MINISTRY OF TRANSPORTATION

PROJECT MANAGEMENT UNIT No. 2 – PMU2

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CENTRAL HIGHLANDS CONNECTIVITY IMPROVEMENT PROJECT
(CHCIP)

UPDATED ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

October 2020

ABBREVIATIONS

AH	Affected Household
AP	Affected Person
BOT	Build-Operation-Transfer
BTNC	Dense Asphalt Concrete
CESMP	Contractor's Environmental and Social Management Plan
CHCIP	Central Highland Connectivity Improvement Project
CSC	Construction Supervision Consultant
DDD	Detailed Design and Documentation
DONRE	Provincial Department of Natural Resources and Environment
DT	Provincial Road
DSCC	District Site Clearance and Compensation Committee
ECOP	Environmental Code of Practice
EHS	Environmental, Health and Safety
EM	Ethnic Minority
EMDP	Ethnic Minority Development Plan
EO	Environmental Officer
ESIA	Environmental and Social Impacts Assessment
ESMP	Environmental and Social Management Plan
FGD	Focus Group Discussion
FPICon	Free, Prior and Informed Consultation
FS	Feasibility Study
GAP	Gender Action Plan
GESI	Gender and Social Inclusion
HH	Household
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
IDA	International Development Association
IEMC	Independent Environmental Monitoring Consultant
IFC	International Finance Corporation
LURC	Land Use Rights Certificate
MONRE	Vietnam Ministry of Natural Resources and Environment
MOT	Vietnam Ministry of Transport
NH	National Highway
ODA	Official Development Assistance
PAPs/APs	Project's Affected Persons/Affected Persons
PIB	Public Information Booklet

PMU	Project Management Unit
QCVN/TCVN	Vietnam National Technical Regulations/Standards
RP/RAP	Resettlement Plan
SEA	Sexual Exploitation and Abuse
STI	Sexually Transmitted Infection
TIP	Trafficking in Persons
TOR	Terms of Reference
PMU	Traffic Safety Project Management Unit
USD	United States Dollar
VND	Vietnam Dong
WB	The World Bank
WHO	World Health Organization

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EXECUTIVE SUMMARY

1. Introduction

The Central Highland Connectivity Improvement Project (CHCIP) will be implemented by the Government of Vietnam (GOV) through a Credit from the International Development Association (IDA) of the World Bank (WB) Group with the aim to (i) contribute to the development of the Asian Highway system connecting the Vietnam coast with neighboring countries; (ii) strengthen the transport and logistics connectivity along the East-West corridor from the Central Highlands to the Central Coastal Provinces; (iii) improve road safety corridor on National Highway No. 19 (NH19) by ensuring a minimum 3-star rating in accordance with the International Road Assessment Programme (iRAP) including Vietnam's Traffic Safety Strategy requirements and (iv) improve connectivity along NH19 to reduce travel time and deliver a design that will respond to the impending challenges associated with climate change.

NH19 is a 243 km long 7-12m wide corridor running from Quy Nhon Port in Quy Nhon City of Binh Dinh province to Le Thanh border gate of Cambodia in Gia Lai province. Out of the 243 km in length of NH19, a total of 143.84km is being considered for improvement under the CHCIP which is subdivided into eight (8) Contract Packages, however, civil works will be executed based on Priority. The Priority Section covering two (2) contract packages with a total length of 38.84 km lies in Gia Lai Province while Non- Priority Section covering six (6) contract packages with a total length of 105 km are situated in the provinces of Gia Lai and Binh Dinh. The subprojects are described in Table 1 below.

Table 1 Priority section and Non-priority section along NH19

No.	Road Section/Bypass	Length (km)	Bridges	Province
PK CW1	Km 50+000 – Km 67+000	17.00	2 Bridges for Replacement	Binh Dinh
PK CW 2	Km 0+000 - Km13+700 (An Khe Bypass)	13.70	6 new bridges (342m)	Gia Lai
PK CW 3	**Km 67+000 – Km 70+740**	**3.74**	**4 Bridges for Replacement**	Gia Lai
	Km 83+600 – Km 90+000	**6.40**		
PK CW 4A	**Km 131+300 – Km160+000**	**28.70**	**2 Bridges for Replacement**	Gia Lai
PK CW 4B	Km 155+000–Km160+000 (Pleiku Bypass)	13.30	2 new bridges (147m)	Gia Lai
PK CW 5	Km 180+000 – Km 200+000	20.00		Gia Lai
PK CW 6	Km 200+000 – Km 222+000	22.00		Gia Lai
PK CW 7	Km 222+000 – Km 241+000	19.00		Gia Lai
TOTAL LENGTH		**143.84**		

Note: PK CW 3 and PK CW 4A are PRIORITY SECTIONS

The preparation of this Updated ESIA and ESMP is in response to the environmental and social safeguards requirements of World Bank (WB) along with the relevant safeguards policies and

guidelines of GOV as the project was approved before 2018, the WB Environmental and Social Framework 2017 (ESF) does not apply.[1] This document is prepared for the Client, the Project Management Unit 2 (PMU2) under the Ministry of Transport (MOT).

GOV Decree 40/NĐ-CP dated 13 May 2019 prescribes preparation of a new ESIA in the event that construction has not commenced within 24 months of prior approval by MONRE. In the case of CHCIP, as detailed design has been ongoing, the approved ESIA is instead being updated.

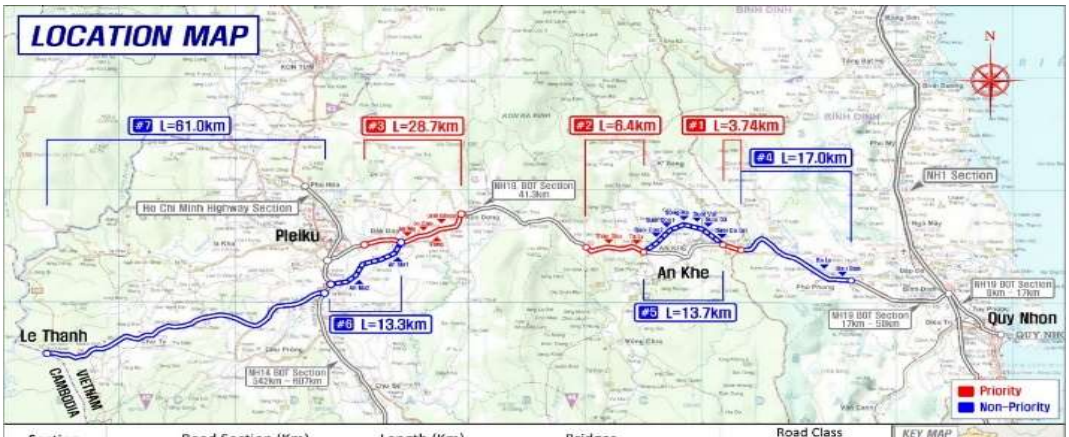
2. Project Description

Physical improvement of the 143.84 km Project within the existing NH19 includes: (i) resurfacing of approximately 16 km of existing road; (ii) widening of around 114 km of road with cross section from 7m to 10-11 m and a 5 km section will be widened into 16 m. Road widening will be done together with the installation of roadside drains. Eight (8) existing weak bridges with length from 9 to 33 m and width at 9 m will be rebuilt at the same locations along NH19. The section on the An Khe pass from km56 to Km67 will be improved with increase curve radius and slope protection and the new construction of 13.7 km An Khe bypass and 13.2 km of Pleiku bypass.

Figure 1 CHCIP Location Map

It is estimated that construction will take place in 24 months and approximately 510 workers will be mobilized in the Project for civil works. The workforce includes the provision of site engineers, technicians, surveyors, heavy equipment operators and assistants, mechanics, general laborers, and security. Out of the estimated 510 workers, 30% will be sourced from local people or villagers, especially for semi-skilled and unskilled laborers. As the work progresses, additional workers are needed, especially at the peak of construction when the workforce will increase to approximately 550.

[1] With exceptions related to application of OP/BP 4.03 and additional IPF financing, the Environmental and Social Framework (ESF) applies to "all IPF operations with a Concept Decision, or equivalent, on or after October 1, 2018. CHCIP was approved 22 June 2017. World Bank, Environmental and Social Directive for Investment Project Financing, 28 January 2020.



Section		Road Section (Km)	Length (Km)	Bridges	Road Class	
					Current	Upgraded
Priority Section	#1	STA. 67+000~STA. 70+740	3.74	-	IV	III
	#2	STA. 83+600~STA. 90+000	6.40	4 Existing Bridges to be Replacement	IV	III
	#3	STA. 131+300~STA. 160+000	28.70	2 Existing Bridges to be Replacement	IV	III
Non-Priority Section	#4	STA. 50+000~STA. 67+000	17.00	2 Existing Bridges to be Replacement	IV	III
	#5	An khe Bypass	13.70	6 New Bridges (342m)	-	III
	#6	Pleiku Bypass	13.30	2 New Bridges (147m)	-	III
	#7	STA. 180+000~STA. 241+000	61.00	-	IV	III
Total		-	143.84	-	-	-

Figure 2 CHCIP Project road alignment

3. Baseline Condition

NH 19 runs from the coastal area in the east to the central highland in the west. The ground elevation of the road changes gradually in most sections following the terrain. From Km 67 to Km76 stretching the An Khe pass have curvy sections with high mountain on one side and abyss on the other side. The existing alignment cut through several streams and rivers which are relatively short and narrow at the western part adjoining the mountains and broader in the eastern part near the delta. Moreover, NH19 passes through populated residential areas in which most houses and shops are situated 5-15 meters away from the roadside and trees of various species like acacia, eucalyptus plantations and pine forest are evident on intermittent sections.

The Project area has tropical monsoon climate in which the annual rainfall in the western part is higher than in eastern part. Consequently, the mountainous areas on the western part are prone to soil subsident and at higher risks of landslides. Of these features, corresponding solution and adaptation strategies are integrated in the detailed design for the project to turn into a climate change resilient road focusing on protecting the infrastructure from the impact of the environmental hazards resulting from climate change.

Air quality sampling was undertaken along NH19 particularly in populated/residential areas and the result remains relatively good in which all parameters are within appropriate Vietnamese standard. Likewise, as per investigation on surface water during rainy season, the total suspended solid (TSS) nearly reach the allowable limit.

The project area is not an environmentally sensitive area because the national parks and natural reserves are 20-50 km away from the Project. Typical vegetation cover is formed by agricultural crop/farmland, plantations, and limited pine forest. No known valuable or any rare/endangered plants, animals and aquatic species are recorded at streams/rivers that project road crosses.

Relative to population, the investment Project realignment goes through 7 districts comprising 28 communes/wards/township in Gia Lai province with a total population of 227,355 out of the provincial population that reached to 15,510,980 as per 2018 Statistical Yearbook. Gia Lai province is home to several ethnic minority groups encompassing the indigenous Bahnar and Jarai and migrant groups

from northern Vietnam who have settled in the project area for many years including Tay, Thai, Nung and Muong. On the other hand, in Binh Dinh province, the Project passes through Tay Son district consisting of two communes namely Tay Thuan and Tay Giang with a total population of 20,786 out of the provincial population of 1,534,767. As to education, statistics show that there are 111 educational institutions that include primary, junior high and high school in the communes covered by the project area in Gia Laia. The number of educational institutions decreases from 121 educational statistics reflected in the ESIA of 2017. While 58 educational institutions in the district covered by the project in Binh Dinh as per Statistical Yearbook 2018.

With respect to health based from Statistical Yearbook of 2018, the Project area in Gia Lai has 122 health establishments that include hospitals and medical service while Binh Dinh Project area is provided with essential conditions to take care of people's health with one hospital and 15 Medical service units. The whole project area often appears some common infectious diseases in adults, such as dengue fever, influenza, tuberculosis, and eye diseases. With the children, several diseases such as HFMD, chickenpox, eye diseases and upper respiratory diseases occur. There are 37 health care facilities along the project area including some provincial and district hospitals and all communes have existing health care centers.

As per track record, traffic accidents are prevalent along NH19. These accidents normally happen in sections from Km 140 to Km 228 wherein eleven (11) black spots are identified. Four sections, Km201-202, Km203, Km 207 and Km 213 have higher frequency of traffic accidents.

4. Potential Impacts and Mitigation Measures

With the proposed investments, the Project is expected to bring about major positive environmental impacts that include: (i) creation of casual jobs and incomes for local people during construction phase; (ii) improve Traffic Safety along NH19 in operation phase; and (iii) contribute to Socio-economic Development in the Project area throughout operation phase. However, there are also potential negative impacts and risks on the environment which are generally localized in spatial extent, temporary and short in duration and can be mitigated by best construction management practices and mitigation measures. Proper plans and engineering designs that take into consideration environmental and social aspects will avoid or minimize most of the potential adverse environmental and social impacts of construction. These potential impacts are summarized below:

Common Construction Impacts:

Community mobility and small business and shop owners on either side of the roads may be affected adversely during construction, for example, through temporary lack of access to the business from the road, and mitigation for these impacts will have to be pre-planned and commence prior to construction.

Surface water quality of water bodies in close proximity to the project construction sites may deteriorate if erosion products and silt, construction material including borrowed fill material and sand, construction waste, water used in construction activities, and domestic effluent from work camps are allowed to reach the receiving water bodies, especially during rainfalls.

Groundwater quality may be adversely affected by uncontrolled extraction of water and indiscriminate discharge of polluted water on open ground.

Air quality may deteriorate due to emissions from operating of plants such as crusher units, hot mix plants, batching plants, and mixers. Further, haulage of construction materials and equipment, and haulage and disposal of stripped material and stripping of road pavement could add to air quality deterioration.

Noise and vibration levels in and around the construction sites could increase because of operating construction machinery and during loading and unloading of material.

Soil in excavated areas may erode and may be carried over by run off; borrowed material may also be washed away or carried away by wind if not covered. Further, soil could become contaminated by accidental spillages of petroleum products and hazardous chemicals used at construction sites.

Wetlands, if identified in the area, may be adversely affected by construction waste, exhaust emissions, and increased noise levels which may impact on sensitive flora and fauna inhabiting the wetlands.

Trees along the road may have to be removed as necessary to accommodate road design and provide for road safety**.** Particular attention must be paid to any natural, production or protected forests that may be in the project area of influence. In the event of any impacts on such forests, appropriate reforestation measures must be considered and implemented.

Handling, storage, and disposal of hazardous materials and wastes may also contaminate the surrounding environment if accidentally released.

Disposal of spoil and construction waste such as stripped pavement material may also contaminate the surroundings and groundwater.

Location and operation of work camps and temporary yards may not only damage the immediate environment but also contaminate the surroundings with waste.

Traffic and Pedestrian movement may be affected adversely by road closures, storage of construction material, and spoil and dust generated by construction activities.

Land use changes may occur if quarries and borrow pits are to be employed to extract base and fill material. Rehabilitation measures must be considered.

Public health could also be adversely affected if water is allowed to pool in and around construction sites and camps, which may lead to vector-borne diseases, and by increased levels of dust and noise.

Occupational Health and Safety of construction workers may be affected adversely due to hazardous working environments where high noise, dust, unsafe movement of machinery, etc. may be present.

Safety Risks. There are safety risks related to some unexploded objects (UXO) that might left at the Project sites during the war. To manage this risk, the Project include a budget at around 6.6 billion VND (or approximately 300,000 USD equivalent) for mine clearance which will be carried out prior to commencement of civil works.

Construction Phase

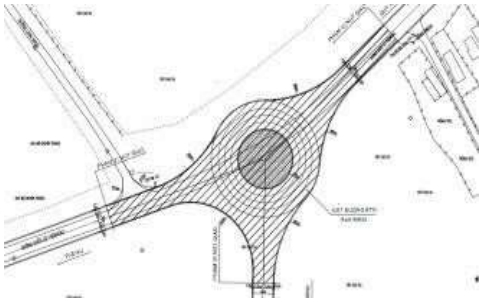
Site-specific impacts and risks: during construction phase and corresponding mitigation measures have been identified. For example, bentonite generated at bridge construction sites will be collected and disposed of at approved disposal sites in order to minimise the potential impacts on river water quality and related aquatic living organisms, provision of alternative access to communities living along the two new bypasses affected with land use fragmentation effects, use pre- casted boxed drains at sections passing schools or other public buildings in order to minimise construction period. Approximately 50 billion VND (or 2 million USD) have been budgeted for repair, rebuild and/or relocation of infrastructures affected by construction such as existing local roads and bridges, canals, and power poles.

Operation Phase

The key potential impacts and risks during **operation phase** are the increased traffic safety risks for communities living along the new bypasses, particularly at the four junctions with the existing NH19. The two new bypasses will also permanently separate the existing land use along the route into two parts, as the designed road elevation at some sections would be up to 4-6 m lower or 5-7m higher than the existing ground level. Such elevated or lower ground due to road construction would disrupt accessibility of communities, although mostly sparsely distributed, from one side to

the other side of the bypasses, and alternate existing local drainage patterns. There will also be land slide and soil subsident risks at slopes created along the two new bypasses. These issues have been considered at feasibility stage, and mitigation measures such as underpass or access roads (with traffic safety control measures and drainage included) will be designed and built to maintain accessibility for local communities. Engineering design also includes slop stabilization with embankments or bio-engineering frames to prevent land slide risks at risky locations during operation phase of the road.

Beginning point- Pleiku bypass (Option 2) Bypass



Ending point- An Khe

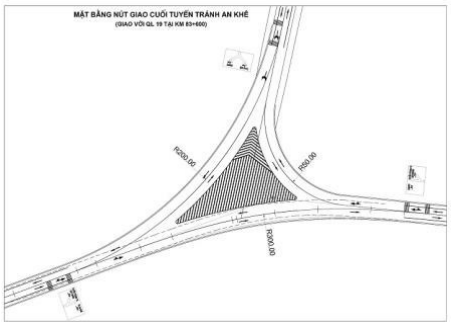


Figure 3 Design of Intersections with Measures to Ensure Traffic Safety

Access to vehicular transport, including public transport, should assist project-affected communities to have better access to social infrastructure such as hospitals, schools, and markets for buying and selling produce, and other services. This will enhance the quality of life and result in appreciated land values. Adverse impacts, such as road accidents, increased noise levels, and air quality deterioration may occur. Potential adverse impacts during the operation phase of a project are summarized below.

Air quality could be affected by marginal increases in the levels of air pollutants as more vehicles use the roads after rehabilitation; however, this may be offset by lower emissions from newer vehicles operating at more efficient speeds.

Noise levels will increase as more vehicles use the road at higher speeds.

Surface water could be adversely impacted by increases in vehicle traffic along the road. Further, vehicle accidents could result in a major spill of fluids or chemicals which could contaminate nearby water bodies.

Road accidents may increase due to the higher number of vehicles using the roads at increased speeds. If control measures are not adopted, this could become a hazard to pedestrians and non-motorized traffic. Farm machinery may also add to the increase in traffic accidents. Further, a higher number of vehicles traveling at increased speeds may pose a threat to wildlife and domesticated animals on the road. Regulations and enforcement measures for controlling speeds may need to be developed, and possibly reflected in national-level directives.

SOCIAL IMPACTS

Social Impacts are wide, diverse, and often overly complex, are seen in all phases, but are predominant during preconstruction and construction. During the construction phase social impacts may also result from construction workers eventually developing conflicts with the local communities, spread of vector borne and communicable diseases, including the rise of HIV/AIDS and STIs, trafficking of persons, including youth and women, and disruption of incomes and services, and shifting of utilities.

One of the most noticeable impacts in any road construction activity is the likelihood of physical and economic displacement as a consequence of land acquisition and resettlement, hence the importance

accorded to that in all multilateral and bilateral guidelines – and mandatory requirements set out as a part of their economic and social policies – as well as national laws and regulations.

Land Acquisition. The Project would acquire permanently approximately 200 ha of land in which 5.7 ha is residential land and 193 ha of agricultural land and the balance is public land. 180 households in Binh Din province and 915 households in Gia Lai province would be affected by land acquisition in which 91 households will have to be relocated. Resettlement Plans have been prepared for Binh Dinh and Gia Lai provinces. A budget at 305 billion VND (approximately14 millions USD) have been estimated to pay for compensations and support to the affected households. A Gender Action Plan/Gender Equality and Social Integration Plan identifies issues specific to the condition of women and strategies for their empowerment, and an Ethnic Minorities Development Plan identifies issues and mitigative measures specific to project-affected minorities.

The project social impacts and mitigation measures will be updated through Detailed Measurement Survey (DMS) along with the conduct of Socio-economic Survey to determine the actual affected assets and number of affected persons that are eligible for compensation and other entitlements after the approval of the detailed design. The DMS will be carried out within the demarcated project boundary limits by a Consultant/Contractor to be engaged by PMU2 with the assistance of the Land Fund Development Commune and District Site Clearance and Compensation Committee (DSCC). Likewise, Replacement Cost Survey will be undertaken by an Independent Appraiser to update the budgetary requirements in the implementation of the RAP.

5. Environmental and Social Management Plan

The main purpose of formulating an ESMP is to recommend a set of environmental and social safeguard measures to address the adverse environmental impacts of the Project. The following approach was used in determining the mitigation actions for the three phases of the Project. The proposed mitigation measures should be: (i) **Pragmatic** – measures should be readily implementable, effective, and practicable; (ii) **Efficient** – measures should effectively achieve the objectives of environmental management within the limits of available information, time, and resources; and (iii) **Adaptive** – measures should be flexible in order that they can be adjusted to the realities, issues, and circumstances of the Project without compromising the ultimate objectives. This approach has been adopted for CHCIP through the 2017 ESIA updated in 2020 that includes the overall ESMP for the Project.

Beyond, key stakeholders with corresponding responsibilities have been identified and summarized in Table 2 Environmental and Social Roles and Responsibilities below.

Table 2 Environmental and Social Roles and Responsibilities

Stakeholders	Responsibility
Ministry of Transport (MOT)	Overall responsible for environmental and social safeguard implementation and compliance monitoring Ensure that adequate resources are allocated for safeguard implementation
Project Management Unit No.2 (PMU2)	Responsible for monitoring and supervision to ensure that the Project comply with the World Bank Safeguard Policies and Vietnamese legislations: - Ensure that the mitigation measures proposed in the ESIA are adequately incorporated into relevant project documents such as engineering design, cost estimations, bidding, and contractual documents - Communicate and coordinate with relevant authorities at central and local levels, with independent monitoring consultants to facilitate public consultation, implementation of mitigation measures and voluntary monitoring - Coordinate with the Construction supervisors to carry out due diligence review of additional sites such as borrow pits and quarries as and when required - Monitor and report on the implementation of RAPs, ESIA/ESMP and EMDPs
Design consultant	- Incorporate mitigation measures into engineering design, cost estimates, bidding documents and construction contract.
Construction Supervision Consultant (Engineer)	- Provide training for contractor's workers on environment, occupational safety, HIV/AIDS training; Provide training on traffic safety for the communities along the two bypasses and around the new junctions between the bypasses and the existing NH19 - Review relevant project documents including ESIA, ESMP, engineering design to ensure that the mitigation measures are properly incorporated; Review and recommend for approval of Site- specific ESMP - Arrange for environmental quality monitoring and report preparation for submission to relevant government authorities - Monitor and supervise the Contractors to ensure compliance with ESIA/ESMP - Direct the Contractors to carry out corrective measures when excessive pollution or any non-compliant is detected - Carry out due diligence review of additional sites such as borrow pits and quarries as and when required
Independent Monitoring Consultant	- Provide training to relevant project stakeholders, particularly PMU2 staff and Construction supervision engineers on project environmental management system - Carry out compliance monitoring and prepare reports.
Contractors	- Prepare site specific Contractor's ESMP (CESMP). - Implement mitigation measures in accordance with contract terms and conditions.
Affected Communities	- Carry out voluntary environmental monitoring according to Decree 19/2015/ND-CP- Cooperate with and Ward/Commune PC in all activities related to land acquisition, compensation, support, and resettlement.
Provincial People's Committee (PPC)	- Ensure that compensation resettlement and livelihoods restoration of affected households is implemented and monitored in accordance with RAP.

Stakeholders	Responsibility
Provincial Project Management Unit (PPMU)	- Ensure the required budget for RAP implementation is timely and sufficiently allocated for planned compensation payment/resettlement – as described in the RAP. - Prepare quarterly progress reports and submit to the WB. - Conduct training and work closely with DPCs and District Board for Compensation and Land Acquisition (DBCLA) in updating RAPs and submit to the Bank for review.
City/District People's Committee (C/DPC)	- Prepare annual land use plan and submit to authorities for review and approval of changed land use plan. - Settle complaints related to land acquisition, compensation, support and resettlement in the district within its jurisdiction. - Approve compensation support and resettlement assessment to be carried out by the City/District BCLA
City/District Compensation& Land Acquisition Board	- Organise compensation payment and provision of assistance to affected people.
Ward/Commune PC	- Cooperate with C/DBCLA in arranging compensation payment, resettlement, and livelihood restoration implementation.

The ESMP also comprises an environmental quality monitoring program, project compliance framework and description of the Project Grievance Redress Mechanism (GRM). The estimated cost for ESMP implementation is summarized in Table 3 below.

Table 3 Estimated costs for ESMP Implementation

No.	Items		Quantity	Unit price (VNĐ)	Total amount (VNĐ)
1	Compensation and resettlement for affected households				362,000,000,000
2	UXO Clearance				6,567,032,960
3	Costs for repair/upgrading of existing local roads, bridges and construction of access roads to construction sites				50,555,392,712
4	Mitigation measures implementation	As a part of construction contracts values			
5	Environmental compliance monitoring	As a part of construction supervision contract value			
6	Environmental quality monitoring				985,525,256
		(as part of construction supervision contract)			
7	Training on HIV /Aids for the workers		15	20,000,000	300,000,000
		(as part of construction supervision contract)			
8	Training on traffic safety for communities along the bypasses	L			132,000,000
		(as part of construction supervision contract)			
	Independent monitoring, including:				775,000,000
	Environmental supervision		5	60,000,000	300,000,000
	Social supervision		5	60,000,000	275,000,000
	Kick-off workshop	Lu	1	200,000,000	200,000,000

1. INTRODUCTION

1.1 Project Origin

The National Highway 19 (NH19) is a 243 km long road with 7 to 12 m wide. It runs through the provinces of Binh Dinh and Gia Lai. Binh Dinh province covers 67 km long while Gia Lai covers 176km long. This national highway starts at Quy Nhon Seaport and ends at Le Thanh Border Gate in Giai Lai province. NH 19 serves as important linkage to the provinces of Central Highlands to Quy Nhon Port in Quy Nhon City of Binh Dinh Province.

The Masterplan for Transport Development of the Central Key Economic Region 2020 towards 2030 and the revised Masterplan were approved by the Prime Minister with decisions No. 07/2011/QĐ-TTg dated January 25, 2011 and No. 2054/QĐ-TTg dated November 25, 2015. These masterplans identified the Quy Nhon-Central Highland transportation corridor as one of the five key transport routes of the region which connects Quy Nhon Seaport to the Central Highland provinces and the neighboring countries of Laos, Cambodia, and the North East of Thailand. The Quy Nhon-Central Highland corridor is planned to be aligned in the existing National Highway 19 (NH19).

Over the past years, approximately 101km out of the total 243km of NH19 has been upgraded and maintained but not synchronize. Noticeably, two road sections (Km17+027 - Km50 and Km90 - Km131+300) passing certain towns and townships have been invested under BOT scheme project with 11-12 m wide. Despite the investment, there are still various narrow sections at a width from 6 to 7 m and road surface are degraded thus affecting road safety and not meeting the economic development needs of Binh Dinh and Gia Lai provinces. It is on this account that upgrading of NH19 according to the masterplan is essential.

1.2 Technical and Legal Basis

1.2.1 Vietnamese Legal Documents

- The Constitution 2013 of Viet Nam;
- Vietnam Law on Environmental Protection No. 55/2014/QH13 dated 23/6/2014; The Environmental Protection Law (No. 55/2014 / QH13) dated June 23, 2014 and the Decree No. 18/2015 / ND-CP dated February 14, 2015 on environmental protection planning, strategic environmental assessment, environmental impact assessment and environmental protection plan are the important legal frameworks for environmental management in Vietnam. The Law on Environmental Protection (LEP) provides regulations on environmental protection activities, the measures, and resources to be used for environmental protection purposes, the rights, duties and responsibilities of agencies, organizations, households, and individuals in environmental protection. LEP is applicable to the state management agencies, public agencies, organizations, households, and individuals within the territory of the Republic of socialist Vietnam, including the mainland and islands, sea, and airspace. LEP also provides provisions on strategic environmental assessment, environmental impact assessment, and environmental protection commitments.
- In addition, the Law also provides regulations for consultation, appraisal and approval of Environmental Protection Plan (Article 11, Chapter II) as well as a list of the entities that are subjected to prepare strategic environmental assessment in Appendix I and II of the Decree No. 18/2015/ND-CP dated February 14, 2015 by the Government and Decree 40/2019/ND-CP dated 13 May 2019 on Amending and supplementing several articles of regulations of Vietnam law in field of environment.
    - The Law on Safety, Labor Sanitation No. 84/2015/QH13 dated June 25, 2015
    - The Land Law No. 45/2013/QH13 dated November 29, 2013

- The Law on Culture Heritage No. 10/VBHN-VPQH dated on 23/7/2013
- The Law on Water Resources No. 17/2012/QH13 dated on 21/6/2012
- The Law on Biodiversity No. 20/2008/QH12 dated on 13/11/2008
- The Law on Road Transport No. 23/2008/QH12 dated 13/11/2008
- The Law on Complaints 02/2011/QH13 dated 11 November 2011
- The Law on Denouncement 03/2011/QH13 dated 11 November 2011
- Law on Forestry No. 16/2017/QH14 dated 15 November 2017
- Decree No.40/2019/NĐ-CP dated 13 May 2019 on Amending and supplementing several articles of regulations of Vietnam law in field of environment
- Decree 18/2015/NĐ-CP dated 14/02/2015 provides regulations on environmental protection, strategic environment assessment, environmental impact assessment and environmental protection commitments
- Article 13 of the Decree (No. 18/2015/ND-CP) explains the requirement of the pertaining ESIA agencies. Clause 1: the project owner or the advisory organization conducting ESIA must meet all requirements – (a) there are staff members in charge of ESIA meeting requirements prescribed in Clause 2 of this Article; (b) there is specialist staff members related to the project obtaining at least Bachelor's degrees; and (c) there are laboratories, inspection and calibration devices eligible for performing measurement, sampling, processing and analysis of environmental samples serving the ESIA of the project; if there is not any laboratory with decent equipment for inspection and calibration, it is required to have a contract with a unit capable of carrying out inspection and calibration. Clause 2: the staff members in charge of ESIA must obtain at least Bachelor „s degrees and Certificate in ESIA consultancy and Clause 3: The Ministry of Natural Resources and Environment shall manage the training and issuance of Certificates in consultancy of ESIA.
- Decree No. 19/2015/NĐ-CP dated 14 February 2015 of the Government detailing the implementation of several articles of the law on environmental protection
- Decree 64/2016/NĐ-CP dated 01/7/2016 of the Government amends and provides additional provisions to the Decree No. 11/2010/NĐ-CP dated 24/02/2010 of the Government on road transport structures
- Decree No 39/2016/NĐ-CP dated 15/5/2016 of the Government provides detailed implementation guidelines to some articles of the Law on Safety, Labor Sanitation
- Decree No. 44/2016 / ND-CP dated 05/15/2016 provides detailed implementation guidelines to some articles of the Law on Safety, Labor Sanitation on technical labor testing, safety training, occupational health and labor environmental monitoring
- Decree No. 38/2015/NĐ-CP dated 24/4/2015 of the government on management of waste and discarded materials
- Decree No 43/2014/NĐ-CP dated 15/5/2014 of the Government provides detailed implementation guidelines to some articles of the Land Law
- Decree No 47/2014/NĐ-CP dated 15/5/2014 of the Government on compensation, support and resettlement due to land acquisition by the State
- Decree No. 201/2013/NĐ-CP dated 27/11/2013 of the Government detailing some articles of Law on Water Resources
- Decree No. 05/2011/NĐ-CP dated 14/1/2011 on Ethnic Minority Work

- Decree No. 98/2010/NĐ-CP dated 21/9/2010 of the Government detailing some articles of the revised Law on Culture Heritage and providing some additional articles of the Law
- Decree No. 65/2010/NĐ-CP dated 11/6/2010 of the Government provides detailed implementation guidelines for some articles of the Law on Biodiversity
- Decree No. 10/2010/NĐ-CP dated 24/2/2010 of the Government promulgates on management and protection of road transport structures
- Decree No. 96/2009/NĐ-CP dated 30/10/2009 of the Government on the handling of buried or sunk assets found in the mainland, islands, seas of Vietnam
- Decree No.44/2014/ND-CP dated 15 May 2014, provides the methodology for land pricing; adjustment to land price brackets, land price lists; specific land pricing and land price consultancy activities
- Decree No. 16/2016/ND-CP dated 16 March 2016, on management and use of official development assistance (ODA) and concessional loans of donors
- Decree No. 01/2017/ND-CP dated 6/1/2017 amending and supplementing a number of decrees detailing the implementation of Land Law
- Decree No. 75/2012/ND-CP of the Government dated 3 Oct 2012, specifies some of articles of the Complaint Law
- Decree No. 76/2012/ND-CP of the Government dated 3 Oct 2012, specifies some articles of the Denouncement Law
- Circular 23/2017/TT0-BNNPTNT dated 15 November 2017. Regulates replacement afforestation upon conversion of forest use purpose to other purposes
- Circular 27/2015/TT-BTNMT dated 29 May 2015 of Ministry of Natural Resources and Environment detailing some articles of the Decree No. 18/2015/NĐ-CP dated 14/02/2015 on strategic environmental impact assessment, environmental impact assessment and environmental protection commitments
- Circular No. 70/2015/TT-BGTVT dated 09/11/2015 of the Ministry of Transport on technical safety testing and environmental protection for the road transportation vehicles
- Circular No. 36/2015/TT-BTNMT dated 30/6/2015 of the Ministry of Natural Resources and Environment on hazardous waste management
- Circular No. 32/2015/TT-BGTVT dated 24/7/2015 of the Ministry of Transport on environmental protection in transport infrastructure development
- Circular No. 05/2014 / TT-MOLISA dated 06/03/2014 of the Ministry of Labor - Invalids and Social Affairs promulgating the list of machinery, equipment and supplies that are subjected to strict requirements on labor safety
- Circular No. 04/2014/TT-BLĐTBXH dated 12/02/2014 of the Ministry of Labor - Invalids and Social Affairs providing guidelines on labor protection equipment policies
- Circular No. 27/2013/TT-BLĐTBXH dated 18/10/2013 2014 of the Ministry of Labor - Invalids and Social Affairs promulgating on labor safety training, labor sanitation
- Circular No. 10/2013/TT-BLĐTBXH dated 10/6/2013 2014 of the Ministry of Labor - Invalids and Social Affairs issuing list of jobs and workplaces that prohibit minors working
- Circular No. 28/2011/TT-BTNMT dated 01/8/2011 of Ministry of Natural Resources and Environment on regulating technical procedures on environmental monitoring of ambient air and noise
- Circular No. 29/2011/TT-BTNMT dated 01/8/2011 of Ministry of Natural Resources and

- Environment regulating the technical procedures on inland surface water monitoring
- Circular No. 30/2011/TT-BTNMT dated 01/8/2011 of Ministry of Natural Resources and Environment regulating the technical procedure on groundwater monitoring
- Circular No 33/2011/TT-BTNMT dated 01/08/2011 promulgating technical procedure for soil environment monitoring
- Circular No. 22/2010/TT-BXD dated 03/12/2010 of Ministry of construction providing labor safety in construction
- Circular No. 37/2014/TT-BTNMT dated 30 June 2014, regulating compensation, assistance and resettlement when the State acquires land
- Circular No. 30/2014/TT-BTNMT dated 2 June 2014 regulations on allocation of land records, lease and transfer of land use, land acquisition
- Decision No: 419/QD -TTg dated 5 April 2017. Decision of the National Action Programme on reduction of greenhouse gas emissions through efforts to reduce deforestation and forest degradation, sustainable management of forest resources, conservation, and enhancement of forest carbon stocks
- Decision No 1023/QD-TTg dated 7 June 2016 on approving the Program on Preventing and Reducing Child Labour in the period 2016 – 2020
- Decision No.63/2015/QĐ-TTg dated 10 December 2015, on the assistance policies for employment and vocational training to labors (households) whose land are acquired by the State
- Decision No. 1956/2009/QD-TTg, dated 17 November 2009, by the Prime Minister approving the Master Plan on vocational training for rural laborer by 2020
- Decision No: 184/2006/QD-TTg dated 10 August 10 2006, Decision Approving The National Plan On Implementation Of The Stockholm Convention On Persistent Organic Pollutants
- Others relevant legal documents issued by the People's Committees of Binh Dinh and Gia Lai which are currently active

Technical standards of relevance:

- QCVN 05:2013/BTNMT–National Technical Regulation on Ambient Air Quality
- QCVN 06:2009/BTNMT– National Technical Regulation on Hazardous Substances in Ambient Air
- QCVN 26:2010/BTNMT - National Technical Regulation on Noise
- QCVN 27:2010/BTNMT – National Technical Regulation on Vibration
- QCVN 08-MT:2015/BTNMT– National Technical Regulation on Surface Water Quality
- QCVN 09-MT 2015/BTNMT– National Technical Regulation on Ground water Quality
- QCVN 14:2008/BTNMT – National Technical Regulation on Domestic Wastewater
- QCVN 40:2011/BTNMT – National Technical Regulation on Industrial Wastewater
- QCVN 03-MT:2015/BTNTM - National Technical Regulations on the Allowable Limits of Heavy Metals in the Soils
- QCVN 07:2009/BTNMT – National Technical Regulations on the Allowable Limits of Hazardous Waste

Legal document:

- The Decision No. 822/QĐ-BGTVT dated 18/3/2016 by the Ministry of Transport allows the Project Management Unit for Traffic Safety to prepare an investment proposal for the Central Highland Connectivity Improvement Project, financed by the World Bank.

1.2.2 World Bank's Safeguards Policies and Guidelines

The Project has been classified as Environmental Category B due to its moderate, site-specific, and reversible potential impacts and risks that can be mitigated with readily known measures. The following World Bank Safeguard Policies have been triggered for the project: (a) Environmental Assessment (OP 4.01); (b) Natural Habitats (OP/BP 4.04); (d) Physical Cultural Resources (OP/BP 4.11); (e) Involuntary Resettlement (OP/BP 4.12); (f) Indigenous Peoples (OP/BP 4.10). A Social and Environmental Management Plan (ESMP) has been prepared in accordance with OP 4.01. In addition, the Bank's requirements on public consultation and information disclosure will also require to be followed.

Environmental Assessment (OP/BP 4.01)[2]: Environmental Assessment (EA) is an umbrella policy for the Bank's safeguard policies. The overarching objective is to ensure that Bank-financed subprojects are environmentally sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental impacts. The EA process is intended to identify, avoid, and mitigate potential impacts of Bank operations. EA considers the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources); and transboundary and global environmental aspects. EA considers natural and social aspects in an integrated way.

In accordance with OP 4.01, draft ESIA that includes ESMP for the Project was prepared in 2017 as part of the Feasibility Studies (FS)/Preparatory Phase in consultation with the local authorities, community and potential project affected persons at district and commune level.

The ESIA/ESMP is updated as part of the DDD in consideration to the significant changes on scope of work, potential impact to the society and environment and the proposed additional mitigation measures as well as adjustment of the ESMP based on the result of the stakeholder engagement and public consultations with the communities conducted in different locations in May and June 2020.

Natural Habitats (OP/BP 4.04): This Policy is intended to prohibit the Bank-financed subprojects that cause significant degradation or conversion of critical natural habitats. The Bank does not support subprojects involving the significant conversion of natural habitats unless there are no feasible alternatives for the subproject and its siting, and comprehensive analysis demonstrates that overall benefits from the subproject substantially outweigh the environmental costs. If the environmental assessment indicates that the project would significantly convert or degrade natural habitats, the project includes appropriate mitigation measures.

Indigenous Peoples policy (OP/BP 4.10)[3]: The Indigenous Peoples policy is designed to ensure that the development process fully respects the dignity, human rights, economies and cultures of Indigenous Peoples or Ethnic Minorities who may be present in the project area. The policy requires projects to identify impacts on indigenous peoples/ethnic minorities and develop a plan to address the impacts, both positive and adverse. Projects should be designed with benefits that reflect the cultural

[2] *The complete description of the OP/BP 4.01 is available at http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTSAFEPOL/0,,contentMDK:20543912~menuPK:1286357~pagePK:64168445~ piPK:64168309~theSitePK:584435, 00.html*

[3] *The complete description of the OP/BP 4.10 is available at http://web.worldbank.org/WBSITE/EXTERNAL/ PROJECTS/ EXTPOLICIES/ EXTSAFEPOL/0,,contentMDK:20543990~menuPK:1286666~page PK:64168445~piPK: 64168309~theSitePK:584435,00.html*

preferences of indigenous peoples/ethnic minorities. The borrower should carry out free, prior, and informed consultation and obtain broad community support for the project.

An Ethnic Minority Development Plan (EMDP) for Gia Lai has been prepared since the province is a home to several ethnic minority groups encompassing the indigenous Bahnar and Jarai and migrant groups from northern Vietnam who have settled in the project area for many years including Tay, Thai, Nung and Muong. Bahnar and Jarai group accounted from 30 to 70% of commune population. The Kinh group mostly settle in the vicinity of NH19. Out of the total provincial population of 15,510,980, 45.03% belongs to the 34-ethnic minority (EM) groups. Most of the EMs are Jarai with a population of 424,631 (30% of total population of the province) and Bahnar with a total population of 166,732 (11.78% of total population of the province) and the rest of ethnic minorities has a total population of 40,993 (3.08 % total population of the province).

Physical Cultural Resources (PCR, OP/BP 4.11)[4]: The objective of this policy is to assist in preserving physical cultural resources (PCR) and avoiding their destruction or damage. PCR includes archaeological, paleontological, architecturally significant, and religious sites including graveyards, burial sites, and sites of unique natural and landscape values. The road passes near cemeteries, including that of the Gia Lai ethnic minority people. In addition, the excavation of soils for the Project may reveal archaeological objects (chance finds) during construction. PCR impact assessment and the responding mitigation measures will be integrated in the environmental and social management plan.

Chance Finds Procedures (CFP)

Definition. Chance find procedure (CFP) or cultural heritage finding procedure outlines the follow up for finding object with archaeological, historical, cultural, karsts, geological features, and remaining materials encountered unexpectedly during project construction or operation. CFP is a project-specific procedure which will be followed if previously unknown cultural heritage or natural features is encountered during project activities. Such procedure generally includes a requirement to notify relevant authorities of found objects or sites by cultural heritage experts; to fence off the area of finds or sites to avoid further disturbance; to conduct an assessment of found objects or sites by cultural heritage experts; to identify and implement actions consistent with the requirements of the World Bank and GOV Law; and to train project personnel and project workers on chance find procedures. Based on the project's environmental and social risk and impact inventory, potential physical cultural resources which will be at risks of being impacted include temples and other geological features which warrant further protection and conservation.

Objectives. To protect physical cultural resources from the adverse impacts of project activities and support its preservation.

Procedure. If the proposed activity discovers archeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction, shall:

a. Site agents will be instructed to keep on an eye on relics in excavations and do a consultation to the community, especially customary or village leader on the site;

b. Should any potential items be located, the PMU2 will immediately be contacted, and work will be temporarily stopped in that area;

c. Delineate and fence the discovered site or area;

d. Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the local Institute of Archaeology if available to take over. PMU2 with the assistance of the CSC will determine whether there is potential significance and contact MOT to

[4] *OP/BP 4.11 is accessible at http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/ EXTSAFEPOL/0, contentMDK:20543961~menuPK:1286639~pagePK:64168445~piPK:64168309~theSitePK:5 84435, 00.html*

pass the information to the relevant department who will be invited to inspect the site and work will be stopped to allow time for inspection.

e. Forbid any take of the objects by the workers or other parties;

f. Notify all subproject personnel of the finding and take the preliminary precaution of protection;

g. Record the chance find objects and the preliminary actions;

h. Responsible local authorities would oversee protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by relevant authorities. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, natural and conservation, scientific or research, social and economic values;

i. Decisions on how to handle the finding shall be taken by the responsible authorities. This could include changes in the subproject layout (such as when finding an irremovable remain of cultural or archeological importance) conservation, preservation, restoration and salvage;

j. Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities;

k. The mitigation measures could include the change of proposed project design/layout, protection, conservation, restoration, and/or preservation of the sites and/or objects;

l. Construction work at the site could resume only after permission is given from the responsible local authorities concerning safeguard of the heritage; and

m. The subproject proponent responsible to cooperate with the relevant local authorities to monitor all construction activities and ensure that the adequate preservation actions already taken and hence the heritage sites protected.

Involuntary Resettlement (OP/BP 4.12)[5]: OP 4.12 seeks to prevent severe long-term hardship, impoverishment, and environmental damage to the affected peoples during involuntary resettlement. It applies whether affected persons must move to another location. The Bank describes all these processes and outcomes as "involuntary resettlement," or simply resettlement, even when people are not forced to move. Resettlement is involuntary when the government has the right to expropriate land or other assets and when affected people do not have the option to retain the livelihood situation that they have.

Resettlement Action Plan (RAP) was prepared for Binh Dinh and Gia Lai provinces in accordance with OP/BP 4.12 and the Resettlement Framework designed for the Project. The RAP sets out a compensation scheme in an Entitlement Matrix, which is applied to all losses, physical and economic due to land acquisition required for the Project. As per 2017 RAP of Gia Lai, an estimated 915 households will potentially be affected, in which 825 are landowners and 90 are renters while Binh Dinh will potentially affect an estimated 180 households, out of this total, 154 are landowners and the 26 are renters.

After the approval of the detailed design, the project impacts and mitigation measures will be updated through Detailed Measurement Survey (DMS) along with the conduct of Socio-economic Survey to conclude the category and magnitude of impacts that eligible for compensation and other entitlements. Likewise, Replacement Cost Survey will be undertaken to update the resettlement budgetary requirements. The DMS will be carried out within the demarcated project boundary limits by a Consultant/Contractor to be engaged by PMU2 with the assistance of the Land Fund Development

[5] *OP/BP 4.12 is available at http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTSAFEPOL/0,,contentMDK:20543978~menuPK:1286647~pagePK:64168445~piPK:64168309~theSitePK:584435,00.html*

Commune and District Compensation and Site Clearance Committee (DSCC) along with the conduct of Replacement Cost Survey to be carried out by an Independent Appraiser.

World Bank Group Environmental, Health, and Safety Guidelines: World Bank-financed projects should also consider the World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines). The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice. The EHS Guidelines contain the performance levels and measures that are normally acceptable to the World Bank Group and are generally considered to be achievable at reasonable costs with existing technologies. The environmental assessment process may recommend alternative (higher or lower) levels or measures, which, if acceptable to the World Bank, become site-specific requirements. Projects should conform to these Guidelines. Workplace conditions related to sexual harassment are covered by Good Practice Note: Addressing Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH) in Investment Project Financing involving Major Civil Works (February 2020).

1.2.3 ESIA Review and Approval Authorities

The 2017 Draft ESIA that includes the ESMP was reviewed and approved both by WB and MONRE and disclosed to the community through Info Shop and the WB website

Decree 40/NĐ-CP dated 13 May 2019 prescribes the mandatory preparation of a new ESIA to be submitted to MONRE for re-appraisal if there are no construction activities within 24 months after approval of ESIA. However, as the CHCIP detailed design has been ongoing, this updated ESIA/ESMP reflects relevant information from the DDD and the environmental quality sampling performed during the preparation of the ESIA in 2017 to establish the baseline conditions will be retained. Supplementary environmental sampling will be conducted during the construction phase.

The Updated ESIA/ESMP will likewise be disclosed to the community in the form of public consultation and to the WB website one approved both by WB and MONRE.

1.3 Related Plans and Projects

1.3.1 Related Plans

a. Masterplan and Adjusted Masterplan for Vietnam Road Transport Development 2020 towards 2030

The Masterplan for Vietnam Road Transport Development 2020 towards 2030 was approved by the Prime Minster with Decision No. 1327/QĐ-TTg on 24 August 2009 and the Adjusted Masterplan was approved with the decision No. 356/QĐ-TTg by the Prime Minister on 25 February 2013. The Masterplan covers the complete construction and upgrading of national highways, expressways, roads along the coast and frontiers, provincial roads, urban and rural road systems. Under this Masterplan, the NH19 has been planned to be upgraded to class III with 2 vehicle lanes. The CHCIP is aligned into these masterplans.

b. Gia Lai Province's Masterplan for Transportation Network Development to 2020

This masterplan was approved at the decision no. 39/2011/QĐ-UBND by the Gia Lai's People Committee on 28/12/2011 on roadway, railway and airway planning in which the NH19 would meet the standard for class III road (delta and mountain road) that will bypass the city to reduce traffic. Hence, the proposed Pleiku Bypass and An Khe Bypass are aligned in this Masterplan.

c. Revised 2020 Master Plan of Pleiku City

The City Masterplan was approved by Gia Lai PPC at the Decision No. 104/2005/QĐ-UB dated 15/8/2005. This City masterplan includes a new section of NH19 bypassing Pleiku City to the east (Figure 3: Pleiku Bypass) in accordance with the city's landuse plan.

The Project design of the NH19 Pleiku City bypass is in accordance with the approved planning design.

Figure 4 Pleiku City Bypass

d. Masterplan of An Khe Town 2020 The An Khe Town Materplan was approved by Gia Lai PPC with Decision No. 05/2007/QĐ-UBND dated 16/01/2007. According to this Masterplan, NH19 bypassing An Khe town running through North direction as illustrated in Figure 4: An Khe Town Bypass.

Thus, An Khe Bypass was proposed under the Project in accordance with the approved masterplan of An Khe town.

Figure 5 An Khe Town Bypass

1.3.2 Related Projects

a. The Build - Operate - Transfer Project (The BOT Project) for Upgrading two sections of NH19 from Km17+027 to Km50 in Binh Dinh Province and Km108 to Km131+300 in Gia Lai Province.

The BOT Project started in 2013 and completed in 2015. This involved the upgrading of 56.27km of NH19 in which 32.97km lies in Binh Dinh Province and 23.3 km is in Gia Lai province. These two sections are in intermittent sections of the proposed CHCIP.

The starting point of CHCIP is the ending point of the first section of the BOT Project at Km 50 in Binh Dinh province. In Gia Lai Province, second section of the BOT Project is located in between the road sections to be financed by CHCIP.

b. The BOT Additional Financing to upgrade the road section from Km 90 to Km108

The additional financing project under BOT scheme covers the upgrading of 18km of NH19 and expansion of 5 bridges along the route. The EIA of this project was approved in the Decision No.3391/QĐ-BGTVT dated on 31/10/2016 by the Ministry of Transport. The construction of the project that starts at km 90 is not officially endorsed. There is no formal announcement as to the construction schedule.

1.4 ESIA Preparation and Updating

The ESIA was carried out by the Institute of Transport Science and Technology engaged by the Traffic Safety Project Management Unit (TSPMU) during the FS/preparatory phase. The ESIA team comprises of the following members:

Table 4 List of ESIA Team Members - Feasibility

No	N	Background	ESIA Involvement
Consultants			
1	Phan Thị Minh Hoa	MSc. Environmental Science	ESIA Manager, conduct field survey and write chapter 1, 3 & 4.
2	Nguyễn Thị Ngà	MSc. Economics	Secretary – provide support and participate in the write up of chapter 2 and 5.
3	Nguyễn Thị Minh Hiền	MSc. Environmental Science	Environmental Team Leader, conduct field survey and write chapter 2, 3 & 4.
4	Phạm Thị Ngọc Thúy	BSc. Environmental Science	Team leader for the social team – conduct field survey, public consultation and write opening chapter & 2,3 & 4.
5	Phạm Tiến Sỹ	MS. Environmental Science	Conduct field survey, public consultation and write 5.
6	Phạm Thị Trà	MSc. Biochem Engineering	Be responsible for environmental monitoring, sampling, analysis, and data processing. Write chapter 2.
7	Trần Văn Toản	MS. Environmental Science	Participate in field survey, public consultation, environmental sampling, and monitoring
8	Nguyễn Thị Mến	BSc Environmental Engineering	Participate in field survey, public consultation and write chapter 6.
9	Phạm Thị Trà Như	BSc. Biotechnology	Participate in field survey, public consultation environmental sampling, monitoring and analysis.
10	Đinh Trọng Khang	MS. Environmental Science	Participate in field survey, public consultation.
PMU			
1	Lê Thắng		Deputy Director – ESIA Lead
2	Nguyễn Ngọc Tân		Receive and review
3	Lê Anh Tuấn	Road, Bridge Construction	Conduct Public Consultation
4	Lê Văn Mạnh	Road, Bridge Construction	Conduct Public Consultation

Further, updating of the ESIA was carried out by the DDD Consultant, Yooshin in joint venture of Katahira & Engineers International (KEI) with the guidance and support of specialists from PMC, Aus4Transpor/AECOM Services Pty and in close coordination with PMU2.

Table 5 List of ESIA Consultant/Specialists – Detailed Design

No	Name		ESIA Involvement
Detailed Design Consultants			
1	Mr. Young Kwan Jee		Team Leader
2	Dolores M. Viloria		Social Development, Resettlement and Gender
3	Hoang The Anh		National Environmental Consultant
4	Trinh Thi Quang		National Social Consultant
5	Hoang Anh Tuan		National Gender
6	Quan Tinh		Technical Staff
7	Nguyen Khac Tuan		Technical Staff
PMC			
1	Ken Thomason		Highway Engineer
2	Albab Akanda		Environmental Specialist
3	Melissa Collins		Social Development and Gender Specialist
PMU			
1	Nguyễn Ngọc Tân		Head PID7

1.5 Methodologies

1.5.1 ESIA Methodologies

Rapid Assessment Method: The Rapid Assessment Method was issued by the World Health Organization (WHO) in 1993. The basis of this method is nature of materials, technologies, and rules of natural processes as well as experiences in rating pollution load. In Vietnam, this method has been introduced and applied in many ESIA studies, performing the relatively accurate calculation of the pollution load in the context of limited measurement and analysis instruments. In this report, the pollution load coefficients are taken under the EIA guidelines of the World Bank *(Environmental Assessment Sourcebook, Volume II, Sectoral Guidelines, Environment, World Bank, Washington D.C 8/1991)* and updates (1993, 1997, and subsequent), and *Handbook of Emission, Non- Industrial and Industrial source, Netherlands).*

Listing method: This method is used to identify impacts according to each activity. The use of this method is presented in Chapter 3.

