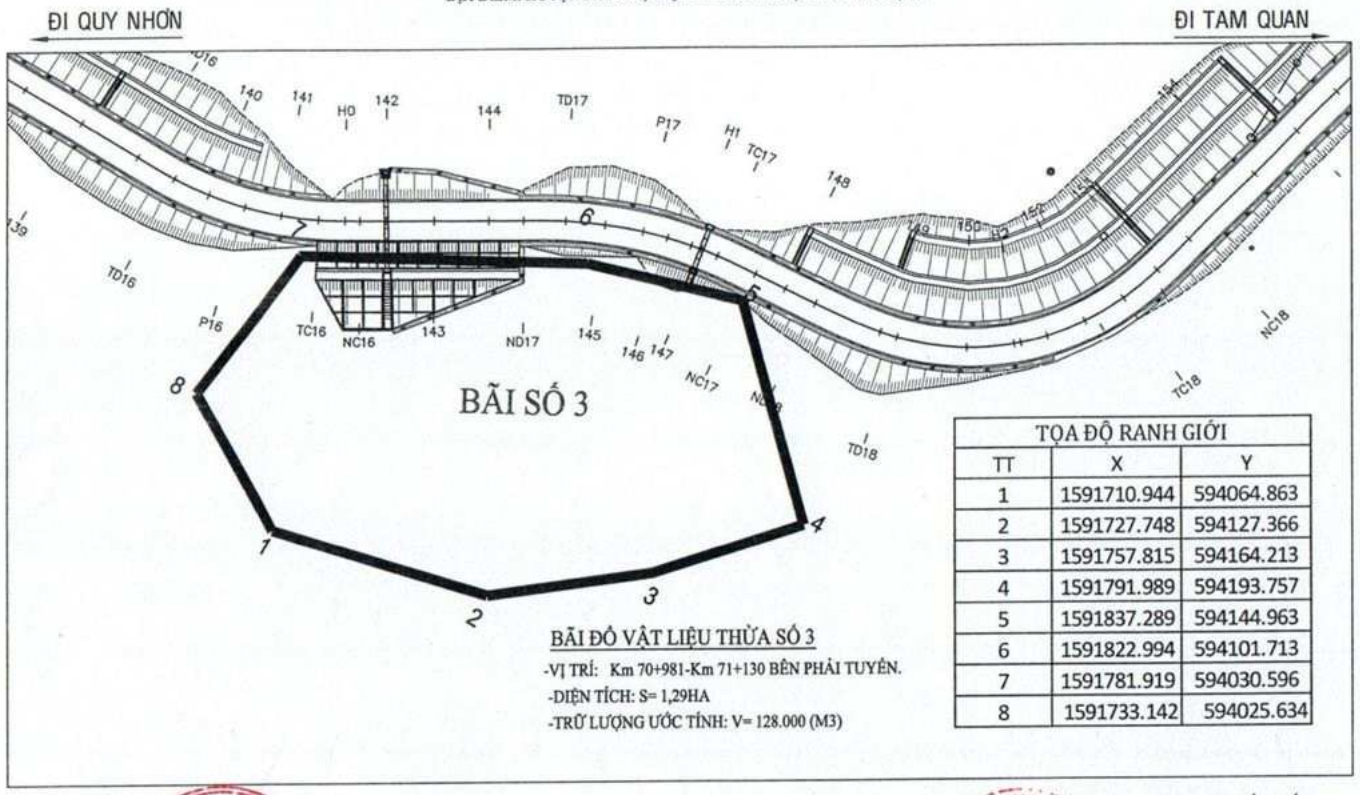
ĐẠI DIỆN UBND XÃ MỸ ĐỨC
CHỦ TỊCH
ĐẠI DIỆN ĐƠN VỊ THIẾT KẾ
GIÁM ĐỐC CHI NHÁNH
Nguyễn Hữu Trung

SƠ ĐỒ VỊ TRÍ BÃI VẬT LIỆU THỪA SỐ 3
DỰ ÁN ĐẦU TƯ XÂY DỰNG ĐƯỜNG VEN BIỂN (ĐT.639)
ĐOẠN MỸ THÀNH - CẦU LẠI GIANG
ĐỊA ĐIỂM: HUYỆN PHÙ MỸ, THỊ XÃ HOÀI NHƠN, TỈNH BÌNH ĐỊNH