Matrix Method: The method is used in chapter 3 of this report. The impact matrix presents the correlations between impacts of each project activity and the issues and environmental compartments. Base on the matrix, the detailed impact contents are studied to assess level of impacts to the environment during construction period.

Modeling method: The modeling methods used in chapter 3, including: Gauss and Sutton numerical modeling to project the emission dispersion of TSP, PM10, SO2, CO, NO2. Noise pollution depletion model by the US Federal Highway Association (FHWA); Noise depletion model for traffic flow during operational phase

Public Consultation: This method is applied to collect information and finalize chapter 2,3,4 and 6. The application of the method includes:

- This method is applied during the interview with local authorities, leaders, and people at the project area to collect information for the preparation of EISA of the project on social economic development. Particularly, the public consultation will introduce about project benefits and possible negative impacts on environment and their life. The feedbacks and expectations of local people and the authority about the project are summarized and integrated in the report.
- Public consultation with local communities in the project area for ESIA is conducted through stakeholder engagement, community meetings at the locality
- During Detailed Design Stage, the public consultations with local communities are conducted through focusing on localities with high potential of negative impacts such as the influence area of the proposed two bypasses and bridge reconstruction.
- Consultation is a continuing process, hence, will continue during pre-construction and construction phases

Field Survey Method: Field survey is undertaken for the ESIA to observe environmental condition of the project area, identify relevant surrounding objects to select sampling position, survey of status of water supply, drainage and power supply and to conduct geographical and topographical surveys, collecting of meteorology-hydrology information. The survey results will be used for assessment of natural conditions of the project area**.**

Expert-comparison-statistical method:

Expert method: is applied throughout the process from the outlining stage, research scoping, identifying environmental problems, surveying the natural and ecological conditions, and proposing mitigation measures and developing environmental monitoring program.

Comparison method: is used to assess the current situation and impacts based on the comparison between the measured results to the national or international acceptable limits and standards.

Statistical method: is used during data processing on natural conditions, hydro meteorological conditions, and socio-economic data of Binh Dinh and Gia Lai provinces.

Environmental Quality Sampling: is used to collect and analyze samples of wastewater, surface water, groundwater, ambient air, noise and vibration, soils, and sediments. Environmental monitoring is conducted in accordance with Vietnamese regulations to assess current environmental situation. The results are discussed in chapter 2.

Data Collection, Analysis and Processing Method: This method is used to identify and assess the natural and socioeconomic conditions in the project area through the data and information collected from various sources such as statistical yearbooks, socioeconomic reports, environmental baseline in the region and the relevant research. Making use of data in the existing reports is necessary as it provides the available data and help identify limitations.

1.5.2 Social Assessment Methods

Different methods were employed in the conduct of social assessment, screening of ethnic minorities, and estimation of magnitude of project impact prior to the RAP preparation including the EMDP for Gia Lai. The social assessment was conducted using the following techniques: household survey (socioeconomic survey), focus groups discussions, and key informant interviews. In addition, community meetings and key informant interviews were used for conducting consultation with local community.

Mixed methods. Qualitative and quantitative techniques are combined to enhance the reliability and the validity of the SES. Quantitative techniques are used for socioeconomic survey on affected

households using questionnaire to collect households' socioeconomic information whereas qualitative techniques are used in focus group discussion, key informant interview, community meetings to obtain in-depth understanding of issues that could not be well captured from structured household survey. Field observation was also conducted throughout the field work. The field work was started from 18-26 August 2016, 17-25 December 2016 for household survey exercise, focus group discussion, and key informant interview. ***Sample size and sampling***. Socioeconomic information that are used to prepare two RAPs (for Gia Lai and Binh Dinh provinces) and the EMDP for Gia Lai were collected on sampling basis. In Gia Lai, a sample of 218 households was taken (from the affected population of 915 households, accounting for 23.8%). In Binh Dinh, a sample of 137 households were collected (from the total affected households of 188). Stratified sampling was adopted to enhance the representativeness of each type of impact. Priority is given to those who are poor and/or vulnerable, particularly to the severely affected and vulnerable groups, including those who a) are affected with more than 20% of agriculture land, b) relocate their house, and c) face cumulative impact (i.e. loss of houses, physical relocation, and loss of businesses…), and those who are from ethnic minorities.

Data analysis. Quantitative data collected from the household survey were analyzed using Microsoft Excel. Qualitative data obtained from consultation sessions (public meetings, focus group discussion, informant interview, etc.,) were also analyzed, by themes. Both method and data source triangulation are employed to ensure validity and reliability/trustworthiness of the findings.

Consultation Techniques. Various methods and techniques should be used to conduct information disclosure, consultation with and participation of affected peoples, including a) community meetings, b) household survey, c) focus group discussion, leaflet delivery, field observation and key informant interview. Using various methods and techniques aims to enhance the reliability and validity of the feedback from the project different stakeholders, particularly the affected people and to ensure that (i) affected people receive fully project information; (ii) all affected people are involved in process of free, prior and informed consultation during preparation and implementation of the subproject.

Severely and vulnerably affected group are fully engaged in the process of information disclosure, public consultation, and participation. Meaningful consultation with this group should be conducted throughout the project cycle and their concerns should be integrated in the subproject design.

Consultation with Affected EM peoples. There are estimated 60 ethnic minority households - belonging to five EM groups, including Bahnar, Jarai, Nung, Thai, and Muong, that are potentially affected because of the subproject in Gia Lai province. Representatives of these groups have been invited to participate in a free, prior and informed consultation (FPICon) process during the RAP preparation to ensure they are consulted in accordance Bank's OP4.10 and their meaningful feedbacks are collected to inform the design of RAP and EMDP for Gia Lai, the technical design of project road, as well as measures to avoid/mitigate the potential adverse impact.

1.5.3 Approaches in Updating the ESIA

Second round of Stakeholder Engagement/Public Consultations with local authorities and community including the conduct of FPICon with the ethnic minorities were undertaken.

Focus Group Discussions (FGD) including need assessment for potential affected women together with representative of Women's Union was carried out by the DDD Social Safeguards and Gender Team after the Public Consultations for Priority Sections on June 1-5, 2020 and on June 18-19 for Non-Priority Sections and during the FPICon on June 16-17, 2020 to assess the specific need of women to fully restore their livelihood.

Along with field surveys and interviews with stakeholders in the project area in support to updating the ESIA, the Environmental Consultant work closely with the technical team to gather pertinent information of the detailed design.

The environmental and social safeguards requirements of WB and GOV were discussed including issues and concerns, negative and positive impacts on environmental and social during construction, likewise, gender equality and social inclusion is discussed. Details of the consultations are discussed in Chapter 7: Public Consultation and Information Disclosure.

The project social impacts and mitigation measures will be updated through Detailed Measurement Survey (DMS) along with the conduct of Socio-economic Survey to determine the actual affected assets and number of affected persons that are eligible for compensation and other entitlements after the approval of the detailed design. The DMS will be carried out within the demarcated project boundary limits by a Consultant/Contractor to be engaged by PMU2 with the assistance of the Land Fund Development Commune and District Site Clearance and Compensation Committee (DSCC). Likewise, Replacement Cost Survey will be undertaken by an Independent Appraiser to update the budgetary requirements in the implementation of the RAP.

2. PROJECT DESCRIPTION

2.1 Project Area

NH19 is a 243 km long 7-12m wide corridor running from Quy Nhon Port in Quy Nhon city of Binh Dinh province to the Le Thanh border gate with Cambodia in Gia Lai province. The proposed Central Highland Connectivity Improvement Project has been proposed with the objective to improve safe and climate-resilient road connectivity along the NH19 Central Highlands-Central Coast corridor for the road users and local population in Vietnam.

The districts/communes covering NH19 is presented in below Table 6: Communes/Wards along NH19 Sections under CHCIP and the road alignment is illustrated in Figure 5. Location Map.

Table 6 Communes/Wards along NH19 Sections under CHCIP

Road section	Province	District	Commune/Ward/District Town
Km50-Km67	Binh Đinh	Tay Sơn	Tay Giang, Tay Thuan
Km67-Km76	Gia Lai	An Khe Provincial Town	Song An and Ngo May
An Khe Bypass			Song An, Ngo Mây, An Phuoc, An Binh and Thanh An
		Đak Pơ	Cu An
Km82+200-Km90			Cu An and Tan An
Km131+300-Km152+500		Mang Yang	Kon Dong and Đak Djrăng,
		Đak Đoa	Tan Binh, K'Dang and Đak Đoa
Km155-Km160		Pleiku City	An Phu and Chư A
Pleiku Bypass		Đak Đoa	Tan Binh, K'Dang, Glar, ADơk and Ia Bang,
		Pleiku City	An Phu and ChưH' Drong
Km180-Km241			Gao
		Chu Prong	Binh Giao, Bau Can, Thang Hung
		Duc Co	Ia Nan, Chu Ty, Ia Pnon, Ia Krieng, Ia Kla, Ia Krel, Ia Dom and Ia Din

Figure 6 Location Map

2.2 Scope of Investment

The Project comprises of two main components.

Component 1: Road Improvements (estimated at US$145m) with the following main physical investments:

- Improvement of approximately 143.84 km of existing NH19. Physical investments include: (i) resurfacing approximately 16 km of existing road; (ii) widening approximately 114 km of road with cross section from 7m to 10-11 m, particularly one 5 km section will be widened to 16 m. Road widening will be done together with the installation of road side drains. Eight existing weak bridges with length from 9 to 33 m and width at 9 m will be rebuilt at the same locations on NH19. The section on the An Khe pass (km56 – Km67) will be improved with increase curve radius and slope protection.
- New construction of 26.9 km bypasses including 13.7 km of An Khe bypass and 13.2 km of Pleiku bypass. The road will be 11 m wide. Eight 12m wide new bridges with length from 33 to 99 m will be built along these two bypasses.
- It is estimated that construction will take place in 24 months and approximately 510 workers will be mobilized to work in the Project during construction phase.

Component 2: Implementation Support (estimated cost of US$9.05m):

- Preparation of detailed design documentation (DDD) for the sections of the roads, bridges and bypass to be improved, as well as the supervision of the works, and the monitoring of the safeguards aspects, all of key importance given the particular climatic environment, with its variability and extreme weather events, which makes Vietnam infrastructure highly susceptible to climate impacts.
- Road safety activities supported by technical assistance:
    - Conduct of a Road Safety Audit
    - Assessment of impacts of motorcycle lanes in Vietnam and update of the draft manual for motorcycle lane design and specifications with incorporation of international best practices
    - Strengthening of the institutional capacity for managing road safety and physical works to improve road safety measures of the road network
- Climate resilient activities supported by technical assistance that will:
    - Support the identification of suitable climate resilience measures to reduce the impact of landslides on NH19. Specifically, this sub-component will aim at strengthening the road specific detailed designs as key climate-related bottlenecks were identified along the NH19. The work under this activity will provide design recommendations that support the prioritization of climate resilience-enhancement measures (including “grey”, “green” and “soft” solutions, or a combination of them) for detailed road design at the hotspots or bottlenecks identified.
    - Review current technical standards, guidelines, and planning tools for the road sector vis a vis climate change adaptation and disaster risk management with a view to strengthening the understanding of the possible effects of global climate change on road infrastructure and network.

Brief description of existing roads and proposed investments are provided in Table 7a: Existing Road Parameters and Proposed Investments

Table 7a Existing Road Parameters and Proposed Investments

Section	Current Status	Proposed Investments
Km50 –59; L=9km,	$B_{road\ surface}$ = 7m and $B_{road\ base}$ = 10m. ground elevation at the starting point is 26m and at the ending point is 69m.	Length of investment road: 9km Widening the road to: $B_{road\ surface}$ = 11m and $B_{road\ base}$ = 12m for road sections not passing residential areas. $B_{road\ surface}$ = 13m and $B_{road\ base}$ =15m. for road sections passing residential areas at: Km51+200-Km52+100; Km53+100-Km54+700; Km56+900-Km58+100 Install vertical and horizontal drainage systems
	Two bridges along the alignment: - Bau Sen bridge at Km50+578, L= 9m, B= 9,2 m, 1 span; - Ba La bridge at Km 51+ 152; L= 87,5m, B= 9.2m, 7 spans.	Reconstruction of 2 bridges B= 12m: - Bau Sen bridge, 1 span 1x12m - Ba La bridge, 3 spans x33m
Km59 – 67; L=8km	B =7m. The route goes through An Khe Pass Area with high mountains and abysses.	Length of investment road: 9km - Widen the road to B =8m - Install drainage system. - Built new emergency exist - Cut curve to increase radius of curve road sections. - Stabilize slopes along the right side of the road.
Km67 -76; L=9km,	$B_{road\ surface}$ = 7m $B_{road\ base}$ = 10m.	Length of investment road: 3.74km (from Km67-Km70 + 740) - Road widening: $B_{road\ surface}$ = 11m $B_{road\ base}$ = 12m for sections not passing residential areas; $B_{road\ surface}$ = 13m $B_{road\ base}$ =15m for sections passing residential areas at Km74+500-Km760. - Install vertical and horizontal drainage systems
Km76 – Km82+200 L = 6.2km	This goes through An Khe town. $B_{road\ surface}$ = 7m $B_{road\ base}$ = 24m.	No investment

Section	Current Status	Proposed Investments
Km82+200 - Km90 L = 7.8 km.	$B_{road\ surface}$ = 7m, $B_{road\ base}$ = 10m.	Length of investment road: 6.4km (from Km83+600-Km90+00) - Road widening: $B_{road\ surface}$ = 11m and $B_{road\ base}$ = 12m for sections not passing residential areas. $B_{road\ surface}$ = 13m and $B_{road\ base}$ =15m for sections passing residential areas at: Km82+300-Km85, Km87+500-Km88+200 - Install and drainage
	2 bridges on this section: - Ta Ly bridge at Km83+894, L= 20m, B = 9m, 2 spans; - Thau Dau bridge at Km87 +390,L= 34.5m, B= 9m, 2 spans	Reconstruction of 2 bridges with B= 12m: - Ta Ly bridge, 1 span x24m - Thau Dau bridge, 2 spans x24m
Km131+300- Km155 L=23.7km		Length of investment road: 23.7km - Re-surfacing the sections
	$B_{road\ bed}$=10m, $B_{road\ surface}$ = 7m. Ground elevation at the starting point and at the ending point of the section is 710m and 740m, respectively.	crossing Kon Dong town (L= 2,5km) and Dak Doa town (L=2.5km), construct and install vertical and horizontal drainage; - Expand the road $B_{road\ surface}$ = 11m, $B_{road\ base}$ = 12m for the following sections passing residential area: Km136+400- Km136+800; Km138+600- Km139+100; Km139+900- Km141+500; Km145- Km145+600; Km147+500- Km148+600 - Expand Km150-Km152 $B_{road\ base}$ = 15m $B_{road\ surface}$ = 13m. The elevation of new road surface is 20-27cm higher than that of the existing road.
	3 existing bridges on the road section, including: - Linh Nham bridge at Km136+308, L = 36m, B= 9,5m, 3 spans; - Vang bridge at Km144+400, L= 12m, B= 9m, 1 span - Le Can bridge at Km149+045, L= 11m, B= 9.1m, 1 span	Construct 3 new bridges with B = 12m: - Linh Nham bridge, 2 spans of 24m long each - Vang bridge , 1 span with length of 24m - Le Can bridge, 1 span with length of 24m

Section	Current Status	Proposed Investments
Km155-Km160 L = 5km	$B_{road\ surface}$=7m, $B_{road\ base}$ = 10m Ground elevation of the starting point is 710m and of the ending point is 720m. The An My bridge at Km156+570 has L= 24m, B = 9m, 1 span.	Length of investment road: 5km Widen the road with $B_{road\ surface}$ = 16m $B_{road\ base}$= 21m install vertical and horizontal drainages. Ground elevation of new road surface is 20-27cm higher than that of the existing road. Reconstruction of An My bridge with B = 12m and 1 span of 33m long
Km180-Km241 L = 61km	$B_{road\ surface}$ = 7m B road base = 10m, The ground elevation of the starting point is 890m and of the ending point is 230m. There are 4 bridges at this section: Tan Lac (Km199+790, L = 20m, B= 9m), Thanh Binh (Km202+670, L = 33m, B= 9m) , Nuoc Pit (Km205 +500, L = 15m, B= 9m) and Ia Lang (Km214+292, L= 33m, B= 9.2m)	Length of investment road: 61km - Resurface the asphalt concrete for the section passing Chu Ty district town (L = 3.5km), - Widen the road $B_{road\ surface}$ = 11m and $B_{roadbase}$=12m install vertical and horizontal drainages. The elevation of new road surface is 20-27cm higher than that of the old road. No investments in the 4 existing bridges
An Khe bypass L = 13.7 km	Agriculture land with no road and bridge	Construct a new city bypass Broad surface = 11m, B road base = 12m Construct culverts and drainages Construct 6 new bridges, B = 12m at the following locations: Da Lat Stream, L= 33m, 1 span, at Km0+155.01; Da Stream, L= 99m, 3 spans, at Km3+569.24; Voi Stream, L= 33m, 1 span, at Km3+810; Ba River, L= 99m, 3 spans at Km6+108.44; Don Stream 1, L= 33m, 1 span at Km8+905.7; Don Stream 2, L = 33m, 1 span at Km9+260
Pleiku City Bypass L =13.3 km	Agriculture land with no road and bridge	Construct new city bypass B road surface = 11m, Broad base = 12m. Construct horizontal culverts and vertical drainages.
		Construction of 2 new bridges with B= 12m: - An My 1 Bridge, L = 33m at Km7+900. - An My 2 Bridge with L= 99m, 3 spans at Km16+500

The following figures present road sections which will be invested by the project.

Figure 7 Section 1: Km67+000-Km70+740 (L~ 3,74km)

Figure 8 Section2: Km83+600-Km90+000 (L~ 6,4km)

Figure 9 Section 3: Km131+300-Km160+000 (L~ 28.7km)

Figure 10 Section 4: Km50+000-Km67+000 (L~ 17,0km)

Figure 11 Section 5: Construction of An Khe bypass with the length of about 13.7km. Starting point: around Km70 + 740. Ending point: Km83 + 600

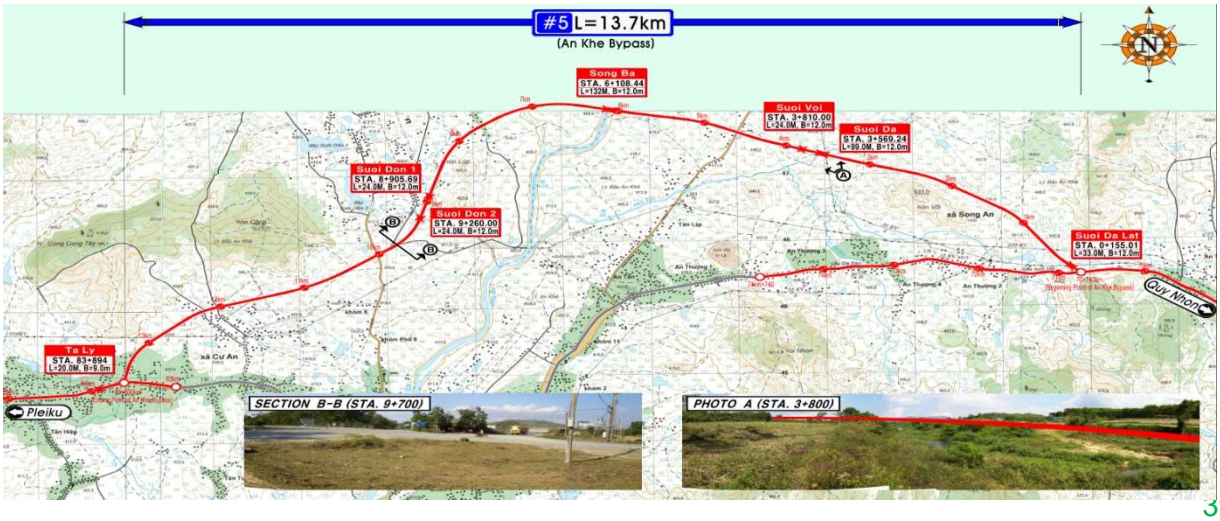


Figure 12 Section 6: Construction of Pleiku bypass with length of about 13.3 km. Starting point: around Km157 + 460. Ending point: around Km177 + 000 (coinciding with Km540 + 000-NH14)

Figure 13 Section 7: Km180+000-Km241+000 (L~ 61,0km)

The implementation of the Project is subdivided into eight (8) construction packages as per re-evaluation from the DDD but civil works are based on priority. The construction packaging is presented in Table 7b: Civil Works Packages.

Table 7b Boundaries for Civil Works Packages

Name of Packages	Station		Length	Administrative boundary		Estimated Cost million USD
	From	To	Km	From	To	
Binh Dinh Province						
PK CW1 Bau Sen and Ba La bridges	Km50+000	Km67+000	17.0	Tay Giang commune (Tay Son district)	Tay Thuan commune (Tay Son district)	19.968
Gia Lai province						
PK CW2 An Khe Bypass (plus 4 new bridges)	Km0+000	Km13+700	13.7	Song An Commune (An Khe town)	Tan An commune (Dak Po district)	13.503
PK CW3 (Ta Ly and Thau Dau bridges)	Km67+000	Km70+740	3.74	Song An Commune (An Khe town)	Song An Commune (An Khe town)	18.011
	Km83+600	Km90+000	6.40	Tan An commune (Dak Po district)	Cu An commune (Dak Po district)	
PK CW4A (Linh Nham, Vang and Le Can bridges)	Km131+130	Km155+000	28.70	Dak Ya commune (Mang Yang district)	Dak Doa town (Dak Doa district)	16.129
PK CW4B include Pleiku Bypass (2 new bridges) plus An My bridges	Km155+000	Km160+000	13.30	An Phu commune (Pleiku city)	Chu A commune (Pleiku City)	16.372
PK CW5 Road only	Km180+000	Km200+000	20.0	Chu HDrong commune (Pleiku City)	Binh Giao commune (Chu Prong district)	15.028
PK CW6 Road only	Km200+000	Km222+000	22.0	Binh Giao commune (Chu Prong district)	Chu Ty town (Duc Co district)	14.230
PK CW7 Road only	Km222+000	Km241+000	19.00	Chu Ty town (Duc Co district)	Ia Dom commune (Duc Co district)	14.629
Total			**143.84**			**127.870**

Note: PK CW 3 and PK CW 4A are PRIORITY SECTIONS The estimated amount of Contract packages for Civil works and subject for adjustment after approval of final design.

Physical improvements of the 143.6 km Project within the existing NH19 include: (i) resurfacing of approximately 16 km of existing road; (ii) widening of around 114 km of road with cross section from 7m to 10-11 m and a 5 km section will be widened into 16 m. The resurfacing and road widening will be done together with the installation of roadside drains, improvement of intersections, provision of road safety facilities and the reinforcement of slopes in areas prone to landslides. Eight (8) existing weak bridges with length from 9 to 33 m and width at 9 m will be rebuilt at the same locations along NH19. The section on the An Khe pass from km56 to Km67 will be improved with increase curve radius and slope protection and the new construction of 13.7 km An Khe bypass and 13.2 km of Pleiku bypass.

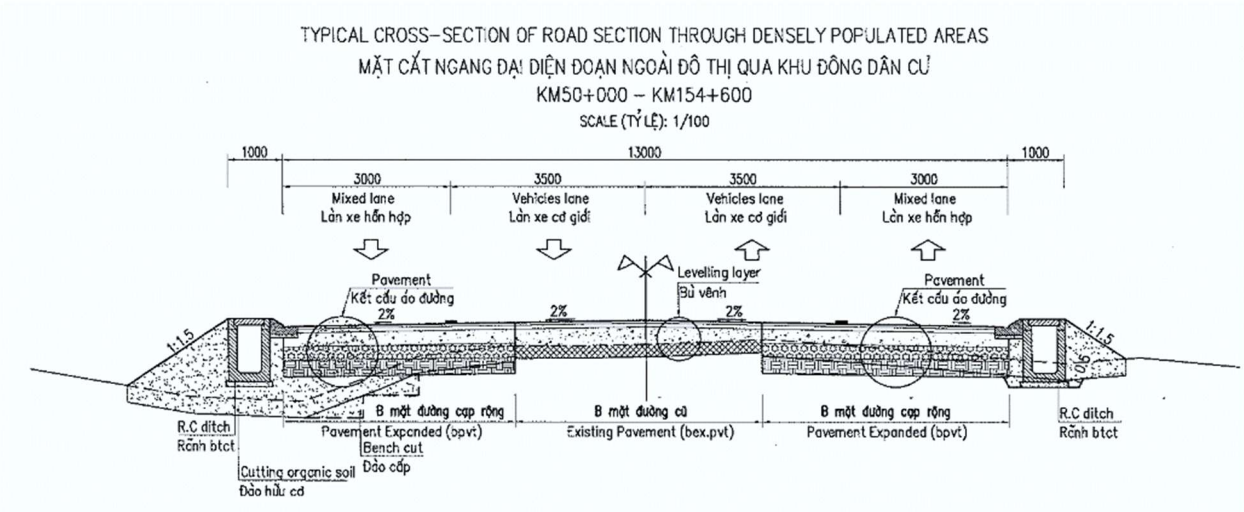
Prior to the execution of civil works for the bridges that will be replaced, detours will be constructed to support the continuous flow of traffic while the bridges are under construction. The temporary lands needed for detours access, leased if privately owned, will be rehabilitated to their original conditions once the new bridges are operational.

Typical cross-section of the road sourced from the DDD is divided into 3 groups which are illustrated below:

<u>Group 1: Road sections go outside of urban area but through densely populated areas</u>

LIST OF ROAD SECTION THROUGH DENSELY POPULATED AREAS (KM50+000– KM154+600)
DANH SÁCH CÁC ĐOẠN NGOÀI ĐÔ THỊ ĐI QUA KHU ĐÔNG DÂN CƯ (KM50+000– KM154+600)

Stt	Điểm Đầu from	Điểm Cuối to	Chiều Dài Đoạn Tuyến length (km)	Ghi Chú Note
#2	**Km83+600- Km90+000**			
	Km83+600 - Km85+000		1.40	Khu Đông Dân Cư / Crowded Area
	Km87+500 - Km88+200		0.70	Khu Đông Dân Cư / Crowded Area
#3	**Km131+300- Km160+000**			
	Km136+300 - Km136+800		0.50	Khu Đông Dân Cư / Crowded Area
	Km138+600 - Km139+100		0.50	Khu Đông Dân Cư / Crowded Area
	Km139+900 - Km141+500		1.60	Khu Đông Dân Cư / Crowded Area
	Km145+000 - Km145+600		0.60	Khu Đông Dân Cư / Crowded Area
	Km147+500 - Km148+600		1.10	Khu Đông Dân Cư / Crowded Area
	Km148+600 - Km152+500		3.90	Khu Đông Dân Cư / Crowded Area
#4	**Km50+000- Km67+000**			
	Km51+200 - Km52+000		0.80	Khu Đông Dân Cư / Crowded Area
	Km53+100 - Km54+700		1.60	Khu Đông Dân Cư / Crowded Area
	Km56+900 - Km58+100		1.20	Khu Đông Dân Cư / Crowded Area



Group 2: Road sections go within urban area and through densely populated areas

LIST OF ROAD SECTION THROUGH DENSELY POPULATED AREAS (KM180+000– KM241+000)

DANH SÁCH CÁC ĐOẠN NGOÀI ĐÔ THỊ ĐI QUA KHU ĐÔNG DÂN CƯ (KM180+000– KM241+000)

Stt	Điểm Đầu from	Điểm Cuối to	Chiều Dài Đoạn Tuyến length (km)	Ghi Chú Note
#7	Km180+000- Km241+000			
	Km185+500 -	Km188+600	3.10	Khu Đông Dân Cư / Crowded Area
	Km194+000 -	Km199+100	5.10	Khu Đông Dân Cư / Crowded Area
	Km200+000 -	Km202+000	2.00	Khu Đông Dân Cư / Crowded Area
	Km206+400 -	Km210+100	3.70	Khu Đông Dân Cư / Crowded Area
	Km212+000 -	Km218+500	6.50	Khu Đông Dân Cư / Crowded Area
	Km230+000 -	Km233+000	3.00	Khu Đông Dân Cư / Crowded Area
	Km235+000 -	Km236+700	1.70	Khu Đông Dân Cư / Crowded Area

TYPICAL CROSS–SECTION OF ROAD SECTION THROUGH DENSELY POPULATED AREAS

MẶT CẮT NGANG ĐẠI DIỆN ĐOẠN NGOÀI ĐÔ THỊ QUA KHU ĐÔNG DÂN CƯ

KM180+000 – KM241+000

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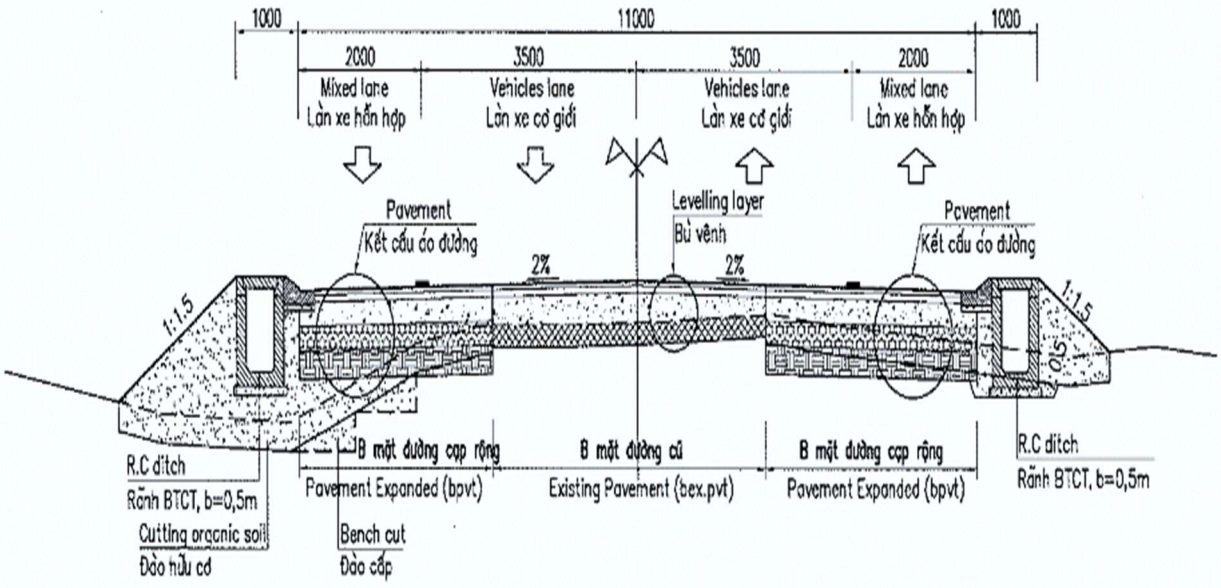
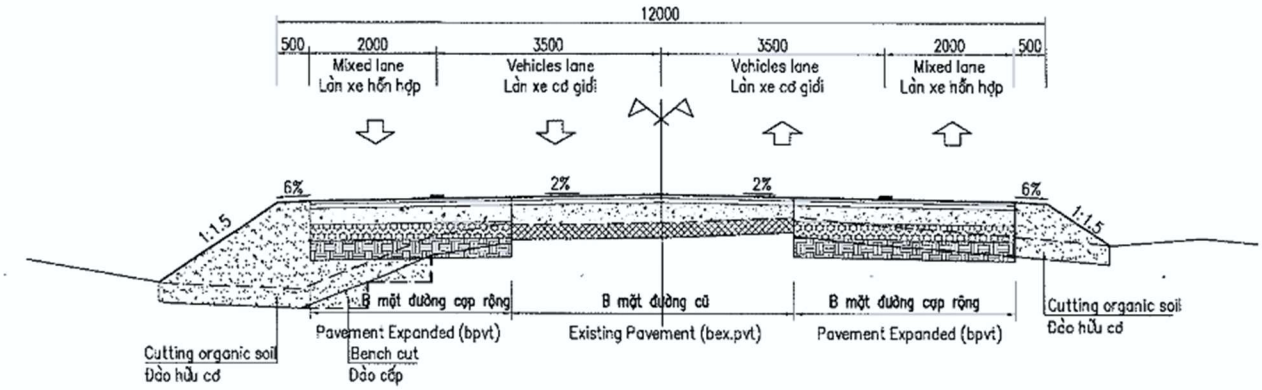


Group 3: Road sections go outside urban area and not through densely populated areas

LIST OF ROAD SECTION NOT THROUGH POPULATED AREAS
DANH SÁCH CÁC ĐOẠN NGOÀI ĐÔ THỊ KHÔNG QUA KHU DÂN CƯ

Stt	Điểm Đầu from	Điểm Cuối to	Chiều Dài Đoạn Tuyến length (km)	Ghi Chú Note
#1	Km67+000- Km70+740			
	Km67+000 -	Km70+740	3.74	Khu Đông Dân Cư / Crowded Area
#2	Km83+600- Km90+000			
	Km83+600 -	Km85+000	1.40	Khu Đông Dân Cư / Crowded Area
	Km87+500 -	Km88+200	0.70	Khu Đông Dân Cư / Crowded Area
#3	Km131+300- Km160+000			
	Km136+300 -	Km136+800	0.50	Khu Đông Dân Cư / Crowded Area
	Km138+600 -	Km139+100	0.50	Khu Đông Dân Cư / Crowded Area
	Km139+900 -	Km141+500	1.60	Khu Đông Dân Cư / Crowded Area
	Km145+000 -	Km145+600	0.60	Khu Đông Dân Cư / Crowded Area
	Km147+500 -	Km148+600	1.10	Khu Đông Dân Cư / Crowded Area
	Km148+600 -	Km152+500	3.90	Khu Đông Dân Cư / Crowded Area
	Km154+600 -	Km160+000	5.40	Khu Đông Dân Cư / Crowded Area
#4	Km50+000- Km67+000			
	Km51+200 -	Km52+000	0.80	Khu Đông Dân Cư / Crowded Area
	Km53+100 -	Km54+700	1.60	Khu Đông Dân Cư / Crowded Area
	Km56+900 -	Km58+100	1.20	Khu Đông Dân Cư / Crowded Area
#7	Km180+000- Km241+000			
	Km185+500 -	Km188+600	3.10	Khu Đông Dân Cư / Crowded Area
	Km194+000 -	Km199+100	5.10	Khu Đông Dân Cư / Crowded Area
	Km200+000 -	Km202+000	2.00	Khu Đông Dân Cư / Crowded Area
	Km206+400 -	Km210+100	3.70	Khu Đông Dân Cư / Crowded Area
	Km212+000 -	Km218+500	6.50	Khu Đông Dân Cư / Crowded Area
	Km230+000 -	Km233+000	3.00	Khu Đông Dân Cư / Crowded Area
	Km235+000 -	Km236+700	1.70	Khu Đông Dân Cư / Crowded Area

TYPICAL CROSS-SECTION OF ROAD SECTION OUTSIDE URBAN AREAS
MẶT CẮT NGANG ĐẠI DIỆN ĐOẠN NGOÀI ĐÔ THỊ
SCALE (TỶ LỆ): 1/100



2.3 Workers to be Mobilized including Machineries and Equipment

2.3.1 Workforce Requirements

It is estimated that construction will take place in 24 months and approximately 510 workforces will be mobilized in the Project for civil works. The workforce will include the provision of site engineers, technicians, surveyors, heavy equipment operators and assistants, mechanics, general laborers, and security. It is also expected that 30% of the manpower will be sourced from qualified local people or villagers, especially for semi-skilled and unskilled laborers then migrated workers would decrease to 360 from the estimated 510 workers.

The workforces to be mobilized are listed below Table 8a– Workers mobilization per Contract Packages.

Table 8a Workers Mobilization Per Contract Packages

Name of Packages	Station		Length	Administrative boundary		Number of Workforces
	From	To	Km	From	To	
Binh Dinh Province						
PK CW1 Bau Sen and Ba La bridges	Km50+000	Km67+000	17.0	Tay Giang commune (Tay Son district)	Tay Thuan commune (Tay Son district)	60
Gia Lai province						
PK CW2 An Khe Bypass (plus 4 new bridges)	Km0+000	Km13+700	13.7	Song An Commune (An Khe town)	Tan An commune (Dak Po district)	100
PK CW3 (Ta Ly and Thau Dau bridges)	Km67+000	Km70+740	3.74	Song An Commune (An Khe town)	Song An Commune (An Khe town)	60
	Km83+600	Km90+000	6.40	Tan An commune (Dak Po district)	Cu An commune (Dak Po district)	
PK CW4A (Linh Nham, Vang and Le Can bridges)	Km131+130	Km155+000	28.70	Dak Ya commune (Mang Yang district)	Dak Doa town (Dak Doa district)	60
PK CW4B include Pleiku Bypass (2 new bridges) plus An My bridges	Km155+000	Km160+000	13.30	An Phu commune (Pleiku city)	Chu A commune (Pleiku City)	80
PK CW5 Road only	Km180+000	Km200+000	20.0	Chu HDrong commune (Pleiku City)	Binh Giao commune (Chu Prong district)	50
PK CW6 Road only	Km200+000	Km222+000	22.0	Binh Giao commune (Chu Prong district)	Chu Ty town (Duc Co district)	50
PK CW7 Road only	Km222+000	Km241+000	19.00	Chu Ty town (Duc Co district)	Ia Dom commune (Duc Co district)	50
Total			**143.84**			**510**

Source: DDD, Draft calculation based on work quantities

2.3.2 Machinery and Equipment

The machineries and equipment required for the Project are listed below Table 8b – List of Machineries and Equipment.

Table 8b List of Machineries and Equipment

No.	Equipment/Machinery	Quantity	No.	Equipment/Machinery	Quantity
1	Compactor 1.5KW	10	19	Crane for placing precast beams	5
2	Drilling machine ED, KH, Soilmec	5	20	Steel cutting and bending machine 5KW	15
3	Stand still drilling machine, 4.5KW	5	21	Pneumatic hammer	15
4	Air compressor Diezen 240m3/h	10	22	Diezen Air compressor, 360m3/h	5
5	Crane truck 10T	2	23	Concrete mixer 80L	10
6	Welding machine 23KW	10	24	Concrete pump 9m3	10
7	Jacking machine 250T	5	25	Tire crane 16T	2
8	Water pump 20KW	10	26	Automatic concrete pump, 50m3/h	4
9	Diesel Air compressor, 600m3/h	10	27	Dump truck 10T	50
10	Jacking machine 500T	2	28	Watering truck 5m3	5
11	Chain hoists 3T	4	29	Tire roller	10
12	Crane 25T	5	30	Bulldozer	10
13	Electric hoist 5T	5	31	Scraper	10
14	Drilling machine TRC-15	1	32	Steel chain backhoe, 1.6m3	2
15	Wire cutting machine 10kW	10	33	Tire backhoe	3
16	Wiring machine 15KW	10	34	Grader	5
17	Side compactor	10	35	Girder casting bed	10
18	Roller/Compactor 2.8KW	10	36	Concrete Paver BTN	5

Source: DDD, Quantity Calculation

2.4 Spoil Disposal Area (SDA)

SDAs for the disposal of unused excavated materials were identified. The identified SDAs are vacant land with bushes and no sensitive sites such as pagoda, church, hospital, or school with its proximity. Nevertheless, permission from the local authorities/village leaders will be secured by the Contractor prior to utilization. if the SDA is privately owned, an agreement will be executed between the lot owner and contractor. Proposed SDAs are described in Table 9-Proposed Site Disposal Areas.

Table 9 Proposed Spoil Disposal Areas

No.	Location	Area (m^2)	Height (m)	Storing capacity (m3)	Distance
1	Ta Giang 1 Hamlet, Tay Giang commune, Tay Son district, Binh Dinh province	10,000	1.5	15,000	Side of Bau Sen bridge at station km50+578
2	Truong Son Hamlet, Tay Thuan commune, Tay Son district, Binh Dinh province	7,000	1.8	12,600	Side of Vuon Xoai Bridge, at km 57+593
3	An Dien Nam Hamlet, Cuu An commune, An Khe town, Gia Lai province	17,000	1	17,000	10 km from NH19, at km76+200
4	4 Hamlet, Gào commune, Pleiku city, Gia Lai province	24,000	0.5	12,000	Side of NH19, at station km181+500
5	Quyet Thang Hamlet, Ia Din commune, Duc Co district, Gia Lai province	13,500	1	13,500	50m from NH19, at km 206+10
6	Thanh Tan Hamlet, Ia Krel commune, Duc Co district, Giai Lai province	9,500	2	19,000	Side of NH19, at station km210+200
7	Ó village, Ia Dom commune (land boundary of Ia Nan commune), Duc Co district, Gia Lai province	13,500	0.5	6,750	Side of NH19, at station km230+800
8	New disposal site in Thang Hung commune, formerly the domestic waste dumping site as recommended from public consultation meeting	3000	0.2	10,000	Side of NH19 at station Km193+300
9	New disposal site at IaDin commune, located on left side of NH19	15000	1	15,000	Side of NH19 at station Km206+600
10	New Disposal site located in Thanh Tan village	10,000	0,1	50,000	Side of NH19, at km 211+600
Total				170,850	

Source: Investigation report on Construction Material and Disposal Area, February 2020 by Detailed Design Consultant

2.5 Borrow Pits and Quarries

The DDD Consultant carried out further investigation to the Material Sources listed during the FS/Approved ESIA which is reflected in Annex 3 as part of the Due Diligence Reviews and the findings and recommendations of the DDD are made, hence, updated the list as shown in Table 10.

Table 10 Material Sources

Enterprise	License	Location	Transportation Route
Filling soil			
1. Ly Kinh Enterprise	467/QĐ-UBND	K'Bang town, K'bang district, Gia Lai province	30.5km from NH19 at station Km 76+200
2. Ia Dowk Soil Mine	Additional planning according to report No.368/BC-UBND dated 24/06/2019 of District People's Committee	Lệ Kim Hamlet, Ia Đơk commune, Đức Cơ district, Gia Lai province	16 km from NH19 at station Km 218+550
3. Thăng Hưng Soil Mine	Planning according to decision No.568/QĐ-UBND dated 08/10/2013	Thăng Hưng commune, Đức Cơ district, Gia Lai	2.0km from NH19 at station Km191+500
Construction sand mines			
4. An Thiên Gia Lai Ltd.	239/GP-UBND	Lơ Pang Commune and Đak Dirăng commune, Mang Yang district, Gia Lai	7.95km from NH19 at station km138+900
5. Đắc Tài Ltd.,	76/GP-UBND	Kon River, Binh Nghi commune, Tay Son district, Binh Dinh	2.9km from NH19 at station Km34+290
6. Hieu Ngoc Ltd.,	92/GP-UBND	Kon River, Phong Phu town, Tay Son district, Binh Dinh	1.1km from NH19 at station Km41+50
7. My An Enterprise	239/GP-UBND	Ba river, Dak Hlo commune, K'bang district and Tu An commune, An Khe town, Gia Lai	15 km from NH19 at station Km 76+200
8. Tay Thuan Co-operative	42/GP-UBND (extension)	Kon River, Tay Thuan commune, Tay Son district, Binh Dinh	4.7 km from NH19 at station Km57+710
Construction Rock Mines/ Cement Concrete and Asphalt concrete			
9. An Thành Enterprise (is also asphalt concrete)	505/GP- UBND	An Thành Commune, ĐakPo district, Gia Lai province	2.5Km from NH19 at station km93+00
10. Mỹ Quang JSC., (is also cement and asphalt concrete)	40/GP-UBND	Son Triều mountain, Phước Lộc commune, Tuy Phước district, Bình Định	1.7Km from NH19 at station km 15+900
11. Quang Đức Company	96/GP-UBND	Ia Dom Commune, Đức Co district, Gia Lai Province	3.4Km from NH19 at station Km 235+810
12. Thang Long JSC., (cement concrete)	644/GP- UBND	Ia Der Commune, Ia Grai district, Gia Lai province	5.4Km from NH19 at station km167+00

Source: DDD, Investigation report on Construction Material and Disposal Area

Other construction materials such as steel, cement, asphalt, and cement concrete will be purchased from local suppliers with good reputations and to be transported to construction sites where travel distance is shorter compared to similar projects in the mountainous area. In general, the availability of material sources in this project is relatively good.

Hot asphalt will be purchased from local mixing stations or made available from the mixing stations to be installed by the contractor at the quarries. The operation of hot mix plants presents EHS/worker safety issues that will have clear procedures set out and monitored under the CESMPs if contractor led.

Based on the survey result of construction materials mines and disposal sites, depending on the volume of earthwork, rock, sand and waste materials of each section, the Consultant calculates the suitable distance for cost estimation.

The estimated volume of raw materials to be used under the Project are shown in Table 11 – Volume of Construction Materials.

Table 11 Volume of Construction Materials

Road Section	Materials	Volume (m3)	Quantity (tons)	Travel Distance (km)
Km50 - Km90	Excavated soils	679,467	978,432	15
	Filling soils	104,971	151,158	15
	Macadam	108,234	190,492	15
	Asphalt concrete	81,775	204,438	15
Km131+500 - Km160	Excavated soils	152,428	219,496	10
	Filling soils	80,476	115,885	10
	Macadam	59,399	104,542	10
	Asphalt concrete	51,807	129,518	10
Km180 - Km241	Excavated soils	340,398	490,173	12
	Filling soils	111,372	160,376	12
	Macadam	169,312	297,989	12
	Asphalt concrete	310,396	775,990	12
An Khe Bypass	Excavated soils	307,453	442,732	5
	Filling soils	284,972	410,360	5
	Macadam	83,979	147,803	5
	Asphalt concrete	1,054	2,635	5
Pleiku Bypass	Excavated soils	949,375	1,367,100	10
	Filling soils	880,637	1,268,117	10
	Macadam	115,500	203,280	15
	Asphalt concrete	1,720	4,300	15
Total		4,874,725	7,664,816	

Source: DDD, calculation of work quantities

2.6 Ancillary Facilities

2.6.1 Workers Campsites

It was estimated that the Project will require around 510 workforces to be mobilized and to be housed in the civil work campsites during the construction period. As such, siting of campsite locations for housing the required labor forces was carried out in consultation with the local authorities and communities and about thirteen (13) locations identified as described in Table 12: NH19 CHCIP Improvement, Proposed Locations of Campsites.

Table 12 Proposed Locations of Campsites

Section	Description	Section	Description
Km56 - Km67	**Location 1: (Km56+800).** The site is idle land and about 20m from residential house to the project road alignment. The proposed camp is expected to accommodate 30 workers	Km132 - Km160	**Location 1: (Km147+700). T**he site is idle land and about 20m from residential house to the project road alignment. The proposed camp is expected to accommodate 40 workers.
	Location 2: (Km67+600). The site is idle land and about 300m from residential house and the Song An Animal Quarantine Station to the project road alignment. The proposed camp is expected to accommodate 20 workers		**Location 2: (Boi Village, Glar commune at Km 4+500 in Pleiku Bypass).** The site is near Km 4+500 and about 30m from residential house to the proposed Pleiku Bypass. The proposed camp is expected to accommodate 60 workers
An Khe Bypass	**Location 1: (Jct bet. An Khe Bypass and DT669).** The area is agricultural land and about 30m from residential house and the provincial road 669 to the proposed bypass. The camp is expected to accommodate 50 workers	Pleiku Bypass	**Location 1: (Boi Village, Glar commune at Km 4+500 in Pleiku Bypass).** The site is near Km 4+500 and about 30m from residential house to the proposed Pleiku Bypass. The camp is expected to accommodate 30 workers
	Location 2: (Km12 of An Khe Bypass). The area is agricultural land about 50m from residential house to the proposed bypass. The camp is expected to accommodate 30 workers		**Location 2: (Km183 +100).** The site is idle land and about 20m from residential house to the proposed bypass. The proposed camp is expected to accommodate 40 workers.
Km 67-Km90	**Location 1: (Km67+600).** The site is idle land and about 300m from residential house and the Song An Animal Quarantine Station to the project road alignment. The proposed camp is expected to accommodate 30 workers.	Km 180-Km 241	**Location 1: (Km183 +100).** Same location as Location 2 of Pleiku Bypass. The 2nd proposed camp is expected to accommodate 20 workers **Location 2: (Km223+100).** The site is idle land near NH19 and about 30m from residential house to the project alignment. The proposed camp is expected to accommodate 40 workers.

Section	Description	Section	Description
	Location 2: (Km12 of An Khe Bypass). The area is agricultural land and about 50m from residential house to the proposed bypass. The proposed camp is expected to accommodate 20 workers.		**Location 3: (Km231 +700).** The site is idle land near NH19 and about 50m from residential house to the project alignment. The proposed camp is expected to accommodate 40 workers.

The above workers camps will have to be approved by local authorities and agreed by the relevant communities prior to establishment in consideration of the ability of host community to provide local workers. The Campsites must be provided with sufficient facilities such as toilet, sewerage and solid waste, safe water supply, fire prevention, etc. and a separate facility must be provided to women workers. The local authorities responsible for health, religious and security are duly informed on the set up of temporary accommodation facilities to maintain effective surveillance over public health, social and security matters.

During the public consultations conducted in May and June 2020, the communes/local people suggested to provide accommodation services to construction workers through rental of their residential houses by the contractor in case additional campsite is required.

Relative to the increase in demand of the host community due to the construction workers to be housed at campsites, the cost and availability local food supply is not an issue since a huge volume of commodities is transported via NH19, and is available for purchase by the Contractor.

2.6.2 Access Roads

The construction sites are accessible via the existing NH19 and the internal roads in wards, communes, and town where the alignment runs through. However, for An Khe bypass and Pleiku bypass since these are new alignment including the construction of new bridges, the intersection between project road and existing road will be opened and maintained for the continuous flow of traffic while civil works are ongoing.

Prior to the replacement of the eight (08) existing bridges along the road, it is required to construct the temporary access road or detour route.

The temporary land access will be rehabilitated into its original condition once the new bridges are operational and if the access road/detour route is a privately owned land, it will be leased and will be rehabilitated into its original condition once construction activities are completed.

Typical detour route design is illustrated below:

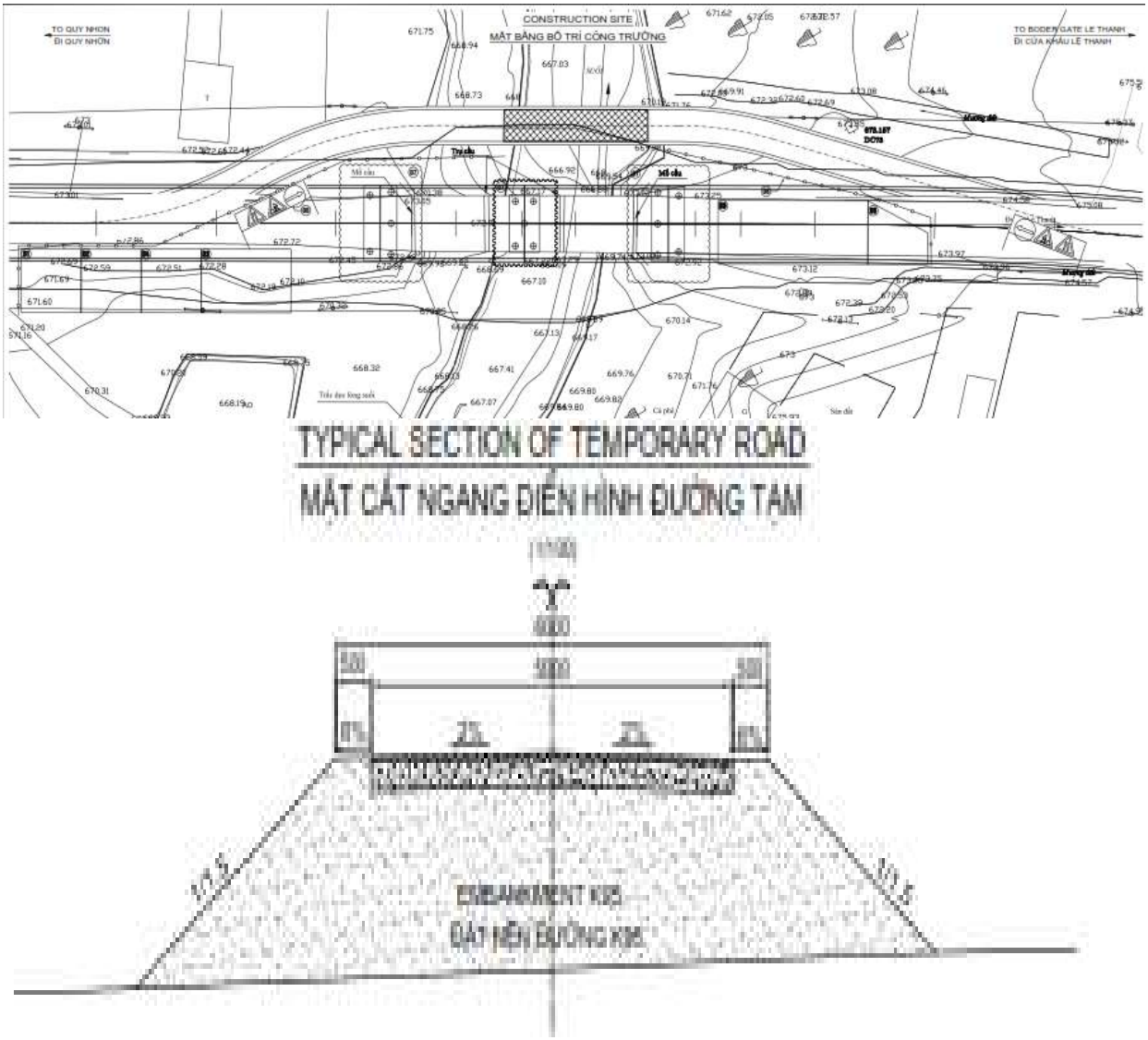


Figure 14 Typical Detour Route Design

2.6.3 Power Supply and Water

National grid power is available in the localities; hence, contractor would connect electricity from the local power utility. Also, during public consultation in May - June 2020, it was informed that the power system is working well, power cut rarely takes place.

With regards to water supply, water for domestic and construction will be sourced locally from the within the project sites. During consultation with local communes, water supply in districts are quite abundant in volume and good quality and would be sufficient sourced for both workforces living in the campsite and construction related activities, except in An Khe district where water shortage often occur in dry season and local people have to buy from mobile water tanks service provider with average price

of 10,000 for each bottle of 20 litter. The new Sai Gon - An Khe water plant located in An Khe-Kanak hydropower dam is under operation and Contractor could access if required.

Domestic wastewater from households mainly conveyed to discharge point far from the water wells. Septic tanks have been installed in almost all households (both in urban town and in rural communes).

In each district covered by the Project area, there is one functional unit in charge of collection, transportation and disposing of domestic solid waste. Services covered to all communes with support of network of commune-level collection team. Contractors can arrange and enter into agreement with the service provider to manage non-toxic solid waste volume generated from construction site.

2.7 Construction Methods

Road Construction:

- In general, the road will be constructed by successive construction methods of 500 meter per section. It is not required that a central warehouse for storing materials for entire project will be provided. Materials will be sourced by local suppliers located close to construction road. A small (bi-weekly or daily) volume of material will be arranged to store right on each construction road sections.
- Alignment: Except new bypasses, the proposed alignment follows the existing alignment and terrain to minimize land acquisition.
- Construction of road base: The construction of road base follows different steps for the road cuts and fills. At the fill, the steps include: (i) Remove top soil, remove tree roots, waste and other materials; (ii) Strengthen weak soil foundation at each section; (iii) Re-fill and strengthen layers to achieve compaction density (K) of 0.95; (iv) Build road base. For deep excavation, the steps are as follows: (i) Use excavators to remove the top soil, waste and other materials; (ii) Use excavators, bulldozers to excavate soil materials to the designed elevation; (iii) Rollers are used to compact the subgrade to the density of K=0.98.
- Installation of the drainage system: Install horizontal culverts and vertical drainage ditches and construct the road base concurrently (1) construct the foundation for culverts; (2) install the culverts; (3) construct culvert joints; (4) Fill soils on the sides and on top of the culverts into layers from 15 to 20cm thick and compact the soils to the required road base compaction degree (K=0.95).
- Construction of road top: Based on technical survey of existing road quality during Detailed Design Stage, the new road surface will be constructed following the bottom up approach, including (1) 25cm thick macadam class II layer; (2) a 25cm macadam class I layer; (3) application of binder material ; (4) make a 7 cm thick of dense asphalt concrete for base layer; (5) application of binder material; (6) make a 5 cm thick of dense asphalt concrete of BTNC 12..
- Junctions between the NH19 and local roads: Smooth connection will be made to link the NH19 alignment to the local road connections.

Bridge Construction:

- Abutment construction : The construction steps include: Leveling and installation of equipment for bored pile drilling; Bored drilling, stabilizing the borehole with the borehole wall and clay mixture; cleaning of the borehole; placing the steel cage using a crane; pouring the concrete following the underwater concretization method. Excavating soils for the abutment foundation to the designed depth; constructing a pile base; pouring and flatting the concrete base; placing the frame, steel

foundation. Install scaffolding and steel cage for abutment wall, wingwall, pouring concrete, removing the falsework structures, and completing the abutment.

- Above water abutment: (1) With regards to abutment with foundation on bored piles, the construction method includes the following steps: Leveling and installation of equipment for bored pile drilling; Bored drilling; stabilizing the borehole with the borehole wall and clay mixture; cleaning of the borehole; placing the steel cage using crane; pouring concrete following the underwater concretization method. Excavating soils for the abutment foundation to the designed depth; installing the steel shell; pouring concrete and flatting the concrete; placing the frame, reinforcing steel; filling soil materials to the top layer of the pier foundation. Placing falsework, steel structure for the pile's body and crosshead. Filling soil materials up to the natural ground level and completing the pile. (2) With regards to the piers that have foundation on reinforced concrete piles, the construction method includes the following steps: Site leveling and identifying the center point of the pier and the pile locations. Installing the pile driving machine and driving the piles to the design depth. Excavated soil for pier foot to the design depth; concretizing the bottom base, flatting the concrete base; placing the falsework, steel bars; pouring concrete; filling soils up to the pier's foot top. Installing falsework and steel structure for the pier's body and the pier crosshead. Pouring the concrete; removing the falsework. Filling soils up to the ground level and completing the abutment.
- Underwater abutment: (1) Abutment with foundation on bored piles: Installing pile drilling machine on floating system or temporary platform. Bored drilling; stabilizing the borehole with the borehole wall and clay mixture; cleaning of the borehole; placing the steel cage using a crane; pouring the concrete following the underwater concretization method. Installing a cofferdam for piles; pouring concrete to seal the bottom, pumping water out of the foot hole, treating the pile tips, pouring concreate for a platform to place falsework, steel bars, and concrete casting. Installing falsework, steel bar column, concrete pouring; removing the falsework. Washing out/cleaning riverbed and completing the abutment. (2) Abutment on reinforced concrete piles: identifying the center point of the abutment and the pile locations. Installing the equipment on a floating system or a platform; driving the piles to the designed depth; Constructing a cofferdam, excavating soils within the cofferdam; pouring concrete to seal the bottom; pumping water out; treating the pile tips; pouring concrete and flattening out the concrete; placing the falsework, steel bars for the abutment foundation; pouring the concrete. Installing falsework, and steel bar column; pouring concrete; removing the falsework. Cleaning the riverbed and completing abutment.
- Superstructure construction: Preparing a beam fabrication site, mobilizing materials and machineries; Constructing falsework; Installing steel bars for beams and prestressed cable and falsework; Pouring concrete; Carrying beams to the construction site, placing them in identified location by cranes or specialized equipment; Constructing the deck slabs and concrete girders; Constructing the waterproof layer for the deck, surfacing the asphalt and completing the bridge construction. The CESMPs will identify appropriate access, storage and safety issues associated with staging areas for bridge construction.

2.8 Project Implementation Schedule

Taking into consideration that the construction of the Project is based on priority, the implementation of the priority section is expected to commence in the 1st quarter of 2021 until the 2nd quarter of 2023 or for a period of two (2) years, yet, it will be contingent on the compliance with related environmental and social safeguards conditions in which the No Objection Letter (NOL) from WB for commencement of physical works will be delivered.

Below are Tentative Schedule of the Construction of Roads and Bridges.

Road component

HẠNG MỤC (CATEGORIES)	WORK ITEMS	MONTH				
		1	2	3	4	5
Chuẩn bị (Prepare)	San ủi, chuẩn bị mặt bằng, tập kết vật tư, thiết bị thi công (Prepare machinery, ground, supplies, equipment)					
Cống tạm (Temporary Culvert)	Thi công mương tạm, cống tạm (Temporary Culvert)					
Hố móng (Foundation hole)	Đào hố móng (Peach foundation)					
Kết cấu cống (Structure culvert)	Lắp dựng đà giáo, ván khuôn, cốt thép thi công bản đáy cống (Scaffold, formwork, reinforcement bot slab)					
	Lắp dựng đà giáo, ván khuôn, cốt thép thi công thân cống và cột sườn giữa (Scaffold, formwork, reinforcement wall culvert)					
	Lắp dựng đà giáo, ván khuôn, cốt thép thi công bản nắp cống (Scaffold, formwork, reinforcement top slab)					
Công việc khác (Other jobs)	Thi công đất đắp thoát nước, gia cố mương cải					
	Thu dọn mặt bằng, hoàn trả tạm và hoàn thiện					

Figure 15 Road Component

Bridge works

PART / BỘ PHẬN	WORK ITEMS / HẠNG MỤC THI CÔNG	1ST YEAR / NĂM THỨ NHẤT							
		1	2	3	4	5	6	7	8
PREPARATION / CHUẨN BỊ	PREPARATION OF LIVING HOUSE, ELECTRICAL STATION AND CONCRETE STATION CHUẨN BỊ MẶT BẰNG, LÁN TRẠI, XÂY DỰNG TRẠM ĐIỆN,TRẠM TRỘN BT REGROUPING MATERIAL AND EQUIPMENT / TẬP KẾT VẬT TƯ THIẾT BỊ THI CÔNG								
ABUTMENT A1 / MỐ A1	PREPARING CONSTRUCTION SITE, CONSTRUCTION OF BORED PILE / SAN ỦI TẠO MẶT BẰNG THI CÔNG, THI CÔNG CỌC KHOAN NHỒI CONSTRUCTION OF ABUTMENT / LẮP DỰNG ĐÀ GIÁO, THI CÔNG MỐ.								
PIER P1 / TRỤ P1	PREPARING CONSTRUCTION SITE, CONSTRUCTION OF BORED PILE / SAN ỦI TẠO MẶT BẰNG THI CÔNG, THI CÔNG CỌC KHOAN NHỒI CONSTRUCTION OF PIER / LẮP DỰNG ĐÀ GIÁO, THI CÔNG TRỤ.								
ABUTMENT A2 / MỐ A2	PREPARING CONSTRUCTION SITE, CONSTRUCTION OF BORED PILE / SAN ỦI TẠO MẶT BẰNG THI CÔNG, THI CÔNG CỌC KHOAN NHỒI CONSTRUCTION OF ABUTMENT / LẮP DỰNG ĐÀ GIÁO, THI CÔNG MỐ.								
	CONSTRUCTION OF SUPERSTRUCTURE / THI CÔNG KẾT CẤU NHỊP								
PREPARATION / CHUẨN BỊ	CONSTRUCTION OF GIRDERS / XỬ LÝ TẠO MẶT BẰNG BÃI ĐÚC, BỆ ĐÚC VÀ ĐÚC DẦM								
CONSTRUCTION OF SPAN THI CÔNG NHỊP N1	INSTALL OF GIRDER / TIẾN HÀNH DI CHUYỂN DẦM RA VỊ TRÍ ĐẦU MỐ A1 VÀ LAO VÀO VỊ TRÍ NHỊP								
	CONSTRUCTION OF DECK SLAB / THI CÔNG BẢN MẶT CẦU								
CONSTRUCTION OF SPAN THI CÔNG NHỊP N2	INSTALL OF GIRDER / TIẾN HÀNH DI CHUYỂN DẦM RA VỊ TRÍ ĐẦU MỐ A1 VÀ LAO VÀO VỊ TRÍ NHỊP								
	CONSTRUCTION OF DECK SLAB / THI CÔNG BẢN MẶT CẦU								
COMPLETION / HOÀN THIỆN	COMPLETION OF BRIGDE / THI CÔNG HỆ MẶT CẦU, LAN CAN, HOÀN THIỆN								
APPROACH ROAD ĐƯỜNG HAI ĐẦU CẦU	ROAD CONSTRUCTION / THI CÔNG ĐƯỜNG HAI ĐẦU CẦU								

Figure 16 Bridge Works

3. ENVIRONMENTAL AND SOCIO-ECONOMIC CONDITION

3.1 Environmental Condition

3.1.1 Geographical Condition

National Highway 19 (NH19), running from east to west with a total length of 243 km, spans from the Quy Nhon Sea Port in Binh Dinh province to the Le Thanh Border Gate in Gia Lai province. NH19 is about 1,000 km from Hanoi to the north, and 600 km from Ho Chi Minh City to the south. This is the Southern corridor part of the Greater Mekong Subregion (GMS) Transport Connection System linking Bangkok through the Northern part of Cambodia to Quy Nhon Seaport of Vietnam.

The sections of NH19 proposed to be invested under the CHCIP starts at Km50 (at coordinates $13^{O}56$"48.3"N and $108^{O}51$"13.3"E) in Tay Giang commune of Tay Son district, Binh Dinh province and ends at Km241 at coordinates 13°45'56.98"N, 107°31'23.63"E) in Ia Dom commune (Duc Co district, Gia Lai province). Figure 6 illustrates the geographical location of NH19 and other connected national highways in the area.

Figure 17 Geographical Location of NH19

3.1.2 Topographical Condition

The Project runs from the East to the West, the terrain gradually transits from the coastal delta to highlands with an average altitude of 800-900 meters and is divided by the Truong Son Mountain range with its diverse, distinctive, and unique climate and soil features into two terrain provinces – the Western and Eastern Truong Son Mountain. There are three main types of topography in the province with mountainous, highland and valley terrain, with mountainous terrain the most dominant, accounting for about two thirds of the natural area of the province.

3.1.3 Geological Condition

The Project area is mainly on mountainous and highland areas characterized by geological formations in Mang Giang, Don Duong, Van Canh, Deo Ca. The geological formations of the area along the NH19 alignment are as follows:

Strata of the area from Km17+027 to Km52 consists of: (i) Layer 1a: Old asphalt concrete surface of road section, (ii) Layer 1b: Filled clay which is semi-plastic mingled with macadam fragments, reddish fragmented rock mixture (CL-B), (iii) Layer 2a: Dust and organic semi-plastic clay (OL), yellow gray, dark grey, soft and plastic, (iv) Layer 2b: Sand and clay mixture (SC), yellow grey, liquified. This layer is distributed locally on the section Km23+280 to Km23+453; Km27+640 to Km31+198.16, (v) Layer 2c: Sand mixed with clay (SC), yellow gray, plastic, (vi) Layer 3a: Sand with poor gradation (SP), white grey, medium dense, saturated, (vii) Layer 3b: Sand with good gradation (SW), white grey, medium dense, saturated,

(viii) Layer 3c: Gravel mixed with dust (GM), brown grey, medium dense, saturated, (ix) Layer 4a: Lean clay (CL), blue grey, yellow grey, plastic and solid, (x) Layer and 4b: Lean clay (CL), blue grey, yellow grey, half-solid, (xi) Layer 4c: Lean clay, blue grey, yellow grey, solid, (xii) Layer 5a: weathered sedimentary deposits in brown grey color, solid level 4-6, (xiii) Layer 6a: Severely weathered and crushed granite, macadam fragments in white grey, black spots, light pink in color, solid level 4-6, (xiv) Layer 6b: Lightly weathered and cracked granite, white grey, black spots, light pink in color, solid level 7-8.

Strata at section from Km67 to Km71 includes (i) soft gray in various colors; (ii) mixed sand (iii) clay mixed with gravels ; (iv) mixed clay ; (v) mixed sand; (vi) mixed sand which is the product of granite weathering; (vii) -granite rock .

Strata of An Khe bypass: The typical geological strata of the An Khe bypass consists of the following layers: (i) Layer 1: Arable land, (ii) Layer 2: Mixed yellow grey sand, plastic and solid, (iii) Layer 3: Mixed yellow brown sand, mingled with grit, solid, (iv) Layer 4: Granite in blue grey with pink spots, white spots, solid.

Strata of the section from Km116 to Km131+300 consists of the following layers: (i) Layer 2: Clay in brown red, soft-plastic to hard-plastic, this layer is evenly distributed across the survey area. The layer's thickness ranges from 7.1 to 7.6m, (ii) Layer 2a: Clay in brown red, half-solid. This layer is 2.7m thick, (iii) Layer 3: Mixed clay in white grey, mingled with grit, half-solid, (iv) Layer 4b: Mixed clay in white grey, mingled with some grit, solid. This layer is evenly distributed across the survey area.

Strata of Pleiku City bypass consists of the following layers: (i) Layer K: This is the field surface level with clay mixed with organic matter in blue grey, red brown. The layer's thickness ranges between 0.2-0.6m; (ii) Layer 1: Clay in dark grey, plastic and pasty. The layer's thickness ranges between 0.4-2.7m. This layer is only found in boreholes at Km5+854 to Km11+955.3, Km13+100 to Km13+134); (iii) Layer 2: Clay mud in blue grey, dark grey. Thickness ranges from 1.2m to 3.9m. This layer is only found in boreholes at Km5+854 to Km8+100); (iv) Layer 3: Clay in red brown. Average thickness is 4.8m. This layer is only found in boreholes at Km0 to Km2+724, Km2+900 to Km5+854; Km11+955.3 to Km13+100; Km13+134 to Km16+630; Km16+700 to Km21) and soil layer is not fully drilled into; (v) Layer 3a: Clay in blue grey, dark grey, mingled with weathered gravel grit. Thickness ranges from 2m to 12.8m. This layer is only found in boreholes at Km5+854 to Km11+955.3; Km13+100 to Km13+134; Km16+630 to Km16+700), (vi) Layer 3b: Clay in dark grey, half-solid. This layer is only found in borehole LC at Le Can bridge at Km2+900. Layer's thickness 2m; (vii) Layer 4a: Severely weathered and britle rock. This layer is only found in borehole AM2 (An My 2 bridge) Km16+680. Layer is 1m thick; (viii) Layer 4b: Weathered rock in dark grey. This layer is found in all bridge boreholes (AM1, AM2, LC). The layer is 6m thick and is not fully drilled into.

Strata of the area from Km180 to Jm243: This section has the following consistent layers: *(i)* Layer K: This is the surface soil layer, plastic dust mingled with rocks and debris, red brown color. The layer's thickness ranges from 0m to 0.8m; *(ii)* Layer 3: Clay in red brown, plastic and solid. The layer's thickness ranges from 0.8m to 5m and is not fully drilled into.

3.1.4 Climate and Meteorological Conditions

The Project area has tropical monsoon climate with two distinct seasons. However, as it spans from the South-Central Coast to the Northern Central Highlands, the climate is influenced by both the sea and the ground altitude. The meteorological characteristics of the Project area are as follows:

For Gia Lai Province, rainy season from May to October and the dry season from November to April. The average annual rainfall is between 2,100-2,200 mm (the Western Truong Son Mountain subregion has average rainfall from 2,200-2,500 mm while the Eastern Truong Son Mountain subregion has an average

rainfall of 1,200 mm - 1,750 mm). The average temperature is 22 - 25°C (highest in May, at around 29-30^{0}C, and lowest in January at around 22^{0}C) and the average annual air humidity is about 80-83%.

For Binh Dinh area, rainy season lasts from August to November. The average annual rainfall is between 1,600-2,000mm. The average temperature is 27.3^{o}C, in which the average temperature is highest in June, July, August, at around 30.6^{o}C. January has the lowest average temperature, at around 22^{o}C.

Sunshine hours: Both the Southern Central Coast and Northern Central Highlands have tropical climate, the number of sunny hours per year is generally high. The annual average number of sunny hours in Binh Dinh is 2,517 hours, and 2,460 hours in Gia Lai.

Wind: Gia Lai is mainly subjected to two main types of monsoon winds, the East-Northeast winds prevails from November to April, and the West-Southwest winds prevails from May to October. During rainy season, the prevailing wind direction is Southwest and West, while in the dry season, winds blow from the Northeast. The average wind velocity is 2.2-2.8m/s, highest at 18-20m/s; strong winds exist in dry season. Meanwhile, Binh Dinh is affected by the Northeastern monsoon winds in dry season and the Southwestern monsoon winds in rainy season. The average wind velocity is 1.9-2.2m/s. The highest wind velocity is usually during storms. The highest wind velocity recorded at Hoai Nhon station was 40m/s in November 1984, at Quy Nhon station was 59m/s in September 1972.

Extreme weather: As the region spans across two types of terrain, the coastal delta and the highlands, each region has its own set of extreme weather conditions, particularly: Binh Dinh province, dry and hot foehn winds from Laos usually blows from June to August. On average, foehn winds blows 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, 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 Project area is one of the area's most easily affected by flood. The dry season lasts for 8 months, droughts usually take place in summer and fall (May to September). While, Gia Lai province, droughts usually manifest in the dry season, from November to April of the following year. Severe droughts usually correspond with periods in which El Nino manifests. Rainstorms mostly pour down in Pleiku highlands at an intensity of approximately 62 days per year, spread out from March to October, concentrated in May with around 13 rainstorm days. Flooding usually occurs at the end of the rainy season, along the major rivers such as the recorded Ba river. In 2016, under the effects of La Nina, heavy rainfalls and widespread floods were recorded in the Southeastern parts of Gia Lai province, including An Khe town and Dac Po district in the Project area.

3.1.5 Hydrological Conditions

All rivers within Binh Dinh province originate from the eastern side of the Annamite High Mountain Range, thus, they are usually short and highly sloped. The upstream has many mountain chains closely running along riverbanks and therefore, the rivers have a high slope, floods come and go rapidly, and flooding time is short. In the delta section, the riverbeds are vast and shallow, with many narrow passages. In water-scarce (dry) season, the water runs low but when big floods hit the downstream area, inundation can last in many days. Within the Project area in Binh Dinh, the Con river is the biggest river. It is 171km long, basin area is around 2,980km^2, ground altitude at source is 925m and average altitude of the basin is 567m. The Con river section does not cut through NH19, and the river section running most closely to NH19 is 300m from Km 50 of NH19 (CHCIP starting point). The Con river is connected with many small canals and streams that cuts through the NH19 alignment. The basin's terrain

are medium-high mountains, low mountains, and hills with an average height of 500-600m. Big floods in the Con river basin are usually the result of rainstorms. Most big floods usually take place from September to December, most of them last in a relatively short time with high return frequency.

Gia Lai province has three main river systems namely the Ba river, the Se San river and the branches of the Serepok river. The Ba river is the largest river in CHCIP area. It originates from the Ngoc Ro mountain (ground altitude of 1,240m) which runs on the eastern side of the Annamite Range through K'Bang, An Khe, Kong Chro, Ia Pa, Ayun Pa and Krong Pa districts of Gia Lai province. The Ba river is 304km long and has a basin area of 13,000km^2, of which the basin area inside Gia Lai province is around 11,450km^2. The hydrological regime of the rivers in Gia Lai are divided into two distinct seasons corresponding to the region's rainy season. Flood season starts in June and ends in October, coinciding with the rainy season in the area. The flow in flood season accounts for 85-90% of the annual total flow. Dry season starts in November and ends in May of the following year, with the flow accounting for only 10-15% of the total annual flow. According to statistics, big floods that took place in the Project area were in 1981, 1987, 1993, 1998 and 2013, many spots in An Khe bypass were inundated.

Figure 18 Hydrological Map of Project Area

3.1.6 Environmental Quality

Environmental quality sampling was performed during the preparation of the ESIA in 2017 in 12 different locations as illustrated in Figure 5: Map Sampling Location to establish the baseline conditions.

All the baseline environmental data will be updated by the Construction Supervision Consultant (CSC) at the same 12 sampling stations/locations and the results will be provided to the Contractor to incorporate into its Construction Environmental Management Plan (CESMP).

Figure 19 Map Sampling Location

The results of samplings are presented in tables below.

3.1.6.1 Air, Noise and Vibration Quality

Air quality samples were taken every two hours, over a 16 hours period at 12 locations shown in Table 3. Test results indicate that the average concentrations of TSP, CO, NO_2, SO_2 in the Project area were within the allowable limits according to both Vietnamese Air Quality Standard QCVN 05:2013/BTNMT and WHO Ambient Air Quality Guidelines. Air quality sampled at residential areas along NH19 remains relatively good with all parameters within applicable Vietnamese standards.

Permissible noise and vibration levels in Vietnam are defined in regulations QCVN 05:2013/BTNMT, QCVN 26:2010/BTNMT and QCVN 27:2010/BTNMT, respectively. At the time of baseline sampling, noise levels at the sampling locations were below established limits. While the baseline vibration level was also acceptable when considering national allowable limits, as set out in QCVN 27:2010/BTNMT, they were considerably higher than WB EHS Guidelines for residential, institutional, and educational areas. The results of the baseline noise quality sampling are presented in Table 13. Baseline Air Quality and Noise/Vibration Levels.

Table 13 Baseline Air Quality and Noise/Vibration Levels

No	Location	Air sample (sample A) *(µg/m³)*				Noise (N)	Vibration (V)
		TSP	CO	NO2	SO2	dB (6h-21h)	
1	A01, N01, V01	82.4	2658	37.4	39.4	62.1	30.1
2	A02, N02, V02	78.4	2291	46.1	43.9	63.0	32.8
3	A03, N03, V03	109.9	3769	41.7	43.4	62.4	37.3
4	A04, N04, V04	80.1	3323	32.1	38.3	60.6	35.8
5	A05, N05, V05	90.4	2517	35.6	36.9	63.3	38.0
6	A06, N06, V06	69.0	1766	26.4	34.4	59.9	36.3
7	A07, N07, V07	76.6	2785	29.7	37.8	60.0	31.1
8	A08, N08, V08	74.5	2658	31.6	35.0	59.7	34.5
9	A09, N09, V09	73.3	2654	30.0	29.8	61.1	31.9
10	A10, N10, V10	74.9	3391	25.7	29.6	59.1	32.5
11	A11, N11, V11	80.6	2521	39.7	42.6	62.3	39.8
12	A12, N12, V12	76.1	2978	29.3	34.5	59.4	34.6
QCVN 05:2013/BTNMT (average concentration 1h)		**300**	**30.000**	**200**	**350**	-	-
QCVN 26:2010/BTNMT		-	-	-	-	**70**	
QCVN 27:2010/BTNMT		-	-	-	-	-	**70**
WHO Ambient Air Quality Guideline[6]				**200**	**500**		
WB EHS Guidelines for residential, institutional, and educational areas						45 (nighttime)	

No	Sample location	Coordinates	Code	Characteristic
1	Residential area of Tay Thuan commune, Tay Son district, Binh Dinh province	13□57‟5,7”N, 108□50‟12,1”E	A01, N01, V01	On the roadside of NH19, near residential areas. It was observed that most passing vehicles were motorcycles.
2	Residential area of Song An commune, An Khe town, Gia Lai province	13□58‟38,6”N, 108□42‟51,3”E	A02, N02, V02	
3	Residential area of An Phuoc ward, An Khe town, Gia Lai province	13□59‟47,3”N, 108□41‟16,8”E	A03, N03, V03	On the roadside of NH19, near residential areas. It was observed that most passing vehicles were motorcycles, private cars and buses.
4	Residential area of Cu An commune, Dak Po district, Gia Lai province	13□57‟42,6”N, 108□37‟19,2”E	A04, N04, V04	

[6] Revised WHO Guidelines are expected sometime in 2020.

5	Residential area of Kon Dong town, Mang Yang district, Gia Lai province	14□02‟36,8”N, 108□15‟34,7”E	A05, N05, V05	
6	Residential area of Glar commune, Dak Doa district, Gia Lai province	13□58‟32,4”N, 108□07‟34,9”E	A06, N06, V06	On the roadside of NH19, near residential areas. It was observed that most passing vehicles were motorcycles.
7	Residential area of Ia Bang commune, Dak Doa district, Gia Lai province	13□55‟41,9”N, 108□03‟58,5”E	A07, N07, V07	
8	Residential area of Bau Can commune, Chu Prong district, Gia Lai province	13□51‟24”N, 107□56‟20,3”E	A08, N08, V08	
9	Residential area of Thang Hung commune, Chu Prong district, Gia Lai province	13□49‟24,7”N, 107□53‟29,5”E	A09, N09, V09	
10	Residential area of Ia Din commune, Duc Co	13□50‟13,6”N, 107□47‟54,7”E	A10, N10, V10	On the roadside of NH19, near residential areas. It was observed that most passing vehicles were motorcycles, private cars and buses.
11	Residential area of Chu Ty town, Duc Co district, Gia Lai province	13□48‟2,1”N, 107□40‟53,1”E	A11, N11, V11	
12	Route end – Km241 NH19	13□45‟57,6”N, 107□31‟23,4”E	A12, N12, V12	

Field observations and inspections conducted in March 2020 showed that traffic density observed along the project route was medium to low with no visible evidence of air pollution. Households consulted during a rapid assessment of 20 interviews conducted with around 20 households located along the road (from starting point to ending points) have no complaint about air quality. The 2019 Gia Lai DONRE Environmental Monitoring Report stated that air quality is within permissible limits. As such, it has been determined the 2017 data on air quality is still valid and sampling was not repeated as part of the updating of the ESIA.

3.1.6.2 Surface Water Quality

Surface water samples were collected at two locations as indicated in Figure 5: Map Sampling Location and the test results are presented in Table 14. show that all water quality parameters were within the limit set in QCVN 08- MT:2015/BTNMT 7, Column B1. As sampling was carried out in rainy season, the TSS content was near the permissible limits.

Table 14 Surface Water Quality

No	Parameters	Unit	Result		QCVN 08-MT:2015/ BTNMT (Column B1)
			NM01	NM02	
1	Temperature	°C	25.5	26.1	-
2	pH	-	7.2	7.3	5.5 – 9
3	Turbidity	NTU	58.1	61.2	-
4	DO	mg/L	4.2	4.5	≥ 4
5	COD	mg/L	20.8	17.6	30
6	BOD5	mg/L	12.5	11.4	15
7	TSS	mg/L	47.3	46.4	50
8	Cu	mg/L	0.017	0.062	0.5
9	Zn	mg/L	0.029	0.058	1.5
10	Fe	mg/L	0.48	0.37	1.5
11	Cd	mg/L	<0.0002	<0.0002	0.01
12	As	mg/L	<0.0002	<0.0002	0.05
13	Pb	mg/L	0.003	0.008	0.05
14	Grease and oil	mg/L	0.27	0.33	1
15	Coliform	MPN/ 100mL	1,800	3,200	7,500

No	Sample location	Coordinates	Code	Characteristic
1	Ba La bridge	13□56‟56,4”N, 108□50‟38,4”E	NM1	Turbid water, slow water flow
2	Ba river bridge	13□57‟15,4”N, 108□39‟5,3”E	NM2	Turbid water, many rocks, slow water flow

Field observations and inspections conducted in March 2020 showed that water level is quite low and there is no trace of visual contamination such as bad smell, turbidity, color. This observation was confirmed by local people interviewed that water quality is good and there is no trace of water contamination.

Surface water from Ba river is pumped by surrounding agricultural household. As per interview with local people, water quality of Ba river is particularly good for irrigation. The An Khe hydropower is just 02 km on the upstream from location of new bridge. However, local people in the downstream of An Khe hydropower dam are facing serious problem on water scarcity leading to the large scale drought due to the significant reduction of Ba river flow, especially after the An Khe hydropower started operation on 2011.

Ba La stream, which is connected directly to Con river, the water level at Ba La bridge is strongly impacted by the Con river flow which is regulated by Van Phong irrigation dam. In dry season, the dam gate is closed leading to the elevation of water level in Ba La stream but there is not visual current observed. Water quality is also strongly influenced by Con river.

The existing Ba bridge crossing Ba river where water sample collected in 2017, but not included in the project

A new Ba bridge will be constructed in this site along An Khe bypass, 6km from the upstream of existing Ba bridge

Figure 20 Existing Ba Bridge

According to Environmental Monitoring report of 2019 prepared by DONRE of Gia Lai province, it was stated that water quality of Ba river (location at existing Ba river bridge) are slightly polluted with elevated indicators such as TSS, BOD, COD, DO and Total Coliform (Hepatitis A and E risks) due to discharging domestic wastewater from surrounding residential areas.

All other Project bridges are crossing small streams with very weak flow. Most of them are nearly drained and/or blocked with extremely poor ecological value. It is recommended that samples will be taken by the Construction Supervision Consultant (CSC) in the following locations and results will be provided to Contractor to incorporate the result in its Construction Environmental and Social Management Plan (ESMP).

Table 15 Proposed for additional sampling prior to construction commencement

No	Proposed Sample location	Sta.	Code	Sampling Location
1	Ba bridge		NM1	Existing
2	Ba La bridge		NM2	Existing
3	Ba bridge – An Khe bypass (2km at downstream of An Khe hydropower dam)		NM3	New
4	Suoi Da bridge – An Khe bypass		NM4	New
5	Linh Nham bridge		NM5	New
6	Thau Dau bridge		NM6	New
7	An My 2 bridge – Pleiku bypass		NM7	New

3.1.6.3 Groundwater Quality

Analysis results of groundwater sampled at 2 locations indicated that all parameters are within the allowable limits of QCVN 09-MT:2015/BTNMT8.

Table 16 Groundwater Quality

No	Parameter		Unit	Result		QCVN 09-MT:2015/BTNMT
				NN01	NN02	
1	Temperature		^{o}C	27.2	26.9	-
2	pH		-	6.7	7.1	5.5 - 8.5
3	Hardness		mg/L	118	175	500
4	Turbidity		NTU	1.7	2.1	-
5	Conductivity		µS/cm	135	162	-
6	TS		mg/L	355	401	1500
7	COD		mg/L	3.1	2.7	-
8	Mn		mg/L	0.38	0.22	0.5
9	Fe		mg/L	1.42	1.15	5
10	As		mg/L	0.0017	0.0021	0.05
11	Hg		mg/L	<0.0002	<0.0002	0.001
12	Pb		mg/L	0.003	0.004	0.01
13	Zn		mg/L	0.012	0.019	3
14	Cd		mg/L	<0.0002	<0.0002	0.005
15	Coliform		MPN/ 100mL	0	1	3

No	Sampling location	Coordinates	Code	Characteristic
1	Route avoiding An Khe town	13°57′42,7″N, 108°37′19,3″E	NN1	Clear, colorless, odorless wells 20-30m deep water
2	Rote avoiding Pleiku city	13°55′48,7″N, 108°5′41,9″E	NN2	Clear, colorless, well depth at 15m

Based on the Environmental Monitoring Report 2019 prepared by DONRE of Gia Lai province, it is stated that ground water quality at sampling locations are within the allowable limits of QCVN 09-MT:2015/BTNMT8.

3.1.6.3 Soil Quality

Results of soil sampled at two locations indicates that that the contents of heavy metals were within the limits set in QCVN 03- MT:2015/BTNMT9. The results of the soil quality in the Project area are presented in Table 17.

Table 17 Soil Quality

No	Parameter	Unit	Result		QCVN 03-MT:2015/BTNMT (arable land)
			D01	D02	
1	As	mg/kg dry soil	2.97	3.48	15
2	Cu	mg/kg dry soil	23.64	31.45	100
3	Zn	mg/kg dry soil	82.15	59.32	200
4	Pb	mg/kg dry soil	13.46	15.71	70
5	Cd	mg/kg dry soil	0.38	0.25	1.5

No	Sample location	Coordinates	Code	Characteristic
1	An Khe town bypass, in Hiep Phu hamlet, Cu An commune, Dak Po district	13°58‟7,2”N, 108 °37‟45,6”E	D1	Land cultivating farm produces, Hiep Phu hamlet, Cu An commune, Dak Po district
2	Pleiku city bypass in A Dok commune, Dak Doa district	13°55‟48,8”N 108°5‟41,7”E	D2	Garden land growing coffee plants, A Dok commune, Dak Doa district

Based on the Environmental Monitoring Report 2019 prepared by DONRE of Gia Lai province, it is also stated that soil quality at sampling locations are within the allowable limits of QCVN 03-MT:2015/ BTNMT.

From 2017 to 2020, there have not been any socio-economic activities such as mining, industrial waste discharging etc. that can potentially result in soil pollution

3.1.6.4 Sediment Quality

The results of sediment samples obtained at the same locations where surface water samples were taken indicate that all parameters were within the limits provided in QCVN 43:2012/BTNMT, as shown in Table 18 below.

Table 18 Sediment Quality

No	Parameters	Result		QCVN 43:2012/BTNMT (fresh water sediments)
		SD1	SD2	
1	As	1.1	2.3	17
2	Cd	0.8	0.9	3.5
3	Pb	35.2	41.2	91.3
4	Cu	28.9	56.3	197
5	Zn	36.9	48.9	315

As per Environmental Monitoring Report of 2019 prepared by DONRE of Gia Lai province, sediment samples were not collected. The construction of project bridges does not require to excavate large volume of sediment at river/stream. There are no industrial sources located close to project stream/river that can potentially be contaminated by illegal discharge of wastewater/solid wastes.

3.1.7 Biological Resources

3.1.7.1 Terrestrial Ecosystem

The areas along NH19 used to be affected by civil wars and by human exploitation. Thus, the existing vegetation cover in the Project area are either planted or regenerated. The Gia Lai Department of Natural Resource and Environment and the People’s Committee of Tay Thuan, Tay Giang communes of Tay Son District, Binh Din informed that there are no known animal or plants species listed in Vietnamese Red Book in these areas. Forests appear scattered along the Project areas and are mainly of two types, as follows:

- Watershed protection forests: Dominated mainly by three-needled pines, these forests were mostly planted from the 1980s and are now being maintained and protected to keep the soil and water for river basins. Watershed protection forests were observed at Km65-68 and Km180-185 of the NH19 and are usually around 15-20m away from existing roads.
- Production forests: These are popular in the Project areas and are most found between Km50and Km90. Production forests include eucalyptus species, acacia utriculiform, acacia hybrid which are

planted and harvested regularly following each species cycle. The forests are usually about 5m away from existing NH19 road margins. An Khe bypass, at the section from Km0 to Km10 crosses through the production forest area of local residents.

In addition to forests, other terrestrial ecosystems found in the Project includes:

- Garden on hills: This garden mainly consists of industrial trees such as pepper, coffee and rubber. Garden mostly observed on the roadsides from Km135 to Km243 on NH19 in Mang Yang, Dak Doa, Duc Co districts and Pleiku city of Gia Lai province.
- Agriculture ecosystem: rice, vegetables or food trees/plants are grown on valleys are cultivated with cassava, sugar canes and elephant grass on low hills. These ecosystems can be easily observed in the NH19 section from Km50 to Km90 part of Tay Son district, Binh Dinh province; An Khe town, Dak Po district, Gia Lai province. In addition, agricultural ecosystems with rice and vegetables were also observed along the Pleiku bypass.
- Urban ecosystem: is highly popular in the Project, scattered along NH19. Gardens grow fruit trees such as bananas, star apples, mangoes, or industrial trees such as pepper, coffee, etc.

According to the 2011-2019 Environmental Status Reports of Binh Dinh and Gia Lai and interviews with residents, several popular animal species are regularly spotted in the Project area, nesting in residential areas and agricultural production areas, including bats, voles. Domestic animals include dogs, cats, pigs, chicken, geese, ducks, buffaloes, cows, goats. Mountainous areas are home to squirrels, porcupines, weasels, viverrids. Popular reptiles, amphibians such as lizards, snakes, toads, rice field frogs, Chinese edible frogs (Hoplobatrachus rugulosus), live on fields or canals along the route. Some species are found in gardens and around residential areas such as house geckos, Asian toads, banded bullfrogs. These species do not have high biodiversity values.

3.1.7.2 Aquatic Ecosystem

According to the Environmental Status Reports of Binh Dinh and Gia Lai provinces, the Project area has species includes aquatic plants such as *Eichhornia crassipes,Vallisneria spiralis, Ceratophyllum demersum, Myriophyllum verticillatum, Nymphaea pubessens*, phytoplanktons belonging to 4 phytoplankton phyla, that is, *Bacillariophyta, Cyanobacteria, Chlorophyta and Euglenophyta*. Among these, *Chlorophyta* dominate in terms of species share and visibility frequency, followed by *Bacillariophyta, Cyanobacteria and lastly, Euglenophyta*. Interview with local residents show that they are not aware if there is any rare/endangered species present in the Project area.

The following species were identified in the previous surveys, Anabastestudineus, Chanastriatus, Monopterusalbus, Mastacembelidae, Notopterus notopterus, Carassius auratus, Rasbora aurotaenia, Rasborinus lineatus, Oreochromis mossambicus. Overall, the density of natural fish remains low while farming output is also modest, mostly sufficient for local use only. Apart from that, fish and shrimps are also farmed in ponds and lagoons at a household scale and serve local demand.

Zooplankton species identified in the Project area belong to the following groups: Copepoda, Cladocera, Rotatoria, Paramecium, and other groups such as Crustacean larva, Mollusc larva, Insect larva. Among these, Copepoda dominate in terms of species share and visibility frequency, followed by Cladocera, Rotatoria and other groups.

Besides phytoplankton and zooplankton, the Project area also houses benthic species including Mollusc, Arthropoda of different classes: Bivalvia, Gastropoda and Crustacea. Among these, the Crustacea class occupy the largest share.

As the Project area mainly consists of agricultural ecosystems, the diversity of species is limited, the majority of which are crop plants and domestic animals of the residents.

Comments: It is clear that under the impact of human activities in the Project area, the flora and fauna found along the route are relatively poor, most of them are crop plants and domestic animals, and there is no known precious, endangered species or species listed in the Red Book in the Project area. Areas with rich, rare, and valuable ecosystems and high biodiversity such as national parks, conservations areas are located quite far from the Project area (20-50km).

3.1.8 National Parks, Conservation Areas near the Project Area

The Kon Ka Kinh National Park and the Kon Chu Rang Nature Reserve located at least 20 km away from project sites.

The Kon Ka Kinh National Park is located in Gia Lai province, around 20km away from NH19‟s Project section. The Kon Chu Rang Nature Reserve spreads across the three provinces of Gia Lai, Quang Ngai and Binh Dinh, with the closest distance from NH19's Project section being around 50km.

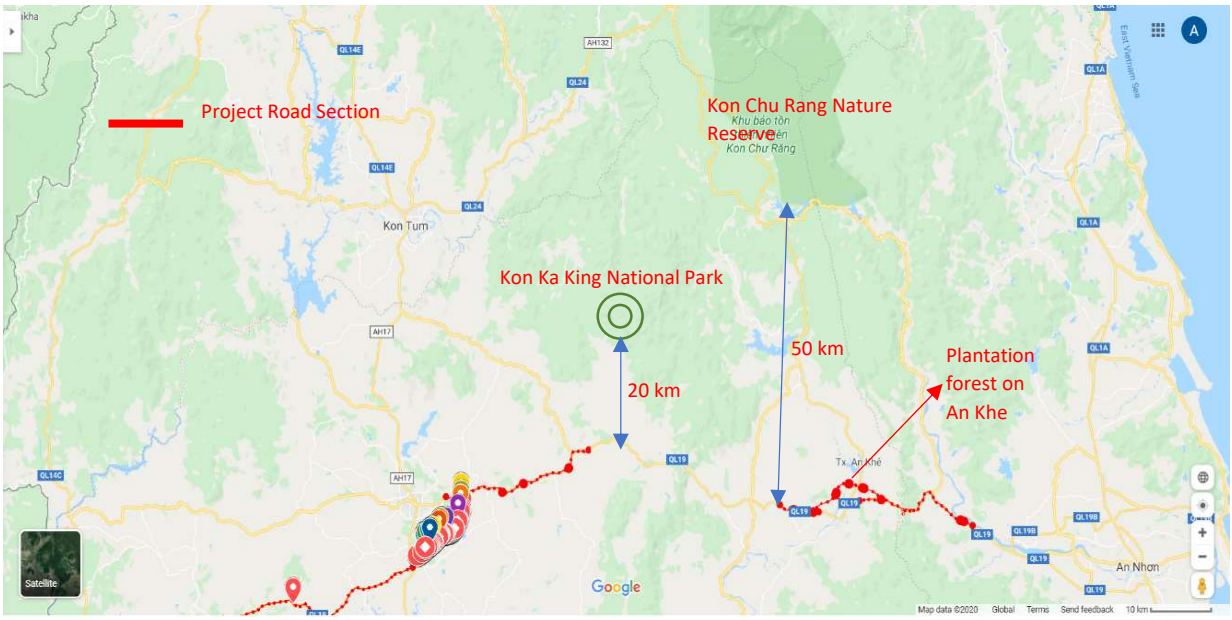


Figure 21 Location of National Parks, Conservation Areas

Kon Ka Kinh National Park: located at Kon Pne, Dak Rong and Krong communes of K'Bang district; Ha Dong commune, Dak Doa district; and Ayun commune, Mang Yang district, Gia Lai province. The total natural land area of the park is 41,780ha. Kon Ka Kinh National Park has 33,565ha of natural forests, which accounts for 80% of its total land area. The park now has different forest habitats in the mountains, of particular importance is the 2,000ha of mixed forests between broad-leaved trees and pine trees, including *Fokienia hodgisii* (Le Trong Trai et al. 2000). This area might inhabit the most pristine biomes in the mountainous region of Central Annamite Range, including the habitat of species currently at risk of extinction such as *Pygathrix cinerea*, *Hylobates gabriellae* and *Panthera tigris* (Le Trong Trai et al. 2000). Kon Ka Kinh lies inside the Kon Tum Plateau Endemic Bird Area where it was identified 6 biome-restricted bird species (Le Trong Trai et al. 2000), one of which is *Garrulax konkakinhensis* – the endemic species of Kon Tum highlands currently considered as globally endangered at the Vulnerable level. The Kon Ka Kinh National Park also registered the presence of four true frogs species that are endemic to the

Annamite Range: *Leptobrachium banae, L. anthospilum, Rana attigua* and *Rhacophorus aliogaster* (IUCN-SSC and CI-CABS 2003).

The Kon Chu Rang Nature Reserve: is located on Son Lang commune, K'Bang district of Gia Lai province. The total natural area of the reserve is around 15,900ha. Kon Cha Rang has a natural forest area of 15,610ha, which represents 98% of the total reserve area. The main type of forest found here is tropical evergreen forest on low mountains, located at an altitude of 900-1,000m at the Northwest of the reserve and dominating 70-80% of the forest area here. The dominant flora are the family plants of *Re Lauraceae*, *Magnoliaceae*, *Podocarpus imbricatus*, *Dacrydium elatum.* The conservation area also has low-mountain evergreen forests at 900m altitude. Only 2% of the reserve is covered in secondary forests, mainly sheltering some pulpwood and shrubs (Anon. 1999). Surveys carried out by the Forest Inventory and Planning Institute and BirdLife International in 1999 listed up to 546 species of Kormobionta connected to 376 branches, 122 genera. Some plant species have been regionally acknowledged as having the globally endangered status, 9 of which are endemic to Vietnam, namely: *Acer erythranthum*, *Baccaurea silvestris*, *Bulbophyllum hiepii*, *Calamus poilanei,Craibiodendron scleranthum*, *Dalbergia cochinchinensis*, *Dendrobium ochraceum*, *Dialium cochinchinensis,* and *Michelia mediocris* (Anon.1999). Survey results also confirmed the existence of 62 animal species, 169 bird species and 161 butterfly species. Of the animals, 8 species are classified as globally endangered and 17 are listed in the Vietnamese Red Book. Notably, there are 3 animal species endemic to the Indochina region, namely, *Hylobates gabriellae*, *Pygathrix nemaeus cinereus* and *Megamuntiacus vuquangensis* (Anon. 1999). Furthermore, Kon Cha Rang is also one of the few areas that registered (although unofficially) the habitat of *Axis porcinus annamiticus* – a specific, endemic species to Indochina that is on the edge of extinction. Two bird species identified in the area which are globally endangered, that is, Rheinardia ocellata and Heliopais personata. Another 7 bird species are at risk. Particularly, 5 biome-restricted bird species have been registered, including *Rheinardia ocellate, Garrulax milleti*, *G. Vassali*, *Jabouilleia danjoui*, and *Macronous kelleyii.* Surveys on regional butterfly fauna reveal 7 taxons that might be new to science (Anon. 1999).

3.2 Socio-economic Condition

Seven (7) Contract Packages lie within Gia Lai province with a total length of 126.84km, out of the 143.84km stretch of CHCIP. Economic condition of the project area is discussed below:

Pleiku city: In 2018, the ratio of trade-services accounted for 53.07%, industry and construction accounted for 42.86% and agriculture, forestry and fisheries accounted for 4.08%. In 2018, average income / hectare of production reached about VND 93 million. Per capita income in 2018 reached 52 million / person / year

An Khe Town: The ratio of industry is 50.4%, service 40.4%, agriculture 9.2%

Đắk Pơ District: The ratio of trade-services is 41.5%, industry and construction accounted for 50.0% and agriculture, forestry and fisheries accounted for 8.5%. The district's grain food production in 2018 is 526.851 tons. The total cultivated area of the district is 22,415.5 ha, of which rice is 1,416.6 ha. Per capita income reached 45.36 VND million / person / year up to 2018

Mang Yang District: In 2018, the ratio of trade-services accounted for 26.1%, industry and construction is 25.7% and agriculture, forestry and fisheries accounted for 48.1%. Per capita income reached 36 million / person / year.

Đắk Đoa District: The economy has experienced steady growth, averaging at 11.0% / year. In the end of 2018, the total value of production reached VND 7.284 billion. Per capita income is estimated at VND 41.1 million/ person / year in 2018. Agricultural economy achieved an average growth of 3.9 % / year in which the ratio of trade-services accounted for 34.4%, industry and construction accounted for 23.84% and agriculture, forestry and fisheries accounted for 41.76%; agricultural development oriented commercial

production, has formed and developed some concentrated production areas of industrial crops of high economic value, such as coffee, pepper. The district currently has over 27,800 hectares of coffee, 6,858.0 hectares of rubber; over 3,205 ha of pepper. In animal husbandry, the district had a total livestock and poultry around 234.315 heads, of which cattle are 61.415 heads, crossbred rate was 26.2%.

Chư Prông District: The total production value in 2018 of the district reached VND 6,508.1 billion (100%), in which agriculture, forestry and fishery is 59.8%, industry and construction are 17.5% and services are 22.7% The total crop area of the district is 15621,6 hectares. Per capita income in 2018 reached 40 VND million / person / year.

Đức Cơ: In 2018, the value of agriculture, forestry and fishery production of the disrtict reach VND 2128.6 billion, in which service production value reached VND 1861.1 billion, accounting for 37.25%; production value of handicraft industry and construction reached VND 1006.5 billion, reaching 20.15%. The total cultivated area of the whole district has reached 32288.2 ha; in which Long-term industrial crops (coffee, rubber, cashew, pepper) with an area of 28864 ha. Equivalent to 40% of the total natural area of the district and 89.4% of the total cultivated area.

Only one Contract Package (PK CW1) lies within Binh Dinh province which passes through Tay Son district consisting of two communes namely Tay Thuan and Tay Giang. Based from the province Statistical Yearbook, 2018, **t**he total area of both communes is 15 hectares with 10 administrative units with a total population of 20,786 spread across 5,224 households**.** The project goes through Tay Sơn District and forest land occupies a large proportion on land use status of the whole province as shown in matrix below.

Table 19 Land Use Status

Administration unit	Agricultural	Forestry	Dedicated land	Residential land	Total
Binh Dinh province	136,730	370,643	35,533	9,514	607,133
Tay Son district	18,049	39,558	6,512	1,022	69,220

On the other hand, the average income per capita of the two project communes is about 42 million VND/person/year, of which Tay Giang is 43 million VND and Tay Thuan is 41million VND. The percentage of poor households is relatively low, while the number and percentage of near poor households remains high.

3.3 Existing Infrastructure and Services

3.3.1 Road Network

NH 19 connects Quy Nhon Seaport with the Central Highland provinces and ends at the Le Thanh Border Gate (Km243 – Gia Lai province). The section passing through Binh Dinh province is 67km long, with the following corresponding scale:

- Section from Quy Nhon Seaport Km0 to Ong Tho T-junction: 5km long, road embankment width 21.5m, asphalt surface Bm=14m;
- Section from Ong Tho T-junction (around Km5) to Ba Gi bridge T-junction Km17+256 (intersecting with NH1): Level III delta road standards, roadbase width 12m, asphalt surface Bm=11m;
- Section from Km17+027 to Km50: this section has been expanded to 11m/12m for the outer urban section, and to 13m/15m for the section running through urban areas;

- Section from Km50 to the end of An Khe Mountain Pass (Km67): road surface width 7m and roadbase width 9m;
- Section from Km67 to Km76: Level IV delta road, road surface width 7m, road base width 10m;
- Section from Km76 (Ka Nat crossroads) to Km82+200 (An Khe town urban area): secondary main road, Bn=24m, Bm=14m;
- Section from Km82+200 to Km90: Level IV delta road, Bn=10m, Bm=7m;
- Section from Km90 to Km108: has not been upgraded, although work to expand the roadsides has been started, bored holes drilled for bridge expansion, however, construction works have temporarily stopped. Asphalt road surface width 7m, road embankment width 10m;
- Section from Km108 to Km131+300: completed following the BOT investment. Asphalt road surface width 11m, roadbase width 12m;
- Section running through Kon Dong town (Km131+300 to Km135): 3.7km long. Secondary urban road, $B_{road\ base}$=24m, $B_{road\ surface}$=14m;
- Section from Km135 to Km152+500 (from the end of Kon Dong town to the beginning of Dak Doa town): 17.5km long, Level IV delta road, road surface width 7m, roadbase width 10m;
- Section from Km152+500 to Km155 (Dak Doa town): 2.5km long, secondary main road, $B_{road\ base}$=24m, $B_{road\ surface}$=14m *(4 lanes)*;
- Section from Km155 to Km160 (from the end of Dak Doa town to the beginning of Pleiku city): 5km long, Level IV delta road, $B_{road\ base}$=10m, $B_{road\ surface}$=7m;
- Section from Km160 to Km167 (from the beginning of Pleiku city to NH14 Phu Dong junction, Km531 NH14, Km1590 Ho Chi Minh Highway): secondary main road, $B_{road\ base}$=35m, $B_{road\ surface}$=21m *(6 lanes)*;
- Section from Km180 to Km218+500 (Ham Rong junction to the beginning of Chu Ty town, Duc Co district): Level III mountain road, road surface width 7m, roadbase width 10m;
- Section from Km218+500 to Km222 (section passing by Chu Ty town): Level III mountain road, road surface width 13m, roadbase width 17m-21m;
- Section from Km222 to Km241 (at the end of Chư Ty town): Level III mountain road, road surface width 7m, road base width 10m;
- Section from Km241 to Km243 (Le Thanh Border Gate): 2km long, Level III mountain road, road surface width 21m *(6 lanes)*, road base width 27m;

Apart from that, the Project area also has other National Highways that intersect with NH19, namely:

- National Highway 1A: The section passing by Binh Dinh province is 118km in length, runs from Binh De Mountain Pass (Km1125) to Cu Mong Mountain Pass (Km1243), passing by the following districts: Hoai Nhon, Phu My, Phu Cat, An Nhon, Tuy Phuoc, and Quy Nhon city. This is a Level III delta road, $B_{road\ base}$= 12m, asphalt road surface $B_{road\ surface}$= 11m, currently being upgraded to Level III road with 4 lanes. The section from Ong Do bridge Km1218+57 to Phu Tai sluice gate at Km1223+2017 is 4.7km long, Level II urban road, construction line 30m.
- National Highway 14: NH14 from DaKrong bridge of Quang Tri province, passes by Thua Thien Hue, Quang Nam, Kon Tum, Gia Lai, Dak Lak provinces and ends at Chon Thanh town, Binh Phuoc

province. The route is 889.7km long, Level III-V road, road base width 7-10m, road surface width 5-7m, currently being upgraded.