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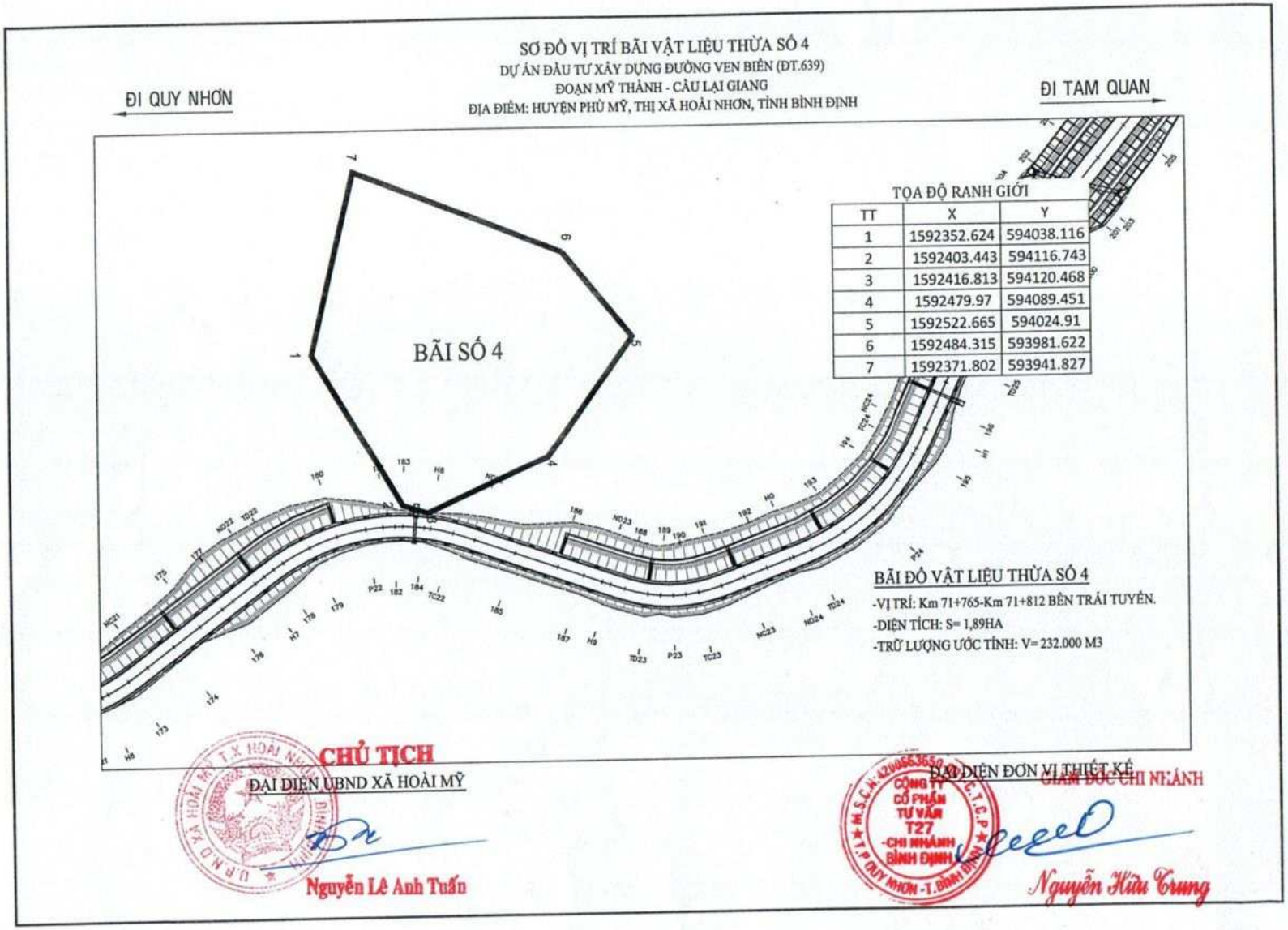
ĐẠI DIỆN UBND XÃ MỸ ĐỨC
CHỦ TỊCH
Đào Duy Nguyên