The average traffic flow at selected locations based on the vehicle count conducted during the FS is presented in Table 20- Average Traffic Flow at Selected Locations. Traffic count was likewise conducted during the DDD and results are compared with the traffic count from FS to DDD in Tables 21 and 22.

As to the traffic survey in the DDD vehicular transport/ public transport routing along NH19, traffic is continuously increasing, thus, adverse impacts, such as road accidents, increased noise levels, and air quality deterioration may occur.

Table 20 Average Traffic Flow at Selected Locations in 2016

No	Station name	Section	Private vehicles	Light truck	2 axles medium truck	Heavy truck		Buses		Tractors/ Simple and small carriages	Motorcycle/ Three-wheeled	Bicycles/ Pedicabs	Total cars	Counted direction
						3 axles	Over 4 axles	Small	Large					
A	**First 6 months of 2016**													
1	An Khe	Km 90+900	369	12	487	212	223	404	88	0	n/a	n/a	**1794**	Binh Dinh - Gia Lai, Gia Lai - Binh Dinh
2	K'Dang	Km 142+040	515	340	549	192	129	427	256	138	0	n/a	**2546**	An Khe - PleiKu, PleiKu - An Khe
3	Chu Prong	Km 197+300	187	190	250	95	55	113	137	0	0	n/a	**1027**	Ham Rong – Duc Co, Duc Co – Ham Rong
B	**Q3/2016**													
1	An Khe	Km 90+900	397	8	551	206	195	490	81	3			**1928**	Binh Dinh - Gia Lai, Gia Lai - Binh Dinh
2	K'Dang	Km 142+040	422	278	424	162	108	356	186	49			**1936**	An Khe - PleiKu, PleiKu - An Khe
3	Chu Prong	Km 197+300	179	202	290	74	57	180	94				**1076**	Ham Rong – Duc Co, Duc Co – Ham Rong

Table 21 Comparison of PCU between FS forecast data and DDD actual counting by road section with assumption of traffic flow growth rate of 6% per year

DD										FS	
Location	Car <12 seats	Coach		Truck					PCU (02/2020)	PCU (2019-2020)	PCU deviation (%) DD-FS
		Cars from 12 seats to 30 seats	Vehicles of 31 seats or more	Trucks under 2 tons	Truck from 2-4T	Trucks from 4t to 10t	Trucks from 10T to 18T, Cont vehicles. 20 fit.	Trucks of 18T or more; Car Cont. 40 fit.			
Section 1	1512	665.5	213.5	42	424.5	437.5	184	303.5	6859	7524	**-8.84%**
Section 2	2314	619	193	123	625	420	182	216	7684	7753	**-0.89%**
Section 3	1395	337	73	57	372	249	58	76	4057	4733	**-14.30%**

* Source: Traffic and axle load survey report submitted by March 25, 2020.

Table 22 Comparison of PCU between FS forecast data in 2017 and actual count in 2020 on traffic flow

	FS forecast data (2017)*	DD actual count (2/2020)**	% deviation
Section 1	6696	6859	2%
Section 2	6900	7684	11%
Section 3	4212	4057	-4%

Sourced: (*) from Table 4.5 and (**) Table 4.6 of Traffic and axle load survey report, Detailed Design Consultant, March 2020

3.3.2 Water Supply and Environmental Sanitation

Data from the Center for Rural Water Supply and Environmental Sanitation of Binh Dinh province shows that the ratio of residents using clean water in Tay Giang and Tay Thuan communes is 71.1% and 74.2%, respectively. The main source of water is the Vinh An Water Supply Plant (capacity 977 m^3/day) and local wells.

According to statistics compiled by Gia Lai province, the rate of residents using clean water in the districts covered by the Project ranges from 61.2% to 98.5%, in which the highest ratio was recorded in Pleiku city and lowest in Mang Yang district.

3.3.3 Drainage and Flooding

The areas near the Ba La and Lo Gom bridges are the lowland areas of Tay Giang commune in Binh Dinh province that were subjected to inundation at 1 to 1.5m during 1.5-2h after the heavy floods in January 2013 and December 2016. The drainage channels along the residential area in Dong Pho of Tay Giang commune often clogged with heavy rain. Along the section at Km57, the Thuong Son residential area of Tay Thuan commune is flooded when heavy rain due to a small drain aperture with flood level from 0.3 to 0.5m.

3.3.4 Domestic Solid Waste Treatment

Domestic waste collection services is available in populated areas located along NH19 and will support the Project (such as Tay Son district, An Khe town, Dak Po district, Kon Dong town and adjacent areas, Dak Doa town and adjacent areas, Pleiku city and adjacent areas, Chu Ty town and adjacent areas). The service is managed by urban management authorities, contractors, or teams such as the Hoa Thien Company in An Khe town, Urban Management Team of Kon Duong Town, Urban Utilities of Gia Lai City or Transport and Urban Services of Duc Co District. The collected waste is transported to landfills such as the Tay Xuan landfill in Tay Son district of Binh Dinh province, An Khe landfill in Song An commune of An Khe town, the Kon Dong landfill in Kon Dong town, city landfill in Gao commune of Pleiku city), and the landfill of Chu Ty town.

For thinly populated areas and those far from the center, local residents are collecting and self-treating domestic waste within the household.

3.3.5 Power Supply and Communication

Overall, grid electricity is provided to all communes affected by the Project, thus, 100% of the households are using the national electricity grid for lightning and daily use. Some residents shared that they use electricity for cooking purposes (such as rice cooking or induction cooker) as per interview during public consultations.

The main communication channels used by affected households in the Project area include mobile phones and television. The survey shows that 100% of households have access to these channels.

3.4 Social Conditions

3.4.1 Land Use

The Project lies particularly in Tay Son district – Binh Dinh province while An Khe town, Dak Po district, Mang Yang district, Dak Doa district, Pleiku city, Chu Prong district and Duc Co district – Gia Lai province.

For Tay Sơn District, Binh Dinh province, forestry land occupies a large proportion of the overall land use status of the province as shown in Table 23 (A and B): Existing land Use in the Project Area:

Table 23a Land use status of project province/district (ha)

Administration unit	Agricultural	Forestry	Dedicated land	Residential land	Total
Binh Dinh province	136,730	370,643	35,533	9,514	607,133
Tay Son district	18,049	39,558	6,512	1,022	69,220

Source: Binh Dinh Statistical yearbook 2018

For Gia Lai covering 7 districts/town/city, agricultural land accounts for the largest share. The detailed land use status is presented in Table 23 B - Land Use Status.

Table 23b Land use status of town/district/city in project area (ha)

Administration unit		Agricultural	Forestry	Specially used/ Dedicated land	Homestead/ Residential land	Total
Gia Lai province	TX. An Khê	12,455	3,965	1,735	642	20,007
	Đak Pơ	24,165	18,035	3,812	385	50,253
	Mang Yang	49,406	51,864	5,910	2,015	112,718
	Đak Đoa	65,237	20,904	3,801	1,174	98,530
	Tp. Pleiku	16,693	2,273	3,211	2,832	26,077
	Chư Prông	105,395	45,596	3,530	1,035	169,391
	Đức Cơ	60,395	6,543	2,589	460	72,186
Land use structure		56.9%	30.5%	5.0%	1.5%	100.0%

Source: Gia Lai Statistical yearbook, 2018.

Details about existing land use status along NH19 is presented in Table 24 below.

Table 24 Land-use along NH19

Section	Section	Land Use Status
Km50 - Km76	Km 50+800 to Km52+100	Residential land for Ta Giang 1 residential area, Tay Giang commune
	Km52+100 to Km53+200	Agricultural land, mostly for rice and sugar cane
	Km53+200 to Km54+900	Residential land for Dong Pho residential area, Tay Giang commune
	Km54+900 to Km56+100	Agricultural land, mostly for rice, cassava and sugar Cane
	Km56+100 to Km58+300	Residential land for Trung Son, Thuong Son residential areas, Tay Thuan commune
	Km58+300 to Km67	Agricultural land, mostly for cassava, Acacia auriculiformis, gum trees
	Km67 to Km73+200	Residents houses mixed with agricultural landlots in Thuong An, An Thuong, An Thuong 2 hamlets, Song An commune
	Km73+200 to Km76	Residential land of Group 6, 7 residential area, Ngo May ward
An Khe Bypass	Km0 to Km0+700	Paddy land of local residents
	Km0+700 to Km1+390	Plantations land with Acacia auriculiformis and gum Trees
	Km1+390 to Km7+560	Agricultural land with some main crops including cassava and sugar canes, alongside several small areas cultivating Acacia auriculiformis, gum trees and rice
	Km7+560 to Km13+560	Agricultural land with some main crops including subsidiary crops, sugar canes, corn and rice
	Km13+560 to Km13+700	Residential land
Km82+200 to Km90	Km82+200 to Km88+100	Residential land of residential areas of Cu An and Tan An commune
	Km88+100 to Km90	Agricultural land with sugar canes as the main crop
Km131+500 to Km152+500	Km131+500 to Km136	Residential land of Kon Dong town
	Km136 to Km138	Residential land of Linh Nham residential area, Dak Djang commune, mixed with agricultural landlots cultivating coffee
	Km138 to Km143+800	Residential land of residential areas of Dak Djang and K‟Dang communes
	Km143+800 to Km144+600	Agricultural land with coffee and pepper as main crops
	Km144+600 to Km146+600	Residential land of Cau Vang residential area, K‟Dang Commune
	Km146+600 to Km147+200	Agricultural land with rubber as the key crop
	Km147+200 to Km151+500	Residential land of residential areas of hamlets 1, 2 and 3, Tan Binh commune, mixed with agricultural landlots planting rubber, coffee and pepper
	Km151+500 to Km152+500	Residential land of Dak Doa town
Km155 to Km160	Km155 to Km157+300	Residential land of Dak Doa town and An Phu Commune
	Km157+300 to Km157+700	Agricultural land cultivating subsidiary crops and rice
	Km157+700 to Km160	Agricultural land of residential areas of An Phu and Chu A communes
Pleiku Bypass	Km0-Km1+800	Ricefield and vegetable garden land
	Km1+800-Km4+930	Coffee plantation
	Km4+930-Km4+970	Ricefield and vegetable garden land
	Km4+970-Km5+250	Coffee plantation

Section	Section	Land Use Status
	Km5+250-Km5+750	Rubber plantation
	Km5+750-Km8+460	Coffee plantation
	Km8+460-Km8 +550	Ricefield and vegetable garden land
	Km8 +550-Km11+650	Rubber plantation
	Km11+650-Km13+200	Rubber plantation
Km180 to Km241	Km180 to Km182+300	Forestry land on both roadsides, about 20m from the Road
	Km182+300 to Km186+700	Residential land of Village A residential area, Gao commune and Dong Tam residential area, Bau Can commune
	Km186+700 to Km187+700	Agricultural land cultivating coffee and tea
	Km187+700 to Km190	Residential land of Doan Ket, Hoa Binh residential areas, Bau Can commune
	Km190 to Km193+400	Forestry land, 20m away from the roads
	Km193+400 to Km199+100	Residential land of residential areas of hamlets 1, 2, 3 and 4, Thang Hung commune; Tan Lac residential area, Binh Giao commune
	Km199+100 to Km200+200	Agricultural land with cashew and pepper as main crops
	Km200+200 to Km202+200	Residential land of Thanh Binh, Thanh An residential areas, Binh Giao commune
	Km202+200 to Km205+800	Agricultural land with coffee and cashew as main crops
	Km205+800 to Km209+100	Residential land of residential areas of IA Din Commune
	Km209+100 to Km211+500	Agricultural land with cassava and cashew as main Crops
	Km211+500 to Km218+700	Residential land of residential areas of IA Krel commune, mixed with agricultural landlots cultivating coffee, pepper and rubber
	Km218+700 to Km229+100	Residential land of Chu Ty town, IA Kla and IA Dom Communes
	Km229+100 to Km231	Agricultural land cultivating rubber and cassava
	Km231 to Km232+800	Residential land of Mook Den, Mook Trang and O residential areas, IA Dom commune
	Km232+800 to Km235	Agricultural land cultivating coffee, rubber and cassava
	Km235 to Km236+300	Residential land of Lang Bi residential area, IA Dom Commune
	Km236+300 to Km241	Agricultural land with rubber as the key crop

3.4.2 Population

GIA LAI. The investment project routes go through 7 districts of Gia Lai province. The most populated among the coverage area is Duc Co with a total population of 55,845 covering seven (7) communes while the least with only two communes/wards is Mang Yang with a total population of 16, 039. The population of the commune/ ward / township in project area is shown in Table 25: Population of Communes/Wards/Township in Project Area.

The population of the whole Gia Lai province reached to 15,510,980 people in 2018 as per Gia Lai Statistical Yearbook. Out of the provincial population, 45.03% belongs to the 34-ethnic minority (EM) groups. Most of the EMs are Jarai with a population of 424,631 (30% of total population of the province) and Bahnar with a total population of 166,732 (11.78% of total population of the province) and the rest of ethnic minorities has a total population of 40,993 (3.08 % total population of the province).

Table 25a Population of Communes/Wards/Township in Project Area

Province	District	Commune/ ward/ township	Population in 2018			Area (km2)	Density (person/ km2)	House hold	Average person/ HH
			Total	Male	Female				
Gia Lai	Đắk Pơ	Cư An	6225	3218	3007	36.9097	169	1624	3.83
		Tân An	11277	5817	5460	26.5493	425	2742	4.11
	An Khe town	Song An	4527	2320	2207	44.171	102	1220	3.71
		An Phước	3289	1689	1600	13.200	249	877	3.75
		Thành An	4767	2457	2310	22.497	212	1135	4.2
		An Bình	8239	4121	4118	9.666	852	2140	3.85
		Ngô Mây	5097	2584	2513	10.278	496	1452	3.51
	Mang Yang	Đak DJrăng	5762	2892	2870	50.47	114.16	1478	3.89
		Kon Dõng	10277	5061	5216	16.88	608.76	2434	4.22
	Đắk Đoa	Đăk Đoa	16847	8377	8470	21.201	794	4446	3.79
		Tân Bình	4737	2382	2355	21.576	219	1278	3.71
		K'dang	10480	5178	5302	75.622	138	2643	3.97
		A Dơk	6677	3283	3394	21.127	316	1477	4.52
		Glar	10176	5026	5150	40.593	250	2278	4.47
		Ia Băng	12709	6403	6306	53.347	238	3038	3.23
	Tp. Pleiku	Gào	5085	2658	2427	57.97	88	1008	5.04
		An Phú	12334	6253	6081	11.16	1106	2840	4.34
		Chư H'Drông	3139	1675	1464	13.13	239	608	5.16
		Chư Á	11246	5697	5549	14.48	777	2097	5.36
	Chư Prông	Thăng Hưng	6395	3183	3212	38.93	164.27	1674	3.82
		Bầu Cạn	5836	2934	2902	33.59	173.74	1614	3.62
		Bình Giáo	6389	3185	3204	42.95	148.75	1591	4.02
	Đức Cơ	Ia Kriêng	5985	2976	3009	109.21	54.80	1622	3.69
		Ia Kla	7689	3830	3859	49.95	153.94	1899	4.05
		Chu Ty	12861	6329	6532	15.45	832.70	3367	3.82
		Ia Pnôn	4767	2376	2390	114.01	41.81	1116	4.27
		Ia Nan	7893	3925	3968	90.31	87.39	1608	4.91
		Ia Krêl	8400	4173	4227	53.48	157.06	1991	4.22
		Ia Dom	8250	4248	4002	145.43	56.73	2073	3.98

Source: Gia Lai Statistical yearbook, 2018.

BINH DINH. Contract Package (PK CW1) passes through Tay Son district consisting of two communes namely Tay Thuan and Tay Giang. The total area of both communes is 15 hectares with 10 administrative units with a total population of 20,786 spread across 5,224 households as describe in Table 25 B: Area, Population and Poverty Rate of Project Communes.

Table 25b Area, Population and Poverty Rate of Project Communes

No.	City/District	Natural area (Ha)	No. of communes/ wards	Population		Average person/HH
				Household	Person	
1	Tay Giang Commune	7398.35	6	3,229	12,980	4,0
2	Tay Thuan commune	7784	4	1.955	7806	3,9
TOTAL		15,582.35	10	5,224	20,786	39,5

Source: Report on socio-economic development, security, and defense situation in 2018 and development directions in 2019 of project commune

Binh Dinh consists of 10 districts/towns and one city. There are 159 commune-level administrative units, including 21 wards, 12 towns and 126 communes. In 2018, the natural area of the province reached to 607,133ha of about 1,534,768 persons of which urban population was 475,481 persons equivalent to 30.98%; rural population is 1,059,286 persons equivalent to 69.02%. As to gender, the male population is 749,538 while female population is 785,229 with corresponding share of 48.84% and 51.16% respectively. Total fertility rate in 2018 was 2.3 children per woman. The crude birth rate was 13.9% and the crude death rate was 7.9%.

3.4.3 Education

BINH DINH. In the school year 2018-2019, there are 58 schools in the whole Tay Son district with a total of 20,859 students of which 260 from kindergarten, 9,263 are primary schoolers, 7,172 are in secondary and 4,164 into upper high school. Refer to Table 26 A: Number of students in the project district/commune 2018-2019

Table 26a Number of students in the project district/commune 2018-2019

Commune	*School*	*Student*				
		Kindergarten	*Primary*	*Secondary*	*Highschool*	*Total*
Tay Son district	58	260	9,263	7,172	4,164	20,859
Tay Giang Commune	5	477	928	741	No data	2,146
Tay Thuan commune	3	270	427	291	No data	988

Source: Tay Son statistical book 2018

GIA LAI. Statistics show that there are 111 educational institutions including primary, junior high and high school in the communes covered by the project area. The number of educational institutions has decreased from the 121 educational statistics in 2015.

Table 27b Schools in communes/wards/township in project area

Province	*District*	*Commune/ ward/ township*	*School*	*Student*				
				Kindergarten	*Primary*	*Secondary*	*Highschool*	*Total*
Gia Lai	An Khê	An Phước	0	0				
		Thành An	2	190		(1 school)		190
		An Bình	4	241	(1 school)	(1 school)	(1 school)	241
		Ngô Mây	2	265	(1 school)			265
		Song An	3	112	443	318		873
	Đắk Pơ	Cư An	4	443	579	326		1348
		Tân An	3	356	911	849		2116
	Mang Yang	Kon Dõng	5	609	2117		0	2726
		Đak DJrăng	3	313	(1 school)	(1 school)		313
	Đăk Đoa	Đak Đoa	10	1234	2519	1594	1295	6642
		Ia Kla						
		Ia Băng	4	556	1461	563	0	2580
		Tân Bình	3	255	517	359	0	1131
		Kdang	4	442	1069	510	0	2021
		Glar	4	374	905	597	0	1876
		A Dơk	4	228	807	425	558	2018
	Pleiku	Gào	2	269	504	256	0	760
		An Phú	3	383	1339	774	0	2113
		Chư Hdrông	1	0	0	627	0	627
		Chư Á	2	512	583	499	0	1082
	Chư Prông	Thăng Hưng	3	231	707	488	0	1426
		Bình Giáo	3	165	719	482	0	1366
		Bàu Cạn	3	252	607	394	0	1253

	Đức Cơ	Ia Kriêng	4	245	598	255	0	1098
		Chư Ty	10	834	2048	1624	1152	5658
		Ia Pnôn	3	1289	567	271	0	2127
		Ia Nan	4	212	867	474	0	1553
		Ia Krêl	5	1341	815	428	0	2584
		Ia Dom	4	445	922	513	562	2442
		Ia Din	5	299	972	513	437	2221

3.4.4 Health

Common illnesses in the project area are dengue fever, influenza, and eye diseases. All Project communes have health care center facilities along the project area including some provincial and district hospitals.

BINH DINH. Like other districts in the province, Tay Son district is provided with essential conditions to take care of people's health. The whole district has 1 hospital and 15 Medical service units.

GIA LAI. Based from Gia Lai Statistical Yearbook of 2018, there are 122 health establishments that include hospitals and medical service in the Project area. (Dak Po- 9; An Khet Town -12; Mang Yang district -14; Dak Doa district -19; Tp. Pleiku-35; Chu Prong-22; and Duc Co district -11)

3.4.5 Physical Cultural Resources

There are cultural and religious establishments along the investment route, such as: (1) Xa temple (Song An commune –An Khê town– Gia Lai, 20-30m from NH19), a small local temple, worshipping snake god, held annually on February 20th, lunar calendar, (2) Cho Dong parish church (An Bình ward - An Khê town - Gia Lai, 20m from NH19), (3) Minh Chau pagoda (Kong Dơng township - Mang Yang district) 20m from NH19, (4) Buu Tan pagoda (Pleiku city – Gia Lai), 10m from NH19, (5) Duc Giang pagoda (Pleiku city – Gia Lai) 20m from NH19, (6) Nguyen Son pagoda, Khanh Thien pagoda (Chư Prông district – Gia Lai) 20-25m from NH19.

The traditional and unique customs, the harvest festival for favorable wishes, good weather, a prosperous life, the main festival of Jarai and Bahnar people are as follows:

+ Po Thi festival held from November until the end of April following the calendar year. It is the biggest, crowded, and longest festival.

+ Dam Trau festival: Organization for the period from the beginning of lunar December last year to March next year. Bahnar held for 3 days, and the Jarai held for one day and a half. Dam Trau festival was held on the victory, the victory of the community celebration, inauguration of the communal house, praying for peace, celebration remove bad omen for the whole village or divine thanksgiving.

+ Com Moi festival: Held in November of each calendar year, the festival is typical of the Bahnar and Jrai held to thank the god of rice, new crop celebrates, pray for the rice fields to grow more grain.

+ Cau Mua festival: Usually held in March - May each year. Ceremony for rain is a folk belief phenomenon, reflecting the aspirations of the inhabitants of agriculture department.

+ Ben Nuoc festival: usually held in March and lasted 1 day to pray for good weather, good harvests, and happy prosperous life.

+ Cong Chieng festival: held every year in alternate form in the provinces that have gong culture in the Central Highlands, the time depends on the organizational plan of the province. The festival is held to promote the Image of Space of Gong culture recognized as a UNESCO Oral and Intangible Heritage of humanity.

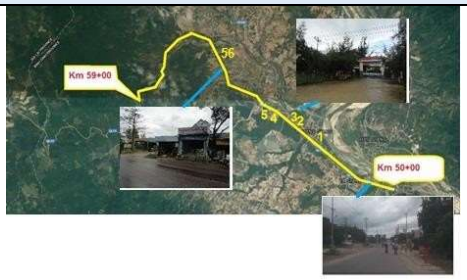
+ Parents festival: commonly held on agricultural leisure (1-3 lunar month), in 1 day (not fixed) from the married child, own their own homes voluntarily informed the clan, parents that he/she want to celebrate thanksgiving for parents gave birth to and raised him/her.

Figure 22 Photos of Local Festivals

3.5 Site-Specific Social and Environmental Conditions

The socio-environment features along the Project are presented in Table 27 Site Specific Features along NH19.

Table 27 Site-specific Features Along NH19

Station	Current Status
Km 50 - Km 59	 Delta area, $B_{road\ surface}$ = 7-9m, some asphalted sections, low road base, there are existing vertical drainage ditch from km51+150 to km54+750. Agricultural land, mainly for planting rice, sugarcane and cassava (Km52+100-Km53+200, Km 54+900-Km56+100), acacia and eucalyptus (km 58+300-Km59) Curved, vision is limited from Km56 to Km58 The sections pass through residential areas at Km 50+800-Km52+100: Ta Giang 1 residential area, Tay Giang commune, 10-15 meters from the road Km53+200-Km54+900: Dong Pho residential area, Tay Giang commune, 7-10 meters from the road Km56+100-Km57+400: Trung Son residential area, Tay Thuan commune, 10-15 meters from the road Km57+700-Km58+300: Thuong Son residential area, Tay Thuan commune, 5-10 meters from the road -Sensitive sites on the route (see the map): Binh Khe Feudal Working Place (Huyện Đường): about 500 m from NH19 No 3 Tay Giang Primary School: 35 m from NH19 Vo Lai High School: 40 meter from NH19 Tay Giang Secondary School: 30 meter from NH19 Binh Giang – Tay Giang Martyrs Cemetery: 180 meter from NH19
Km 59 - Km 67	 An Khe Pass Area goes through high mountains and deep valleys. The route is along rocky and steep cliffs with many twists, corners with limited visibility. High voltage lines of power of 220KV and 35KV run along the route with some intersections. L-shaped roadbed. Agricultural land for planting cassava, acacia and eucalyptus (km59-km67) A Rescue Road at Km63+174 7-meter-wide traveled way, 9-meter-wide roadbed, many damaged sections. Plantation forest areas locate along the An Khe bypass. And there are some landslide locations.

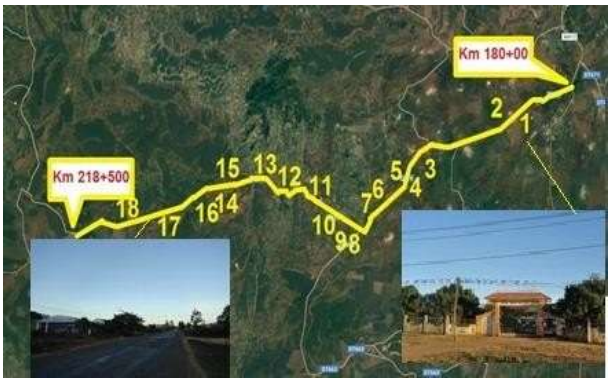
Station	Current Status
Km 67 - Km 76	 Flat plateau and low hilly area. Along the route's sides are fruit orchards, rice fields and residential areas. L-shaped and low roadbed. Select sections with vertical slop of about 10 percent adjacent to the An Khe Pass. A drainage ditch on the left hand side, along the road is at the section from km 75+500 to km76. 7-meter-wide road top, 10-meter-wide road embankment, heavily damaged (km72- km76) The sections pass through residential areas at Km69+319-Km71: People's houses combined with agricultural land at An Thuong hamlet, Song An commune, 10-15 meter from the road Km71+700-Km73+200: Thuong An residential area, Song An Commune, 10-15 meter from the road Km73+364-Km76: No. 6 and No. 7 residential area, Ngo May Ward; 10-15 meter from the road - Sensitive objects along the route include: Snake Temple: 20-30 meter from NH19 Ngoc An Monastery, 15-20 meter from NH19 Hoa Mai Kindergarten, 15-20 meter from NH19 Tran Phu Primary School, 30 meter from NH19 Tuoi Tho Kindergarten, 30 meter from NH19
An Khe By pass (13.7km long)	 New road to be constructed. The road will pass through paddy, vegetable and plantation land from Km0+700 to Km1+390 (mostly land for acacia and eucalyptus) The end of the route passes through residential areas.

Station	Current Status
Km 76 - Km 82+200	 An Khe Urban Town, densely populated area, relatively high traffic density, 14-meter-wide road surface, 24-meter-wide roadbed, good asphalt road Residential area is 10-15 meter from National Road Environmentally sensitive sites along the route include: 1.Mai Anh Kindergarten: 20 meter from NH19 2. Cho Don Church: 20m from NH19 3. Son Ca Kindergarten : 20m from NH19
Km 82+200 - Km 90	 7 meter-wide-road road top and 10-meter-wide road embankment. Heavily damaged road surface at the sections from km85 to km90. Agricultural land for sugarcane plantation (from km88-km90) The route passes through residential areas at: Km82+200-Km83+854: Residential Areas of Tan Binh, Tan Son at Tan An commune, and An Hiep, An Binh at Cu An Commune, 10-15 m from the National Road Km83+894-Km87: Residential Area of Tan Lap, Tan Dinh at Tan An Commune, Residential Area Chi Cong, Thuan Dong, An Dinh, An Hoa at Cu An commune, 10-15 m from the National Road Km87+390-Km88+100: Residential Area of Dong Che, Tan An Commune, 10-15m from National Road Sensitive sites along the road include: 1. Le Quy Don Primary School: 30 meter from National Road 2. Tuoi Tho Kindergarten: 20m from National Road 3. An Son Parish: 5-10m from NH19 4.An Sơn cemetery: 20m from NH19

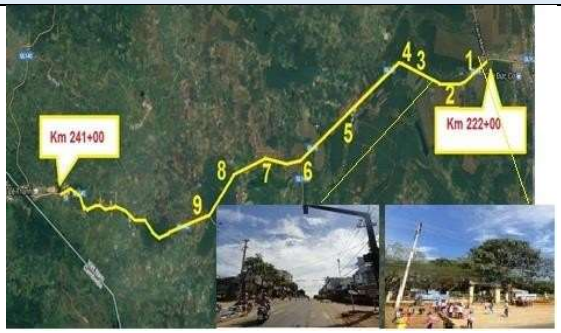
Station	Current Status
Km 131+300 - Km 135	 Passing through the residential area of Kon Dong, medium traffic density, 14-meter wide asphalted road top, 24-meter-wide road embankment, good surface condition People's houses are 5-7 m from the road Environmentally sensitive sites along the route include: 1. Chau Khe Parish: 25m from NH19 2. Minh Chau Pagoda, 20m from NH19 3. Primary School of Kon Dong 1 Town: 30m from NH19
Km 135 - Km 152+500	 Low hilly and sloppy area, farms of coffee and pepper along the route's sides (km143+800-km144+600, km147+200-km151+500), rubber (146+600-km147+200 km147+200-km151+500), pine tree forest. Low roadbed, 7-meter-wide road surface 10-meter-wide roadbase. The route passes residential areas at: Km136+308-Km138: Residential Areas at Linh Nham – Dak Djrang commune Residential areas and agricultural land, 10-15 m from the road Km138-Km139+200: Tan Phu Residential Area, Dak Djrang, 10-15 m from the road Km139+200-Km139+700: Nam Dat Residential Area, Dak Djrang, 7-10 meter from the road Km139+900-Km143+800: Residential Areas of Cay Diep and Ha Long 2 – K" Dang commune, 7-10 m from the road Km144+600-Km146+600: Cau Vang Residential Area, K"Dang commune, 10-15 m from the road Km147+200-Km152+500: Residential Area of Hamlet 1, 2,3 at Tan Binh commune, 15 meter from the road. - Sensitive sites along the route include: 1. Tran Phu Secondary School: 30m from NH19 2. K" Dang Kindergarten: 20 m from NH19 3. Tan Binh Kindergarten : 5-10m fro m NH19

Station	Current Status
Km 152+500 - Km 155	 Passing through Dak Doa town, 14-meter-wide asphalted road top, 24-meter-wide roadbase, densely populated area, medium traffic density. Good road surface. People's houses are 7-10 m from the road - Sensitive sites along the route include: 1. Hoa Mi Kindergarten: 20m from NH19 2. Nguyen Hue Highschool: 30m from NH19 3. Boarding Secondary School Dak Doa: 30m from NH19 4. Primary School No 2, Dak Doa Town, 50m from NH19
Km 155 - Km 160	 A narrow road linking two cities, high population density along the two sides of the route, multiple continuous curves, small radius, potential risk of traffic accidents. The quality of the road surface is fine. 7-meter-wide road top, 10-meter-wide roadbase Main crops along the route are vegetables and rice (km 157+300-km157+700) The road passes through residential areas at: Km155+700-Km157+300: Residential Areas of Hamlet 1, 2, and 3 at An Phu Commune, 5-7 m from the road Km 157+700-Km159: Residential Areas of Hamlet 5 and 6 at An Phu Commune (An Phu 2 Market at Km158+850); Residential households are 10-15m from the road Km159-Km160: Residential Areas at the center of Chu A commune. The households are 15m from the road. Sensitive sites along the route include: 1. An My Church: 30 m from NH19 2. Hoa Sua Kindergarten: 30m from NH19 3. Nguyen Khuyen Primary School: 20m from NH19 4. Buu Tan Pagoda: 10m from NH19

Station	Current Status
Dak Doa Pleiku Bypass (Length of bypass is 13.2km)	 New bypass road is to be constructed, passing through agricultural areas planting rubber, pepper, coffee, rice and vegetables.
Km 160- Km 167	 Pleiku city, densely populated area, relatively high traffic density, 21-meter-wide asphalted road top, 37-meter-wide road embankment. The road is still in a good status. The people's houses are 10-15m from the road Sensitive sites along the route is the Thien Phuoc Kindergarten: 20m from NH19

Station	Current Status
Km 180 - Km 218+500	 7-meter-wide road top, 9-meter-wide road embankment. The quality of road surface is still in good condition, except Km180 - Km182, Km195 - Km199 where the quality is poor. Sparsely populated. The route sessions from Km180-Km182+300, Km190-Km193+400 are forest land along both sides, 20 m from the road The route passes through residential areas at Km182+300-Km185: Residential Area of Hamlet 4. A Village, Gao Commune, people's houses at 15m from the road. Km185-Km186+700: Dong Tam Residential Area, Bau Can Commune, people's houses are 15m from the road Km187+700-Km190: Doan Ket Residential Area, Hoa Binh, Bau Can Commune, people's houses are 15m from the road Km193+400-Km198: Residential Areas of Hamlet 1,2,3 and 4 – Thang Hung commune, people's houses are 15m from the road Km198-Km199+100: Tan Lac Residential Area, Binh Giao commune, people's houses are 15m from the road

Station	Current Status
	Km200+200-Km202+200: Thanh Binh Residential Area, Thanh An, Binh Giao commune, people's houses are 10-15m from the road Km207+300-Km209+100: Thong Nhat Residential Area, Dong Tam, IA Din Commune, people's houses are 10-15m from the road Km211+500-Km212+700: Thanh Tâm Residential Area, IA Krel; people's houses are 10-15m from the road Km213+100-Km215+200: Residential Areas of Thanh Giao and Ngol Lel 1, IA Krel Commune; people's houses are 10-15m from the road Km216+200-Km218+700: Residential Areas of IA Lam, Lam Tok and Khop, IA Kre commune; people's houses are 10m from the road. Km218+700-Km222+800: Residential Areas at the center of Chu Ty town. The people's houses are 5-7 m from the road, mixed up with agricultural areas for cassava coffee, cashew nuts, pepper and tea. Environmentally sensitive sites along the route include: 1.Don Hero Secondary School: about 30m from NH19 2. Po Lang Flower Kindergarten: about 20m from NH19 3. Rose Kindergarten: about 20m from NH19 4. Tran Quoc Tuan Secondary School: about 20m from NH19 5. Tran Phu Highschool: about 20m from NH19 6. Duc Giang Pagoda: about 20m from NH19 7. Duc Hung Parish: about 20m from NH19 8. Luong The Vinh Primary School: about 20m from NH19 9. Nguyen Son Pagoda: about 20m from NH19 10. Khanh Thien Kindergarten: about 20m from NH19 11. Hoa Binh Kindergarten: about 20m from NH19 12. Trung Vuong Primary School: about 20m from NH19 13. Thanh Binh Kindergarten: about 20m from NH19 145. Primary School of Thanh Binh hamlet: about 20m from NH19 15. Thanh Binh Church: 30m from NH19 16. Hung Vuong Primary School: 30m from NH19 17. Martyrs cemetery of Chu Ty town: 50m from NH19
Km 218+500 - Km 222	 Chu Ty Town, 13-meter-wide road top, road embankment width from 17 to 21 meter. Densely populated area. Medium traffic sensitivity. People's houses are 10-15m from the road.

Station	Current Status
Km 222 - Km 241	 7-meter wide road top, 9-meter wide road embankment, good quality road surface sparsely populated. The road passes through residential areas at: Km222+500-Km222+800: Residential Areas No 7, Chu Ty town. The people's houses concentrate at the righthand side of the road and 7-10 meter from the road. Km225+500-Km228: Residential Areas of Chu Bo 1 and Chu Bo 2, Ia Kla commune, people's houses are 7-10 from the road. Km228+800-Km229+100: IAMUT Residential Area, IADOM commune; people's houses are 15m from the road. Km231-Km232+800: Residential Areas of Mook Den and Mook Trang, O - Ia Dom commune, people's houses are 10-15 m from the road; m235-Km236+300: Residential Areas of Bi village IaDom commune: people's houses are at 15m from the road. Mixed with agricultural areas for coffee, rubber and cassava Environmentally sensitive sites along the route include: 1. Kim Dong Primary School: 30m from NH19 2. 18-4 Kindergarten: 20m from NH19 3. Nguyen Du Secondary School: 20m from NH19 4. Chu Van An Primary School: 20m from NH19 5. Nguyen Truong To Primary School: 30m from NH19 6. Martyrs Cemetery: 50m from NH19 7. Nguyen Trai Secondary School: 20m from NH19 8. Tran Phu Primary School: 20 m from NH19

3.6 Social and Environmental Conditions at the Ancillary Facilities

3.6.1 Disposal Sites

Table 28 Disposal Sites

Location	Current Status	Photo
Km50+578	Located at the right side of NH19 and next to Bau Sen Bridge. Currently, it is agricultural land for planting rice and sugarcane. The area was reserved for building a residential area of Tay Giang Commune. There are no sensitive sites such as pagoda, church, school around this landfill. The nearest houses are at 30m from this position.	

Location	Current Status	Photo
Km57+593	0.2 km from NH19 on the lefthand side and next to Vườn Xoài bridge. Currently, it is vacant land with bushes. No sensitive sites such as school, hospital, or church. People's houses locate along NH19"s sides and the closest house is 50m from the site.	
Km58+600	At the left hand side of NH19. Currently agricultural land for cassava. This area was reserved for building a residential area of Tay Thuan commune. No sensitive sites such as pagoda, church, hospital or school. People's houses at 50m from the site and at the other side of the road.	
Km76+200	Located at the right hand side of NH19 in An Dien Nam Hamlet, Cuu An commune, An Khe town, Gia Lai province. Currently it is vacant land with bushes. No sensitive sites such as pagoda, church, hospital or school. People's houses at 50m from the site and at the other side of the road.	
Adjacent to Km4+500 of Pleiku bypass	300 meter from the Pleiku bypass at the right hand side. Empty land with bushes and small pine trees. Strongly eroded by water. Surrounding this area is agricultural farms of coffee and pepper. There is no sensitive site at this area and the closest people's houses locate at a distance of about 100m.	
Km 193+300 (new site identified during public consultation)	Located 120m on the left side of NH19, it is formerly the domestic waste dumping site of locality. The evelation deviation is 3-5 m deeper than the existing ground. This site is far from residential areas and suitable for disposal.	

Location	Current Status	Photo
Km199+500	- 50 meter from NH19 at the left side. A low digging land, covered by bushes. Agricultural farms with main crops of coffee, cashew nuts, and pepper. No sensitive sites. The people's houses locate along NH19 and at a distance of 50 m from this area.	
Km 206+600 (new site identified during public consultation meeting)	Located on left side of NH19, this is currently the planting area of one local household who have demand for landfilling.	
Km 211+500 (new site proposed in public consultation meeting)	Located on the right side of NH19 in IaKrel commune, this area is under threat of serious erosion. One culvert were constructed by local fund with expectation to control the risk but the key issue is a shortage of material for landfilling. It is expected that the material from project will significantly contribute to erosion control.	
Km 211+200 (new site proposed in public consultation meeting)	Located on the left side of NH19 in IaKrel commune, the elevation of this area is currently lower than existing road. This site will be developed to be new residential area and have practical demand of landfilling. This area is not close to hospital, church or pagoda and also far from residential area.	
Km230+200	0.2 km from NH19 at the right hand side. 2.5-meter- wide asphalted road, located in Ó Village, IaDom commune. This areas will be developed to be new residential area that is lower than the existing road. The local authority is planning to make a higher. This area is not close to hospital, church or pagoda. The closest house is at 500m from this site.	

3.6.2 Borrow Pits, Quarries and Mixing Stations

Table 29 Borrow Pits, Quarries and Mixing Stations

Type	Current Status	Image
Quarries	**An Thanh Rock Quarry** located at An Thành Commune, ĐakPo district, Gia Lai province at a distance of 2.5Km from NH19, at station km93+00. It is located far from residential areas, surrounded by agricultural land areas for planting coffee and pepper. There is no sensitive site at this areas.	
	My Quang Rock Quarry at Phuoc Loc Commune, Tuy Phuoc District, Binh Dinh Province is 1.7km far from NH19, at station km 15+900. Surrounding the rock quarry are agricultural land areas for planting coffee, pepper and pine trees. There is no sensitive site at this area and the closest house locate at about 1km from this area. In 2018, this quarry used to be reported on news for their dust, noise and vibration impacts to nearby local household. If selected to be supplier of project, the operation of this quarry and its compliance on social and environmental protection should be strictly inspected prior to and during construction	
	Thang Long Rock Quarry locates at Ia Der Commune, Ia Grai district, Gia Lai province. Around the quarry are vacant land and agricultural land. There are no sensitivity sites such as school, hospital, church, or pagoda in this area.	
	Quang Duc Rock Quarry at Iadom Commune, Duc Co District, Gia Lai Province locates at the left hand side of NH19. Surrounding the quarry is land for rubber tree and coffee of local people. There is no sensitive site in this area. The closest house locates at 1 km from this area. Quang Duc Quarry used to be reported on news for their noncompliance on environmental protection and impacts to nearby local people in 2018. If selected to be supplier of project, the operation of this quarry and its compliance on social and environmental protection should be strictly inspected prior to and during construction.	

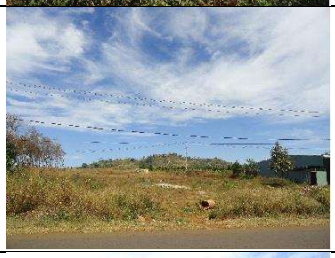
Sand pits	**An Thien Gia Lai Sand mine** located at Lơ Pang Commune and Đak Dirăng commune, Mang Yang district, Gia Lai province, 7.95km far from NH19, at station km138+900. Surrounding the quarry is land for rubber tree and coffee of local people. There is no sensitive site in this area. The closest house locates at 1 km from this area. **Dac Tai Sand pit** is situated at Binh Nghi commune, Tay Son district, Binh Dinh province, 2.9 km far from NH19 at station km 34+290, connecting with NH19 via DT636B. The closest house is around 200m. In the year 2013, this sand pit used to be reported by News for their negative impacts such as degradation of road, change of hydraulic flow to local people. If selected to be supplier of project, the operation of this sand pit and its compliance on social and environmental protection should be strictly inspected prior to and during construction. **Hieu Ngoc Sand pit** at Tay Xuan Commune, Tay Son District, Binh Dinh Province is 500 meter from the NH19 at the right hand side (Km39+400 QL19). The pit is adjacent to Con river and surrounding by vacant land. There is no sensitive site in this area. The exploitation site is at a distance of 400m from the closest house. A cement concrete and asphalted road with the width of 5m, adjacent to the residential area.	  
	My An Sand pit at Ba river, Dak Hlo commune, K'bang district and Tu An commune, An Khe town, Gia Lai province is 15 km far from the NH19 at the right hand side (Km76+200 QL19). The pit is adjacent to Ba river and surrounding by vacant land. There is no sensitive site in this area. The closest house is 200m from main pit. **Tay Thuan Sand pit** is located next to Kon River, at Tay Thuan commune, Tay Son district, Binh Dinh province. Surrounding is vacant and agricultural land, there is no sensitive site in this area. The closest house is 200m from main pit.	 
Borrow pits	**Ly Kinh Borrow pit** locates at Hamlet 76, K'bang town, K'bang District, Gia Lai Province. An asphalted road with the width of 4m and about 12 km from National Road at Km76+200. Empty land with mostly bushes and coffee farms. There is no sensitive site close the pit. The closest household is about 300 m from the pit.	

	Thang Hung Borrow pit is 1.8 km from the NH19 at the right hand side (Km191+500). Accessible through 4-meter-wide dirt road passes through agricultural land for coffee and rubber. Surrounding the quarry are vacant land with bushes. There is no sensitive site close to the quarry. The closest household is 500m from the quarry.	
	Ia Dok Borrow pit is 16km far from National Road 19 at Km218+500, Ia Dok Commune, Duc Co District, Gia Lai Province. Surrounding this area are mainly coffee farms. There is no sensitive sites. The closest household is at a distance of about 1km.	

3.6.3 Workers Camp

Table 30 Workers Camps

Station	Current Status	Image
Km56+800	An empty land is adjacent to NH19 within a residential area. The camp site is 20m from the people's houses. It is easy to access to power and water and water discharge. Mainly covered by bushes.	
Km67+600	An empty land is adjacent to the National Road and Song An Animal Quarantine. Around this site are agricultural land and timber trees. It is about 300 m from the people's houses. It is easy to access to power and water and water discharge.	
Intersection between An Khe bypass andDT669 road	Agricultural residential area is adjacent to the planned Pass by and next to the planned Pass by and DT 669 road. The site is 30 m from households. It is easy to access to power and water and water discharge.	

Station	Current Status	Image
Km147+700	Empty land near residential area and adjacent to NH19. Around the area are the people's houses at a distance of 20m. It is easy to access to power and water. Mainly covered by bushes.	
Bio Hamlet – Glar Commune (at Km4+500 in Pleiku Bypass)	Adjacent to the planned Pleiku Bypass and the surroundings are agricultural land. 30m from the people's houses. It is easy to access to power and water and water discharge.	
Km183+100	Empty land within the residential area and adjacent to NH19. Surrounding are the people's houses at a distance of 20m. It is easy to access power and water and water discharge.	
Station Km223+100	Empty land adjacent to residential area and NH19. Surrounding are household at a distance of 50m. It is easy to access to power and water and water discharge. Mainly covered by bushes.	
Km231+700	Empty land is adjacent to residential area and NH19. Around are the people's houses at a distance of 50m. It is easy to access power and water and water discharge. Mainly covered by bushes.	

4. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

4.1 Positive Impacts

The Central Highlands Connectivity Improvement Project (CHCIP) is expected to bring about the following positive impacts:

Improve Traffic Safety along the National Highway 19 (NH19). The upgrading and expansion of the NH19 will help to improve the quality of the roads, to eliminate "black spots" and create a separate lane for 2-wheeled vehicles, thereby enhancing the safety of the road users. The construction of An Khe and Pleiku bypasses will help reduce traffic load on the existing NH 19, especially the inflows of cars into cities/towns, contributing to improved road safety for these areas. The Project also helps to minimize landslide risks on An Khe Pass in rainy season through the strengthening of slopes to improve traffic safety.

Improve drainage, reduced localized flooding after new drains are installed along the highway.

Positive Impacts on Socio-economic Development. The upgrading and expansion of NH19 sections will facilitate smoother travel and reduce travel time between the Central Highlands provinces and the coastal region, thereby boosting trading of goods within the area: Goods and materials would be transported to the Central Highlands provinces more quickly and conveniently, the selling of agricultural products such as coffee, rubber, sugar canes, etc. and other products grown in the Central Highlands to other provinces and for exports would also be more convenience, contributing to the region's economic development.

Creation of casual jobs and incomes for the local people during the construction phase. It is anticipated that the contractors would hire about 150 local workers during construction phase, generating employment opportunities and additional sources of income for these workers.

4.2 Negative Impacts

Beside the potential positive impacts that Project would bring about, some potential negative impacts and risks may also occur during the construction and operation phase of the Project which cover the following main civil works:

- (1) Construction of 13.7 km An Khe Bypass including 6 bridges on the alignment;
- (2) Construction of 13.2 km Pleiku Bypass including 2 bridges;
- (3) Rehabilitation and upgradation of 110 km of selected sections along NH19, including Km50 - Km90, Km131+500 - Km160, Km180 - Km241 and construction/reconstruction of 8 bridges.

The main activities that would be carried out during the construction phase include:

<u>For road construction</u>

- Land acquisition, site clearance;
- Construction of site offices, storage areas, worker camps, mixing stations, etc.;
- Mobilization of workers and machinery to the construction site;
- Top soil excavation and removal, ground leveling, and transport the waste to the disposal site;
- Transportation, unloading and temporary storage of construction materials at the site;
- Casting of drainage pipes, boxed drains and pillars;
- Excavation and filling for road construction, install drainage
- Transport the wastes to disposal sites;
- Backfilling, finishing, and site reinstatement.

<u>For bridge construction:</u>

- Land acquisition and site clearance
- Staging areas and camps
- Construct temporary access road and bridge

- Demolition of existing bridge
- Pile driving
- In-situ casting
- Waste disposal arrangement (including bentonite collection and disposal)
- Finishing, and site reinstatement.

With these physical interventions, the potential negative impacts that may occur during the construction phase include:

- Safety risk related to UXO;
- Land acquisition
- Dust, exhaust emissions, noise, vibration;
- Wastewater generation;
- Degradation of surface water quality;
- Increased erosion and landslides risks;
- Solid waste generation including small quantity of hazardous waste,
- Obstruction or interruption to agricultural production activities,
- Cutting trees and removal of vegetation cover;
- Community disturbance, including disturbance to traffic, accessibility, daily activities, and business due to construction activities;
- Social impacts related to mobilization of the workers to the construction sites;
- Damages/degradation of existing infrastructure and related services such as roads, bridges, power supply, irrigation etc.,
- Traffic disturbance and increase traffic safety risks;
- Increased bush fires risks;
- Increased local flooding risks,
- Impacts on the existing culture/historical structures;
- Health risks and safety issues of the workers; and
- Public health and safety issues.

There would also be some potential negative impacts and risks during operation phase, including: (i) dust, exhaust emissions, noise; (ii) increased traffic safety risks, particularly at the four new intersections and along the two new bypasses; (iii) separation between residential and agricultural land, (iv) impacts on natural drainage.

4.2.1 Pre-Construction Phase

4.2.1.1 Land Acquisition, Site Clearance

Resettlement Action Plan (RAP) was prepared for Binh Dinh and Gia Lai province in 2017 to compensate Project Affected Persons (PAP) and /or mitigate the impact of resettlement due to land acquisition required for the Project. As per 2017 RAP of Gia Lai, an estimated 915 households will potentially be affected covering a total length of 123.57 kilometers (Kms) that stretches Section from Km67-Km90; Section from Km131+300-Km167; Section from Km180-Km247 including the 6.2km of the proposed An Khe Bypass and 21km Pleiku Bypass. Out of this total, 825 are landowners and 90 are renters along with the land acquisition of approximately 1,808,604 square meters (sqm) of land of which 1,745,967sqm (96.6%) classified as agricultural land; 54,790 sqm (3.0%) residential land; and 7,307 sqm (0.4%) public land. In addition to the RAP, an Ethnic Minority Development Plan (EMDP) was developed since Gia Lai province is a home to several ethnic minority groups. The EMDP laid out the strategies and programs for

the involvement of the recognized EM groups living along the NH19 and within the two bypasses (An Khe Bypass and Pleiku Bypass) in the development and implementation of the plan during construction including associated activities. While the RAP for Binh Dinh province covered approximately 19km in length starting from Km51+152 within Tay Son district and ends at Km67, border of Binh Dinh and Gia Lai will potentially affect an estimated 180 households. Out of the 180 affected households (AHs), 154 AHs are landowners and the 26 AHS are renters along with the acquisition of approximately 19 hectares (ha) of agricultural land and 0.16 ha of rural residential land. A budget of 305 billion VND (approximately 14 million USD) is estimated to compensate the losses and support to the affected households.

Aside from the RAPs, an EMDP was prepared given any evidence of project-induced impacts on ethnic minorities or indigenous peoples, together with a Gender Action Plan (or Gender Equality and Social Inclusion (GESI) Plan) that identifies issues specific to the condition of women and strategies for their empowerment. Livelihood restoration programs area also devised where alternative means of livelihood are necessary to ensure a continuing acceptable, or even better, improved, quality of life.

The Project's social impacts (land acquisition and livelihood impacts) and mitigation measures will be updated through Detailed Measurement Survey (DMS) along with the conduct of Socio-economic Survey to determine the actual affected assets and number of affected persons that are eligible for compensation and other entitlements after the approval of the detailed design. The DMS will be carried out within the demarcated project boundary limits by a Consultant to be engaged by PMU2 with the assistance of the Land Fund Development Commune and District Compensation and Site Clearance Committee (DSCC). Likewise, Replacement Cost Survey will be undertaken by an Independent Appraiser to update the budgetary requirements (compensation and entitlements) in the implementation of the RAP.

4.2.1.2 Safety Risks Related to Unexploded Objects

The Project area used to be affected by wars, therefore there is a risk that some UXO have been left at some locations in the 198 ha of land to be acquired by the Project. Deep excavation or filling of high slopes would take place during the construction phase along the An Khe and Dak Doa-Pleiku bypasses and the section from km155 to km160. Therefore, safety risks related to UXO at these sections would also be higher than other areas. Incidents related to UXO during construction phase would lead to the loss of lives and property. To prevent safety risks related to UXO, the Project will arrange for mine clearance to be carried out before construction commencement with total estimated costs at 6.57 billion VND (approximately 300,000 USD)

4.2.2 Potential Negative Impacts and Risks of Construction Phase

4.2.2.1 Air Pollution

During construction phase, dusts would be generated from the demolition of the existing structures, site clearance, topsoil removal, excavation, and filling, loading and unloading of granular materials and waste, temporary storage and transportation of these materials etc. Exhaust gases such as NOx, SO_2, CO, CO_2 etc. would also be generated from the engines of trucks and construction plants. Noise, and vibration will also be generated from construction activities such as pile driving and compaction.

a. Dust and Exhaust Gases Emission

Dusts generated from demolition activities:

The number and land area of structures to be demolished along each section of NH19 are shown in Table 31-Structures to be Demolished.

Table 31 Structures to be Demolished

Structure	Unit	Km 50-67	Km 82 + 200 - 90	Km 132-152	Km 155-160	An Khe Bypass	Km 180-241	Pleiku Bypass	Total
		L = 17km	L = 7.8 km	L = 20 km	L = 5 km	L =13.7 km	L = 61km	L =13.2km	
Two-story houses	House	-	-	2	-	1	-	-	3
	m^2			136		54			190
Grade 4 houses	House	4	11	8	18	30	8	11	90
	m^2	152	908	629	2189	1682	197	358	6155
Temporary houses	House	-	-	-	6		5	1	12
	m^2				221		180	82	483
TOTAL	House								105
	m^2								6,828

Demolition of 105 houses on 6,828 m2 of land would generate some dusts. The structures to be demolished are scattered along the alignment of NH19, for example the most is 30 grade 4 houses along 13.7 km of the An Khe bypass, or 18 grade 4 houses along 5 km of the section from Km 155-160. Therefore, the amount of dusts generated at each location would be limited, localized, at low level and last in relative short period of time. This local impact can be mitigated by commonly known method such as watering the materials before demolition and/or cover the areas/buildings to be demolished.
The above number of houses to be demolished will be validated during the DMS once the project boundary limits is demarcated.

Dust generated from Earthworks and Transportation:
The volume of earthworks is presented in Table 32 -Volume of Earthwork below:

Table 32 Volume of Earthwork

Category	Unit	Km50-Km90	Km131-Km160	Km180-Km241	An Khe Bypass	Pleiku Bypass
Excavation	m^3	679467	152428	340398	307453	949375
Filling	m^3	104971	80476	111372	284972	840637
Total	m^3	784438	232904	451770	592425	1790012

On average excavation or filling of 1 m^3 of soil will generate around 0,075 kg of dust, 10% of which is suspended dust[7]. Given the pollution coefficient E = 0,075 kg/m^3, and based on construction schedule, the expected amount of dust spread in the air during excavation, filling and leveling is shown in Table 31.

Table 33 Dust from Excavation and Filling

No	Route/section	Dust generated (kg)	Length of the construction section (km)	Duration (months)	Load (kg/day)	Load (mg/m.s)
1	Km50-Km90	58833	33.8	12	188	0.19
2	Km131-Km160	17468	26	12	56	0.07
3	Km180-Km241	33883	61	12	109	0.06
4	An Khe Bypass	44432	13.7	12	142	0.36
5	Pleiku Bypass	134251	13.2	12	430	1.13

[7] Dr. Nguyen Khac Cuong. Environment in construction, Ho Chi Minh City University of Technology, 2007

The figures presented in Table 32 above indicated that the amount of dust generated would be the most in the area along the Pleiku and the An Khe bypasses. This is due to new road construction with large volumes of filling and excavation would take place along these two bypasses.

Besides, a considerable amount of dust and emissions would also be generated from the operation of construction equipment and transport materials. Emission factor of the World Health Organization shows that the emission factor of trucks from 3.5 to 16 tons is 0.9G TSP/km.truck; 4.29S g SO2/km.truck (according to Vietnamese technical specification (QCVN01: 2007/BKHCN, S = 0.05%); 11.8g NO2 /km.truck, 60g CO/km.truck. Specifically, the total amount of dust and emission expected from operation of machinery and construction equipment is shown in Table 34.

Table 34 Amount of Dust and Gas emission from Fuel Consumption by Equipment

No	Category	Traffic Load (trips/day)	Load (mg/m.s)			
			TSP	SO_2	NO_2	CO
1	Km50-Km90	153	0.005	0.023S	0.063	0.319
2	Km131-Km160	57	0.002	0.008S	0.023	0.119
3	Km180-Km241	173	0.005	0.026S	0.071	0.360
4	An Khe Bypass	100	0.003	0.015S	0.041	0.208
5	Pleiku Bypass	284	0.009	0.042S	0.116	0.592

As can be seen from Tables 33 and 34, the total amount of dust and emissions generated from excavation and transport activities in each construction item are summarized in Table 35 below:

Table 35 Amount of Dust and Gas Emitted

No	Category	Load (mg/m.s)			
		TSP	SO_2	NO_2	CO
1	Km50-Km90	0.2	0.023S	0,063	0,319
2	Km131-Km147	0.07	0.008S	0.023	0.119
3	Km180-Km241	0.07	0.026S	0.071	0.360
4	An Khe Bypass	0.36	0.015S	0.041	0.208
5	Pleiku Bypass	1.14	0.042S	0.116	0.592

Applying Gaussian model with assumption that wind speed during the dry season at 2.2m/s, during the rainy season at 2.8 m/s, calculation for the distance at 5 to 50m from the source of emission, we can calculate concentration of pollutants generated from excavation and transportation activities as follows:

Table 36 Forecasts of Exhaust Gas Emissions

Parameter	Season	Forecast concentration by distance (*) (mg/m^3)				QCVN05:2013/BTNMT
		5m	10m	25m	50m	
Km50-Km90						
TSP	Dry		**0.44**	0.25	0.16	**0.3**
	Rainy	**0.45**	**0.35**	0.20	0.12	
SO_2	Dry	<0.001	<0.001	<0.001	0.000	**0.35**
	Rainy	<0.001	<0.001	<0.001	0.000	
NO_2	Dry	0.018	0.014	0.008	0.005	**0.2**
	Rainy	0,014	0.011	0.006	0.004	
CO	Dry	0.091	0.070	0.040	0.025	**30**
	Rainy	0.072	0.055	0.032	0.019	
Km131-Km160						
TSP	Dry	0.2	0.154	0.088	0.054	**0.3**
	Rainy	0.157	0.121	0.069	0.043	
SO_2	Dry	<0.001	<0.001	<0.001	<0.001	**0.35**
	Rainy	<0.001	<0.001	<0.001	<0.001	
NO_2	Dry	0.007	0.005	0.003	0.002	**0.2**
	Rainy	0.005	0.004	0.002	0.001	

Parameter	Season	Forecast concentration by distance (*) (mg/m^3)				QCVN05:2013/BTNMT
		5m	10m	25m	50m	
CO	Dry	0.034	0.026	0.015	0.09	30
	Rainy	0.027	0.021	0.012	0.007	
Km180-Km241						
TSP	Dry	0.2	0.154	0.088	0.054	0.3
	Rainy	0.157	0.121	0.069	0.043	
SO_2	Dry	<0.001	<0.001	<0.001	<0.001	0.35
	Rainy	<0.001	<0.001	<0.001	<0.001	
NO_2	Dry	0.02	0.016	0.009	0.006	0.2
	Rainy	0.016	0.012	0.007	0.004	
CO	Dry	0.103	0.079	0.045	0.028	30
	Rainy	0.081	0.062	0.036	0.022	
An Khe Bypass						
TSP	Dry	**1.03**	**0.79**	**0.45**	0.28	0.3
	Rainy	**0.81**	**0.62**	**0.36**	0.22	
SO_2	Dry	<0.001	<0.001	<0.001	<0.001	0.35
	Rainy	<0.001	<0.001	<0.001	<0.001	
NO_2	Dry	0.012	0.09	0.005	0.03	0.2
	Rainy	0.009	0.007	0.004	0.003	
CO	Dry	0.06	0.05	0.026	0.016	30
	Rainy	0.05	0.04	0.02	0.01	
Pleiku Bypass						
TSP	Dry	**3.26**	**2.51**	**1.43**	**0.89**	0.3
	Rainy	**2.56**	**1.97**	**1.13**	**0.70**	
SO_2	Dry	<0.001	<0.001	<0.001	<0.001	0.35
	Rainy	<0.001	<0.001	<0.001	<0.001	
NO_2	Dry	0.033	0.026	0.015	0.009	0.2
	Rainy	0.026	0.020	0.011	0.007	
CO	Dry	0.169	0.130	0.074	0.046	30
	Rainy	0.133	0.10	0.06	0.04	

Table 35 shows that the concentrations of CO, SO2, NO2 at all construction sites would be within allowable limit. Dust level would be higher than allowable level (0.3mg/m3) at certain areas:

- Km50-Km90: Dust concentrations ranges from 0.12-0.57 mg/m^3, and within 10m from source, dust level would be from 1.17 to 1.19 times higher than allowable limits. Some villages along Km 67-76 namely An Thuong, Thuong An of Song An Commune and Ngo May ward) would be affected by dust.
- Km131-Km160 and Km 180-241: Dust level would be always within allowable limit.
- An Khe Bypass: Dust concentrations ranges from 0.22 to 1.03 mg/m3. Particularly, within 5 m from source, dust level would be from 2.7 to 3.4 times higher than allowable limits; within 5-10 m from source, dust level would be from 2.1 to 2.6 times higher than allowable limits, and within 10-25 m from source, dust level would be higher than allowable limits 1.2 to 1.5 times. Dust level in the area within 25-50 m from source always within allowable limits. As the Cu An, Song An and Ngo May residential areas are located only 10-15m, these would be affected with dust level would be 2 times higher than standard.
- Pleiku Bypass: Similar to the estimated dust concentrations for the An Khe bypass, dust level would be highest and exceed allowable levels in the areas within 5 m from source, at 8.5 to 1.01 times. Dust level along the Pleiku bypass is predicted to be higher than that along the An Khe bypass, and at distance of 50 m from source, dust level still exceed allowable limits 2.3 to 3 times. Some residential along this section would be affected as indicated in the site-specific impact assessment section.

For pavement raking activities, dust generated on each section ranges from 56-430kg/day.

At many sections along the Pleiku and An Khe Bypass, dust mainly affects the workers at the construction site as population density is low in these sections. Sections of existing NH19 running through numbers of residential areas, dust would also affect the people living along these sections where construction activities would take place.

Cultural sites such as the Mieu Xa temple (in Song An commune), Cho Dong Church (An Binh, An Khe -Gia Lai), Minh Châu Pagoda (Kong Dơng town, Mang Yang district), Buu Tan Pagoda (Pleiku – Gia Lai), Duc Giang Pagoda (Pleiku – Gia Lai), Nguyen Sơn Pagoda, and Khanh Thien Pagoda (Chu Prong – Gia Lai) are located around 20-25m from construction sites thus the impacts of dust would be limited and mainly affect the access road area.

It should be noted that the amount of dust and gas emission heavily depends on the number of machinery and vehicles working on the construction site, the amount of waste and materials temporarily loaded in the areas, wind and other climatic conditions. Therefore, the potential impacts of dust is mitigable by construction schedule and methods, particularly in densely populated areas like Pleiku city, Dak Doa and An Khe towns, Tan An residential area, An Cu commune, Kon Dong town, Dak Djrang, K'Dang, Tan Binh, An Phu, Chu A, Gào, Bau Can, Thang Hung Binh, IADin, IA Krel, Chu Ty, Ia Kla, Ia Dom.

Therefore, dust level would be very high along the Pleiku bypass, high along the An Khe bypass, significant along the two new bypasses and at moderate level at other sections. Dust would have negative impacts on workers and public health, particularly in populated areas. Dust may also have negative impacts on plant growth. Dust can be minimized by various methods such as covering the trucks, minimizing the volume of materials and wastes stored temporarily at the site, cover materials loads, watering dusty areas etc. Therefore, the potential impacts of dust would be at moderate level.

b. Noise

During road construction, noise is generated from the operation of construction equipment and vehicles such as excavator, vehicles, cement mixers, etc. Noise levels generated by various types of construction plants and equipment are shown in Table 37 below:

Table 37 Typical Noise Level Generated from Construction Equipment

No	Type of equipment	Lmax (dBA)	No.	Type of equipment	Lmax (dBA)
New road construction			23	Air compressor	78
1	Excavator	78	78	Excavator	78
2	Roller	83	83	Roller	83
3	Bulldozer	81	79	Concrete mixer truck	79
4	Truck tipper	77	81	Concrete pump truck	81
5	Excavator	81	81	Crane	81
6	Excavator with reverse bucket	80	81	Bulldozer	81
7	Leveling machine	85	77	Truck tipper	77
8	Sidewalk trenching machine	89,5	81	Excavator	81
9	Pavement concretizing machine	77,2	80	Excavator with reverse bucket	80
10	Paver	83	81	Power generator	81
11	Pump	77	85	Leveling machine	85
Road widening			35	Hammer drill (Handheld)	81
11	Roller	83	77	Pump	77
12	Bulldozer	81	84	Soil scrapers (raking, dredging)	84
13	Truck tipper	77	81	Tractor	81
14	Paver	83	80	Steel bending machine	80
15	Excavator	78	83,7	Chainsaws	83.7
16	Excavator	81	83,0	Cement and concrete mixing plant	83.0
17	Pavement raking machine	88.5	89,6	Concrete saw	89.6

No	Type of equipment	Lmax (dBA)	No.	Type of equipment	Lmax (dBA)
Bridge construction			43	Flip bucket mixer	80
18	Vacuum road sweeper	81.6	101,3	Pile machine	101.3
19	Roller Compactor	80	89,5	Sidewalk trenching machine	89.5
20	Pile pressing machine	100.8	80,0	Pile drilling machine	80.0
21	Welder	74	83	Paver	83
22	Paver	83	77	Leveling machine	77

(*at distance of 15.24m from sources)

Source: Acoustical measurement in FHWA roadway construction noise model user's guide. FHWA-HEP-05-054, 1/2006.

Total noise level is calculated by the formula[8]

$$L_{\Sigma} = 10\lg \sum_{i}^{n} 10^{0,1.Li}$$

Where: L□is the total noise level; Li is the noise level from source i;
n is the total number of noise sources.

Pile driving is the activity that generates highest noise level. Noise generated from construction sites is highest at bridge construction sites, which is at 77-82.6 dBA at 15.24m from source, at 77-81.5dBA along the bypass construction sites and road rehabilitation sites. Noise level generated from bridge expansion sites is 75-80.4 dBA, for the pavement rehabilitation is 76 to 80.5 dBA (compared to QCVN 26-2010/BTNMT of 70dBA during daytime and 55 dBA during nighttime).

The majority of residential areas along the route are located at from 10 to 15m from the construction site, thus would be affected by noise as detailed in Table 38. For the construction of bridges along the NH19, the An Khe and Pleiku bypasses, noise level would exceed standard by 7-11.5 dB. For the expansion of existing NH19, the noise level exceeds by 6-11.5 dB.

Table 38 Noise Sensitive Receptors

Residential area	Locations	Distance to road/ bridge (m)	Excess to allowable limits (dB)
Ta Giang 1 residential area - Tay Giang commune	Km 50+800-Km52+100	10-15	7-11.5
Dong Pho residential area - Tay Giang commune	Km53+200-Km54+900	7-10	**>11.5**
Trung Son residential area - Tay Thuan commune	Km57+700-Km58+300	5-10	**>11.5**
An Thuong and An Thuong 2 residential areas - Song An commune	Km69+319+Km71	10-15	7-11.5
Ngoc An Vihara	Km68-km70	15-20	7-11.5
Hoa Mai Kindergarten	Km68-km70	15-20	7-11.5
Thuong An residential area - Song An commune	Km71+700-Km73+200	10-15	7-11.5
Residential groups 6&7 - Ngo May ward	Km76-Km73+364	10-15	7-11.5
Mai Anh preschool, Son Ca kindergarten, Cho Dong church	Km 80-km82	20	7-9
Tan Binh, Tan Son residential areas - Tan An commune, and An Hiep, An Binh residential areas - Cu An commune	Km82+200-Km83+854	10	**>11.5**
Early Childhood Kindergarten	Km83-km84	20	7-9

[8] *Pham Ngoc Dang, 2003. Air environment. Science Publishing House 2003*

Residential area	Locations	Distance to road/ bridge (m)	Excess to allowable limits (dB)
Chi Cong, Thuan Dong, An Dinh, An Hoa residential areas - Cu An commune and Tan Lap, Tan Dinh residential areas - Tan An Commune	Km83+894- Km87	10	**>11.5**
Dong Che residential area - Tan An commune	Km87+390- Km88+100	10	**>11.5**
Minh Chau Pagoda	Km131-km132	20	7-9
Kon Dong town	Km131+300-Km136	6-7	7
Linh Nham residential area - Dak Djang commune	Km136+308- Km138	15	7
Tan Phu residential area - Dak Djang commune	Km138+Km139+200	15	7
Nam Dat residential area - Dak Djang commune	Km139+200- Km139+700	7-10	**>11.5**
Cay Diep and Ha Long 2 residential areas - K'Dang commune	Km139+900- Km143+800	7-10	**>11.5**
Cau Vang residential area - K'Dang commune	Km144+600- Km146+600	10-15	7-11.5
K'Dang Preschool	Km145-km146	20	7-9
Hamlet 1,2, and 3 - Tan Binh commune	Km147+200- Km152+500	15	7
Tan Binh Kindergarten	km149-km150	5-10	**>11.5**
Dak Doa town	Km151+500- Km152+500 and Km155-Km157+700	7-10	**>11.5**
Hamlets 1, 2 and 3 of An Phu commune	Km155+700-	7-10	**>11.5**
Hamlet 5 and 6 residential areas - An Phu commune	Km 157+700-Km159	10-15	7-11.5
Buu Tan Pagoda	Km158-km159	10	**>11.5**
Chu A center residential area	Km159-Km160	15	7
Hamlet 4 and Village A residential areas - Gao commune	Km182+300-Km185	15	7
Dong Tam residential area - Bau Can commune	Km185-Km186+700	15	7
Doan Ket and Hoa Binh residential areas - Bau Can commune	Km187+700-Km190	15	7
Hamlet 1,2, 3 and 4 - Thang Hung commune	Km193+400-Km198	15	7
Tan Lac residential area - Binh Giao commune	Km198-Km199+100	15	7
Thanh Binh and Thanh An residential areas - Binh Giao commune	Km200+200- Km202+200	10-15	7-11.5
Thong Nhat and Dong Tam residential areas - IA Din commune	Km207+300- Km209+100	10-15	7-11.5
Thanh Tam residential area - IA Krel commune	Km211+500- Km212+700	10-15	7-11.5
Thanh Giao and Ngol Lel 1 residential areas - IA Krel commune	Km213+100- Km215+200	10-15	7-11.5
IA Lam, Lam Tok and Khop residential areas - IA Krel commune	Km216+200- Km218+700	10	7
Chu Ty town central residential area	Km218+700- Km222+800	5-7	**>11.5**
Residential area no.7-Chu Ty town	Km222+500- Km222+800	7-10	**>11.5**

Residential area	Locations	Distance to road/ bridge (m)	Excess to allowable limits (dB)
Chu Bo 1 and Chu Bo 2 residential areas - IA Kla commune	Km225+500-Km228	7-10	**>11.5**
IAMUT residential area - IA Dom commune	Km228+800-Km229+100	15	7
Mook Den, Mok Trang and O residential areas - IA Dom commune	Km231-Km232+800	10-15	7-11.5
Bi village residential area - IA Dom commune	Km235+Km236+300	15	7
Boi village - Glar commune	Km4+300-Km4+700 on Pleiku Bypass	5	**>11.5**

Table 37 above indicates that some residential areas would be affected with noise level exceeding allowable level more than 11.5dB, particularly the Tan An and Cu An communes of Dak Po district has the most number of residential areas that would be affected by high noise level exceeding allowable limits from 11.5 dB.

Noise disturb listening, learning and recreation activities, affecting sleeps of people, particularly aged people. Long lasting high noise may also cause stress to people. Workers exposed to high noise level regularly or in long duration may be affected decreased hearing ability or deaf. Noise level generated from construction activities would exceed standard at number of locations discussed above, however, most of the construction activities that generate high level of noise would last in a relative short period, not continues. The level of noise reduced with increased distance from source. The level of noise impacts varies by aged group, baseline noise level, time of the day noise is generated, frequency and duration, and awareness of the affected people. Therefore, the potential impacts of noise if at low to moderate level, and mitigable by scheduling construction activities to avoid most sensitive hours in the day such as late at night or early in the morning, regularly maintain construction equipment and install mufflers to reduce noise generation, or provide ear plugs to the workers working at the construction sites.

b. Vibration

Vibration levels generated from construction plants such as compactors, excavators, bulldozers, trucks, road rollers, etc. can be calculated as follows:

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

Whereby: - L is vibration at a distance "r";

- L_0 is vibration at a distance "r_0". Vibration at a distance r_0= 10m is generally acknowledged as the source vibration;

- a is the intrinsic vibration decreasing coefficient against the clay ground and approx. 0.5.

Calculated vibration levels are presented in Table 39 below:

Table 39 Vibration Levels by Distance from Construction Equipment

No	Equipment	Source vibration (r_0= 10m)		Vibration decreasing levels with distance							
				r=12m		r=14m		r=16m		r=18m	
				L_{aeq} (dB)	L_{veq} (dB)	L_{aeq} (dB)	L_{veq} (dB)	L_{aeq} (dB)	L_{veq} (dB)	L_{aeq} (dB)	L_{veq} (dB)
1	**Excavator**	80	1,72	70,5	0,58	61,1	0,20	51,9	0,07	42,6	0,02
2	**Bulldozer**	79	1,53	69,5	0,51	60,1	0,17	50,9	0,06	41,6	0,02
3	**Heavy truck**	74	0,86	64,5	0,29	55,1	0,10	45,9	0,03	36,6	0,01

No	Equipment	Source vibration (r0= 10m)		Vibration decreasing levels with distance							
				r=12m		r=14m		r=16m		r=18m	
				Laeq (dB)	Lveq (dB)	Laeq (dB)	Lveq (dB)	Laeq (dB)	Lveq (dB)	Laeq (dB)	Lveq (dB)
4	**Roller**	82	2,17	72,5	0,73	63,1	0,25	53,9	0,08	44,6	0,03
5	**Air compressor**	81	1,93	71,5	0,65	62,1	0,22	52,9	0,08	43,6	0,03
QCVN 27:2010/BTNMT, allowing 75dB levels from 6 - 21h and ambient level from 21h -6h. DIN 4150, 1970 (Germany), 2mm/s: no damage; 5mm/s: Mortar flaking; 10mm/s: likely to damage the bearing power; 20□40mm/s: damage to the bearing power.											

The above suggests that, beyond 10m distance from construction equipment, vibration level is within the permitted limit set by QCVN 27:2010/BTNMT.

Road compaction and pile driving are likely the most popular activities that cause vibration during construction phase of the project. Vibration cause people to feel uncomfortable or even unsafe. As the majority of households located along NH19 are distance of 15 - 30m from the construction sites, the potential impacts of vibration onto local residents would be limited.

There are existing structures that such as grade 4 (one story) houses/buildings located within 5-10 m from road expansion construction sites in Dong Pho residential of Tay Giang commune, the Trung Son in Tay Thuan commune, Kon Dong Town, Nam Dat in Dak Djang commune, Cay Diep and Ha Long 2 in K'Dang commune, Dak Doa town, IA Lam, Lam Tok and Khop residential areas - IA Krel commune, Chu Ty town, Chu Bo 1 and 2 residential area - IAKLA commune, Tan Binh, Buu Tan Pagoda kindergartens etc.

Particularly, Villages 1, 2 and 3, An Phu commune located in the section where the road will be widened from 7 to 16 m with road base extended from 10 to 21m, i.e. the road will be expanded 5.5m at each side, just beside some existing houses and structures. Weak existing structures along this section may be at risk of being cracked due to vibration.

The level of vibration can be minimized through construction methods, such as the use of static compaction instead of vibrating compaction. Supports can also be installed to protect the weak structures from subsidence.

Some weak structures along Km155-160

4.2.2.2 Wastewater Generation

During construction phase, wastewater would be generated from worker camps, storm water runoff would appear at the construction sites including material preparation yards. If not responsibly managed, it can result in water contamination, unsanitary conditions and spreading pathogens from water.

a. Domestic Wastewater from Worker camps

It is estimated that about 357 workers would be mobilized during construction phase of the project as shown in Table 38. According to Vietnamese Construction Codes (TCXDVN) 33:2006 applicable to towns, industrial - agricultural centers, - industrial - fishery centers, and rural populace, on average each person uses 100 liters of water per day. The amount of wastewater generated accounts for 80% of water supplied. The total volume of wastewater generated during 24 months of construction on each site is estimated in Table 40 below.

Table 40 Estimated Volume of Wastewater Generated

Camp sites		Number of Workers	Volume of Wastewater Generated (m3)		
			Per day	Per Month	24 months
Km50-Km67	Km56+800	23	1.8	55	1,331
	Km67+600	18	1.5	44	1,048
Km82-Km90	Km67+600	23	1.8	55	1,331
	At Km12 in An Khe bypass	20	1.6	47	1,129
An Khe bypass	Junction between An Khe bypass and ĐT669 (Km4+500)	39	3.1	92	2,218
	At Km12 in An Khe bypass	23	1.8	55	1,331
Km132-Km160	Km147+700	31	2.5	74	1,774
	Boi village- Glar commune at Km4+500 on Pleiku bypass	46	3.7	111	2,661
Pleiku bypass	Boi village-Glar commune at Km4+500 in Pleiku bypass	23	1.8	55	1,331
	Km183+100	31	2.5	74	1,774
Km180-Km241	Km183+100	18	1.5	44	1,048
	Km223+100	31	2.5	74	1,774
	Km231+700	31	2.5	74	1,774
Total		357 (70%)	29	855	20,523

Provided that 30% labor work locally sourced and around 20-30 workers living at each camp, 1.6 to 3.7 m3 of wastewater would be generated each day or 44-111 m3 each month from each camp site. Although construction period is 24 months, it is expected that not all of the workers would be at the sites during all 24 months thus the amount of wastewater generated in 24 months in practice would be less than the figures in the last column of the Table 39 above. However, the total amount of wastewater generated at each camp site during 24 months would be still relative large, would be one to three thousands cubic meters.

Based on WHO's load factor of urban sewage contaminants, published in 1993, Vol.1. "*Rapid Assessment Methods*", the amount generated and concentration of pollutants in wastewater are as follows:

Table 41 - Volume of Wastewater and Concentration of Pollutants

No	Pollutant	Volume* (g/person/day)	Concentration (mg/l)	QCVN 40:2008/BTNMT, column B
1	BOD_5	45-54	562-675	50
2	COD	72-102	900-1275	-
3	Suspended solids	70-145	875-1812	120
4	Lubricant	10-30	125-375	20
5	Total nitrogen	6-12	75-150	-
6	Ammonium	2.4-4.8	30-60	10
7	Total Phosphorus	0.8 - 4.0	10-50	-

Source: (*) WHO, 1993

Table 40 shows that the concentrations of pollutants such as BOD_5, ammonia, total phosphorus, TSS, lubricant in wastewater would be high and exceed standard.

The relatively large volume of wastewater would mainly generate from the workers camps. Such wastewater contains pollutants exceeding standard, if not managed properly, would make the areas surrounding the camps become unhygienic, causing nuisance, surface water pollution. Stagnant

wastewater would become breeding grounds for mosquitoes and affect the health of the workers and the public. Wastewater from workers camps is manageable by piped or closed drains, and treatment tanks installed together with kitchen, bathroom, and sanitation facilities.

As mentioned above, instead of big central areas of hundreds of workers, campsites with around 20-30 workers per each will be distributed in various district/communes along the road, resulting in small amounts of wastewater discharged daily. Renting local house which already have sufficient wastewater collection system together with sanitary toilets will be better option. It can also provide additional income to local people, reducing the social conflict between construction workers and local people living along the road. From public consultation meetings, local people are willing to provide accommodation services to contractors if requested. The CESMPs will include a Code of Conduct intended to guide workers in interaction with residents, thereby ensuring cordial relations.

b. Stormwater Runoff

Rainfall runoff is calculated in accordance with TCXDVN 51: 2008/BXD as follows:

$$Q = q.C.F$$

Where:

Q - Flow calculated (l/s);

F - The catchment area of the storm water (area of the construction site);

C - Flow coefficient *(for project areas at a slope from 2% - 7%, and frequency of rainstorm P = 5 years):* 0.4;

q - rainfall intensity (l/s.ha) and is calculated using the formula: $A.(1+C.\lg P)$

$$q = \frac{}{(t+b)^n}$$

Whereby:

t - duration of rainfall (average): 60 minutes;

P - Repeating cycle of the calculated rain (years): 5;

A, C, b, n: parameters determined in accordance with local rain intensity (according to Annex II, TCXDVN

51: 2008/BXD, in Gia Lai are A = 8800, C = 0.49, b = 29 and n = 0.82). q = 385.3l/s.ha

According to WHO (1993), the concentration of pollutants in storm water is as follows: Total Nitrogen from 0.5 - 1.5mg/l, Phosphorus: 0.004 to 0.03 mg/l, COD: 10-20 mg/l, SS: 10-20 mg/l. Storm water run-off running through construction sites may lead to sedimentation in drainage channels and localized flooding. It may also cause increases in turbidity and suspended solids at the receptors.

Storm water runoff at the construction site can be estimated as follows:

- Km50-Km76: the area is 59.8 ha, calculated storm water runoff flow rate is around 9.2m3/s. Along this route is mainly agricultural land for rice, sugarcane, cassava and some drainage ditches. Therefore, if filling/excavation from road expansion are not properly managed, they may follow surface runoff to cause sedimentation in agricultural land, drainage channels and affect crop productivity. Materials generated from road excavation may also cause blockage of existing drains.
- Km82+200-Km90: the area is 18.4ha, calculated surface runoff flow rate is at 2.8m3/s.
- Sugar cane farms along the road may be affected by turbidity in surface runoff running through construction sites.
- An Khe Bypass: the area is 31.5ha, calculated runoff is around 4.8m3/s. Surface runoff through construction sites may cause increases in turbidity and sedimentations at water bodies along the road such as the Da Lat Spring at Km0 + 155, the Da Spring at Km3 + 569, the Voi Spring at Km3 + 810, the Ba River Km6 + 108, the Don 1 Spring Km8 + 905, and the Don 2 Spring at Km9 + 260.

- Km132+500-Km160: the area is 64.4ha, calculated runoff is 9.9m3/s. If not drained properly, stormwater that contains high solid contents from construction sites may cause localized flooding in urban areas along the route such as Kon Dong, Dak Doa, Pleiku.
- Pleiku Bypass: the area is 30.4ha, calculated surface runoff is 4.7m3/s. Rainwater can contribute additional turbidity to some water bodies along the route such as the Le Can stream at Km2+600, the An My 1 stream at Km7+900 and An My 2 steam at Km16+500.
- Km180-Km241: the area is 140ha, calculated surface runoff is 21.6m3/s. Stormwater containing impurities from construction sites may affected residential areas.

The main potential impacts related to surface runoff are localized flooding and washing off the wastes and materials from construction sites, causing sedimentation along drainage channel and at the receptors. Creation of proper drains with sedimentation traps, regularly maintain them, and protect materials and wastes from surface runoff would help to reduce the potential negative impacts of surface runoff.

c. Bentonite generated from Bridge Construction sites

The Project would reconstruct eight bridges along the existing NH19 and build eight new bridges along the two bypasses. Bentonite solutions will be used for the construction of abutment foundations, piers and bored piles. During this construction phase, relatively large amounts of bentonite solution with high solid contents will be generated as shown in Table 42.

It is noticeable that the volume of bentonite generated from construction sites of some shorter bridges may be greater than that from longer bridges. In particular, the largest volumes of bentonite would be generated from the construction sites of the Vang (244 m^3) and the Le Can bridge (277 m^3) although the length of the bridges (or the correlative width of the streams) are relative small, at 24 m only. The amount of bentonite generated at the Bau Sen bridge (which is only 9 m long on a narrow stream) construction site is estimated at 76 m^3, which is relative high compare to other larger streams. This is due to the amount of bentonite generated not only depending on the number of piles to be drilled but also their depths.

Table 42 Volume of Bentonite Generated from Bridge Construction Sites

Bridge reconstruction along existing NH19	Bridge	Bàu Sen	Ba La	Ta Ly	Thầu Dầu
	Length (m)	12	99	24	48
	Location (Km)	50+578	51+152	83+894	87+390
	Bentonite Vol. (m3)	76	177	90	139
	Bridge	Linh Nham	Vàng	Lệ Cần	An Mỹ
	Length (m)	48	24	24	33
	Location (Km)	136+308	144+400	149+045	156+570
	Volume (m3)	139	244	277	140
An Khe Bypass	Bridge	Đá Lật	Suối Đá	Suối Vôi	Sông Ba
	Length (m)	33	99	33	99
	Location (Km)	0+155	3+569	3+810	6+108
	Volume (m3)	123	209	123	250
	Bridge	Dồn stream 1	Dồn stream 2		
	Length (m) Location (Km) Volume (m3)	33 8+906 123	33 9+260 123		
Pleiku bypass	Bridge	An Mỹ 1	An Mỹ 2		
	Length (m) Location (Km) Volume (m3)	33 7+900 112	99 16+500 172		

As confirmed in Detailed Design, bentonite has to be collected, dewatered, and disposed at disposal sites, specifying in ESMP, CESMP accordingly.

d. Wastewater from Maintenance of Construction Equipment

Wastewater from the maintenance of construction equipment does not only contain oil but also high contents of solids. Table 43 presents the estimated volume and quality of wastewater generated from the maintenance of construction equipment.

Table 43 Amount of wastewater from equipment maintenance

Type of Wastewater	Amount (m^3/day)	Concentration of Pollutants		
		COD (mg/l)	Oil (mg/l)	SS (mg/l)
From equipment maintenance	2	20 - 30	-	50 - 80
From equipment washing	5	50 - 80	1.0 - 2.0	150 - 200
From equipment cooling	4	10 - 20	0.5 - 1.0	10 - 50
Total	11	30 - 49	0.6 - 1.3	81 - 124
QCVN40:2011/BTNMT, column B		*100*	*10*	*100*

The figures given in Table 44 shows that the contents of COD, oil in wastewater generated from maintenance, cleaning and cooling of construction equipment is within allowable limits set in QCVN 40:2011/BTNMT, column B and SS contents may exceed standard.

In practice, equipment maintenance is usually not carried out on-site but in registered workshops with their own drainage system.

Level of Impact: moderate and manageable

4.2.2.3 Surface Water Quality Degradation

The volumes and quantity of the wastewater from workers' camps, stormwater runoff running through construction sites, and bentonites from bridge construction sites discussed in the previous section may affect the receptors or water bodies at the construction sites.

Domestic wastewater, if not effectively managed, would mainly contribute additional BOD, nutrients and pathogens to the receptors. Surface runoff through construction sites would mainly lead to increase turbidity and suspended solids. As the main contents of bentonite is clay, bentonite, if not effectively managed, would also mainly cause increased turbidity at the receiving surface water bodies.

Baseline data on surface water quality of the Ba La and Song Ba rivers shows that TSS contents in rainy season (46.4 - 47.3 mg/L) nearly reach applicable allowable limits (50 mg/L). Although baseline water quality is limited, it was observable that the river water in the region are generally very turbid in due to high erosion potentials in the catchment. Therefore, significant addition of solids from construction sites may lead to TSS contents in water bodies in Project area exceeding standard.

As the water bodies in the Project areas is mainly for drainage and irrigation, water quality degradation would mainly cause sedimentations in drainage/irrigation channels. Limited aquatic flora and fauna in these water bodies may also be affected.

Regarding new Ba bridge on An Khe bypass, which is 2km far from the An Khe hydropower dam to the downstream. Surface water of Ba river from on-site observation (on February 2020) is quite good and water in the An Khe hydropower lake are used as intake water for An Khe – Sai Gon water supply plant. There is not any big cattle farm and or food processing plant located close to Ba river where project bridge is across. Thus, the additional sampling on water quality should be conducted before construction commencement. And testing result will be used as baseline data to evaluate/monitor the environmental protection compliance of contractors. Mitigation measures for surface water quality have to be prepared and implemented promptly.

4.2.2.4 Erosion and Landslide Risks

As described in Chapter 3, the annual rainfall in the Project area is relatively high. On the other hand, topographically, the sections from Km59 - Km67 (on An Khe Pass) and Km203 - Km205 of the existing NH19 are steep with many slopes thus subjected to relative high erosion potentials and landslide

risks. Six locations on the An Khe Pass have been identified that landslides usually happen in October – November every year. This risk would be even increased during the construction phase to modify some curvy sections on the An Khe pass (Km59-Km67) and to lower the slopes.

Construction sites of An Khe and Pleiku Bypasses are on fairly complex terrain, mostly passing steep hillsides and separated by valleys, rivers and streams. Erosion potential and land slide risks is highest at the sections where deep excavation or high filling would take place, particularly:

- On the An Khe Bypass, excavation to 3-4 m deep along 1500 m of Km 0-Km 5, and to 6 m deep along 160 m at km 6+640-Km 6+800, and filling to 2.5 to 7.5 m along 1400 m at Km 0-Km 9+650;
- On the Pleiku bypass, excavation to 6 m along 700 m from Km 16+100-16+800 and filling from 2-4 m at other locations;

Erosion and landslides risks, which generally higher during rainy season and unstable slopes, would threat the safety of the workers, traffic means on the roads, and communities. Farmland may also be buried.

Level of Impact: at moderate level and can be controlled by mitigation measures and construction schedule.

During detailed design, DDD Consultant integrate the climate change adaptation and mitigation measures into the design of the new bridges, the proposed bypasses along with the design of drainage facilities/ slope protection, thus, alternative solutions have been developed (see figure below):

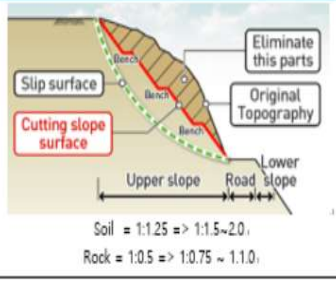
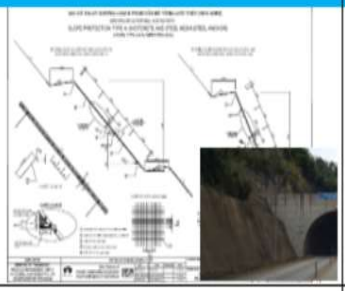
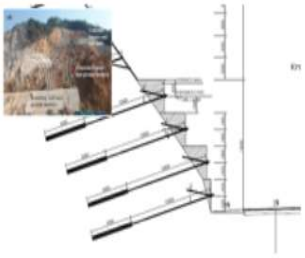
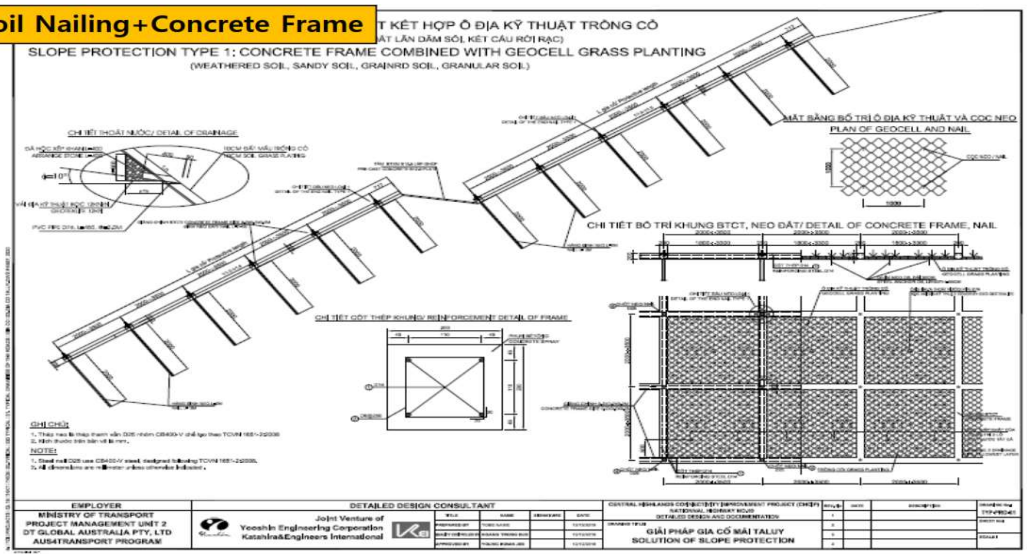
Classification	Alternative-1	Alternative-2	Alternative-3
Reinforcement	General Slope Gradient	Soil Nailing	Ground Rock Anchor
General Drawing (Application Example in Vietnam)			
Construction Experience	a lots of experience	Hanoi - Lao Cai Expressway	Ha Long – Van Don Expressway
Pros & Cons	- It is installed across failure surfaces - This can be used for smaller failure planes or smaller rock masses. - Could be the most applicable method due to its simplicity and cost effectiveness - Applicable in case of finite slope - Large earth work and enviromental disruption potential could be a disadvantage.	- Soil nailing is relatively simple and economical than earth anchor - Applicable in case of infinite slope - It is installed only to across failure surface of rock slope - It is a method to delay the progress of weathering by covering the exposed rock cutting of cutting works. - These can be used for large rocks as rock anchor(strand) have higher strength than rock bolts	It is installed across failure surfaces to increase its strength - These can be used for large rocks as cables have higher strength than rock bolts. - Applicable in case of infinite slope - This method is effective for slopes with seepage, the unsuitable slope for vegetation, or slopes where the surface may collapse even if there is vegetation is present.
Construction Difficulty	Simply	Normal	Difficulty
Construction Cost	Very Economical	Economical	Expensive
Suggestion	0	0	0

Figure 23 Alternative Slope Stabilisation Solutions

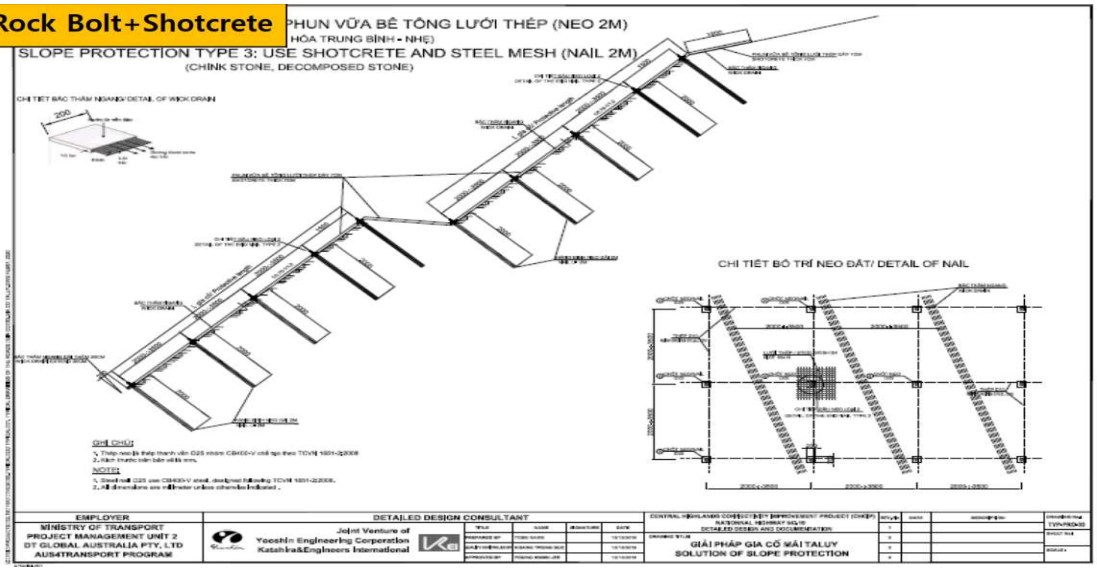
Specific solution for slope cutting sections in the An Khe Pass are finalized as follows:

- Km65+100m(Soil): Retaining Wall (S=1:0.5) + Ground Rock Anchor (L=14~26m)
- Km65+240m(Soil): Retaining Wall (S=1:0.5) + Ground Rock Anchor(L=20~25m)
- Km65+580m (Soil + Rock combined Slope):
    - Soil (Talus) :General Slope Gradient(S=1:1.25~1.5) + Mattress Gabion
    - Rock (Moderately Rock): S=1:0.5~1.0 + Shotcrete

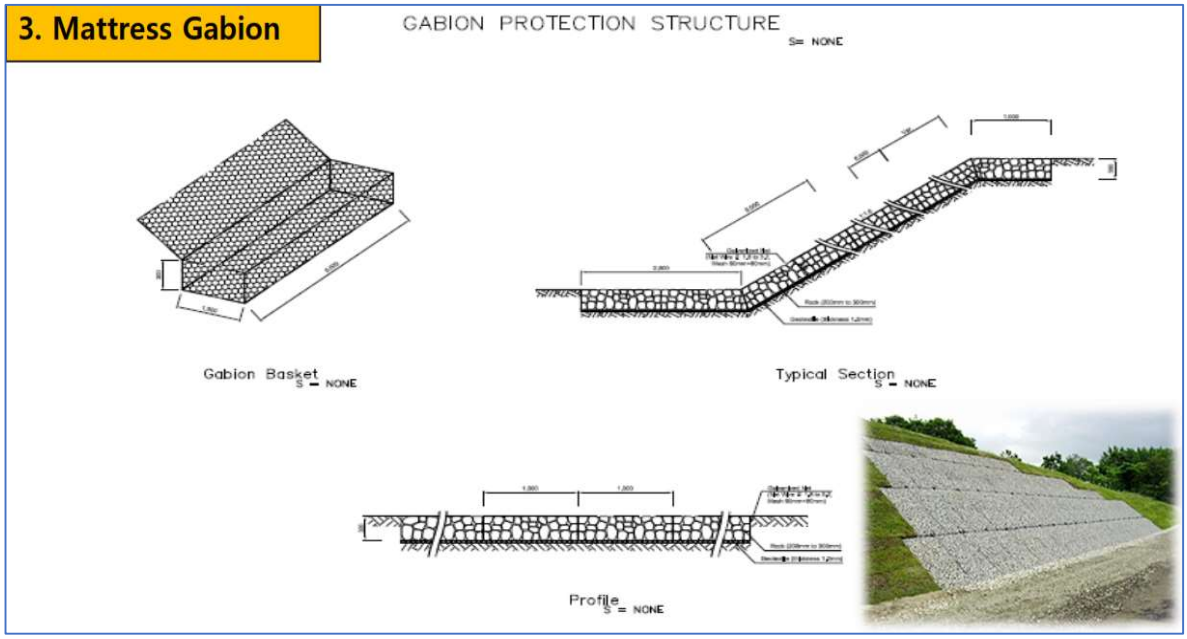
1. Soil Nailing+Concrete Frame



2. Rock Bolt+Shotcrete



3. Mattress Gabion



4.2.2.5 Solid Waste Generation

a. Waste from demolition of existing structures/bridges

Solid wastes generated from demolition of existing structures would mainly be the concrete from 8 bridges, however, the estimated volume is not available. In addition, it is estimated that 2,100 tons of solid waste would also be generated from the demolition of existing structures along the alignments including the three 2-storey houses, 90 single story houses, 12 temporary houses. Concrete, brick and mortar from structure demolition are often reused for leveling, steel scrap is sold for reuse or recycling.

As work quantity estimation from detailed design, demolition of 08 existing bridges will generate around 2,800 m3 (around 250-350 m^3 per each) solid waste. Most of them can be reused onsite as filling materials for constructing temporary access road and bridges.

b. Construction Waste

During construction phase, construction waste generated mostly from the excavation and removal of top soil for new roads construction or expansion, or from raking of the existing road surface for asphalt paving, excavation for abutments and piers construction etc. The contractor would reuse part of the excavated soil (50-60%) for filling, and the remaining volume of excavated materials would need to be dealt with.

The estimated volume of solid waste generated during the construction of each section is follow:

- km50-km90: 679,467 m3 of excavated materials;
- km131-km160: 152,428 m3 of excavated materials;
- km180-km241: 340,398 m3 of excavated materials;
- An Khe Bypass: 307,453m3 of excavated materials;
- Pleiku Bypass: 949,375m3 of excavated materials.

Thus, the estimated volume of solid waste generated is 2,429,121 m3 of excavated materials and normally 10% is topsoil (equivalent to 242,912 m^3).

The top soil removed during construction will be used by local people for filling low laying areas or agricultural land. Other construction waste would be used by local authority for leveling sites needed in accordance with local land use plan.

The remaining solid waste will be temporarily loaded along the route before being transported to the approved disposal site along NH19 in accordance with the environmental management plan presented in Chapter 6.

c. Domestic Solid Waste

It is estimated that each person would generate 0.5 kg of solid waste per day. Therefore, the amount of solid waste generated at each camp site would be as indicated in Table 44 below:

Table 44 Estimated Solid Waste Generation

Camp sites		Number of Workers	Solid waste generated (kg)		
			Per day	Per Month	24 months
Km50-Km67	Km56+800	23	16.5	345	8,280
	Km67+600	18	9	270	6,480
Km82-Km90	Km67+600	23	11.5	345	8,280
	At Km12 in An Khe bypass	20	10	300	7,200
An Khe bypass	Junction between An Khe bypass and ĐT669 (Km4+500)	39	19.5	585	1,4040
	At Km12 in An Khe bypass	23	11.5	345	8,280
Km132-	Km147+700	31	15.5	465	1,116

Camp sites		Number of Workers	Solid waste generated (kg)		
			Per day	Per Month	24 months
Km160	Boi village- Glar commune at Km4+500 on Pleiku bypass	46	23	690	1,6560
Pleiku bypass	Boi village-Glar commune at Km4+500 in Pleiku bypass	23	16.5	345	8,280
	Km183+100	31	15.5	465	1,116
Km180-Km241	Km183+100	18	9.5	270	6,480
	Km223+100	31	15.5	465	1,116
	Km231+700	31	15.5	465	1,116
Total		357	178.5	5355	128,520

As shown in Table 44 above, each day 10-25 kg of domestic solid waste would be generated from each camp site. The volumes of wastes to be generated each month would be from 300 to 900 kg, depending on the number of workers living at each site. As the figures given in the last column above was calculated for the case of maximum number of workers staying at each camp site during 24 months, the actual of solid waste generated during 24 month would be less. Nevertheless, the amount of wastes generated from each camp site would be relatively large after 24 months, at least several tones.

Solid waste would generate bad odor, cause nuisance to the public, attract vermin, has potential to cause water and soil pollution. If not properly managed, solid wastes may affect the health of the workers and the people living near the camps. CESMPS should specify the procedures for segregating wastes as it is simple enough to distinguish recyclables from wet/organic waste, which makes disposal easier. As solid waste collection service is available in most of the residential areas along the NH19 and mitigation measures can be applied during temporary storage of the garbage, the potential impacts of domestic waste would be manageable. The service on domestic solid waste collection and treatment is available at project areas, provided by functional units at district level together with collection team at commune level. Contractors will be required to sign contracts with their service providers during construction phase.

Level of Impact: at moderate level and can be controlled by mitigation measures.

4.2.2.6 Hazardous Materials

Some hazardous materials such as fuel and oil would be stored at the site. Hazardous waste generated includes waste oil, oily rags, oil containers. The amount of waste oil generated during construction process depends on the following factors:

- Number of vehicles and construction equipment on construction site
- The amount of oil discharged from the transportation and construction
- Frequency of oil change and maintenance of construction equipment

On average, the amount of oil discharged from the transportation and construction equipment is 7 liters/time. Frequency of oil change and maintenance of construction equipment is every 3 months at the maximum. As presented in Chapter 1, the number of vehicles and construction equipment requiring oil replacement used for the project is 290 vehicles, therefore, the amount of waste oil generated per month would be (290 vehicles x 7 liters)/3 = 677 liters. In addition, the project also generates waste grease rags and grease container estimated at 200kg/month.

In practice, vehicle and equipment maintenance including oil change would be carried out at workshops, and repair would be carried out on-site only in emergency cases. Therefore, the amount of hazardous wastes generated at the construction sites would be very limited. Even small quantity, if not properly managed, hazardous waste would pose adverse impacts on soil and water pollution.

The potential impacts related to hazardous materials is at moderate level and can be controlled with mitigation measures.

4.2.2.7 Impacts on Agricultural Production

There is crop land such as rice fields, sugarcane, cassava, rubber, pepper, tea, etc. along the existing NH19. The potential impacts of construction activities on these agricultural lands include:

- Transportation, loading and unloading, temporary loading of construction materials may obstruct access to crop land of farmers;
- Excavated and filled areas may cause difficulties for the movements of the farmers, machineries and animals;
- Crop productivity may be affected by dusts from construction materials and wastes;
- Crop land and irrigation/drainage canals may be filled up by construction materials and wastes if not properly managed. That may lead to disturbance to irrigation service or drainage function of the affected canals.

The potential impacts on agricultural land would be highest during seedling or harvesting period. These impacts are mitigable by careful operation of construction activities and provision of temporary access or prioritizing the construction of alternative permanent access to farmlands.

Specific mitigation measure for 2 bypasses to be constructed, include but are not limited to:

- Temporary crop access road/intersection have to be prepared/maintained
- Mitigation measures for dust
- Silt fence/silt trap should be considered to avoid run-off water impacted to crop.
- GRM system, connection between Contractor and local authorities as well as community-based inspection will be operated to immediately handle complaints/if any.

4.2.2.8 Impacts on Biological Resources

The Project would not cause any significant impacts on terrestrial biological resources as the Project area is not environmentally sensitive. The nearest environmental sensitive areas, the Kon Ka Kinh National Park and the Kon Cha Rang nature reserve are 20-50 km from the project area.

Some small sections of the An Khe bypass run through eucalyptus and acacia plantations. A total of 1.6 ha of acacia and eucalyptus plantations will be acquired for bypass construction. However, the areas of plantation are distributed along the four sections from Km0+150 to Km0+400 (250 m long), Km0+750 to Km 1+150 (400m long), Km 1+600 to Km 2+200 (800 m long) and Km 2+400-Km 3+800 (1.6 km long). With small strips of vegetation to be cleared along each section, the direct potential impacts on terrestrial biology would be extremely limited and compensable.