ĐẠI DIỆN ĐƠN VỊ THIẾT KẾ
CÔNG TY CỔ PHẦN TƯ VẤN T27 - CHI NHÁNH BÌNH ĐỊNH
GIÁM ĐỐC CHI NHÁNH
Nguyễn Hữu Trung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ĐOẠN MỸ THÀNH - CẦU LẠI GIANG
ĐỊA ĐIỂM: HUYỆN PHÙ MỸ, THỊ XÃ HOÀI NHƠN, TỈNH BÌNH ĐỊNH
ĐI QUY NHƠN
ĐI TAM QUAN
BÃI SỐ 4
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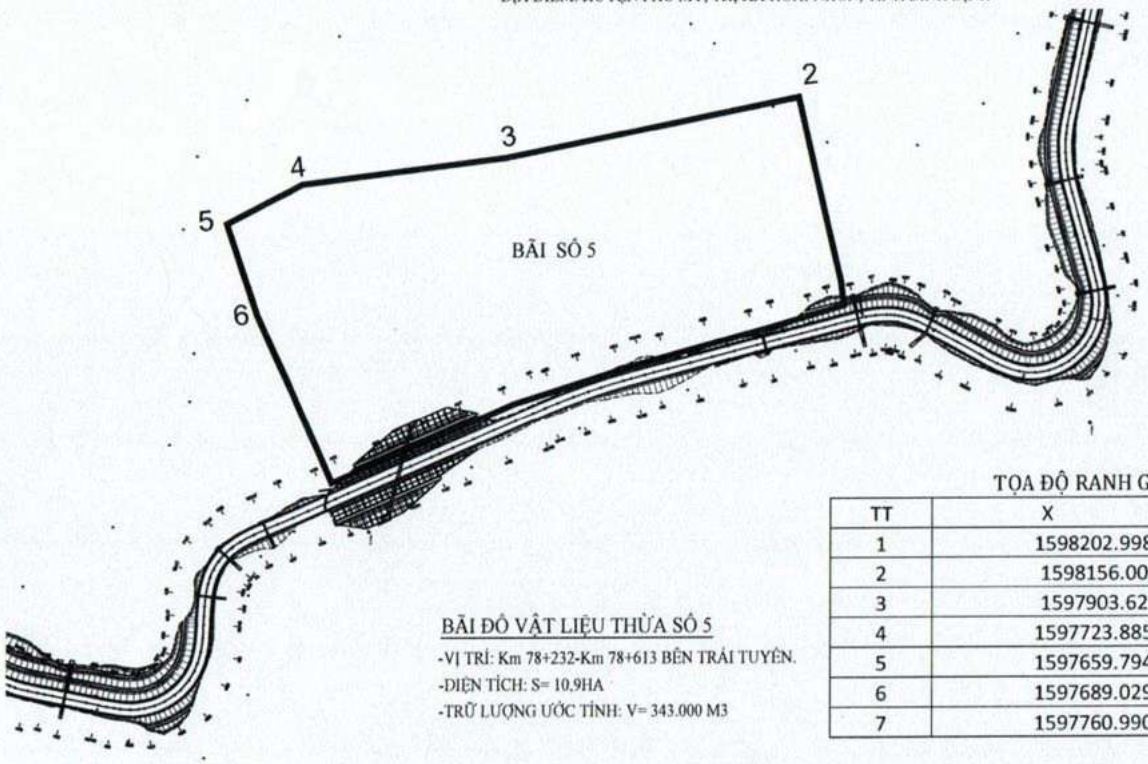
CHỦ TỊCH
ĐẠI DIỆN UBND XÃ HOÀI MỸ
Nguyễn Lê Anh Tuấn
ĐẠI DIỆN ĐƠN VỊ THIẾT KẾ
GIÁM ĐỐC CHI NHÁNH
CÔNG TY CỔ PHẦN TƯ VẤN T27 -CHI NHÁNH BÌNH ĐỊNH
Nguyễn Hữu Trung

SƠ ĐỒ VỊ TRÍ BÃI VẬT LIỆU THỪA SỐ 5

DỰ ÁN ĐẦU TƯ XÂY DỰNG ĐƯỜNG VEN BIỂN (ĐT.639)

ĐOẠN MỸ THÀNH - CẦU LẠI GIANG

ĐỊA ĐIỂM: HUYỆN PHÙ MỸ, THỊ XÃ HOÀI NHƠN, TỈNH BÌNH ĐỊNH



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-DIỆN TÍCH: S= 10,9HA

-TRỮ LƯỢNG ƯỚC TÍNH: V= 343.000 M3

ĐẠI DIỆN UBND XÃ HOÀI HẢI

CHỦ TỊCH

Phạm Tiến Dũng

ĐẠI DIỆN ĐƠN VỊ THIẾT KẾ

GIÁM ĐỐC CHI NHÁNH

Nguyễn Hữu Trung