On the other hand, during construction phase, there is a risk that that the existing vegetation cover and the trees are over cleared or damaged by activities such as temporary loading of materials and wastes. Some area of existing vegetation cover would also be disturbed or damaged by activities such as loading of materials and wastes, camp, and site office construction etc. Such potential impacts can be avoided or minimized.

The potential impacts on aquatic lives would also be limited. As discussed earlier, bentonite solution generated from drilling activities at bridge construction sites may lead to increases in water turbidity thus could affect negatively on aquatic species, particularly the benthic. Some aquatic species may also be affected by drilling and excavation activities for the construction of bridge abutments. However, this risk is small as pile drilling period is relative short, construction areas under water are usually bound and thus bentonite would be collectable. and there is no know valuable aquatic species in the project area.

Habitat loss would be limited at the areas of pile and abutment construction areas which is estimated at about 40 m2 (at each pile in the Ba river and Suoi Da where two 99 m long bridges will be constructed). Habitat loss at short bridge construction sites would be negligible as there will be no pile constructed on waterway but only two abutments will be built on the two banks of the stream.

Level of Impact: small, mitigable and can be controlled by mitigation measures.

4.2.2.9 Community Disturbance

There are 330 household businesses located along the sections of existing NH19 to be upgraded/expanded, concentrated in in urban areas such as An Khe town, Chu Ty, Dak Doa and other populated residential area. These businesses would mainly be affected by temporary, short term construction impacts such as dust and noise. Impacts on accessibility to roadside structures due to road expansion and/or drainage installation would be marginal as the businesses are usually located at some distance from roadside, and construction period at each section would also be relative short. The potential impacts on the roadside businesses can be mitigated further by avoiding loading and unloading of materials and wastes near the shops and clean up construction areas regularly.

Roadside households would be disturbed by dusts, noise, temporarily reduced accessibility to their houses along the road, traffic disturbance, and increased traffic and safety risk. Some services such as water and power supply may be cut off for poles/pipes relocation. Accessibility to the surrounding areas of the households living along the bypasses will be disturbed or even disrupted, particularly along the sections where deep excavation or high filling would take place. They may also be affected by dust, noise, vibration. These potential impacts are unavoidable, however, manageable by informing the affected communities about construction schedule in advance, site- management measures and reconnect the affected services as soon as the relocation is completed.

4.2.2.10 Social Disturbance Related to Mobilization of Workers

As indicated in Section 2.7.1, the number of workers living at each camp varies from 20 to 30 people. It is expected that only the workers will reside at the camps and there will be no followers. The number of workers coming to work in the Project and stay in each camp is very small in comparison to the existing population of local communities which ranges from approximately 2500 people (Chư H'Đrông commune of Pleiku city to over 11,000 people. Therefore, no significant variation in population of the project communes is expected due to the Project.

Most of the camp sites are located between 20 to 50 m from the nearest houses, except that the camp site at Km 67+600 is 300 m from the nearest residential houses. The houses are located within 5-15 m from the roadside where construction will be taking place thus there would be some interactions between the workers and residents. On the other hand, as discussed above, construction activities may cause negative environmental impacts such as dust, noise and nuisance to communities located at roadside. Worker's camps will generate solid wastes and wastewater which may lead to environmental pollution if not managed properly.

Due to limited construction activities and areas, worker camps may not be required for construction of the storm water pump station, stormwater and wastewater sewers, tertiary sewer lines. The main potential social problems associated with worker camps could be: (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) sexual abuse and exploitation (SEA) due to influx of workers employed by the construction company in the area. However, with the shortage of labor for the construction, local workers in the city will have the opportunity to participate in the construction. Therefore, the impact is assessed as moderate.

Public consultation conducted in Binh Dinh province shows that local communities are aware there will be workers from other places to come and live in their locality during construction. While some residents said that there may be conflicts between workers, causing disturbance in the area, several community members believe there will be no conflict and inconvenience caused to local people due to labor influx. With regards to shared use of water sources and public assets, community is worried about increased pressure on water resources and common property of people in the area. Most people reported that there is no big worry about security/social order when workers are present in the locality, however, there may be conflicts between workers and local youth as workers may drink, engage in gambling, or involved in theft. Community also consider that transmission of HIV/AIDS, and/or STI could be a potential issue among workers themselves with possibility of impact on local communities. In terms of housing, community representative viewed that the workers would typically have construction camps to live in but they could also rent local houses or a part of people's houses if needed to help creating some temporary additional income for local households.

Therefore, social conflict risk is expected to be relatively small and manageable. Social conflict risks would be further mitigated by the development and application of workers' codes of conducts, and camp management measures, recruitment of local labor for simple works in the project, provision of trainings for the workers on environment, safety, health including awareness raising on HIV/Aids. Other measures discussed/proposed for social conflict management during public consultation will also be incorporated into camp and labor management measures presented in the ESMP and these will be incorporated into construction contracts.

Due to shortage of drinking water in dry season in An Khe district, it should be suggested that Contractor should actively prepare their own water supplying plant to avoid water consumption dispute with local people. The simple solution should be the supplying contract with Sai Gon An Khe Water Supply Plant which is located close to project road.

As per public consultations in May-June 2020, Supervision Community Representatives officially established at every CPC including representatives of local government authority, social organization as well as residential zone/village. One of the main responsibilities of this board is to conduct inspection activities on every state funded infrastructure project within each locality, especially regarding to environmental and social impacts generated during construction. It will strongly contribute to reduction and control of social conflict generated from project (if any).

4.2.2.11 Impacts on Existing Infrastructure and Related Services

16-ton trucks will be used to transport the construction materials to construction sites and the wastes to disposal sites. Such heavy trucks would cause degradation to existing local roads, particularly the existing local roads that would be used as access to the bypasses. Some existing irrigation canals on agricultural land will also be affected by the construction of the Khe and Pleiku bypasses thus irrigation service may also be affected.

51 power/telecommunication poles will also be relocated for road construction. Power would need to be cut off in some days for relocation. This potential impact is unavoidable but temporary and last in a short time. Existing power and communication lines that are not required to relocate may also be damaged due to the operations of cranes and excavators.

Damages to existing roads, relocation of power poles or irrigation canals and the impacts on related services would be at moderate level, compensable and mitigable through the measures presented in Chapter 5.

4.2.2.12 Traffic Disturbance and Increased Road-safety Risks

Vehicles and machines used in the project will contribute to raise traffic density along NH19 and local roads. However, currently traffic density along NH 19 is not high in may sections thus traffic jam is not expected along NH19 during construction phase. Traffic density is expected to increase considerably on access roads to the bypasses.

Additional heavy trucks travelling along the road may also lead to increased traffic accident risks. The risks would be higher at sections passing residential areas, passing schools, markets or public buildings listed in Table 45.

Table 45 Traffic accident-prone locations on NH19 during the construction phase

Residential area	Section	Potential traffic-affecting Activities
Ta Giang 1 residential area - Tay Giang Commune	Km 50+800-Km52+100	Road widening up to 15m and construction of vertical drainage ditch
Dong Pho residential area - Tay Giang Commune	Km53+200-Km54+900	
Trung Son residential area - Tay Thuan Commune	Km57+700-Km58+300	
An Thuong and An Thuong 2 residential areas - Song An commune	Km69+319+Km71	Road widening up to 12m and construction of vertical drainage ditch
Thuong An residential area - Song An Commune	Km71+700-Km73+200	

Residential area	Section	Potential traffic-affecting Activities
Group 6&7 residential areas - Ngo May Ward	Km73+364- Km76	Road widening up to 15m and construction of vertical drainage ditch
Tan Binh, Tan Son residential areas - Tan An commune, and An Hiep, An Binh residential areas - Cu An commune	Km82+200-Km83+854	
Chi Cong, Thuan Dong, An Dinh, An Hoa residential areas - Cu An commune and Tan Lap, Tan Dinh residential areas - Tan An Commune	Km83+894- Km87	
Dong Che residential area - Tan An Commune	Km87+390- Km88+100	
Kon Dong town	Km131+300-Km136	Asphalt paving
Linh Nham residential area - Dak Djang Commune	Km136+308- Km138	Road widening up to 15m and construction of vertical drainage ditch
Tan Phu residential area - Dak Djang Commune	Km138+Km139+200	
Nam Dat residential area - Dak Djang Commune	Km139+200-Km139+700	
Cay Diep and Ha Long 2 residential areas - K'Dang commune	Km139+900- Km143+800	
Cau Vang residential area - K'Dang Commune	Km144+600- Km146+600	
Hamlet 1,2, and 3 residential areas - Tan Binh commune	Km147+200-Km152+500	
Dak Doa town	Km151+500-Km152+500, Km155-Km157+700	Road widening up to 12m and construction of vertical drainage ditch
Hamlets 1, 2 and 3 of An Phu commune	Km155+700-Km157+300	
Hamlet 5 and 6 residential areas - An Phu Commune	Km 157+700-Km159	
Chu A center residential area	Km159-Km160	
Hamlet 4 and Village A residential areas - Gao commune	Km182+300-Km185	
Dong Tam residential area - Bau Can Commune	Km185-Km186+700	
Doan Ket and Hoa Binh residential areas - Bau Can commune	Km187+700-Km190	
Hamlet 1,2, 3 and 4 residential areas - Thang Hung commune	Km193+400- Km198	
Tan Lac residential area - Binh Giao Commune	Km198-Km199+100	
Thanh Binh and Thanh An residential areas - Binh Giao commune	Km200+200-Km202+200	
Thong Nhat and Dong Tam residential areas - IA Din commune	Km207+300-Km209+100	
Thanh Tam residential area - IA Krel Commune	Km211+500-Km212+700	
Thanh Giao and Ngol Lel 1 residential areas - IA Krel commune	Km213+100-Km215+200	
IA Lam, Lam Tok and Khop residential areas - IA Krel commune	Km216+200-Km218+700	
Chu Ty town central residential area	Km218+700-Km222+800	
Residential area no.7-Chu Ty town	Km222+500-Km222+800	
Chu Bo 1 and Chu Bo 2 residential areas - IA Kla commune	Km225+500- Km228	
IAMUT residential area - IA Dom commune	Km228+800- Km229+100	

Residential area	Section	Potential traffic-affecting Activities
Mook Den, Mok Trang and O residential areas - IA Dom commune	Km231+Km232+800	
Bi village residential area - IA Dom Commune	Km235+Km236+300	

Impacts on NH19 traffic when its existing road surface is being upgraded:

Traffic disturbance and road safety risks mainly occur at sections being under road resurfacing on NH19. Half of road to be occupied by machinery gathering for excavation works and asphalt paving will affect the traffic flow as only half of the road is available for vehicles. If no effective management exists, traffic congestion will appear on these sections, notably those passing urban and residential areas. Besides, road safety risks, especially at night, for two- wheeled vehicles on these sections are also higher due to the height differences between traffic part and under- constructed part of road or between road surface and gutters being constructed.

Impacts on NH19 traffic when its existing road is widened:

Traffic disturbance and increased road safety risks are also caused by road widening, but mostly on the existing road shoulder intersecting section being widened and at the beginning and ending points of section under construction.

Impacts on local road traffic when bypasses are constructed:

An Khe and Pleiku bypasses consist of several grade crossings (intersections) with existing public roads. Construction activities at these crossings and the use of existing public roads as access roads to construction sites will create traffic disturbance and increase road safety risks.

Traffic fragmentation will also occur in some areas due to the construction of bypass when designed surface elevation is considerably different from current road elevation. Locations having significant ground elevation are: (i) An Khe bypass with 1500m of 3-4m deep excavation at section Km0-Km5 and 160m and 6m deep excavation at Km6+640-Km6+800, 1400m of 2.5-7.5m high embankment at section Km0-Km9+560; (ii) Pleiku bypass with 700m of 6m deep excavation at section Km16+100-Km16+800 and 2-4m high embankment at sections crossing rice fields. The movement of local people between residential and production areas or within their production land will be hampered.

Construction of section passing An Khe mountain pass

This is a difficult terrain area with cliffs and deep gorges and some positions highly prone to landslide. The construction of this section will occupy part of existing road surface. There are also more frequency of trucks carrying construction materials and waste. These factors will attribute to the increased traffic density and road safety risks during the construction process.

Potential impacts are at moderate level and can be controlled by traffic control measures.

4.2.2.13 Increased Localized Flooding Risks

The project site is in mountainous area with narrow and short rivers. Therefore, floods frequently appear during rainy season. If large materials and waste loads are not responsibly managed, materials from this load may enter existing drainage ditches and water bodies, causing sedimentation and blockage of these paths. These may lead to localized flooding.

When the new bypasses are built, the elevated ground also cause embankment effect and may cause localized flooding. Locations prone to flooding during rainy season, from May to October, during construction phase are the Section passing Son An commune of An Khe bypass, Km3- Km3+500 and Km5-Km8 on the Pleiku bypass.

Extent of impacts: Moderate and can be mitigated.

4.2.2.14 Increased Bush Fire Risks

There are bush fire risks along the road sections passing eucalyptus and acacia plantations or pine trees at Km0+150-Km0+400, Km0+750-Km1+150, Km1+600-Km2+200 and Km2+400-Km3+800 of the An Khe bypass. Bush fire risk is relating to the usage or storage of fuel, the use of electricity and gases at the

construction sites, and the workers" behaviors. The risk is higher in dry season from November to April of following year. Bush fire may cause losses of vegetation and trees, damage the landscape, and cause economic loss to the owner of plantations

Bush fire risk is at moderate level and can be mitigated.

4.2.2.15 Physical Impacts on Physical Cultural Heritages

Impacts on existing cultural, historical and religious sites: There are a number of local religious sites along the road and away 20-25 m from construction site, namely Miếu Xà (Song An commune), Chợ Đồng parish church (An Bình, An Khê -Gia Lai), Minh Châu Pagoda (Kong Dơng town, Mang Yang district), Bửu Tân Pagoda (Pleiku – Gia Lai), Đức Giang Pagoda (Pleiku – Gia Lai), Nguyên Sơn Pagoda, and Khánh Thiện Pagoda (Chư Prông – Gia Lai). Despite not being affected by land acquisition, these sites still potentially suffer from construction activities. Potential impacts include inconveniences in moving in or out of the sites by local people and visitors; dust and emission from earthworks, temporary gathering of materials and waste, or excavation activities.

Customs and traditions of indigenous people: Cultural activities of ethnic minority in Gia Lai usually take place in community cultural houses which are not located in project areas. Therefore, no significant impacts on cultural and religious activities of ethnic minority community will be caused by construction activities. However, with regard to the culture of Jarai and Bahnar people, agricultural activities closely associated with wet rice are important and they often hold new rice festival from November to January. Construction performed during festival period might disrupt relevant activities, increase risks of accidents, dust and emissions that affect festival participants and cause conflicts.

Additionally, ethnic minority population in Gia Lai often converge into separate communities with Kinh people or with other ethnic groups, their living areas are also away from main roads and urban areas. The construction of Pleiku bypass across agricultural land and close to habitats of ethnic minority population will cause negative impacts on their living customs and activities such as grazing, collecting natural vegetables, funeral rituals, and community activities. In addition, the high concentration of outsider labor force with different cultural features is potential to create negative impacts like abuse and metamorphosis of religious culture into superstition to take advantage of local ethnic people.

Artifacts and archaeological relics could be revealed due to earthworks during construction phase. Therefore, an appropriate handling process should be in place under the project for this event.

4.2.2.16 Occupational Health and Safety Risks for Workers

Potential risks during construction phase might be accident, fire and explosion. Accident risks are often related to deep excavated areas, high piles of materials and waste, operation of machinery and trucks, loading of bulky materials like sewer pipes, etc. Fire and explosion risks are often generated from the transportation and storage of fuel, explosives, power lines or electricity consumption.

Worker health will be affected by noise, dust and emissions from materials, waste and machinery.

Health effects of dust and emissions:

Dust particles greater than 10 µm, if contact with eyes will potentially cause eye injuries, infections and allergies. Dust particles smaller than 5µm can penetrate into the lung and cause respiratory diseases such as: Asthma, pneumonia, long-term exposure to dust will lead to dust deposition and accumulation which is root of pulmonary fibrosis; NO_2 penetrates into lung through respiratory tract and absorb into lung membranes. Long-term and high exposure to NO_2 can cause to pneumonia.

Negative effects of Noise: Noise can cause damages to parts of human body. First is the auditory sensory organ. It is directly affected by noises thereby decreasing sensory level of ears, declining hearing ability and causing occupational deafness. In addition, noises are causes of headaches, tinnitus, dizziness, nausea, neurological disorders, cardiovascular disorders and diseases related to the digestive system. Particularly for construction workers as during their work they are exposed continuously to noise and therefore will feel fatigue, hearing decline, distracted during labor process which can cause labor accidents.

The direct contact with cement, exposure to toxic substances such as petroleum, construction additives can lead to skin corrosion or body absorption through the skin. The storage/use of fuel at camps is potential risks to fire, explosion, electrical shock, affecting significantly worker health and safety. Safety risks are also from the operations and functions of machinery, excavation works and slopes under construction.

In addition, in the project area there are common infectious diseases such as dengue, malaria, eye diseases, and gastrointestinal diseases, etc. Construction workers stay in camps with insufficient sanitation or no sufficient knowledge and effective preventive measures provided; there would be an infection risk of these diseases. Insects, poisonous creatures like snakes, poisonous spiders, Anopheles mosquitoes, Culex could be appear in camp areas and cause health effects. In addition, the concentrations of workers can also lead to increased social evils such as prostitution, drug use, trafficking persons (TIP), and risk of diseases such as sexually transmitted infections (STIs), hepatitis, and HIV/AIDS.

Level of risk: Moderate, manageable

4.2.2.17 Public Health and Safety Risks

Site clearance can pose accident risk to local people as well as the workers.

Construction activities with open holes and slopes created, construction plant and vehicle operations, loading and unloading of construction materials and wastes, usage of gases etc. all pose safety risks to local residents if presence at or near construction areas. Increased vehicle traffic on existing roads, emissions, dust, and noise from construction activities will also cause health and safety risks to the local people.

If camp is not managed well, waste and stagnant wastewater may become vector breeding grounds which will cause pollution to the surrounding environment and affect public health.

Mobilization of workers to work and reside in project area may also lead to increased social evils such as prostitution, drug addicts which may then lead to HIV/AIDS and STIs.

The level of these potential impacts and risks depends on the scope of work at each construction sites, distance between disturbed areas and local houses, the number of works to be mobilized to the site, construction duration, weather conditions etc. and social background of each specific location. Therefore, these potential impacts and risks are at small to moderate level and can be mitigated.

4.2.2.18 Potential Impacts Related to Disposal Site

As presented in Table 10, ten disposal sites have been proposed for disposal of approximately 70,000 m3 of spoils. Therefore, additional disposal sites or opportunities for reuse will be determined during detail design and construction phase. The potential social and environmental impacts related to disposal of the excavated materials include:

- Dusts emitted along transportation route from trucks carrying excavated materials. The volume of dusts has been calculated in Table 32. The largest volume of dusts will be along the An Khe and Pleiku bypasses.
- Occupy land area. During project preparation phase, ten disposal sites have been identified to accommodate 170,850 m3. Therefore, additional sites will need to be identified for the disposal of the balancing excavated materials.
- Increased erosion potential and land slide risks. As shown in Table 10, the calculated height of the dumps would be between 2 to 3 m. However, the existing ground elevation at the disposal sites are 1.5 to 2.5 m below ground elevation of the surrounding areas. Therefore, the final height of the dumps would be 0.5 to 1.5 m higher than the surrounds. Thus, landslide risk from the slopes created by the dumps would be extremely low. However, under the impacts of surface runoff and wind, erosion potential would be increased when vegetated ground surface are covered with granular materials. These potential impacts is at moderate level and can be managed by measures such as levelling the sites.

- Impacts on crops in the areas surround the disposal site As there are existing agricultural land surround the disposal sites, disposed materials may overflow into crop land and causing damages to vegetation and affect productivity.
- Disturb drainage pattern. As the disposal sites are currently lower than the surrounding ground, when being filled with materials, localized drainage pattern in the area will be changed, localized flooding may happen if alternative drains are not created. This potential impact is at moderate level and can be managed and mitigated by the construction and maintenance of ditches surrounding the foot of the dispose dumps.
- Safety risks for local community. As described in Section 2.6.1, the identified disposal sites are 30-350 m away from the nearest house. There is a risk that local people may enter the disposal site when the trucks, bulldozer are working, or holes and slopes have been created and pose accidental risk. This issue is manageable by site management measures such as putting in place fences, warning sites and restrict access to the site, and levelling the disposed materials regularly.

4.2.2.19 Impacts of Blasting

During construction of An Khe mountain pass, rock blasting will be conducted to widen roadbed and decrease slope. Expected blasting method used is electric ticking time explosion with a hole diameter of 30-50mm □ and 2-2,5m depth □ with volume of explosives used for locations as follows.

Table 46 Volume of explosives used for Blasting

Section	Section	Volume of rock demolished (m^3)	Volume of explosives (kg)
An Khe Bypass	Km7+667- Km7+692	1000	446
An Khe Mountain Pass	Km60+289- Km60+580	26400	11761
	Km60+900-Km61+300	43800	19513
	Km61+495-Km62+100	44300	19736
	Km63-Km63+100	19700	8776
	Km64+650-Km64+716	15500	6905
	Km64+900- Km65+71	18500	8242
	Km65+200-Km65+591	84400	37600
	Km66+267-Km66+374	6200	2762

Blasting will generate vibration, dust, and emissions such as CO, CO2, SO2, etc. which are shown in the following table.

Table 47 Emission Level of Blasting

No	Areas measured	Dust mg/m^3)	Noise (dB)	Emission (mg/m^3)		
				CO	CO_2	SO_2
1	40 min after blasting at a distance of 30-40m	500-600	160	1%	2%	-
2	Rock shoveling after Blasting	1,6-5	90-110	1,3-2	0.2	0.73
3	1Km away downwind	0,4-0,6	75-80	-	-	-

Source: Scientific report: Warning on health, safety and environment issues related to mining of stone in Vietnam, 1999 (Những vấn đề cấp bách về môi trường lao động trong khai thác and chế biến đá ở Việt Nam, 1999)

According to research results shown in Table 47, immediately after blasting there will be a large amount of dust and emissions releasing into the surroundings. However, these emissions have local impacts and the dust concentration arising from the blasting will decline gradually with increasing distance from the epicenter of the explosion. At one (1) km downwind from the epicenter of the explosion, volume of dust

and noise recorded are still higher than permitted limits and ranges from 0.4-0.6 mg/m[39] for dust and from 75-80 dB for noise[10]

One of the important factors related to environmental impact assessment of blasting is the minimum safety distance (r_{min}) between boundary of the affected area by air wave and location of the technicians. This distance can be quantified by the following formula:

$$r_{min} = 15\sqrt[3]{Q} \qquad (m)$$

where Q is the quantity of explosives used (kg) for simultaneous explosion.

According to research results of Dong Nai Department of Industry (2006) of the quarry in Dong Nai province, a safe distance calculated for each explosion is.

Table 48 Safe Distance

No	Scale of explosion Q (kg)	Safety 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, a safe distance of explosion vibration for houses and building by one exploding is calculated using the formula:

$$r_c = K_c \alpha \sqrt{Q} \qquad (m)$$

When:

- r_C is safety distance (m);
- K_C is dependent coefficient and ground nature of protected buildings (K_C=8)
- □□is a coefficient dependent on exploding impact indicator n (□ = 1,2)

Also according to the research results of Dong Nai Department of Industry (2006), a safe distance is calculated for blasting in the quarries Dong Nai province as follows.

Table 49 Calculation of safety radius corresponding to vibration of blasting scale

No	Scale of explosion Q (kg)	Safety distance r_C (m)
1	100	96
2	200	136
3	300	166
4	400	192
5	500	215
6	1.000	304

[9] QCVN 05:2013/BTNMT-National standards on ambient air quality with dust volume limit per hour of 0,3 mg/m^3
[10] QCVN 26:2010/BTNMT-National standards on noise limits in normal areas in a day (70dB).

Thus, with the expected volume of explosives used in each explosion that of around 150kg, the safety distance for technicians is more than 80m and safety radius for explosion vibration is greater than 120 meters from the epicenter of the explosion.

4.2.2.20 Site-Specific Impacts

Table 50 Site-specific Impacts, Risks and Issues

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
Km 50 - Km 59: (1) Road expansion, (2) Install drains, (3) Rebuild two bridges		
NH19 passing residential areas at Km50-Km52, Km53-Km54 and Km57-Km58	Tả Giang residential area at Tây Giang Commune Km51-Km52 Đồng Phó residential area at Km53-Km54, 7-10m from roadside Thường Sơn residential area at Km57-8, houses located at 5- 10m from roadside) Weak houses/structures at risk of being cracked due to vibration	- Increased traffic safety risks. - Disrupt access to roadside houses and shops due to pipe trenching for drainage. - Dust and noise exceed allowable limits from 1.5 to 2 times and 7 to 11.5dB, respectively which would affect residential houses at shops. - Increased noise, vibration, construction solid wastes, and wastewater. - Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - Potential cutting down of trees. - Potential risks of weak structures being cracked. - Run-off water reach to nearby houses due to elevation deviation between of the upgraded road and current ground.
Rebuild Bầu Sen and Ba La bridges	Existing Bầu Sen bridge at Km50+578 Existing Ba La bridge at Km51+152	- Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - Disruption of traffic on the two existing bridges. - High noise levels from pile driving - Stream water pollution due to bentonite from drilling and sedimentation from excavation. - Safety risks for workers when working at height and on water surface. - Potential risks of weak structures being cracked when the temporary access road and bridge are constructed closer to nearby households
+ NH19 passing some schools	- Tây Giang secondary school, 35m from road side at Km 54+150 - Võ Lai High School, 40m from road side at Km54+250 - Tây Giang Kindergarten, located 30m from roadside	- Increased construction wastes, waste water, exhaust gases, dust and noise affecting pupils' health. - Increased risks of traffic accidents to teachers and pupils due to construction transportation and other activities. - Disturb or disrupt access to schools during drainage installation.

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
NH19 passing agricultural land at Km58-Km59.	- Agricultural land along the road - Cassava crop land	- Potential impacts on irrigation canals in this area: blockage of irrigation canals, spreading of soils to the irrigation canal. - Construction materials and wastes affecting the cultivating fields and arable agricultural land. - Potential disruption of the local agricultural cultivating and harvesting activities, damages to cassava, and other vegetable crops.
Km 59 - Km 67 (On An Khe pass): Road expansion, Install drains, Build new emergency exist, Slope stabilization		
The Pass is on high mountain with abyss, many curves with limited visions. Some sections have HV power poles run nearby, and crossing NH19 at one location	- Curved sections, blasting will be carried out	- Increased traffic safety risks at curved sections. - Safety risk for community and workers related to blasting and high voltage power lines. - Damages to the high voltage power lines at location crossing NH19.
Natural Landslide happened at some locations	- Landslide happening	- Increased landslide risks in rainy weather and during construction due to slope cutting activity. - Potential risks of traffic safety and health safety for road travelers and construction workers. - Temporary disruption of road traffic.
Plantations along the side	- Acacia and eucalyptus plantations along the road	- Bush fire risks related to workers' behaviors, particularly in dry season. - Safety risks to workers related to toxic/harmful insects such as snakes or bees
Km 67 - Km 76: (1) Road expansion, (2) Install drains		
+ NH19 passing residential area at Km69-Km71 and Km72-Km76	- Residential area at Ngô Mây road, located 10-15m from roadside. - Residential area at Song An commune, located 10-15m from roadside. - Power poles and cables. - Infrastructure of utility companies such as water supply and communications.	- Increased traffic safety risks. - Disrupt access to roadside houses and shops due to pipe trenching for drainage. - Dust and noise exceed allowable limits from 1.5 to 2 times and 7 to 11.5dB, respectively which would affect residential houses at shops. - Increased noise, vibration, construction solid wastes, and wastewater. - Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - Potential risks of weak structures being cracked.

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
+ NH19 passing Hoa Mai and Tuoi Tho kindergartens, Trần Phú primary school	- Tuổi Thơ Kindergarten located 30 from roadside at Km 75+850 - Trần Phú primary school located 30 from roadside at Km72+700	- Increased construction wastes, waste water, exhaust gases, dust and noise affecting pupils' health. - Lessons affected by noise and vibration. - Increased risks of traffic accidents to teachers and pupils due to construction transportation and other activities. - Disturb or disrupt access to schools during drainage installation.
NH 19 passing Ngọc An monastic and (15-20m from road side), Xà Temples	- Xà temple, located 30m from roadside at Km 69+300	- Increased dust and exhaust gases due to construction activities affecting the visitors. - Increased risks of traffic accidents due to construction transportation. - Temporary degradation of the landscape around the temple. - Increased construction waste and waste water. - Conflicts between workers and visitors.
Pine forest along Km67-Km68	- Pine forest at 10-15m from road side	- Damages to the trees and vegetation cover outside construction area. - Increased bushfire risks, particularly in dry season from November to April due to workers' inappropriate behavior.
Construction of new An Khê bypass including drains and six bridges		
+ The bypass intersects with the existing NH19 at Km70+740 and Km83+600	- Intersection at the beginning point, - Intersection at the ending point with power poles to be relocated	- Increased traffic safety risks at the intersections with the existing NH 19. - Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires.
+ Build six new bridges including Đá Lật, Suối Đá 2, Suối Vôi, Sông Ba, Suối Dồn 1 and Suối Dồn 2.	- Proposed location of Sông Ba bridge at Km6+108 - Proposed location of Suối Đá Lật at Km0+155	- Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - High noise levels from pile driving - Stream water pollution due to bentonite from drilling and sedimentation from excavation. - Safety risks for workers when working at height and on water surface

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
+ The bypass passing rice field, one 1400m will be filled to height 2.5-7.5m higher than existing ground	- The Bypass passing area subjected to flooding at Km0+100, - The bypass cutting through rice field at Km3	- Some existing irrigation canals shall be affected - Separate thus disrupt accessibility to agricultural land, particularly during seedling and harvesting seasons - Increased safety risk for local people, particularly the farmers - Construction materials and wastes may fill up agricultural land and irrigation canals - Flooding risks in rainy season due to embankment effect
The bypass passing low hill, excavation to 3-4m deep at Km0-Km5, and to 6m deep along 160 m at Km6+640-Km6+800	- Agricultural land and farmers	- Separate agricultural land, particularly during the harvesting season of sugar canes and cassava during September to December - Landslide risks at deeply excavated areas - Social conflicts between the workers and ethnic communities
The bypass passing some residential areas.	- Residential area at the ending section of the bypass, - An existing house at Km4+500	- Increased traffic safety risks. - Disrupt access to roadside houses and shops due to pipe trenching for drainage. - Dust and noise exceed allowable limits from 1.5 to 2 times and 7 to 11.5dB, respectively which would affect residential houses at shops. - Increased noise, vibration, construction solid wastes, and wastewater. - Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - Potential risks of weak structures being cracked.
The bypass cut through some eucalyptus plantations at four sections: Km0+150-400, Km0+750-1+150, Km1+600-2+200, 2+400-Km3+800	- Plantation at Km2+200, - Eucalyptus plantation at Km3+800	- Damages to the trees and vegetation cover outside construction area - Increased bushfire risks, particularly in dry season during November to April
Access road to An Khe Bypass		
Access road at Km2+800, 4+500, 9+800 and 12	- B = 3-4 m, Residential houses at the beginning section, 5 m from main road, then passing agricultural land Km4+500	- Increased traffic safety risks. - Disrupt access to roadside houses and shops due to pipe trenching for drainage. - Dust and noise exceed allowable limits from 1.5 to 2 times and 7 to 11.5dB, respectively which would affect residential houses at shops.

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
	- Asphalt road B =4m. Residential houses at 5-7m from the road - An Khê-K'Bang Inter-district road access to Km9+800, - Concrete road B =5m. Houses are at 7 m from the road - Commune road to Km12, Concrete road B = 3.5m, Houses are at 7 m from the road - An Khê residential area, houses are 5-10m from roadside - - Kanak intersection	- Increased noise, vibration, construction solid wastes, and wastewater. - Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - Potential risks of weak structures being cracked.
Km 76+00 - Km 82+200: Resurfacing		
NH19 passing An Khê populated residential area	- An Khê residential area, houses are 5-10m from roadside Kanak intersection	- Increased traffic safety risks. - Disrupt access to roadside houses and shops due to pipe trenching for drainage. - Dust and noise exceed allowable limits from 1.5 to 2 times and 7 to 11.5dB, respectively which would affect residential houses at shops. - Increased noise, vibration, construction solid wastes, and wastewater. - Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - Potential risks of weak structures being cracked.
NH19 passing Mai Anh and Sơn Ca kindergartens and Nguyễn Khuyến highschool.	- Sơn Ca, Mai Anh kindergartens located 20m from roadside - Nguyễn Khuyến highschool located at 20 m from roadside	- Increased construction wastes, wastewater, exhaust gases, dust and noise affecting pupils" health. - Lessons affected by noise and vibration. - Increased risks of traffic accidents to teachers and pupils due to construction transportation and other activities. - Disturb or disrupt access to schools during drainage installation.

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
NH19 passing An Khe and Cho Do Churches	- An Khê Church located at 30m from roadside - Chợ Đồn Church located at 20m from roadside	- Increased dust and exhaust gases due to construction activities affecting the visitors. - Increased risks of traffic accidents due to construction transportation. - Temporary degradation of the landscape around the church. - Increased construction wastes and wastewater. - Conflicts between workers and visitors. - Disturb church praying activities, particularly on Sunday and Christmas
NH19 passing Đồn market	- Đồn market located at 10m from roadside	- Increased dust, exhaust gases, noise, vibration, construction wastes, hazardous waste, domestic wastes, and wastewater due to construction activities affecting the market foods and product for the local people. - Clogging of local drainage canal leading to localized flooding. - Increased traffic congestion and risks of traffic accidents due to construction and transportation. - Hindering of access by the customers to the market due to construction activities affecting income of the business-people. - Conflicts between workers and traders
Km 82+200 - Km 90: (1) Road expansion, (2) Install drains, (3) Rebuild two bridges		
Nh19 passing popular residential areas located 10-15m from road side at Km82-Km88 Power lines running along and passing the section	- Cư An and Tân An Residential area 10m from roadside)	- Increased traffic safety risks. - Disrupt access to roadside houses and shops due to pipe trenching for drainage. - Dust and noise exceed allowable limits from 1.5 to 2 times and 7 to 11.5dB, respectively which would affect residential houses at shops. - Increased noise, vibration, construction solid wastes, and wastewater. - Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - Potential risks of weak structures being cracked.

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
Rebuild two new bridges, Ta Ly và Thầu Dầu	- Existing Ta Ly bridge at Km83+894 - Existing Thầu Dầu bridge at Km87+390 - Lê Qúy Đôn primary school, 30m from roadside	- Power poles would be relocated, service may be interrupted - Disrupt traffic on the two existing bridges - High noise levels from pile driving - Water pollution due to bentonite from drilling - Safety risks for workers when working at height and on water surface - Increased construction wastes, wastewater, exhaust gases, dust and noise affecting pupils" health. - Increased risks of traffic accidents to teachers and pupils due to construction transportation and other activities. - Disturb or disrupt access to schools during drainage installation
NH19 passing school and kindergartens	- Tuổi Thơ kindergarten, 20m from roadside - Hoa Mai kindergarten, 30m from road side	- Increased construction wastes, waste water, exhaust gases, dust and noise affecting pupils 'health. - Increased risks of traffic accidents to teachers and pupils due to construction transportation and other activities. - Disturb or disrupt access to schools during drainage installation
NH 19 passing a church and a cemetery	- An Sơn Church, 10m from roadside - An Sơn cemetery, 40m from roadside	- Increased dust and exhaust gases due to construction activities affecting the visitors. - Increased risks of traffic accidents due to construction transportation. - Temporary degradation of the landscape around the church. - Increased construction wastes and wastewater. - Conflicts between workers and visitors. - Disturb church pray activities, particularly on Sunday and Christmas
Km 131+300 - Km 135: Resurfacing		
Passing populated areas in Kon Dõng town	- T junction at Kon Dõng town - Central garden at Kon Dõng town - Kon Dõng primary school, 30m from roadside	- Increased traffic and safety risks, particularly at the main T junction of Kon Dõng town - Noise level exceed limits from 7 to 11.5 dB. - Visual impacts on urban landscape - Increased construction wastes, wastewater, exhaust gases, dust and noise affecting pupils' health. - Increased risks of traffic accidents to teachers and pupils due to construction transportation and other activities.
NH19 passing school	- Kon Dõng 1 primary school	- Increased traffic and safety risks for students and teachers. - Disrupt access to the schools during pipe installation

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
NH19 passing Minh Châu pagoda and Châu Khê church	- Châu Khê paris 35m from roadside - Minh Châu Pagoda 20m from roadside	- Disrupt access to the paris and pagoda to drainage installation - Disturb religious activities at the Church and pagoda - Increased dust and exhaust gases due to construction activities affecting the visitors. - Increased risks of traffic accidents due to construction transportation. - Temporary degradation of the landscape around the church. - Increased construction wastes and wastewater. - - Conflicts between workers and visitors.
Km 135+00 - Km 152+500: road expansion, Build drainage, Rebuild bridges		
NH19 passing populated residential areas at 7-15m from road side at Km136-Km139, Km144-Km146 and Km147-Km152. Powerline running on the right	- Residential area at Năm Đạt T junction (Km139) - Residential area, some weak/ temporary structures, power lines must be relocated	- Increased traffic safety risks. - Disrupt access to roadside houses and shops due to pipe trenching for drainage. - Dust and noise exceed allowable limits from 1.5 to 2 times and 7 to 11.5dB, respectively which would affect residential houses at shops. - Increased noise, vibration, construction solid wastes, and wastewater. - Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - Potential risks of weak structures being cracked
Rebuild 3 bridges namely Linh Nham, Lệ Cần and Vàng	- Linh Nham Bridge at Km136+308 - Vàng Bridge at Km144+400 - Lệ Cần Bridge at Km149+045	- Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - Disruption of traffic on the two existing bridges. - High noise levels from pile driving - Stream water pollution due to bentonite from drilling and sedimentation from excavation. - Safety risks for workers when working at height and on water surface
NH19 passing Trần Phú Secondary School, K‟Dang and Tân Bình kindergartens	- Trần Phú high school, 30m from roadside - K”Dang kindergarten, 5-10m from roadside - Tân Bình kindergarten, - 50m from roadside	- Increased construction wastes, wastewater, exhaust gases, dust and noise affecting pupils ‘health. - Increased risks of traffic accidents to teachers and pupils due to construction transportation and other activities. - Disturb or disrupt access to schools during drainage installation.

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
NH19 passing Bửu Tân pagoda	- Pagoda Bửu Tân, 10-20m from roadside	- Increased dust and exhaust gases due to construction activities affecting the visitors. - Increased risks of traffic accidents due to construction transportation. - Temporary degradation of the landscape around the Pagoda. - Increased construction wastes and waste water. - Conflicts between workers and visitors.
Km 152+500 - Km 155: Resurfacing		
Nh19 passing Đak Đoa town with high population density	- Residential area at Đắk Đoa town	- Increased traffic safety risks. - Disrupt access to roadside houses and shops due to pipe trenching for drainage. - Dust and noise exceed allowable limits from 1.5 to 2 times and 7 to 11.5dB, respectively which would affect residential houses at shops. - Increased noise, vibration, construction solid wastes, and wastewater. - Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - Potential risks of weak structures being cracked.
NH19 passing Đắk Đoa 2 Primary school, Đắk Đoa and Nguyễn Huệ high schools	- Primary school No. 2 Đắk Đoa (20m from roadside) - Secondary School dân tộc nội trú Đắk Đoa (20m from roadside) - Nguyễn Huệ High school, 20m from roadside - -	- Increased construction wastes, wastwater, exhaust gases, dust and noise affecting pupils 'health. - Lessons affected by noise and vibration. - Increased risks of traffic accidents to teachers and pupils due to construction transportation and other activities. - Disturb or disrupt access to schools during drainage installation.
Km 155 - Km 160: (1) Road expansion, (2) Drainage installation, (3) Bridge reconstruction		

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
NH19 passing residential area at Km155-Km157, Km158-Km160 Houses are 7-10 m from roadside, powerline runs on the right	- Residential area, power lines and poles will be relocated	- Increased traffic safety risks. - Disrupt access to roadside houses and shops due to pipe trenching for drainage. - Dust and noise exceed allowable limits from 1.5 to 2 times and 7 to 11.5dB, respectively which would affect residential houses at shops. - Increased noise, vibration, construction solid wastes, and wastewater. - Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - Potential risks of weak structures being cracked.
+ bridge An Mỹ (Km156+570)	- An Mỹ bridge at Km156+570	- Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - Disruption of traffic on the two existing bridges. - High noise levels from pile driving - Stream water pollution due to bentonite from drilling and sedimentation from excavation. - Safety risks for workers when working at height and on water surface
+ NH19 passing Hoa sữa kindergarten, Nguyễn Khuyến Primary school,	- Nguyễn Khuyến high school at 50m from roadside - Hoa Sữa Kindergarten 20m from roadside)	- Increased construction wastes, wastewater, exhaust gases, dust and noise affecting pupils‟ health. - Lessons affected by noise and vibration. - Increased risks of traffic accidents to teachers and pupils due to construction transportation and other activities. - Disturb or disrupt access to schools during drainage installation.
+ NH19 passing An Mỹ church, Bửu Thọ Pagoda.	- An Mỹ Church, 30m from roadside - BửuThọ Pagoda 30m from roadside	- Increased dust and exhaust gases due to construction activities affecting the visitors. - Increased risks of traffic accidents due to construction transportation. - Temporary degradation of the landscape around the church. - Increased construction wastes and wastewater. - Conflicts between workers and visitors.

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
+ NH19 passing An Phú, Chư Á markets	- An Phú market,7-10m from roadside - Chư Á market, 50m from roadside	- Increased dust, exhaust gases, noise, vibration, construction wastes, hazardous waste, domestic wastes, and wastewater due to construction activities affecting the market foods and product for the local people. - Clogging of local drainage canal leading to localized flooding. - Increased traffic congestion and risks of traffic accidents due to construction and transportation. - Hindering of access by the customers to the market due to construction activities affecting income of the business-people. - Conflicts between workers and traders
+ NH19 passing agricultural land at Km157-Km158	- Agricultural land	- Construction material and waste fill up agricultural land and drains
	- There are weak structures along the road right next to the expanded road	- At risk of being cracked/damaged by vibration from excavation for road base construction and road compaction
Pleiku Bypass: Build new road and bridges		
Bypass intersect with NH19 at Km157+460 and Km177+00, power and telecommunication lines are low	- Intersection on the right at the beginning point - Intersection on the right at the ending point	- Increased traffic safety risks at the intersections - Power and telecommunication lines must be risen so as and construction plants passing - underneath, service may be interrupted
Nh19 passing paddy field at Km0-Km2, Km4+950 and Km8+900, ground will be elevated	- Bypass will be 2-4m higher than existing ground at Km1 - Bypass will be 5-6 m higher than existing ground at rice field at Km8	- Separate agricultural land thus disrupt accessibility from one to the other side of the road - Increased landside risks at wall/slopes created - Dust affect rice and vegetable crops - Interrupt irrigation service as some canals would be affected - Social conflict with ethnic community
Ân Mỹ 1 and 2 bridges will be built at Km1+100 and Km8+900		- High noise levels from pile driving - Water pollution due to bentonite from drilling - Safety risks for the workers when working at height on water
Bypass passing coffee and rubber plantations on low hills at Km2-Km4+900, Km5-Km8+400 and Km9-Km13+200	- - Excavation to 4-5m deep crossing coffee plantation at Km6 - Excavation to 6-7m crossing coffee plantation at Km13	- Separate agricultural land thus disrupt accessibility from one to the other side of the road - Increased landside risks at wall/slopes created - Dust may affect coffee productivity if too much dust is on coffee flowers - Obstruct accessibility of farmers in coffee harvesting season (September - December).

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
The bypass pass Đồng Xanh tourist are and Bông Lar residential area in Ia Băng commune	- Đồng Xanh tourist area, 30m from roadside - Bông Lar village 30m from roadside	- Dust exceed standard three times. - Increased traffic and safety risks - Landscape - Disturb tourist activities
Access road near Đồng Xanh tourist area, Km0-Km1 Access roads for Pleiku bypass construction sites	- Access road near Đồng Xanh tourist area, Km0-Km1 - B = 10m at the beginning section and B= 3.5m at the end, L = 1 km. School is 100m and Dong Xanh tourist area is 20 m from the access road and construction sites	- Dust and noise; - Increased traffic safety risks; - Damages or degrade existing roads
Access road from Chư Á commune to Km8 of the bypass	- Asphalt/concrete road, B= 3-4 m; - Residential houses are 5-7 m from the road, mainly at the beginning section - There are 2 bridges (3-4 m long) with loads at 5 T along the access road - There are some school clusters along the road, 7 m from roadside and at least 300-400 m from construction sites	- Dust and noise; - Increased traffic safety risks; - Damages or degrade existing roads - Damages to weak bridges
Access road from Đắk Đoa town and Ham Rong T junction	- Asphalt road B =4 m, there are residential clusters at 7m from the	- Dust and noise; - Increased traffic safety risks; - Damages or degrade existing roads
Km 180 +00 - Km 218+500: (1) road expansion, (2) Build drainage		
Plantations along some sections	- - Plantations, 20 m from roadside at Km180-Km182 - Plantations, 30 m from roadside at Km190-Km193	- Damages to the trees and vegetation cover outside construction area - Increased bushfire risks, particularly in dry season during November to April

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
NH19 passing residential areas at Km187-Km190, Km193-Km202, Km207-Km209, Km211-Km215 and Km216-Km218 Powerline running along the road	- Residential area, 10-15m from roadside at Km193- Km198 - Residential area, 10-15m from roadside at Km198- Km199 - Residential area 10-15m from roadside at Km200-Km202 - Residential area, 10-15m from roadside at Km211- Km215	- Increased traffic safety risks. - Disrupt access to roadside houses and shops due to pipe trenching for drainage. - Dust and noise exceed allowable limits from 1.5 to 2 times and 7 to 11.5dB, respectively which would affect residential houses at shops. - Increased noise, vibration, construction solid wastes, and wastewater. - Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - Potential risks of weak structures being cracked.
NH19 passing schools	- Trưng Vương and Hùng Vương primary schools, - Lê Hồng Phong secondary School - Đôn Hero Secondary School, 20m from roadside - Secondary School Trần Quốc Tuấn 20m from roadside - High school Trần Phú, Lương Thế Vinh 20m from roadside - Thanh Bình Hoa Hồng, Hòa Bình kindergartens	- Increased construction wastes, wastewater, exhaust gases, dust and noise affecting pupils 'health. - Lessons affected by noise and vibration. - Increased risks of traffic accidents to teachers and pupils due to construction transportation and other activities. - Disturb or disrupt access to schools during drainage installation.
Bypass passing Đức Giang, Hồng Đức, Nguyên Sơn and Khánh Thiện pagodas, Đức Hưng and Thanh Bình Church's, Đồng Tâm Family Church	- Thanh Bình Church, 30m from roadside - Đức Hưng church 30m from roadside - Nguyễn Sơn pagoda 30m from roadside - Khánh Thiện pagoda 30m from roadside	- Increased dust and exhaust gases due to construction activities affecting the visitors. - Increased risks of traffic accidents due to construction transportation. - Temporary degradation of the landscape around the church. - Increased construction wastes and wastewater. - Conflicts between workers and visitors.

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
Bypass passing coffee, tea, cashew nuts and pepper plantations at Km182-Km190, Km199-Km200, Km202-Km205…	- Coffee and cashew nut plantation - Pepper and cashew nut plantation	- Separate agricultural land thus disrupt accessibility from one to the other side of the road
Km 218+500 - Km 222: Road resurfacing		
NH19 passing residential area in Chư Ty town, houses are 5-7m from roadside	- Town Intersection - Residential area	- Increased traffic safety risks. - Disrupt access to roadside houses and shops due to pipe trenching for drainage. - Dust and noise exceed allowable limits from 1.5 to 2 times and 7 to 11.5dB, respectively which would affect residential houses at shops. - Increased noise, vibration, construction solid wastes, and wastewater. - Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - Potential risks of weak structures being cracked.
NH19 passing Primary school Kim Đồng	- Primary school Kim Đồng 30m from roadside	- Increased construction wastes, wastewater, exhaust gases, dust and noise affecting pupils‟ health. - Lessons affected by noise and vibration. - Increased risks of traffic accidents to teachers and pupils due to construction transportation and other activities. - Disturb or disrupt access to schools during drainage installation.
NH19 passing Đức Cơ District Memorial	- Đức Cơ District Memorial 50m from roadside	- Landscape - Obstruct access of visitors, particularly on 27 July, 22, 1st and full moon of lunar months
NH19 passing Đức Cơ market	- ĐứcCơ market, 30m from roadside	- Increased dust, exhaust gases, noise, vibration, construction wastes, hazardous waste, domestic wastes, and wastewater due to construction activities affecting the market foods and product for the local people. - Clogging of local drainage canal leading to localized flooding. - Increased traffic congestion and risks of traffic accidents due to construction and transportation. - Hindering of access by the customers to the market due to construction activities affecting income of the business-people. - Conflicts between workers and traders.
- Km 222 - Km 241: (1) road expansion, (2) Build drainage		

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
NH19 passing residential areas Powerline running along	- Residential area, 7 - 15m from roadside, - power lines running along	- Increased traffic safety risks. - Disrupt access to roadside houses and shops due to pipe trenching for drainage. - Dust and noise exceed allowable limits from 1.5 to 2 times and 7 to 11.5dB, respectively which would affect residential houses at shops. - Increased noise, vibration, construction solid wastes, and wastewater. - Potential risks of electrical shocks and temporary power cut due to relocation of power poles and wires. - Potential of water supply shut down due to relocation of water piles, and suspension of service due to disruption to utilities. - Potential risks of weak structures being cracked.
Passing agricultural land	- Cashew nuts and cassava cop land along the road	- Separate agricultural land thus disrupt accessibility from one to the other side of the road
NH19 passing Kim Đồng Primary school, 18-4 kindergarten, Nguyễn Du, Chu Văn An, Nguyễn Trường Tộ, Nguyễn Trãi, Trần Phú schools, 20-30m from road side	- Primary school Trần Phú 30m from roadside - Secondary school Nguyên Du (20m from roadside) - Chu Văn An Primary school 30m from roadside - Nguyễn Trường Tộ High school 20 m from roadside - Secondary School Nguyễn Trãi 30m from roadside - - Kindergarten 18-4, - 20m from roadside	- Increased construction wastes, wastewater, exhaust gases, dust and noise affecting pupils‟ health. - Increased risks of traffic accidents to teachers and pupils due to construction transportation and other activities. - Disturb or disrupt access to schools during drainage installation.
Disposal sites		
Disposal site at Bau Sen bridge Currently agricultural land Land area = 5,000 m2. Accommodate = 10,000 m3 Height of dump =	- The nearest house is 30 m from the site and next to the road - Existing ground level is 1.5 m lower than the surroundings.	- Loss of crops. - Some irrigation canal cut through the site materials overflow onto the surrounding agricultural land - Increased erosion potentials from barren soil dumps - Safety risks for local community

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
Disposal site at Km57+300 NH19 Currently plantation on hilly area. Land area = 2,000 m2 Accommodate = 5,000 m3. Height of dump =2.5 m.	- The nearest house is 50 m from the site, 300 m from NH19, there are only several houses along the access road - Existing ground level is 2 m lower than the surroundings.	- Damages to the existing earthen access road - Traffic safety risk at the entrance from main road
Disposal site at Km58+300 NH19 Currently cassava crop land. Land area = 2,000 m2. Accommodate = 5,000 m3. Height of dump = 2.5 m.	- Existing ground level is 2 m lower than the surroundings - The site is next to NH19, nearest house is 50 m from the nearest house	- Loss one crop - Materials overflow onto agricultural land and NH19 - Traffic safety risk on NH19
Disposal site at Km58+600 Currently the site is agricultural land Land area = 2,000 m2. Accommodate = 5,000 m3. Height of dump = 2.5 m.	- The site is next to NH19, the nearest house is 50 m from the site - Existing ground level is 2 m lower than the surroundings	- Loss one crop. - Increased traffic and safety risks when trucks entering and leaving the site - Materials overflow onto agricultural land and NH19.
Disposal site at Bối village- Glar commune- Dak Doa district Currently barren land, near coffee and pepper farmland, Land area = 8,000 Accommodate = 20,000. Height of dump = 2.5 m.	- The site is 1.2 km from NH 19, 100m from the nearest house. Access road is low grade asphalt road B=3-4 m, degraded at some sections, there are number of houses at the intersection with NH19, houses scattered along the access road, some business along the route Existing ground level is 2 m below the surround ground.	- Damages to the existing trees - Increased erosion risks - Increased sedimentation risks in existing canal and drains - Dust, safety risks to residents along the access road - Damage local access road

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
Disposal site at Km199+500 NH19 Currently barren low land with holes. Land area = 8,000 Accommodate = 20,000. Height of dump = 2.5 m	- Existing ground level is 2 m below the surround ground The site is 50m from the nearest house, 200 m from NH19, there is no existing access road on grass land next to the site from NH19	- Materials overflow onto agricultural land and irrigation canal in the surrounding area.
Disposal site at Km230+650 of NH19 Currently low-laying football ground, CPC wanted to level Land area = 7,000 m2. Accommodate = 15,000 m3. Height of dump = 2.1m	- The site is 350m from the nearest house - Access road is 3 m wide, low grade asphalt road, 150 m from NH19, there is no houses along the access road. There is one school next to the junction between NH19 and access road - Existing ground level is 1.5 m below the ground at the surroundings.	- Damage on access road. - Increased traffic safety risks when trucks entering and leaving the site from NH19 - Traffic safety near the school - Interrupt sport activities on the existing playground
In Thang Hung commune, new disposal site is proposed by local community at Km193+300. This area has storing capacity of around 10,000 m3.	- This site located on the right side of NH19, 100m to the left - Access road is 3m wide, soil road. - There are no houses close to site or access road. It is formerly the domestic waste dumping site of community - Existing ground level is 3-4m below the ground	- No impact. - Positive impact: Local commune already had the plan to close this waste dumping site. The excavated materials will be very useful in filling and leveling.

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
New disposal site at Km206+600, located on left side of NH19,	- This is currently the planting area of one local household who have demand for landfilling with storing capacity of 15,000m3. - No need to have access road, it located right on the side of NH19 - Existing ground level is 1-2m below the ground - It is low populated areas.	- Increased traffic safety risks when trucks entering and leaving the site from NH19 - Dust, noise impact to nearby households.
Disposal site at Km 211+600 is located in Thanh Tan village, IaKrel.	- Access road is soil road, 30m to NH19. - It is low populated areas. -	Positive impact: This area is under high threat of erosion. A new culvert conveying rainwater was constructed here. In order to extend the length of culvert to minimize erosion, it is expected to receive at least 50,000m3 material for landfilling. Negative impact: - Increased traffic safety risks when trucks entering and leaving the site from NH19 Dust, noise impact to nearby households.

4.2.3 Impacts and Risks During Operation Phase

4.2.3.1 Impacts on Air Quality

a. Dust and gas emissions

The operation of vehicles on the road generates dust and emissions polluting the environment. The forecast of emissions and dust from the operation of vehicles on the road is done based on forecast data on the vehicle types for 2036 and Sutton model is applied as follows:

$$C = 0{,}8 \times \alpha \times n \times \frac{\exp\left[-\frac{(z+h)^2}{2 \times S_z^2}\right] + \exp\left[-\frac{(z-h)^2}{2 \times S_z^2}\right]}{S_z^2 \times U}$$

Whereby:
- C: Emission (mg/m^3)
- □: Coefficient of pollution
- n: Traffic flow per day night
- Z: Height of forecast point (m)
- h: Elevation difference between road and surrounding ground, m
- U : Wind speed, m/s
- S_z: Vertical diffusion coefficient, $S_z = 0{,}53 * x^{0{,}73}$
- x is the distance from road center to calculated point (m)

To determine the amount of pollutants discharged, the air pollution limit by World Health Organization (WHO, 1993) given for cars: For dust: 0.07, CO: 7.72 and HC: 0.83.

Table 51 Forecast data on vehicle types by 2036

Types of Vehicle	Km20		Km76		Km135	
	Car/day night	PCU/day night	Car/day night	PCU/day night	Car/day night	PCU/day night
Car	1532	1532	921	921	396	396
Minibus	582	1164	882	1764	476	952
Large bus	633	1583	403	1008	280	700
Light truck	1420	2840	793	1586	729	1458
Light truck	1478	2956	1660	3320	1049	2098
Heavy truck 1	1240	3100	745	1863	509	1273
Heavy truck 2	1457	3643	667	1668	202	505
Cumulative	-	**16817**	-	**12129**	-	**7382**

Sutton model is applied in the event of the average wind speed in the area is 2.8 m/s, the road surface is higher 0.5m than the ground of 2 road shoulders, the height z = 2m. Results of air pollution forecast per vehicle types are presented in the following Table 52:

Table 52 Results of air pollution forecast per vehicle types (g/m3)

Year	Air	Distance					QCVN 05:2013/BTNMT:	QCVN 06:2009/BTNMT:
		5m	15m	20m	25m	30m		
Km20	TSP	**768**	**308**	205.3	152	118.3	*300*	-
	CO	**35723**	**32868.5**	26404.5	18767.9	15048.6	*30000*	-
	HC	**5291.5**	3533.8	2434.6	1802.8	1402.9	-	*5000*
Km76	TSP	**453.9**	214.9	148.1	109.6	85.3	*300*	-
	CO	25763.6	23704.9	19043.1	13535.5	10853.1	*30000*	-
	HC	3816.3	2548.6	1755.8	1300.2	1011.8	-	*5000*
Km135	TSP	**337.1**	150.8	90.1	66.7	51.9	*300*	-
	CO	15679.9	14427.0	11589.7	8237.8	6605.3	*30000*	-
	HC	2322.6	1551.1	1068.6	791.3	615.8	-	*5000*

*Notes: * QCVN 06:2009/BTNMT - National technical regulation on some hazardous substances of ambient air QCVN 05:2013/BTNMT – National Technical Regulations on the Allowable Limits of Hazardous Waste*

Forecast results show that dust and emissions from vehicles will exceed the regulations within 15m from the road shoulder at section Km20. For sections Km76 and Km135, the dust concentration will exceed the regulated limit within 5 m from the road shoulder. As such, main affected population of dust and emissions during the operation phase is households located along NH19 with 5-10 meters away from the road.

Extent of impacts: Small

b. Noise level

Traffic flow on NH19 will increase as forecasted in Table 52, so the noise level along the road will also increase. Based on traffic flow forecast for 2036 in Table 3.15, we use the Nordic forecasting method for traffic noise which was modified by the Institute of Transport Science and Technology to evaluate the

increasing level of traffic noise with the average speed in residential areas is 50 km/h and outside residential areas is 70 km/h. Forecast on traffic noise level on NH19 is shown in the Table 53 below.

Table 53 Traffic Noise Forecast for 2036

Section		Noise level (dBA)					
		7,5m	10m	15m	20m	25m	30m
Km20	74,6	70,5	68,8	67,5	66,5	65,7	65.7
	72,0	67,7	66,1	64,4	63,8	63,0	63.0
Km76	72,8	68,7	66,9	65,6	64,6	63,8	63.8
	70,1	66,0	64,2	62,9	61,9	61,1	61.1
Km135	70,4	66,3	65,1	63,8	62,3	61,5	61.5
	67,7	63,6	62,2	60,7	59,5	59,7	59.7
QCVN 26:2010/BTNMT:	Day	70					
	Night	55					

Comparing the forecast results in the table above with the noise level on NH19 (average at 61dB) shows that the increased number of vehicles has led to an increased noise level on the roads while forecast for inside and outside residential areas ranges from 67.7-74.6dB (at a distance of 7.5m). The forecast results also show that majority of households living along NH19 are affected by noise within 30m when vehicles function at night (noise level within this distance ranges from 59.7-74.6 dBA compared to 55dBA at night as per regulated). During daytime, the noise level usually does not exceed permitted limits (70dBA) that of 7.5m, therefore impacts on roadside communities will decrease.

The impacts are evaluated at small level.

4.2.3.2 Separating Residential Area and Production Area

The two Pleiku and An Khe bypasses running through production lands cause fragmentation of agricultural land, separating residential areas from production areas. The movement of people from houses or agricultural land to the other side of the road will be difficult due to ground elevation variations, and traffic flow on the road at speed of 70km/h. Movements of human, local traffic means and agricultural machines, animals would be particularly difficult at sections where road elevation is significantly different from existing ground level if no adequate mitigation measures are applied. Specifically:

- An Khe bypass: 1500m at Km0-Km5 will be 3-4 m lower than existing ground level, and 160m at Km6+640-Km6+800 will be 6 m lower than existing ground level, 1400m at Km0-Km9+560 will 2.5-7.5m higher than the surroundings;
- Pleiku bypass has 700m at Km16+100-Km16+800 will be 6 m lower than existing ground level and small section will be 2-4m higher than the surrounding rice fields.

The differences in ground elevation will also cause difficulties for cattle grazing or transportation of production materials between the two roadsides become also more difficult when there is a height difference between the current situation surrounding roads. This has been addressed in the final designs.

4.2.3.3 Disturb Existing Drainage

The two new bypasses will change the natural drainage direction in the area because of embankments or channels at high embanked sections of 2-4m or of average excavation of 3-6m. This effect will be relatively huge on bypass across rice fields or near residential areas and cause local flooding.

Extent of impacts: moderate and manageable by using design solutions and mitigation measures during construction phase.

4.2.3.4 Increased Traffic Safety Risks

Traffic safety risks during operation phase would be increased specifically at the following locations:

- The four intersections between the existing NH19 and the An Khe and Pleiku bypasses
- The intersections between the two bypasses and the existing local roads

These potential impacts would be at medium to high level, and mitigable through design solutions and operational control methods.

5. ANALYSIS OF ALTERNATIVES

The objectives of the analysis for alternative technical designs options of the investment supported under the project are to compare social and environmental impacts associated with those design options. The final options are selected based on a thorough consideration of the technical, economical, effective, environmental, and social aspects of the proposed options.

The implementation of the Central Highland Connectivity Improvement Project is in line with the following plans and planning: (i) The Vietnam Road Transport Development Planning to 2020 with a vision toward 2030[11], the Vietnam Road Transport Development Adjusted Planning[12]; (ii) Gia Lai Provincial Transportation Network Development Planning to 2020[13] on Roadway, Railway and Airway; (iii) the Adjusted Pleiku City Master Planning to 2020[14]; (iv) An Khe Provincial Town's Detailed Construction Planning to 2020[15].

5.1 With Project and Without Project Scenarios

The project area includes the land of Tay Son district of Binh Dinh province and An Khe town, Dak Po district, Dak Doa, Mang Yang, Pleiku City, Chu Prong district and Duc Co district of Gia Lai province where the road runs through. These areas are characterized mainly as hills, mountains, and plateau. Results from the field survey in the project area show that (i) the air, the water and the soil environment of the area are not deteriorated by pollutants; (ii) Economic activities in the region are quite simple with agriculture plays a key role and there are many ethnic minority people living in the project area, (iii) Many road sections have narrow cross sections and are degraded. Therefore, if the CHCIP project is not implemented, negative environmental and social problems are bound to exist in current conditions:

- The road continues to be degraded as the traffic grows every year, increasing traffic risks. The project's feasibility study report has identified 11 black spots of traffic accident and 4 sections where traffic accidents are often occurred along the NH19[16]. Without the project, the black spots continue to exist, and traffic accidents might continue to happen.
- Flooding risks continue to be unsolved. At the section between Km53 and Km 67, the road runs along the mountain ridge, crossing streams that have short lengths and steep slopes thus during the rainy season, at these locations, water at high flow might quickly become flash flood, flooding the road.
- Long travel time and high travel cost will continue as the road connecting the coastal provinces and the Central Highland region has narrow cross section and is being degraded.
- Erosion risks continue to exist. Every year, embankment erosion often happens at several locations on An Khe Pass, causing danger to the people and vehicles traversing by 20. If the road is not upgraded, the erosion risk might still exist, causing accidents.
- The local people will still be exposed to the traffic safety risks at the road sections especially where non-motorized vehicles share the same lane with the 4-wheel vehicles.

[11] The planning was approved in Decision no. 1327/QĐ-TTg by the Prime Minister on 24/8/2009

[12] The adjustment to the planning was approved in Decision No. 356/QĐ-TTg by the Prime Minister on 25/02/2013

[13] The planning was approved in Decision No. 39/2011/QĐ-UBND by Gia Lai Provincial People's Committee on 28/12/2011

[14] The adjusted planning was approved in Decision No. 104/2005/QĐ-UB dated on 15/8/2005 by Gia Lai Provincial People's Committee

[15] The planning was approved in Decision No. 05/2007/QĐ-UBND dated 16/01/2007 by Gia Lai Provincial People's Committee

[16] According to the official document No. 37/ATGT dated on March 8, 2016 by the General Department of Road Transport, 11 transport black spots include Km 140- 144, Km 148+400-152+7200, Km 155-159+960, Km 190+500-191, Km 197, Km 199-200, Km 202-203, Km 217+400-218+600, Km 222+250-223+200, Km 226-228+350; 4 locations where traffic accidents often occur are at Km 201+800-202+200, 203+100, 207+200-207+600 and 213+400-213+700

The comparison between environmental and social issues associated with the With and Without Project alternative is described in Table 54 below.

Table 54 Analysis of "With" and "Without Project" Alternative

No	Environmental and Social Problems	Without the Project	With the Project
1	Air quality	It is not affected by the construction work. Vehicle emission will increase as the traffic density increases while the road is narrow and degraded.	Noise and dust impacts will be increasing during the construction period however these impacts are temporary, localized and controllable. During the operational period, vehicle emission will increase as the traffic density increases however the emission rate might lower than that of the "without project" scenario because the improved road surface will make the vehicles run more easily and smoothly.
2	Surface water quality	It is not affected by the construction work and there are no additional impacts during the operational period.	The construction of bridges crossing streams or of road sections near the surface water flows in the area might lead to an elevated level of TSS, BOD5, coliform... However, these impacts are short-term and manageable. During the operational period: Level of surface water turbidity depends on the quality of water runoff over the entire catchment therefore the installation of
3	Groundwater quality	Not affected	Not affected
4	Soil	Not affected	The project will change very little the quality of soils in the project area. Land slide, soil erosion risks will be reduced as road embankment will be strengthened, upgraded or embanked.
5	Ecosystem	Not affected	There will be insignificant impacts on the ecosystem as the project area is not an important natural area.
6	Drainage capacity	Not affected	The two new bypasses will cause some changes in the natural drainage flow direction due to the variation of surface elevation along the route. The road design will include vertical and horizontal drainage system to mitigate the impacts.

No	Environmental and Social Problems	Without the Project	With the Project
7	Traffic Safety	Traffic safety risks increase as traffic volume is increasing while the road is degraded and motorbikes continue to share the same lane with 4-wheel vehicles.	Traffic safety risks will be better managed as the black spots will be resolved, segregation lanes are created to separate motorbikes and 4-wheel cars transport, and the road surface will be rehabilitated and improved.
8	Residential area and land fragmentation	Residential areas and production land keep unchanged.	Some sections of the bypass will be elevated or lowered than the current base elevation, cutting up production land pieces or separating residential land and production land. This impact will be minimized by including the design for an underpass or making connection slopes between the isolated land pieces and the bypass to ensure traffic safety.

5.2 Analysis of Road Options

5.2.1 Options for Pleiku Bypass

Two options for the road section bypassing Pleiku City are under consideration: (1) there will be a bypass of 13,2km long with the starting point at Km157+350 and the ending point at Km177 on NH19, including 2 new bridges of An My 1 (at Km7+900) and An My 2 (at Km16+500) and (2) the alternative bypass is 21km long with the starting point at Km147 and the ending point at Km177 on NH19, including 3 new bridges of Le Can (at Km2+600), An My 1 (at Km7+900) and An My 2 (at Km16+500). Both options run through agriculture land.

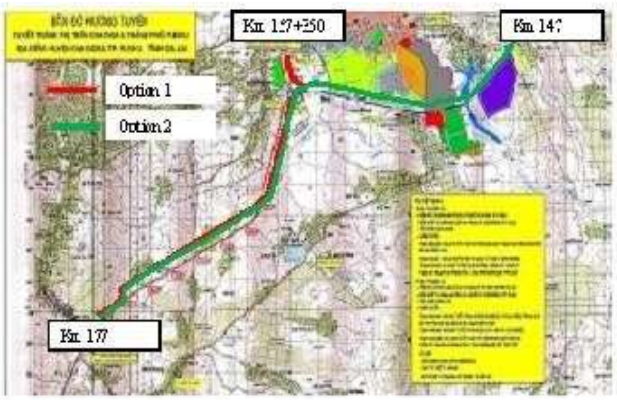


Figure 24 Pleiku Bypasses

The level of impacts of the bypass options is presented in Table 53.

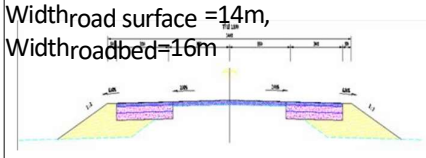
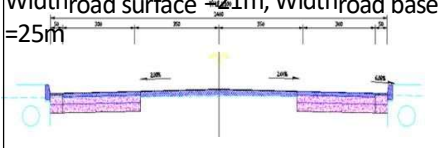
Table 55 Alternative analysis of the bypass around Pleiku City

Content	Option 1 (selected)	Option 2
Area of land acquired and number of households affected	Total acquired land is about 313,176 m^2 and there will be 173 affected households.	Total acquired land is about 498,234 m^2 and there will be 276 affected households.
Road length, excavated soil volume, waste generation	13.2 km. The project will construct 2 small bridges with the maximum length of 99 m. The length of the road in this option is shorter than that of the option 2 therefore its negative impacts are less than those of option 2. Excavated soils and generated waste are smaller than those in the option 2 therefore the areas of material quarries and disposal sites will be smaller. Excavated, backfilling waste, temporary storage waste and material transportation would be less than those in the option 2. The volume of backfilling and excavated waste would be 596,750 m^3 and 553,543 m^3 respectively.	21 km. The project will affect forestland. There will be 3 bridges constructed of which Le Can bridge is 231 m long. There will be more negative impacts than those in the option 1. Excavated soils and generated waste are greater than those in the option 1 therefore the areas of material quarries and disposal sites will be bigger. Excavated, backfilling waste, temporary storage waste and material transportation would be greater than those in the option 1. The excavated soil volume would be 949,375 m^3 and the backfilling soil volume would be 880,637 m^3, greater than those in option 1.
Impacts during operational phase	The traffic safety risks are not resolved completely at the road section running through Dak Doa district town.	The project will ensure better traffic safety than option 1 as the bypass runs around the densely populated Dak Doa town.

5.2.2 Alternative Analysis for the Section from Km155 to Km160

The cross-sections of road embankment and road top are 10 m and 7m respectively. Based on the current status of the road section of NH19 running through Dak Doa town and the Master Planning of Pleiku City, the technical consultant has proposed 2 expansion options for the section. These options are analyzed and compared in Table 56 below.

Table 56 Comparing the Options for the Section from Km155 to Km160

Content	**Option 1 (Selected)**	**Option 2**
Cross section	$Width_{road\ surface}$ =14m, $Width_{roadbed}$=16m 	$Width_{road\ surface}$ =21m, $Width_{road\ base}$ =25m 
Area of affected Land	- Acquired land of 20,000m^2.	- It will acquire 55,000 m^2 of land and affect many people's architectures.
Investment cost	- Low investment cost which is about VND 73,512,363,576 (equivalence of USD 3,241,286)	- Higher investment cost

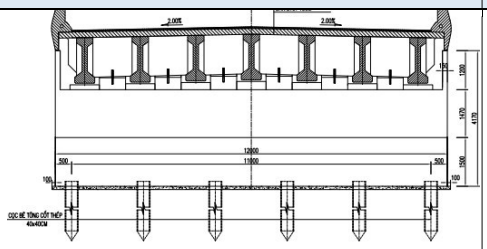
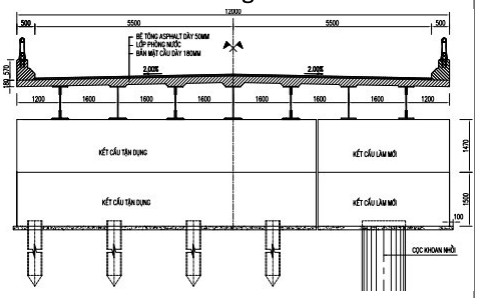
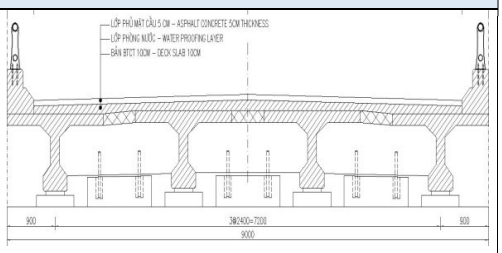
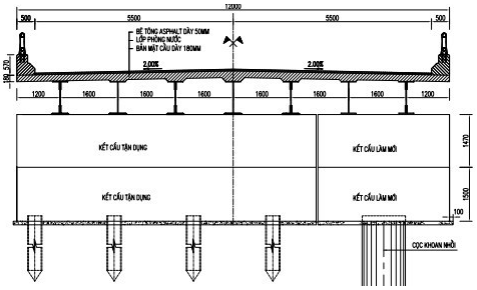
Alignment with the planning	- It is in line with the current road of Dak Doa town.	- It is in line with the current status of road surface in Pleiku City. However it does not have 5 m wide sidewalk on each roadside and a centered segregation line of 2m wide (total 33m wide) as requested by the province.
Environmental impacts during operational phase	The road size is smaller so that the impacts will be less than those in the option 2.	The road size is bigger so that the impacts will be more than those in the option 1

Based on the analysis, option 1 is selected as the affected area and the investment cost will be lower than those of the option 2.

5.2.3 Alternative Analysis for the Construction of Bridges on NH19

The NH19 section running through the project area currently has 12 bridges of which 4 bridges are located between Km50 and Km90 and 8 bridges are distributed between Km131+513 and Km247 with the cross sections ranging from 9m to 9.7m. As the road will be widened, the bridges should be expanded accordingly. The options for the bridge construction are analyzed in Table 57 below. Based on the analysis, option 2 is selected.

Table 57 Alternative Analysis for Bridges on NH19

Content	Option 1	Option 2 (Selected)
Proposed option	 Cross section of the new bridge  Cross section of the expanded	 Cross section of the existing bridge  Cross section of the new bridge
Solution	- Expansion of 4 bridges, including Tan Lac, Thanh Binh, Nuoc Pit and Ia Blang up to 12m wide. - Construction of 8 new bridges, including Bau Sen, Ba La, Ta Ly, Thau Dau, Linh Nham, Le Can and An My	- Keep 4 existing bridges of Tan Lac, Thanh Binh, Nuoc Pit and Ia Blang unchanged. - Construction of 8 new bridges, including Bau Sen, Ba La, Ta Ly, Thau Dau, Linh Nham, Le Can and An My.

Content	Option 1	Option 2 (Selected)
Comparison	This option will ensure that the bridges on NH19 have the cross sections in conformity with the road width and therefore the traffic safety risks are reduced. However, the expansion of the 4 bridges will increase land acquisition, site clearance as well as investment cost compared to those in option 2 as it will involve construction work for all 12 bridges on NH19.	The 4 bridges of Tan Lac, Thanh Binh, Nuoc Pit and Ia Blang have been invested recently thus these bridges will be kept unchanged, helping to reduce the project's investment cost. Besides, excavated and backfilling soil materials and area of acquired land will be smaller.
Conclusion	This option is less feasible as the investment cost will be higher and environmental and social impacts will be emerged at 4 locations where the bridges are expanded.	This option is selected as the investment cost is lower and the environmental and social impacts are less.

5.2.4 Solutions at Km65+800 on An Khe Pass

There are 3 options proposed for the treacherous road section at km65+800: (i) Unchanging the curve radius R=20m but widening the road cross section from 7m to 8m for 100m long; (ii) increasing the curve radius R=40m and widening of the section from 7m to 8m for 220m long, (iii) increasing the curve radius R=125m, widening of the section from 7m to 11m and constructing a bridge on land with 630 m long. The analysis of alternatives is provided in Table 58.

Table 58 Comparing the options

Content	Option 1	Option 2 (Selected)	Option 3
Excavated soil volume	Rock excavation on average of 3m (at the road centerline) with excavated soil volume of 3,700m^3	Rock excavation on average of 15m (at the road centerline) of 55,000m3	Excavated soil volume 340,000 m^3
Budget	0.74 billion VND	11 billion VND	680.4 billion VND
Environmental and Social Impacts	The option does not help in reducing traffic accidents and soil erosion in rainy season.	The option will help to manage traffic safety and soil erosion risks.	The option will help to reduce traffic accidents but might increase the number

From the above analysis, option 2 is selected because its investment cost is at medium, the associated environmental and social impacts are limited while better address the issues of traffic safety and soil erosion.

6. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

With the potential impacts and risks identified and assessed in Chapter 5, an Environmental and Social Management Plan (ESMP) has been developed in this chapter with the aims of impact prevention and mitigation. Procedures for implementation, monitoring, supervision, and reporting are also included in this ESMP together with Capacity building program and cost estimation. This ESMP consists of main contents as follows:

- The measures to minimize the potential environmental impacts from Feasibility Study and Detailed Design stage to pre-construction, construction and operation phases together with implementation responsibilities;
- Environmental Monitoring Program;
- The Project Compliance Framework, including environmental and social supervision arrangements, fines applicable to non-compliance;
- Capacity building programs;
- Cost estimation; and
- Grievance Redress Mechanism.

6.1 Mitigation Measures

6.1.1 Measures Incorporated in the Feasibility Study and Detailed Design

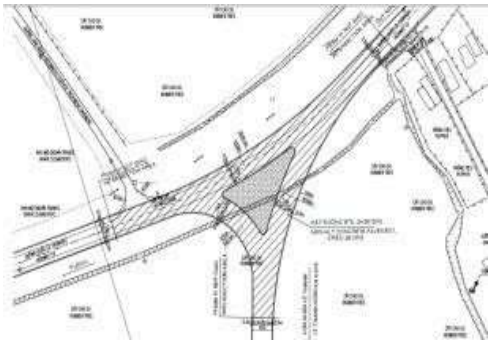
The following measures were considered during the preparation of the feasibility study and are integrated in the detailed designs to mitigate the potential socio-environmental impacts and traffic safety risks during operation phase:

- The route closely follows the terrain. The designs ensure the technical and safety requirements (curve radius, longitudinal and horizontal slope etc.) are met. At the same time, minimize site clearance requirements. Specifically, the Pleiku bypass has shortest possible length with smallest possible affected households. The road sections to be improved follow the existing alignment.
- The road shall be expanded equally at each side to maintain the existing landscape (existing houses are located 5-15 m from each roadside) and avoid significant disturbance to traffic flow during both construction and operation phases.

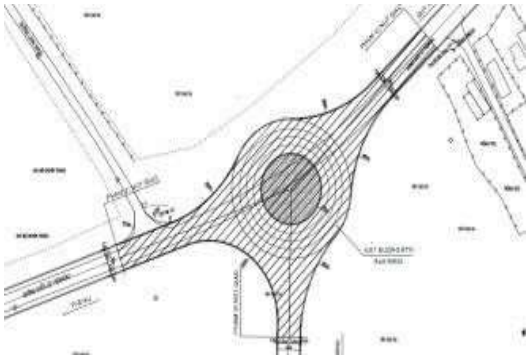
The following measures have been incorporated into feasibility study and will be included in detail engineering design to enhance traffic safety along NH19:

- Raise curve radius at some sections, particularly on An Khe bypass.
- Build four additional escape lanes at Km62+158 (165m long), Km 63+200 (153m long), Km64+470 (175m long) and Km66+065 (128m long).
- Create separate lanes for motorbike at each side of the road.
- Plant trees such as bamboos outside the hard barriers installed at curvy section to stop vehicles from falling into abysses when accidents happen.
- Protect embankment slopes with vegetation cover and concrete frames and/or embankments. Vegetative cover is applied to embankment slope only, not to cutting slope.
- Install additional vertical and longitudinal drains to enhance stability of the roads.
- Smooth connection with local roads together with traffic safety control measures at intervals to maintain access for local communities to travel from one side of the road to the others.
- Design the intersections between the by passes and NH19 with measures to ensure traffic safe.
- Cost estimate prepared at feasibility stage included the costs of approximately 50 billion VND for repair, upgrade/build access road to construction sites including existing weak bridges on local roads.

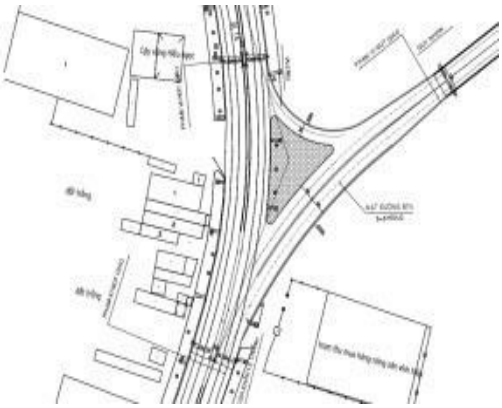
Figure 13 shows the design of the intersections between NH19 and the bypasses in which traffic and safety control measures included.



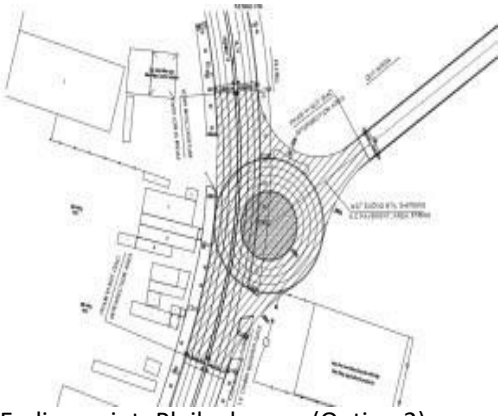
Beginning point- Pleiku bypass (Option 1)



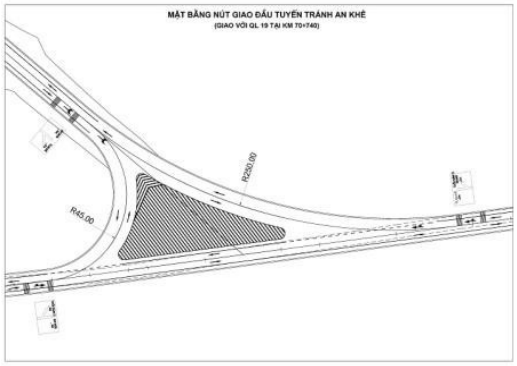
Beginning point- Pleiku bypass (Option 2)



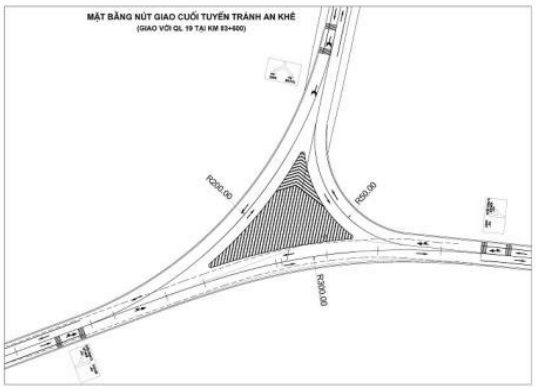
Ending point- Pleiku bypass (Option 1)



Ending point- Pleiku bypass (Option 2)



Beginning point- An Khe Bypass



Ending point- An Khe Bypass

Figure 25 Design Intersections between An Khe and Pleiku Bypasses

6.1.2 Measures to be Implemented in Pre-Construction Phase

6.1.2.1 Measures to Prevent Safety Risks related to UXO

Unexploded bombs and mines will be searched for removal right after completing the compensation for site clearance and before carrying out the leveling of the site. This is required to be made prior to

the construction of new road sections and road enlargement. The project owner will sign contract with a military civil engineering unit or a professional organization for searching, detecting, and destroying bombs and mines. The cost for clearing bombs and mines is estimated at around 6.6 billion Vietnamese Dong (equivalence of USD 300,000).

6.1.2.2 Measures to address the Impacts of Land Acquisition and Resettlement

To mitigate the potential impacts of land acquisition, Resettlement Actions Plans were (RAPs) were prepared for two provinces in 2017. In summary, Gia Lai province has an estimated 915 households that will potentially be affected covering a total length of 123.57 kilometers (Kms) that stretches Section from Km67-Km90; Section from Km131+300-Km167; Section from Km180-Km247 including the 6.2km of the proposed An Khe Bypass and 21km Pleiku Bypass. Out of this total, 825 are landowners and 90 are renters along with the land acquisition of approximately 1,808,604 square meters (sqm) of land of which 1,745,967sqm (96.6%) classified as agricultural land; 54,790 sqm (3.0%) residential land; and 7,307 sqm (0.4%) public land. In addition to the RAP, an Ethnic Minority Development Plan (EMDP) was developed since Gia Lai province is a home to several ethnic minority groups. While, Binh Dinh province has an estimated 180 households to be affected. Out of the 180 affected households (AHs), 154 AHs are landowners and the 26 AHS are renters along with the acquisition of approximately 19 hectares (ha) of agricultural land and 0.16 ha of rural residential land.

A budget of 305 billion VND (approximately 14 million USD) is estimated to compensate the losses and support to the affected households. Details about compensations and supports to be paid to the affected households are presented in Table 59 below.

Table 59 Compensation and Supports to Affected Households

Items	Amount (VND)	
	Gia Lai province	Binh Dinh province
Compensation for land (including 2% transaction costs)	**119,446,834,596**	**114,774,602,400**
Agricultural land	34,919,334,800	3,426,120,000
Residential land	82,185,405,000	109,098,000,000
Compensation for structures	**16,582,950,000**	**380,000,000**
Compensation for crops and trees	**290,940,000**	**865,530,000**
Rice, crops	241,940,000	856,530,000
Crops temporarily affected	49,000,000	9,000,000
Support	**9,256,254,400**	**64,200,000**
Support in training, job change and job search	7,659,054,400	6,852,240,000
Livelihood stabilization	1,267,200,000	6,000,000
Transportation	235,000,000	50,000,000
Support for vulnerable groups	95,000,000	5,000,000
Total (including transaction costs, management cost, independent monitoring, management costs and 10% contingency)	**165,020,370,433**	**139,614,243,833**

During DDD, the two RAPs primarily updates the policies to address the discrepancies/inaccuracies in the RAP of 2017, clarifies the institutional framework and mechanism for implementation, and the monitoring and evaluation.

After the approval of the detailed design, the project impacts and mitigation measures will be updated through the Detailed Measurement Survey (DMS) in which the actual affected assets and number of affected persons that are eligible for compensation and other entitlements will be concluded including the accurate Resettlement Cost. The DMS will be carried out within the demarcated project boundary limits by a Consultant/Contractor to be engaged by PMU2 with the assistance of the District Compensation and Site Clearance Committee (DSCC) along with the conduct of Replacement Cost Survey.

Taken into consideration that CHCIP will be implemented based on priority, Rapid Assessment Survey was conducted on July 3-7, 2020 along the alignment of the section utilizing the preliminary Land Acquisition Plan. A total of 1, 394 AHs were accounted as presented per District/Commune in matrix below. The affected assets are mostly concrete frontage/driveways, concrete access to households' properties and trees of various species, hence, impacts are considered insignificant. The list of HHs will be verified along with the affected assets during the DMS as there is a significant increase from the inventoried affected persons and assets in 2017.

Table 60 Potential Number of AH along the Priority Section

District	Commune	Number of AH
An Khe town	Song An	117
Dak Po	Cu An	301
Dak Po	Tan An	186
Mang Yang	Kon Dỡng	145
Mang Yang	Dak D'Jang	273
Dak Doa	K' Dang	233
Dak Doa	Dak Doa town	139
TOTAL		**1,394 AHs**

No rapid assessment survey was undertaken in the Non-Priority Sections since the detailed design along the alignment is still under finalization including the Land Acquisition Plan.

Compensation and supports given to the affected households will be based on the following key principles:

- All AP who have assets within or reside within the area of project land-take before the cut-off date are entitled to compensation for their losses. Those who have lost their income and/or subsistence will be eligible for livelihood rehabilitation assistance based on the criteria of eligibility defined by the project in consultation with the PAPs. If, by the end of the project, livelihoods have been shown not to be restored to pre-project levels, additional measures will be provided.
- Land will be compensated in cash at replacement costs. Those loosing 20% or more of their land will be assisted to restore their livelihoods through participating in the livelihoods restoration program set forth in the RAPs. The same principles apply for the poor and vulnerable people losing 10% or more of their productive land holding.
- Compensation for all residential, commercial, or other structures will be offered at the replacement cost.
- Additional efforts, such as economic rehabilitation assistance, training and other forms of assistance, should be provided to PAPs losing income sources, especially to vulnerable groups including women and female-headed HHs, disabled people, the elders and children.
- Individual graves are considered physical cultural resources (PCR), and even though the costs associated with their Resettlement will be covered in the RAP.
- For annual and perennial crops, and aquatic livestock which are not due to be harvested at the time of land acquisition, compensation will be paid to HH at full replacement cost.
- If community infrastructure such as schools, factories, water sources, roads, sewage systems, medical centers, distribution/transmission, communication and power cables are damaged and the community wishes to reuse them, the project will ensure that these are restored or repaired as the case may be, at no cost to the community.
- Public infrastructure related to people's livelihoods and developmental needs, such as irrigation canals, schools, clinics, transportation road, electricity, telecommunication, cable lines will be restored/rebuilt to pre-project or higher quality levels or compensated at replacement cost.
- If the project need land temporarily for construction, the PMU rents the land of the owners complying with regulations stipulated by the Civil Law. Damaged caused to property will be restored to its former condition by contractors, immediately upon completion of civil works.
- Besides the compensation for affected assets, PAPs will be provided with financial assistance to cover their expenses during the transition period. The assistance levels will be adjusted, taking into account inflation factor and price increase to be appropriate to the payment time.

For affected households who are from EM groups, in addition to the compensation and support provided to them, as indicated in the RAP for Gia Lai, affected EM peoples, and non- affected EM will receive additional socioeconomic benefits through participating in development program proposed in the EMDP for Gia Lai. For example, as surveyed, the first aspirations of Bahnar and Jarai affected persons are

to get capital loans in order to develop their family businesses, receive benefits in cash and attend training courses related to investment using credits for business development. Following this line, households can borrow and average of VND 10 million/ household from the existing credit program(s) available at the project's participating communes, but this is not a part of the project. The PMUs of provinces and cities shall support the training and visits to the successful business models that may be suitable to Bahnar and Jarai households with a total budget estimated at around 1 billion Vietnamese Dong. One adolescent in each Bahnar and Jarai affected household will enjoy a training course worth 5,000,000 Vietnamese Dongs. Activities to build and enhance the capacity of Bahnar and Jarai low-income communities affected by the project will be organized with the estimated budget of around VND 10 million/location. The total budget for implementing the EMDP is estimated at around VND 744,000,000.

Compensation will be made to the affected households for the assets that are lost/affected, including their loss of income because of land acquisition. In addition to compensation, households who are severely affected will be provided with additional financial support for resettlement. They are also eligible for participating in the Livelihood Restoration Program that was designed based on their needs to assist them in promptly restoring their livelihood as a result of loss of land/business/crops, or as a result of physical relocation. In addition to the compensation and support, other measures will be taken to mitigate the potential adverse impact, including early notification of land acquisition (i.e. before 90 days for agricultural land and 180 days for residential land), resettlement site is constructed close to the existing households. During resettlement process, consultation will be conducted regularly to ensure comments and feedback of affected households are considered to avoid/mitigate the resettlement impact. Temporary impact on existing living and business activities will be mitigated by allowing the households to continue using their existing houses and running their current business until their new houses are ready to move in. Contractors will apply all possible mitigation measures to avoid and/or mitigate negative impacts on local people during construction with closely monitoring by PPMU and local community.

Costs for implementation of the EMDP for Gia Lai is estimated at 744,000,000.

Gender Mainstreaming:

Below are some suggestive actions to promote gender equality through the implementation of RAP for Gia Lai and Binh Dinh, and the implementation of the EMDP for Gia Lai.

Gender Action: As part of RAP implementation, the following gender actions will be made.

- ***Participation*.** Women should be invited to all consultation sessions throughout project cycle, particular to consultation done in groups to allow them chance to express their opinion, concerns, and to provide feedback on their resettlement and income/livelihoods restoration process. Women are prioritized to work in the project on jobs that are suitable to them to earn extra income.
- ***Well-informed of Project Impact.*** The potential impact of resettlement and livelihoods restoration should be further informed to the affected women so that they are fully aware of the potential impact on their household as well as their income generation activities, and as such propose measures that the project should do to avoid or minimize the impact.
- ***Intra-household gender disparities:*** as the gender analysis indicates, women spend more time than men doing housework and care of their children. Some also work to earn extra income or do jobs that are typically done by men such as spraying of pesticide. As a result, the relocation process, particularly for those losing shelter, would apparently take them more time and effort and affects their ability to earn income, particularly those who work as hired labor, or are directly involved in crop care, or even travel out of their community for off-season jobs which apparently increase their burden.
- ***Income/Livelihoods Restoration.*** As some households may change their jobs, i.e. households who depend on seasonal income – primarily from crops and/or fruit trees, counseling and training of new jobs for this group should be done with the capacity of men and women in mind so as to ensure the training knowledge provided area applicable for them.
- ***Safety Assurance.*** As women take care of children, they need to be notified/warned of potential risks that are inherent during the construction process and/or during the relocation of their houses. In many cases where both men and women are directly involved in the relocation/house

building/new business operation, they need to arrange a safe, alternative person to take care of their children.

Based on the gender consultations and as mentioned above, the methods of compensation payment, particularly the coordination between PPMU, C/DBCLA, and severely affected households, will need to be worked out carefully to ensure difficulties and challenges potentially faced by severely affected households are avoided, or minimized if not avoidable.

More consultation needs to be carefully done among affected EM households to ensure the support and compensation provided to them are culturally appropriate to them, and that both men and women will have opportunity to participate in and receive socioeconomic benefits that are to be provided to them through development activities proposed under the EMDP for Gia Lai.

6.1.3 Measures to be Implemented during Construction Phase

The potential impacts and main risks that may occur during the construction include: (i) dust, emission, noise, vibration; (ii) wastewater; (iii) risk of surface water quality deterioration; (iv) risk of erosion and landslide, (solid waste and a small fraction of hazardous waste; (vi) impact on agricultural production; (vii) impact on biological resources; (viii) impact on business; (ix) impact on the society; (x) impact on the existing infrastructure and related services; (xi) traffic disturbance and traffic safety risks; (xii) risk of fire to the forest; (xiii) inundation; (xii) impacts on existing cultural and religious edifices and risk of exposing cultural objects; (xv) risk to safety and health of workers; (xvi) impact on the safety and health of the community. In addition, some special impacts by types of work, such as destructive explosion, construction of bridge or sensitive locations along the route, have also been identified.

Below are the mitigation measures to be implemented during the construction phase of the project and presented by category:

- General mitigation measures presented as ECOP (Environmental Codes of Practice). ECOP will be applied to all bid packages by the contractors and supervised by the construction supervision consultant (or Engineer).
- Mitigation measure applicable to specific types of activities to be carried out; and
- Site-specific mitigation measures to address site-specific potential impacts and risks

Bidding documents and construction contracts of each bid package will include the entire ECOP and specific mitigation measures by type of construction activity and location consistent with the work content in the bid package.

The contractors will be required to prepare Contractor's Environmental and Social Management Plan (CESMP) and submit to the Construction Supervision Consultant and to the Project Management Unit 2 for review and approval at least two weeks prior to construction commencement. The CESMP will be prepared to meet the mitigation requirements described below.

6.1.3.1 Environmental Codes of Practice (ECOP)

The mitigation measures for common negative impacts during the construction phase are presented in the form of Environmental Codes of Practices (ECOP). ECOP will be included in all bidding documents and construction contracts of all bid packages to request the contractors to implement. ECOP compliance will be supervised by the Construction Supervision Consultant (CSC) in coordination with PMU.

ECOP, together with relevant type-specific and site-specific mitigation measures will be included in the construction contract signed between the PMU and the Contractor. In addition, each contractor will be required to prepare Contractor Social and Environmental Management Plan (CESMP) to cover all measures that the contractor will carry out to address potential impacts and risks associated with the works that they are contracted to implement.

- Impacts on air quality because of dust, exhaust, noise, and vibration
- Wastewater
- Solid waste
- Reduced water quality

- Water pollution
- Erosion and Sedimentation
- Traffic Disturbance and Safety Risks
- Impacts on organism, aquatic system
- Impacts on urban landscapes,
- Impacts on Cultural Heritages
- Social Impacts
- Community Health and Safety
- Workers' Health and Safety
- Hazard Risk
- Chance findings

Table 61 Environmental Codes of Practice (ECOP)

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
1) Generated dust, emission, noise, vibration	Maintain the level of emission at construction sites within the permissible limit provided for in QCVN 05: 2013/BTNMT: National Technical Regulation on Ambient Air Quality. Vehicles in Vietnam must undergo a regular emissions check and obtain certification: "Certificate of conformity from inspection of quality, technical safety and environmental protection" following Decision No. 35/2005/QD- BGTVT Carry out watering for dust control at least 3 times a day: in the morning, at noon, and in the afternoon during dry weather with temperatures of over 25^{o}C, or in windy weather. Avoid overwatering as this may make the surrounding muddy. Exposed soil and material stockpiles shall be protected against wind erosion and the location of stockpiles shall take into consideration the prevailing wind directions and locations of sensitive receptors. Dust masks should be used by workers where dust levels are excessive There should be no burning of waste or construction materials on site. Cement processing plants should be far from residential areas. Only employees use transportation vehicles with valid registry. Neatly gather construction materials and wastes. Arrange for the workers to collect and gather construction materials and wastes to the designated places at the end of each day or shift. Do not overload the materials/soils and stones onto trucks, as this may result in drops along transportation routes. Tightly cover the trucks carrying wastes and bulk materials before getting out of construction sites or quarries and borrow pits to restrict scattering along	- QCVN 05: 2013/MONRE: National technical regulation on ambient air quality QCVN 26:2010/BTNMT: National technical regulation on noise QCVN 27:2010/BTNMT: National technical regulation on vibration TCVN 6438-2005: Road vehicles. Maximum permitted emission limits of exhaust gas - Decision No.35/2005/QD-BGTVT on inspection of quality, technical safety and environmental protection;	Contractor	PMU, CSC, IEMC

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	transportation routes. Put temporarily gathered materials and waste heaps with a volume of about 20m^3 within barriers or covered so as to avoid dust dispersion. Transport wastes out of construction sites to the designated locations for reuse or to the disposal sites in the soonest possible time. Do not put vehicles and machines to run idle in more than 5 minutes. Avoid preparations of construction materials near local people's houses or other sensitive works like pagodas, school gates, or offices. Locate vehicle washing stations at the exit/entrance of big construction sites. Periodically wash the trucks used for transporting materials and construction wastes. Avoid construction operations generating great vibration and loud noise within the time between 6am and 6pm when construction takes place near residential areas. Night construction must be informed to the community at least 2 days in advance. Perform the method of successive construction for each sewer section in construction sites of long sewer lines. Observe and secure construction progress correctly. Set up minimum 2.5m-high fences of corrugated iron around the construction sites. When needed, measures to reduce noise to acceptable levels must be implemented and could include silencers, mufflers, acoustically dampened panels or placement of noisy machines in acoustically protected areas			

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	Avoiding or minimizing transportation through community areas and avoiding as well as material processing areas (such as cement mixing).			
2) Wastewater management	The Contractor must be responsible for compliance with Vietnamese legislation relevant to wastewater discharges into watercourses. Employ local workers to limit the amount of generated domestic wastes and wastewater. Provide septic tanks for toilets for treating wastewater before it can be discharged into the environment. On-site mobile toilets with 3-compartment septic tanks can be used in areas for major work items as traffic roads. Wastewater from toilets as well as kitchens, showers, sinks, etc. shall be discharged into a conservancy tank for removal from the site or discharged into municipal sewerage systems; there should be no direct discharges to any waterbody Wastewater containing pollutants over standards set by relevant Vietnamese technical standards/regulations must be collected in a conservancy tank and removed from site by licensed waste collectors. Clear ditches around the workers' camps every week. Build sedimentation ponds and ditches to receive stormwater runoff at the construction sites. Make appropriate arrangements for collecting, diverting or intercepting wastewater from households (if any) to ensure minimal discharge or local clogging and flooding. Before construction, all necessary wastewater disposal permits/licenses and/or wastewater disposal contracts have been obtained. At completion of construction works, wastewater collection tanks and septic tanks shall be safely disposed or effectively sealed off	- QCVN 14:2008/BTNMT: National technical regulation on domestic wastewater - QCVN 40: 2011/BTNMT: National technical regulation on industrial wastewater	Contractor	PMU, CSC, IEMC

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
3) Solid waste management	Before construction, a solid waste control procedure (storage, provision of bins, site clean-up schedule, bin clean-out schedule, etc.) must be prepared by the Contractors and it must be carefully followed during construction activities. Before construction, all necessary waste disposal permits or licenses must be obtained. Solid waste may be temporarily stored on site in a designated area approved by the Construction Supervision Consultant (CSC) and relevant local authorities prior to collection and disposal through a licensed waste collector. Waste storage containers shall be covered, tip-proof, weatherproof and scavenger proof. No burning, on-site burying or dumping of solid waste shall occur. If not removed off site, solid waste or construction debris shall be disposed of only at sites identified and approved by the Construction Supervision Consultant and included in the solid waste plan. Under no circumstances shall the contractor dispose of any material in environmentally sensitive areas, such as in areas of natural habitat or in watercourses. Limit waste pollution from litter and drop of materials. Place dustbins at the workers' camps. Temporarily collect and separate domestic wastes. Provide watertight dustbins for domestic waste and tightly cover them to avoid giving rise to bad odors and leachate leakage, attracting flies, mice and other pathogenic species. Periodically collect and transport the waste to the dispose. Perform concrete mixing on impermeable ground. Collect waste and wastewater containing cement through drainage ditches with	- Decision No 59/2007/NĐ-CP on garbage management - Decision No.38/2015/NĐ-CP dated 24/04/2015 on waste and scrap management	Contractor	PMU, CSC, IEMC

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	sedimentation pits in construction sites before being discharged into receiving waters. Separate the components and parts which can be reused or recycled in the construction wastes before transporting the residual waste to disposal sites in accordance with design documents acceptable to the supervision engineer. Weathered soil, wood and bricks can be reused for useful purposes such as ground leveling. Wood scraps may be used for cooking. Corrugated iron, iron, steel, packing materials and other materials which can be recycled can be delivered and sold to scrap traders. Collect waste and tidy up construction sites at the end of a working day/shift and the transport waste out of the construction sites in the soonest possible time. If dredged/excavated materials are to be temporarily stored, necessary measures must be applied to control pollution such as gathering them within enclosures, under coverings, within fenced areas, etc. with warning signs. The Contractor will sign a contract with licensed units from project districts of Binh Dinh and Gia Lai provinces to collect solid waste, conforming to Decree No. 59/2007/ND-CP dated 09 April 2007 on solid waste management and Decree No. 38/2015/ND-CP dated 24 April 2015 on management of waste and			
4) Hazardous waste management	Temporarily collect, store, and transported for treatment all hazardous wastes (road asphalt, waste oil and grease, organic solvents, chemicals, oil paints, etc.) in accordance with Circular No. 36/2015/TT-BTNMT on management of hazardous waste. Collect and temporarily store used oil and grease separately in specialized containers and place in safe and fire-free areas with impermeable floors roofs, at a safe distance from fire sources. Sign	- Circular No. 36/2015/TT-CBTNMT on hazardous waste management - Decision No.38/2015/NĐ-CP dated 24/04/2015 on waste and scrap management	Contractor	PMU, CSC, IEMC

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	contracts with for oil and grease to be delivered to suppliers/ manufacturers Chemical waste of any kind shall be disposed of at an approved appropriate landfill site and in accordance with local legislative requirements. The Contractor shall obtain needed disposal certificates. The removal of asbestos-containing materials or other toxic substances shall be performed and disposed of by specially trained and certified workers. Used oil and grease shall be removed from site and sold to an approved used oil recycling company. Used oil, lubricants, cleaning materials, etc. from the maintenance of vehicles and machinery shall be collected in holding tanks and removed from site by a specialized oil recycling company for disposal at an approved hazardous waste site. PCB contained materials is prohibited Unused or rejected tar or bituminous products shall be returned to the supplier's production plant. Relevant agencies shall be promptly informed of any accidental spill or incident Store chemicals appropriately and with appropriate labeling Appropriate communication and training programs should be put in place to prepare workers to recognize and respond to workplace chemical hazards Prepare and initiate a remedial action following any spill or incident. In this case, the contractor shall provide a report explaining the reasons	- Decision 184/2006/QD-TTg on approving the national plan on implementation of the Stockholm convention on persistent organic pollutants		

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	for the spill or incident, remedial action taken, consequences/damage from the spill, and proposed corrective actions.			
5) Water pollution	The Contractor is responsible for controlling the surface water quality when discharging it out of the construction site, in accordance with relevant standards. Provide preliminary sedimentation ponds and ditches of stormwater runoff at the construction sites Provide construction workers on site with gender disaggregated mobile toilets. Avoid excavation and backfilling during rains. Gather materials and wastes generated during excavation and backfilling, collect and transport them out of the construction site to the approved disposal sites within the soonest possible time. Do not allow temporary gathering of bulk materials and mixing of concrete within 50m from ponds, rivers, streams, or other water sources. Maintain maximum distances possible between the gathering points to water sources. Store used and unused oil and petrol in closed containers on impermeable ground covered with roofs and contained within surrounding banks for easy control and collection in case of leakage. Do not locate oil and petrol storages within 25m from ponds, rivers, and streams. Only perform maintenance work of motored vehicles and equipment, including oil replacement or lubrication in designated areas, without allowing chemicals, petrol, oil, or grease to leak onto soil or into the drainage system or water sources. Trays are to be used to hold rags and materials used in maintenance.	- QCVN 08-MT:2015/BTNMT – National Technical Regulation on surface water quality - QCVN 09:2008/BTNMT: National technical regulation on underground water - QCVN 14:2008/BTNMT: National technical regulation on domestic wastewater - QCVN 40: 2011/ BTNMT: National technical regulation on industrial wastewater - TCVN 7222: 2002: General requirements for concentrated wastewater treatment plants	Contractor	PMU, CSC, IEMC

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	Collect and discard wastes in accordance with hazardous waste management regulation.			
6) Impacts on plants and aquatic species	The Contractor shall prepare a Clearance, Re-vegetation and Restoration Management Plan for prior approval by the Construction Supervision Consultant (CSC), following relevant regulations. The Clearance Plan shall be approved by the Construction Supervision Consultant and followed strictly by the contractor. Areas to be cleared should be minimized as much as possible. Limit disturbances to areas with construction operations, especially in locations covered with green trees or vegetation. Do not use chemicals to clear vegetation. Do not gather materials and wastes at places covered with vegetation or with green trees, but on vacant land instead. Use sheet pile driving method using Larsen piles to limit impacts on the water quality. If possible, trees should be moved and replanted in other places if the trees are in the right of way (ROW) of the road to be upgraded/newly built. The contractor shall remove topsoil from all areas where topsoil will be impacted by construction activities, including temporary activities such as storage and stockpiling, etc.; the stripped topsoil shall be stockpiled in areas agreed to by the Construction Supervision Consultant for later use in re-vegetation and shall be adequately protected. Trees cannot be cut down unless explicitly authorized in the vegetation clearing plan.	- Law on environmental protection No. 55/2014/QH13	Contractor	PMU, CSC, IEMC

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	When needed, temporary protective fencing will be erected to efficiently protect the preserved trees before commencement of any works within the site. No area of potential importance as an ecological resource should be disturbed unless there is prior authorization from CSC, who should consult with PMU, IEMC and the relevant local authorities. This could include areas of breeding or feeding for birds or animals, fish spawning areas, or any area that is protected as a green space. The Contractor shall ensure that no hunting, trapping, shooting, poisoning of fauna and collecting of flora takes place.			
7) Impacts on urban landscape and beauty	Carefully cover transport vehicles for materials and waste and periodically wash and clean the vehicles. Dismantle the camps as well as other temporary works set up during construction and restore the site before the completed work could be handed over to the subproject owner. Back fill and tightly seal toilet pits, septic tanks, and temporary sewerage ditches. Do not temporarily gather construction materials and wastes within 20m from the gate of schools, offices temples, pagodas, etc. Materials and waste around the construction site must be regularly collected and construction sites are to be neatly tidied up.	- Law on environmental protection No. 55/2014/QH13 - TCVN 4447:1987: Construction regulation - Circular No. 22/2010/TT-BXD on requirements on safety	Contractor	PMU, CSC, IEMC
8) Sedimentation, erosion, flooding, subsidence and slides	Avoid disturbances and damage to the existing vegetation and green trees. Periodically and thoroughly remove soils, stones and wastes from drainage sewers and ditches inside and around the construction site. Neatly gather materials and wastes so as to limit them being swept away by stormwater.	- TCVN 4447:1987: Construction regulation - Circular No. 22/2010/TT-BXD: Regulation on construction safety	Contractor	PMU, CSC, IEMC

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	Carry out ground leveling and rolling after discarding materials at disposal sites.	- QCVN 08:2008/BTNMT – National technical regulation on surface water quality		
9) Traffic management	Before construction, carry out consultations with local government and community and with traffic police. Arrange and provide separate passageway with safe and easy access for pedestrian and for people with disability and mobility issues especially the areas in proximity of schools, including easy wheelchair access and hand rail. Make staff available any time for helping people with disability if needed. Set up traffic and maintain instruction signs and warnings to secure safety for people and means of transport during construction. Put speed limit signs 200m from the construction site. Carefully cover materials on trucks. Do not load to a height of 10cm higher than the truck body so as not to spill out and scatter materials onto roads, giving rise to dust and endangering road users. Collect generated soils and materials at the construction site each day to avoid slippery incidents for vehicles. Do not park vehicles in the roads longer than necessary. Do not allow construction vehicles and materials to encroach upon the pavements. During construction near schools, deploy staff at the site to guide the traffic at the start of school time and when school is over. Water the roads to prevent dust, limit the speed of traveling trucks, do not allow flared horns, and do not dispose the waste and wastewater onto areas near schools.	- Law on communication and transport No.23/2008/QH12; - Law on construction No.50/2014/QH13; - Law No. 38/2009/QH12 dated 19/6/2009 amending and supplementing some articles of the Law relating to capital construction investment - Circular No. 22/2010/TT-BXD on regulation on construction safety	Contractor	PMU, CSC, IEMC

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	Install night lighting of all construction sites. Significant increases in number of vehicle trips must be covered in a construction plan previously approved. Routing, especially of heavy vehicles, needs to consider sensitive sites such as schools, hospitals, and markets. Installation of lighting at night must be done, if necessary, to ensure safe traffic circulation. Employ safe traffic control measures, including road/rivers/canal signs and flag persons to warn of dangerous conditions. Avoid material transportation for construction during rush hours. Passageways for pedestrians and vehicles within and outside construction areas should be segregated and provide for easy, safe, and appropriate access. Signposts shall be installed appropriately in both waterways and roads where necessary.			
10) Influence to existing infrastructure and services	Provide information to affected households on working schedules as well as planned disruptions (at least 2 days in advance). The Contractor must only use vehicles of sizes and loads within permissible limits for the roads along such vehicles' route. During the construction under power lines, deploy qualified staff to observe and give instructions to the drivers of cranes and excavators so as to avoid causing damages to power lines, telecommunications lines, etc. Stop construction when existing works are damaged. Identify causes of related incidents and work out solutions. In case the damages are due to the Contractors' faults, the Contractors have to repair, recover, and compensate for all damages at their own expenses. The results of handling such damages must be approved by the Supervisor Engineer.	- Decree No. 73/2010/ND-C CP on administrative penalization of violations related to security and social affairs	Contractor	PMU, CSC, IEMC

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	The contractor should ensure alternative water supply to affected residents in the event of disruptions lasting more than one day. Any damages to existing cable utility systems shall be reported to the authorities and repaired as soon as possible.			
11) Social mitigation measures through worker management	Inform the community at least 2 weeks before commencement of the construction. In case electricity and water supplies are to be disrupted, the PMU must inform PAHs of the same at least 2 days in advance. Employ local laborers for simple tasks. Instruct workers on environmental issues, safety and health before construction tasks are assigned. It is advisable to communicate to migrant workers on local customs, practices and habits in order to avoid conflicts with local people. Child labor is prohibited. Zero tolerance for SEA and sexual harassment. The project owner and contractor are to cooperate closely with the local government in performing effective community sanitation in case of epidemic symptoms breaking out in the area. The project owner and contractor are to cooperate with local authorities in preventing and fighting against social evils. Conduct sensitization campaigns with both workers and communities on these issues, liaison with local organizations to ensure monitoring, and a grievance redress system to which the community can refer to. The subproject will cooperate with the local health agency in developing and implementing plans for control of diseases among workers. Workers temporarily residing at the camps and rented houses must be registered with the local authorities for temporary residence.	- Decree No. 73/2010/ND-CP on administrative penalization of violations against security and social affairs	Contractor	PMU, CSC, IEMC

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	Provide training on issues related to social security, social evils, diseases and epidemics, prostitution and drug use, TIP, environment, safety and health, STIs, HIV/AIDS and infectious diseases for the workers within 2 weeks since mobilization of the workers in each construction contracts which last at least 6 months. This training is mandatory. Prohibit workers from: - Consuming alcoholic drinks during working time - Quarreling and fighting - Gambling and indulging in social evils such as drug use and prostitution Disposing of garbage indiscriminately			
12) Control of impacts on physical cultural resources	Do not gather materials and wastes within 20m from cultural, historical, and religious works such as temples, pagodas, churches, monuments, historic relics, etc. Water spray the construction sites next to such works. Do not use machines generating loud noise and high vibration levels near cultural, historical, and religious works. In case of archeological objects being unearthed during the implementation of earthwork, all parties will conform to the following procedures: i. Suspend construction operations at the place of discovery, ii. Preliminarily describe the area where the archaeological objects are to be unearthed, iii. Strictly protect the area of the discovery so as not to damage or lose moveable objects. In case the unearthed objects are moveable or sensitive ruins, provide night protection until the local authorities, the Department of Culture and Sports or the Institute of Archaeology takes over these unearthed objects, iv. Inform the Supervision Engineer of the event and who in turn will	- Law on cultural heritage No. 28/2001/QH10 - Amended and supplemented Law on cultural heritage No.32/2009/QH12 - Amended and supplemented Decree No.98/2010/ND-CP	Contractor	PMU, CSC, IEMC

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	immediately inform the subproject owner, the local authorities in charge of the case and the Institute of Archaeology (within 24 hours or less), v. Local relevant agencies and the Vietnam National Administration of Cultural Heritage will be responsible for protecting and preserving such archaeological relics before making decisions on the next suitable formalities. The Institute of Archaeology may be needed in the preliminarily assessment of the unearthed objects. The significance and importance of such discovered objects will be assessed by different criteria related to the nature of cultural heritages; such criteria would include aesthetic, historical, scientific, social or economic values, vi. Decisions on handling such discovered objects will be made by competent levels. Such decisions can result in changes in site arrangements (e.g. when the discovered item is a cultural relic which cannot be displaced or is archaeologically important, it is necessary to preserve, recover and excavate it), vii. The implementation of such decision by competent agencies related to the management of discovered objects will be communicated in writing by local competent agencies, and viii. Only resume construction activities at the site after being permitted by the local competent agencies and the PMU in relation to safeguarding such relics.			
13) Community's safety and health	The Contractor will have to conform to regulations in Circular No. 22/2010/TT- BXD by the Ministry of Construction on safety in construction. The project owner and contractor are to cooperate closely with the local government in performing effective community sanitation in case of epidemic symptoms breaking out in the area.	- Circular No.22/2010/TT-BXD regulation on construction safety - Directive No.02/2008/CT-BXD on safety and sanitation issues in construction units	Contractor	PMU, CSC, IEMC

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	The project owner and contractor are to cooperate with local authorities in preventing and fighting against social evils. Fence of excavation pits and open channels and make off with luminous cordon and warning signs. Provide sufficient lighting when carry out construction at night. Limit the speed of transport means to 20km/h within 200m from the construction site so as to minimize dust and noise. Keep noise-generating machines and vehicles at such suitable distances that noise transmitted to residential areas will not be higher than 70dBA. Use static compacting when the road base is constructed near areas with many households and weak temporary works to restrict vibration. The project owner and contractor will cooperate with the local health agency in developing and implementing plans for control of diseases among workers.	- TCVN 5308-91: Technical regulation on construction safety - Decision No. 96/2008/QD-TTg on clearance of UXOs		
14) Workers' health safety	Train workers on issues related to environment, safety and health, thus enhancing their awareness of HIV/AIDS and infectious diseases within 2 weeks prior to the commencement of packages with construction items lasting at least 6 months. Provide workers with and request them to use adequate personal protective equipment (PPE) such as masks, helmets, shoes/boots, goggles, etc. depending on job characteristics. Safely install power lines at offices and in construction sites and do not lay connectors on the ground or water surface. Electric wires must be with plugs. Place outdoor electric panels in protection cabinets. Ensure PPE usage and safe practices at batching/hotmix plants. Limit the speeds of vehicles traveling inside construction sites to be 5km/hour. Provide fire-extinguishers, first-aid bags, and medical	- Decree No. 22/2010/TT-BXD on regulation of construction safety - Directive No.02 /2008/CT-BXD on safety and sanitation issues in construction units - TCVN 5308-91: Technical regulation on safety in construction	Contractor	PMU, CSC, IEMC

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	cabinets with sufficient medicines for treating general diseases in the locality must be provided at construction sites. Use regular toolbox sessions for daily raising awareness of workers. Safely store fuels and chemicals in areas with impermeable ground with roofs and surrounding banks, equipped with safety warning signs located at least 20m from the camps and at the end of prevailing winds. In case of chemical and fuel leakage, the following steps will have to be taken: Immediate check must be carried out to detect any possible case of injury. In case of injury, first-aid must be given and emergency evacuation should be prepared by that the injured person must be rushed to the nearest medical station/nearby hospital for healthcare, and at the same time the case must be informed to the Construction Supervision Consultant and the PMU. Carry assessment to determine the kind of leaking/overflowing fuel/chemical. Do not flush overflowing chemicals into drainage systems. Send staff with suitable safety gear to the site to handle the leakage by scattering sawdust (in case of small volumes of leaks/overflow) or sand (for high volumes of leaks/overflow). Use shovels to remove the surface soil layer if the leakage/overflow takes place on vacant land, and After the occurrence of such incident or accident, the Contractor will have to prepare a detailed report describing the incident and performed activities and submit the same to the CSC and the PMU for consideration and filing. Such report will also be presented to the Department of Natural Resources and Environment or functional agencies at their request. Set up the camps with sufficient supplies of clean water, power, and sanitation facilities. There must be at least one toilet compartment for			

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	every 25 workers, with separate toilets for males and females. Workers' beds must be provided with mosquito nets to prevent dengue fever. Temporary tents will be unacceptable. Clean camps, kitchens, baths, and toilets and sanitize regularly, and keep in good sanitation conditions. Provide dustbins and collect wastes daily from the camps. Clear drainage ditches around the camps periodically. Stop all construction activities during rains and storms, or upon accidents or serious incidents.			
15) Management of warehouses and borrow pits	All borrow pit locations to be used must be previously identified in conformity with approved construction technical specifications. Sensitive sites such as scenic spots, areas of natural habitat, areas near sensitive receiving waters, or areas near water sources should be avoided. An open ditch shall be built around the stockpile site to intercept wastewater. Retaining walls are to set up around disposal areas if necessary. The use of new sites for stockpiling, gathering, or exploiting materials necessary for construction operations must obtain prior approval from the Construction Engineer. In case landowners are affected by the use of their areas for stockpiling, gathering or exploiting materials, such landowners must be included in the project resettlement plan. If access roads are needed for these new sites, they must be considered in the environmental assessment report. PMU‟s Environment Officer should conduct due diligence to make sure that borrow pits and quarries are legally operating by undertaking a	- Decision No.96/2008/QD-TTg	Contractor	PMU, CSC, IEMC

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	rapid review of quarry sites to assess if operations are in compliance with Vietnamese laws and Bank requirements prior to construction. Include the requirement that the contractors shall be required to buy materials from licensed borrow pit and quarry operators into the civil work contractual documents.			
16) Communication to local community	Open communications channels are to be maintained with the local government and concerned communities; the contractor shall coordinate with local authorities (leaders of local wards or communes, leaders of hamlets) for agreed schedules of construction operations in areas nearby sensitive places or during sensitive times (e.g. religious festival days). Copies of Vietnamese versions of these ECOPs and of other relevant environmental protection documents shall be made available to local communities and to workers at the site. Project information will be disseminated to affected parties (e.g. local authorities, enterprises and affected households, etc.) through community meetings before construction commencement. A contact address will be provided to the community. The community will be provided with all information, especially technical findings, in a language that is understandable to the general public and in a form convenient to interested citizens and elected officials through the preparation of fact sheets and news releases, when major findings become available during subproject phase. Community concerns and requested information are to be monitored as the project progress.	- Decree No. 73/2010/ND- CP on administrative penalization of violations related to security and social affairs	Contractor	PMU, CSC, IEMC

Environmental-Social Issues	Mitigation Measures	Vietnamese Regulations	Responsibility	Supervised by
	Inquiries must be responded by telephone and written correspondence in a timely and accurate manner. Residents must be informed about construction and work schedules, interruption of services, traffic detour routes and provisional bus routes, blasting and demolition operations, as appropriate. Technical documents and drawings will be provided to local People's Committees, especially the sketch of construction areas and the EMP of the construction site. Notification boards shall be erected at all construction sites providing information about the project, as well as contact information about the site managers, environmental staff, health and safety staff, telephone numbers and other contact information so that affected people could have a channel to voice their concerns and suggestions.			

6.1.3.2 Type-Specific Mitigation Measures

Depending on the scope of work and type of auxiliary items of each bid package, the Contractors will be required to comply with the specific requirements described below. The CSC and PMU shall monitor the Contractor's compliance.

Demolition of Existing Infrastructures

The following measures shall be implemented to protect workers and the public from falling debris and flying objects:

- Set aside a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels,
- Conduct sawing, cutting, grinding, sanding, chipping or chiseling with proper guards and anchoring as applicable,
- Maintain clear traffic ways to avoid driving of heavy equipment over loose scrap, and
- Provide all workers with safety glasses with side shields, face shields, hard hats, and safety shoes.

Workers and Workforce Management

A concern during construction phase of the project is the potentially negative impacts of the workforce interactions with the local communities. For that reason, a Code of Conduct shall be established to outline the importance of appropriate behavior, alcohol abuse, and compliance with relevant laws and regulations. Each employee shall be informed of the Code of Conduct and bound by it while in the employment of the Client or its Contractors. The Code of Conduct shall be available to local communities at the project information centers or other place easily accessible to the communities.

The Contractor is responsible for providing appropriate training to all staff according to their level of responsibility for environmental, health and safety matters.

The Code of Conduct shall address the following measures (but not limited to them):

- All of the workforce shall abide by the laws and regulations of the Socialist Republic of Vietnam,
- Illegal substances, weapons and firearms shall be prohibited,
- Pornographic material and gambling shall be prohibited,
- Fighting (physical or verbal) shall be prohibited,
- Creating nuisances and disturbances in or near communities shall be prohibited,
- Disrespecting local customs and traditions shall be prohibited,
- Smoking shall only be allowed in designated areas,
- Maintenance of appropriate standards of dress and personal hygiene,
- Maintenance of appropriate standards hygiene in their accommodation quarters,
- Residing camp workforce visiting the local communities shall behave in a manner consistent with the Code of Conduct, and
- Failure to comply with the Code of Conduct, or the rules, regulations, and procedures implemented at the construction camp will result in disciplinary actions.

Prohibitions. The following activities are prohibited on or near the project site:

- Cutting of trees for any reason outside the approved construction area,
- Hunting, fishing, wildlife capture, or plant collection,
- Buying of wild animals for food,
- Use of unapproved toxic materials, including lead-based paints, asbestos, etc.,
- Disturbance to anything with architectural or historical value,
- Building of fires,

- Use of firearms (except authorized security guards),
- Use of alcohol by workers during working hours,
- Gambling should be strictly forbidden,
- Washing cars or machinery in streams or creeks,
- Doing maintenance (change of oils and filters) of cars and equipment outside authorized areas,
- Disposing trash in unauthorized places,
- Driving in an unsafe manner in local roads,
- Having caged wild animals (especially birds) in camps,
- Working without safety equipment (including boots and helmets),
- Creating nuisances and disturbances in or near communities,
- The use of rivers and streams for washing clothes,
- Indiscriminate disposal of rubbish or construction wastes or rubble,
- Littering the site,
- Spillage of potential pollutants, such as petroleum products,
- Collection of firewood,
- Poaching of any description,
- Explosive and chemical fishing,
- Latrine outside the designated facilities, and
- Burning of wastes and/or cleared vegetation.

Security. Some security measures shall be put into place to ensure the safe and secure running of the camp and its residents. Some of these security measures include:

- The list of workers must be registered to local authorities in accordance with existing Vietnamese regulations,
- By law, children under 15 years of age cannot be employed. Children aged 15-18 must not be deployed to a construction site. Children of school age should not be hired under the Project,
- Adequate, day-time night-time lighting shall be provided,
- Control of camp access. Access to the camp shall be limited to the residing workforce, construction camp employees, and those visiting personnel on business purposes,
- Prior approval from the construction camp manager for visitor's access to the construction camp,
- A perimeter security fence at least 2m in height constructed from appropriate materials, and
- Provision and installation in all buildings of firefighting equipment and portable fires extinguishers.

Any construction worker, office staff, Contractor's employees or any other person related to the project found violating theses prohibitions will be subject to disciplinary actions that can range from a simple reprimand to termination of his/her employment depending on the seriousness of the violation.

Workers Camps

Workers' Camp and Site Installation Requirement. Potential sites of workers camps were discussed with and proposed by local communities and authorities during consultations. Construction camp sites will have to be approved by local authorities and agreed with local communities prior to their establishment. If additional camps and ancillary construction sites are selected, for following criteria must be used:

- Construction sites, including concrete mixing stations and asphalt stations as well as construction camps will minimize the land occupation by setting them at the interchange areas where relatively large areas of land will be needed eventually.

- Site offices shall be located at least 200 meters from any existing residential settlements,
- Camp facilities should not be on steep slopes,
- Site offices, camps be located at least 100 meters from any watercourses, and be operated so that no pollutants enter watercourses. Camp areas shall be located to allow effective natural drainage,
- All construction camps shall be zoned according to their use. For example, workers' camp zone, sanitary facilities, offices, etc.
- The workforce shall be provided with safe, suitable, and comfortable accommodation,
- They must be maintained in clean and sanitary conditions,
- In every site adequate and suitable facilities for washing clothes and utensils shall be provided and maintained for the use of contract labor employed therein,
- Potable water for human consumption shall be provided for at camps, site offices, medical facilities, and other areas. Potable water shall follow the National Standards for Drinking Water Quality, and the other municipal water will be in accordance with class A1 of QCVN 08-2008/BTNMT - National technical regulation on surface water quality,
- The camp can be characterized as a housing estate, and the water quota could refer to class A1 QCVN 08-2008/BTNMT - National technical regulation on surface water quality, and
- Drainage, wastewater treatment and solid waste disposal of the construction site shall follow national regulations and the mitigation measures presented in the Contractor's Waste Management Plan.

Sanitary Facilities. In every camp site separate and adequate lavatory facilities (toilets and washing areas) shall be provided for the use of male and female workers. Toilet facilities should also be provided with adequate supplies running water, soap, and toilet paper. Such facilities shall be conveniently accessible and shall be kept in clean and hygienic conditions:

- Where workers of both sexes are employed, there shall be displayed outside each block of latrine and urinal, a notice in the language understood by the majority of the workers "For Men Only" or "For Women Only" as the case may be;
- Sanitary arrangements, latrines and urinals shall be provided in every work place on the following scale: Where female workers are employed, there shall be at least one latrine for every 25 females or part thereof; Where males are employed, there shall be at least one latrine for every 25 males or part thereof;
- At every construction camp, there must be at least one septic tank. The wastewater from the tank shall not be discharged into any watercourses. The wastewater shall be periodically transported away by a water tank to the nearest treatment plant; and
- Sewage tanks shall be designed and installed by the Contractor(s) in accordance with the National Design Code for construction of camps.

Medical Facilities. A medical and first aid kit shall be provided at each camp area. All consumables in the first aid kit should be checked and recharged regularly.

Concrete mixing stations

- Construction sites, including concrete mixing stations and asphalt stations will minimize the land occupation by setting them at the interchange areas where relatively large areas of land will be needed eventually.
- Concrete mixing must be done on impermeable ground, waste and wastewater containing cement must be collected through drains with slurry sump on-site before being discharged into the receiving source.

- The concrete mixing station must be at least 200 meters away from residential houses or other sensitive buildings such as Buddhist pagodas, churches, temples, school gates, medical facilities and public agencies.

Safety during Blasting

Small blasting is envisaged under the project for road work on An Khe by pass and An Khe pass which runs through steep rock. No house is in the project site at these road sections. Blasting method is electric ticking time explosion with a hole diameter of 30-50mm and 2-2,5m depth. Volume of explosives used for each project sites are presented in Table 45.

- The explosion of mines must comply with the safety rules on explosion of mines promulgated by the State in Decree No. 39/2009/ND-CP dated April 23, 2009 of the Government on industrial explosives.
- Explosives and related equipment must be transported in specialized and highly safe equipment; Detonators must be stored in closed and shockproof box. Speed is limited to max 20k/ h for vehicle transporting explosive material and equipment. During the transport, any collision must be avoided and smoking is prohibited. Vehicles must be 50 m distant from each other. Fire prevention equipment must be available.
- Organize the safe storage and supply of explosives. Make a construction diary book to record all the receipts and deliveries of explosives and detonators.
- Before blasting is carried out, a detailed survey shall be conducted at nearby communities to evaluate the degree of impacts due to the blasting activity (e.g. possible damage to structures or infrastructure due to vibration, effects on animals, local residents, etc.). No blasting shall be allowed during nighttime unless prior approval is obtained from the government authority and the CSC.
- Define the scope of guard, guardian, and shelter at time of explosion. Define and announce the time of explosion. The radius of danger zone must be calculated according to the conditions at the site and in compliance with regulations on safety and storage, transport and use of explosives.
- Before carrying out the explosion for demolishment, it is obliged to carry out the check and acceptance of each hole of explosive and the explosion grid, etc., in compliance with the regulations on check and acceptance of the drilling and mine explosion works. At the working locations, establish signboards and orders announcing the time of mine explosion from the commander-in-chief of the explosion for destruction work.
- Clear the site, use a chainsaw and by hand to cut down trees within the construction area to prevent the construction process from any possible interruption. Non-duty persons are prohibited to enter the blasting area and the traffic must be suspended for a short period of time to ensure absolute safety against the explosion.
- The Contractor shall take necessary precautions to prevent damage to special features and the general environment; organize the protection of dangerous area with signals, signboards, monitoring and command station within the limited boundaries of the explosion area.
- Announce in advance the explosion to authorities of the locality and to local people and explain the signals.
- People should be at least 200 m away from the blasting point.
- For the transportation, storage, process, package on site, connect, blasting and the disposal of the blasting, the procedure shall be in accordance with the Vietnamese regulations on blasting.
- Except for detonation, all the power and the light shall be turned off.
- The excavation face shall be on the same level with the lining of surface. The distance is defined according to the factors of the intensity of the concrete and the character of the wall rock.
- The safety examination shall be fulfilled after the blasting, the procedure shall be performed according to the Vietnamese regulations on blasting.
- The quantity of blasting materials shall be carefully controlled according to the real situation.

Earthworks, Cuts and Fill Slopes Management

Earthworks, cuts, and fill slopes shall be carefully managed to minimize negative impacts on the environment:

- All earthworks shall be properly controlled, especially during the rainy season.
- The Contractor shall maintain stable cut and fill slopes at all times and cause the least possible disturbance to areas outside the prescribed limits of the works.
- The Contractor shall complete cut and fill operations to final cross-sections at any one location as soon as possible and preferably in one continuous operation to avoid partially completed earthworks, especially during the rainy season.
- In order to protect any cut or fill slopes from erosion, in accordance with the drawings, cut off drains and toe-drains shall be provided at the top and bottom of slopes and be planted with grass or other plant cover. Cut off drains should be provided above high cuts to minimize water runoff and slope erosion.
- The Contractor shall use the excavated material from for filling unless the CSC consider the material unsuitable for filling.
- Any excavated cut or unsuitable material shall be disposed of in designated disposal areas as agreed to by the CSC.

6.1.3.3 Site-Specific Mitigation Measures

Stockpiles, Quarries and Borrow Pit

Existing borrow pits or quarries located near the project area will be used. However, in case that new borrow pits and quarries are needed, the Contractor shall carry out the following activities:

- Locations of stockpiles, quarries and borrow pits shall be identified and demarcated, ensuring that they are far away from critical areas such as steep slopes, erosion-prone soils, cultivated lands, and areas that drain directly into water bodies. Locations of stockpiles, quarries and borrow pits shall be in non-productive land to the maximum extent possible and be approved by DONRE, PMUs the ECO.
- Location of stockpiles, quarries, and borrow pits shall avoid sensitive areas such as nature reserves, scenic spots, forest parks, water source protection areas, etc.
- An open ditch shall be built around the stockpile site to intercept wastewater.
- Limit extraction of material to approved and demarcated quarries and borrow pits.
- Stockpile topsoil when first opening the borrow pit. After all usable borrow has been removed, the previously stockpiled topsoil should be spread back over the borrow area and graded to a smooth, uniform surface, sloped to drain. On steep slopes, benches or terraces may have to be specified to help control erosion.
- Excess overburden should be stabilized and re-vegetated. Where appropriate, organic debris and overburden should be spread over the disturbed site to promote re- vegetation. Natural re-vegetation is preferred to the extent practicable.
- Existing drainage channels in areas affected by the operation should be kept free of overburden.
- Prior to the initiation of construction, the materials stockpiles shall be constructed with peripheral storm water drains and interception ditches to divert storm water into rivers downstream, in order to avoid direct erosive impact from storm water. If necessary, sedimentation ponds will also be constructed to remove sands and other solids in storm water before it reaches the rivers downstream.
- The design document indicates that the largest percentage of spoils will be rocks and stones. Thus in order to reclaim the stockpiles after dumping of spoils is completed, the top soil shall be removed before the site is cleared. The topsoil will be placed on a corner of the disposal site. The location and pile structure will be taken into consideration for erosion control. The interception

ditches and sedimentation ponds in the disposal sites will also be used to control loss of topsoil due to erosion.

- The Contractor shall ensure that all borrow pits used are left in a trim and tidy condition with stable side slopes, re-establishment of vegetation, restoration of natural water courses, avoidance of flooding of the excavated areas wherever possible so no stagnant water bodies are created which could breed mosquitoes.
- When the borrow pits cannot be refilled or reasonably drained, the Contractor shall consult with the local community to determine their preference for reuse such as fish farming or other community purposes.
- No foreign material generated/ deposited during construction shall remain on site.
- Areas affected by stockpiling shall be reinstated to the satisfaction of the CSC.

Spoil Disposal Sites

If the Contractor proposes any new sites as disposal sites during the construction phase, they have to be approved by PMU and relevant local authorities. The contractor should ensure that these sites (a) are not located within designated forest or cultivated areas, or any other properties; (b) do not impact natural drainage courses; and (c) where they can cause future slides, (d) do not impact endangered/rare flora. Under no circumstances shall the contractor dispose of any material in environmentally sensitive areas. The final use of the disposal site shall be approved by the local government.

Besides the requirements for the location of spoil disposal sites, the following actions shall be put into place:

- Landowners shall be compensated if farmland is occupied for disposal sites.
- Before the commencement of the disposal operation, 30 cm of natural soil from the surface shall be first removed and stored at the site. This material will be reserved and used at the end of the disposal operation as cover material for the rehabilitation of the disposal site.
- If the disposal site would be located near a river or water course, a retaining wall and/or interception ditch or settling ponds shall be built prior to the initiation of the construction activities. The surface runoff shall be retained and settled first before allowed discharge into the receiving water.
- To ensure the stability of the spoil disposal site, the mortar rubble masonry pavement and grouted rubble toe protection shall be adopted to prevent erosion and maintain stability.
- A drainage ditch shall be built around the disposal site to control surface runoff.
- The construction of disposal sites and transportation of spoils at night is strictly prohibited near residential areas. The sites shall be watered for dust suppression during their operation.
- Disposal sites close to patches of agricultural land will be limited in size to avoid damages to crops.

Reconstruction of the bridges:

- Inform the local authorities and communities of the construction plan and schedule, block off and demolition of the existing bridge, or any temporary disruption of services at least one month before start of the construction.
- Install signboard directing the traffic diversion 600m from the bridge before the existing bridge is blocked off for demolition and reconstruction.
- Provide a temporary bridge for the local traffic.
- Fence off the construction sites by iron sheet of 2.5m high to ensure safety for people.
- Signboards and fences shall be placed and maintained to safely block off access to the two ends of the existing bridge. Allocate staff to guard the site 24 hours per day. Ensure adequate lighting at nighttime.
- Use steel Larsen pipe driving method to construct the coffer dam for bridge foundation.

- Prohibit discharge or dumping of any wastewater, slurry, waste, fuels, and waste oil into the river. All these materials must be collected and disposed of on land at the banks. The slurry and sediment shall also pump to the banks for disposal and shall not be allowed to discharge to the rivers directly.
- Use the mobile toilets to avoid polluting the surrounding environment.
- During the construction phase, the contractor would arrange the marker posts, construction site signs, speed limit signs at the proper distance that easily visible of traffic participants. Staff must be deployed to keep an outlook on the traffic and give instructions and warnings, especially when vehicles come in and out of the construction sites or stop for loading and unloading of materials and waste.
- Reasonably arrange time for materials transportation that avoid the peak hours from 6am to 8am and from 4pm to 6pm.
- Regularly maintain, repair roads used for transporting the construction materials.
- Request drivers to control the speed as prescribed: maintain vehicle speed to ensure the safety in accordance with regulations for the vehicles on the road when crossing the localities.
- Strictly prohibit to use the air horn when crossing through the residential areas.
- Restrict the construction activities at night. If the construction activities at night are unavoidable or disrupt services (supplying electricity, water, etc.), the community must be informed at least one week in advance.
- Restore the damaged infrastructure after construction completion

Construction of New Bridges

- The bridge works shall be scheduled to avoid the high river flow season.
- Descriptions on measures for spill prevention, and sedimentation control, surface water flow diversion, reinstatement, etc.
- Local authority and community shall be informed about the construction works the existing bridge with at least two weeks' notice.
- Equip life jackets, safety belts, ear plugs to workers when building bridge over a river or streamline.
- Signboards and fences shall be placed and maintained to safely block off access to the two ends of the existing bridge. Allocate staff to guard the site 24 hours per day. Ensure adequate lighting at nighttime.
- Life vests and protective equipment are provided to the workers and enforce the use when working in or above water surface, especially during construction of bridge abutments (2-3m high above the water surface).
- For bridge construction, the waste shall be controlled strictly to restrict discharge or dumping of any wastewater, slurry, waste, fuels, and waste oil into the water. All these materials must be collected and disposed of on land at the banks. The slurry and sediment shall also pump to the banks for disposal and shall not be allowed to discharge to the rivers directly.
- After bridge construction, the works area shall be reinstated.
- Concrete mixing directly on the ground shall not be allowed and shall take place on impermeable surfaces.
- All runoff from batching areas shall be strictly controlled, and cement-contaminated water shall be collected, stored and disposed of at the approved site.
- Unused cement bags shall be stored out of the rain where runoff won't affect it; Used (empty) cement bags shall be collected and stored in weatherproof containers to prevent windblown cement dust and water contamination.
- All excess concrete shall be removed from site on completion of concrete works and disposed of. Washing of the excess into the ground is not allowed. All excess aggregate shall also be removed.

- In the course of bore pile driving, the use of bentonite must be conducted inside a cofferdam made of earth or steel to prevent any spillage from overflowing into the environment and all the mixture of soil and bentonite and bentonite spilled over must be collected and the following forms of processing any spillage are recommended.
- Construction of bridge pier (abutments) on land: spillage of mixture of soil and bentonite although liquefied and bentonite will be primarily handled: Waste solution of bentonite will be collected into a collector drain, sump or cistern to avoid direct discharge within the construction site, then it will be deposited, preliminary dried and transported for disposal at a designated location either for recycling or recovering the bentonite.
- Construction of piers adjacent to the flow: soil mixed with bentonite, even liquefied, and spilled bentonite will be either moved to storage yards on the shore or placed in containers for depositing or drying and then transported to indicate waste dumps for recycling and recovering the bentonite.
- For any in water construction for bridges, there shall be strict waste control plan to restrict discharge or dumping of any directly discharge of wastewater, slurry, waste, fuels, and waste oil into the water. All these materials must be collected and disposed at the banks. The slurry and sediment shall also pump to the banks for disposal and shall not be allowed to discharge to the rivers directly.
- Reinstatement of watercourse crossings shall be carried out, including generic methods for all watercourse crossings and site-specific methods statements for significant or sensitive watercourse crossings.
- After bridge construction, the works area, stream diversion, settlement pond areas and temporary bypasses shall be reinstated to the satisfaction of the ECO and SES.

Construction of by-pass

- Arrange the area for spraying and cleaning wheels of vehicles leaving the construction site.
- Limiting disturbance green areas or vegetation cover outside the scope of construction.
- Conducting excavation in areas with high positive slope, excavating in dry season; stabilizing slope before the peak period of the rainy season. Construction work will be arranged so that the surface area to reduce to minimum amount during periods of high rainfall (rainy season). The examination of the mud flow when it rains will be frequently done, particularly in areas close to the slopes.
- Construction work at the intersection with urban roads, public roads must be struck to ensure the movement of people.
- Designing temporary road so that people can cross in the agricultural land fragmented by deepening or embanking in An Khe and Pleiku bypasses. Construct access roads in areas fragmented to ensure safety of people when crossing.
- In rainy season, contractor will finish construction each segment of road base and compact to prevent soil erosion. Additionally, the contractors should regularly check the sections of embanking road before each rain, if there is possibility of erosion, contractors will continue to reinforce.
- Maximize the use of excavated materials for reuse.
- Ensure that roadside slope will be replanted grass after construction completed.
- Along the foot of the slope of two bypasses will be installed bulkhead to separate construction sites with around areas to prevent sediment spill into lower land areas along the road.

6.1.3.4 Site-Specific Mitigation Measures along NH19 and Disposal Sites

The relevant site-specific mitigation measures along NH19 listed in Table 62 will be included into construction bidding and contractual documents of each bid package.

Table 62 Site-specific Mitigation Measures along NH19 for Priority Section

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Km 50 - Km 59 - Road expansion - Install drains	NH19 passing residential areas at Km50-Km52, Km53-Km54 and và Km57- Km58	Increased traffic safety risks	Install fences and sign surround disturbed areas to separate construction areas provide adequate lighting at nighttime Ensure adequate lighting at night Do not load materials and wastes on the road, tidy up the sites daily	Included in construction contract values	Contractor	CSC, PMU
		Disrupt access to roadside houses and shops for drainage	Provide temporary access to houses and shops when access is disrupted	Included in construction contract values	Contractor	PMU/ CSC/ Contractors/ Local authorities
		Dust and noise exceed allowable limits from 1.5 to 2 times and 7 to 11.5dB, respectively which would affect residential houses at shops.	Avoid activities generating high noise between 6 pm and 6 am Water the road, particularly excavation area, in hot, dry, windy weather	Included in construction contract values	Contractor	CSC
		Potential risks of electrical shocks	Arrange staff to direct crane Drivers	No cost	Contractor	CSC
		Electrical poles, wires, water piles must be relocated, services may be disrupted.	Inform community two days in advance before power cut off for poles relocation	No additional Costs	PMU, Contractor	CSC, PMU, Contractors

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Some trees may be cut down.	Allocate staff to instruct crane drivers to avoid trees, Request the workers to avoid damages to tree branches when carrying out manual works	No cost	Contractor	CSC
		Some weak structures at risk of being cracked	Carry out inventory of weak structures before compaction Apply static compaction method at these sections only	Included in construction contract values	Contractor	CSC, PMU, Local authorities
Rebuild Ba La bridge		Dust, noise from demolition of existing bridge	Install fences to separate the construction sites with roads and residential areas Water the access road, particularly excavation area, in hot, dry, windy weather	Included in construction contract values	Contractors	CSC
		Water pipes and power poles would be relocated, service may be interrupted	Inform community at least two days in advance about service disruption, at least one week before blocking the existing bridge	No additional Costs	PMU/ CSC/ Contractors/ Local authorities	PMU/ CSC/ Contractors/ Local authorities
		Increase safety risks	Install signboards, barriers and fences to separate the construction sites with roads and residential areas	Included in construction contract values	Contractors	CSC
		Disrupt traffic and road congestion due to bridge blocking	Inform local community at least one week in advance before blocking the new bridges Build temporary access road before blocking the existing bridge Use signboard at construction site for at least one week to publicly disclose the time of bridge blocking and access road opening Use local media (of Binh Dinh and Gia Lai provinces) to disseminate the timeframe of bridge blocking and access road opening.	Included in construction contract values	Contractors/PMU	CSC/PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented bv	Monitored by
		High noise levels from pile driving	Avoid pile driving between 10 pm and 6 am	No additional costs	Contractors	CSC
		Water pollution due to bentonite from drilling	Direct and collect bentonite storage tank	Included in construction contract value	Contractors	CSC
		Safety risks for worker when working at height and on water surface	Install nets along the bridge, provide lifevest and belts, hard hats and force the workers to use		Contractors	CSC
Rebuilt Bau Sen bridge		Dust, noise from demolition of existing bridge	Install fences to separate the construction sites with roads and residential areas Water the access road, particularly excavation area, in hot, dry, windy weather	Included in construction contract values	Contractors	CSC
		Water pipes and power poles would be relocated, service may be interrupted	Inform community at least two days in advance about service disruption, at least one week before blocking the existing bridge	No additional Costs	PMU/ CSC/ Contractors/ Local authorities	PMU/ CSC/ Contractors/ Local authorities
		Increase safety risks	Install signboards, barriers and fences to separate the construction sites with roads and residential areas	Included in construction contract values	Contractors	CSC

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Disrupt traffic and road congestion due to bridge blocking	Inform local community at least one week in advance before blocking the new bridges Build temporary access road before blocking the existing bridge Use signboard at construction site for at least one week to publicly disclose the time of bridge blocking and access road opening Use local media (of Binh Dinh and Gia Lai provinces) to disseminate the timeframe of bridge blocking and access road opening.	Included in construction contract values	Contractors/PMU	CSC/PMU
		High noise levels from pile driving	Avoid pile driving between 10 pm and 6 am	No additional costs	Contractors	CSC
		Water pollution due to bentonite from drilling	Direct and collect bentonite storage tank	Included in construction contract value	Contractors	CSC
		Safety risks for worker when working at height and on water surface	Install nets along the bridge, provide life vest and belts, hard hats and force the workers to use		Contractors	CSC

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Km 59 - Km 67 (On An Khe pass): **- Road** expansion - Install drains - Build new emergency exist - Slop stabilization	The Pass is on high mountain with abyss, many curves with limited visions Some sections have HV power poles run nearby, and crossing NH19 at one location	Increased traffic safety risks at curvy sections Safety risk for community and workers related to blasting and high voltage power lines Damages to the HV power lines at location crossing NH19	Install reflective fences, warning and speed limit signs at 5km/h at construction area Arrange staff to direct traffic at curvy sections Tidy up the site regularly Provide adequate lighting at night Cover and place signs at open trenches Implement the mitigation measures related to blasting as presented in Section 5.3.2 of the ESMP	Included in construction contract values	Contractors	CSC, PMU
	Landslide happened at some locations	Increase landslide risks in rainy weather and during construction phase.	Install temporary drains during construction phase Workers avoid standing at the foot of slopes at risks if not necessary, avoid parking machines and vehicles at these locations	Included in construction contract values	Contractors	CSC, PMU
	Plantations along the side	- Bush fire risks related to workers' behaviors, particularly in dry season. - Safety risks to workers related to toxic/harmful insects such as snakes or bees	Train the workers and monitor compliance with worker's codes of conducts Provide adequate protective cloths for the workers and enforce the use	Included in construction contract values	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented By	Monitored by
Km 67 - Km 76: - Road expansion, - Install drains	+ NH19 passing residential area at Km69- Km71 and Km72 -Km76	Increased traffic safety risks	Install fences and sign surround disturbed areas to separate construction areas provide adequate lighting at nighttime Ensure adequate lighting at night Do not load materials and wastes on the road, tidy up the sites daily	Included in construction contract values	Contractors	CSC, PMU
		Disrupt access to houses and shops due to drainage construction	Provide temporary access to houses and shops when access is disrupted	Included in construction contract values	Contractors	CSC, PMU
		Dust and noise exceed limits 1.5 times and 11.5dB.	Avoid activities generating high noise between 6 pm and 6 am Water the road, particularly excavation area, in hot, dry, windy weather	No cost incurred Included in construction contract	Contractors	CSC, PMU
		Relocation of electrical poles and wires, water piles, service may be disrupted.	Inform community two days in advance before power cut off for poles relocation	No cost incurred	Contractors	CSC, PMU
		Some weak/temporary structures at risk of being cracked	Carry out inventory of weak structures before compaction Apply static compaction method at these sections only	No costs Included in construction contracts	Contractors, CSC and PMU	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented By	Monitored by
	NH19 passing Hoa Mai and Tuoi Tho kindergartens, Trần Phú primary school	Increased traffic and safety risks for students and teachers.	Inform school managers at least one week in advance. Install speed limit at 5km/h sign at the two ends of the section Arrange staff to direct traffic at school opening and school over time at sections in front of the school. Install fence and warning signs open holes, channels Do not load materials and wastes within 50 m from school gates Do not load or unload materials during rush hours	No costs incurred Included in Construction contracts	Contractors, PMU Contractors	CSC, PMU
		Disrupt access to the schools during pipe installation	Use pre-cased boxed drain to minimize construction period	Included in construction contracts	Contractors,	CSC, PMU
	NH 19 passing Ngọc An monastic and (15-20m from road side), Xà Temples	Construction materials and wastes may affect aesthetical values of the area	Do not load materials or wastes within 50 m from these structures	No costs incurred	Contractors	CSC, PMU
		Obstruct access to the monastic and temple	Schedule to minimize or avoid construction during full moon or the first day of lunar months	No costs incurred	Contractors,	CSC, PMU
	Pine forest along Km67-Km68	Damages to the trees and vegetation cover outside construction area	Train the workers on the codes of conduct and monitor compliance, particularly do not set fire if not authorized	Included in Construction and CSC Contract values	Contractors, CSC and PMU	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented By	Monitored by
		Increased bushfire risks, particularly in dry season November to April	establish fire prevention corridor along the section passing the forest	Included in construction contracts	Contractors,	CSC, PMU local author ities
Km 83 - Km 90: - Road expansion, - Install drains	Nh19 passing popular residential areas located 10-15m from road side at Km82-Km88 Power lines running along and passing the section	Increased traffic safety risks	Install fences and sign surrounding disturbed areas to separate construction areas provide adequate lighting at nighttime Ensure adequate lighting at night Do not load materials and wastes on the road, tidy up the sites daily	Included in Construction Contracts	Contractors	CSC, PMU
		Disrupt access to roadside houses and shops due to pipe trenching for drainage	Provide temporary access to houses and shops when access is disrupted	Included in Construction Contracts	Contractors	CSC, PMU
		Dust and noise exceed allowable limits 1.5-2 times and 11.5dB, respectively affecting residential houses at shops.	Avoid activities generating high noise between 6 pm and 6 am Water the road, particularly excavation area, in hot, dry, windy weather	No costs incurred Included in Construction Contracts	Contractors	CSC, PMU
		Electrical poles and wires, water piles may be relocated, service may be disrupted.	Inform community two days in advance before power cut off for poles relocation	No costs incurred	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented By	Monitored by
		Some weak/temporary structures at risk of being cracked	Carry out inventory of weak structures before compaction Do not allow vibration compaction, apply static compaction method at these sections only	Included in Construction Contracts	Contractors	CSC, PMU
	NH19 passing school and kindergartens - Le Quy Don primary school (30m from roadside) - Tuoi Tho kindergarten (20m from roadside) - Hoa Mai kindergarten (30m from roadside)	Increased traffic and safety risks for students and teachers.	Inform school managers at least one week in advance. Install speed limit at 5km/h sign at the two ends of the section Arrange staff to direct traffic at school opening and school over time at sections in front of the school. Install fence and warning signs open holes, channels Do not load materials and wastes within 50 m from school gates Do not load or unload materials during rush hours	Included in Construction Contracts	Contractors	CSC, PMU
		Disrupt access to the schools during pipe installation	Use pre-cased boxed drain to minimize construction period	Included in Construction Contracts	Contractors	CSC, PMU
	NH 19 passing a church and a cemetery	Disrupt access to the Church and cemetery due to drainage installation	Use box drains for this section Provide temporary access crossing the trench	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented By	Monitored by
	- An Son church (10m from roadside) - An Son cemetery (40m from roadside)	disturb religious activities at the Church and other activities at the cemetery	Schedule construction to avoid Sunday and Christmas time, the first and full moon of lunar months Arrange staff to direct An	Included in Construction Contracts	Contractors	CSC, PMU
Rebuilt Ta Ly Bridge (km83+894) Construction duration is 6 months, of which 2.5 months for abutment construction	- 250 m^3 construction waste from demolition of existing bridge; - totally 150m3 of excavated soil, of which 100m3 from earth work slope protection and 50m3 from building access road - Around 1800 m^3 materials for building up	Dust, noise from demolition of existing bridge Dust noise from demolition of temporary access road when bridge construction completed	Install fences to separate the construction sites with roads and residential areas Water the access road, particularly excavation area, in hot, dry, windy weather	Included in construction contract values	Contractors	CSC

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented By	Monitored by
	temporary access road will be removed when construction completed; - 10mx10m of workman building area surrounded by 3-m-high sheeting fence - The existing stream is blocking in dry season. There is not visual flow observed during site visit; - Access road is located very close to 04 houses (on the east end of bridge) with distance is below 3m;	Increase safety risks	Install signboards, barriers and fences to separate the construction sites with roads and residential areas	Included in construction contract values	Contractors	CSC
		Disrupt traffic and road congestion	Inform local community at least one week in advance before blocking the existing bridge Build temporary access road before blocking the existing bridge	Included in construction contract values	Contractors/PMU	CSC/PMU
		High noise levels from pile driving	Avoid pile driving between 6 pm and 6 am	No additional costs	Contractors	CSC

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented By	Monitored by
		Water pollution due to (30m^3) bentonite from drilling	Direct and collect bentonite storage tank	Included in construction contract value	Contractors	CSC
		Water pollution due to earthwork from building and demolition of	Setting up silt fence to protect the water flow from run-off water		Contractors	CSC
		Safety risks for workers when working at height and on water surface	Install nets along the bridge, provide life vest and belts, hard hats and force the workers to use		Contractors	CSC
		Weak structure of houses located close to access road can be impacted by heavy vehicle flow	Control the traffic speed when run through access road Conduct inventory of structure/assets before construction with the witness of local authorities and PMU		Contractors, PMU	CSC, PMU and local authority

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Km131+300 – Km135 Resurfacing	Passing populated areas in Kon Dõng town	Increased traffic and safety risks, particularly at the main T junction of Kon Dõng town	Install warning signs and signboards Arrange staff to direct traffic in rush hours Cover open holes and trenches Load materials and wastes tidily, remove the wastes from construction sites on daily basis	Included in Construction Contracts	Contractors	CSC, PMU
	Central garden at Kon Dõng town	Noise level exceed limits from 7 to 11.5 dB.	Inform communities about construction schedule at least two weeks in advance Avoid carrying out activities that generate high noise between 6 pm and 6 am	Included in Construction Contracts	Contractors	CSC, PMU
		Visual impacts on urban landscape	Do not load materials and wastes within 50 m from the central gardens or any urban landscaping sites. Limit construction activities at the weekend near the parks	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	NH19 passing Kon Dỡng 1 primary school	Increased traffic and safety risks for students and teachers.	Inform school managers at least one week in advance. Install speed limit at 5km/h sign at the two ends of the section. Arrange staff to direct traffic at school opening and school over time at sections in front of the school. Install fence and warning signs open holes, channels Do not load materials and wastes within 50 m from school gates. Do not load or unload materials during rush hours.	No costs incurred Included in Construction Contracts	Contractors	CSC, PMU
		Disrupt access to the schools during pipe installation	Use pre-cased boxed drain to minimize construction period	Included in Construction Contracts	Contractors	CSC, PMU
	NH19 passing Minh Châu pagoda and Châu Khê church	Disrupt access to the Church and Pagoda	Provide temporary access crossing the trench	Included in Construction Contracts	Contractors	CSC, PMU
		Disturb religious activities at the Church and pagoda	Schedule construction of the section passing the Church to avoid Sunday and Christmas time Schedule construction of the section passing the pagoda to avoid the first and fullmoon of lunar months	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Km 135 - Km 152+500: Road expansion, Build drainage,	NH19 passing populated residential areas at 7-15m from road side at Km136- Km139, Km144- Km146 and Km147- Km152. Powerline running on the right	Increased traffic and safety risks	Install warning signs and signboards Arrange staff to direct traffic in rush hours Cover open holes and trenches Load materials and wastes tidily, remove the wastes from construction sites on daily basis	Included in Construction Contracts	Contractors	CSC, PMU
		Disrupt access to roadside houses and shops due to pipe trenching for drainage	Provide temporary access to houses and shops when access is disrupted	Included in Construction Contracts	Contractors	CSC, PMU
		- Noise level exceed standard 7-11.5 dB, affecting residents.	Avoid activities generating high noise between 10pm and 6 am	Included in Construction Contracts	Contractors	CSC, PMU
		Power lines and poles must be relocated, power supply may be disrupted	inform community at least one week before power cut off.	Included in Construction Contracts	Contractors	CSC, PMU
		Weak/temporary structures at risks of being cracked/damages	Carry out inventory of weak structures before compaction use static compactors instead vibrating compactors	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	NH19 passing Trần Phú Secondary School, K'Dang and Tân Bình kindergartens	Increased traffic and safety risks for students and teachers.	Inform school managers at least one week in advance. Install speed limit at 5km/h sign at the two ends of the section Arrange staff to direct traffic at school opening and school over time at sections in front of the school. Install fence and warning signs open holes, channels Do not load materials and wastes within 50 m from school gates Do not load or unload materials during rush hours	No costs incurred Included in Construction Contracts	Contractors	CSC, PMU
		Disrupt access to the schools during pipe installation	Use pre-cased boxed drain to minimize construction period Provide temporary access over open trenches	Included in Construction Contracts	Contractors	CSC, PMU
	NH19 passing Bửu Tân pagoda	Disrupt access to the pagoda due to drainage installation	Use box drains for this section Provide temporary access crossing the trench	Included in Construction Contracts	Contractors	CSC, PMU
		Disturb religious activities at the pagoda	Schedule construction of the section passing the pagoda to avoid the first and full moon of lunar months	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Km 152+500 – Km 155 **Resurfacing**	NH19 passing Dak Doa town with high population density	Increased traffic and safety risks, particularly at the main T junction of Kon Dong town	Install warning signs and signboards Arrange staff to direct traffic in rush hours Cover open holes and trenches Load materials and wastes tidily, remove the wastes from construction sites on daily basis	Included in Construction Contracts	Contractors	CSC, PMU
		- Noise level exceed standard 7-11.5 dB, affecting residents. - Dust	Inform communities about construction schedule at least two weeks in advance Avoid activities generating high noise between 10pm and 6 am Water the road before excavation	Included in Construction Contracts	Contractors	CSC, PMU
		Impacts on urban landscape and sanitation	Daily collect and transport the waste to deposal site	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	NH19 passing Dak Doa 2 Primary School, Dak Doa and Nguyen Hue schools	Increased traffic and safety risks for students and teachers	Inform school managers at least one week in advance. Install speed limit at 5km/h sign at the two ends of the section Arrange staff to direct traffic at school opening and school over time at sections in front of the school. Install fence and warning signs open holes, channels; Do not load materials and wastes within 50m from school gates Do not load and unload materials during rush hours	Included in Construction Contracts	Contractors	CSC, PMU
		Disrupt access to the schools during pipe installation	Use pre-cased boxed drain to minimize construction period; Provide temporary access over open trenches	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Rebuilt Linh Nham bridge (Km136 +308) Construction duration is 8 months, of which 5 months for two abutments and one pier construction	- 350 m^3 construction waste from demolition of existing bridge; - 650m^3 of excavated soil, of which 150m^3 from earth work slope protection and 500m^3 from temporary access road - 50m3 of excavated soil will be reused at site - Around 2500 m^3 materials for building up temporary access road and bridge will be removed when construction completed; - 10mx10m of workman building area	Power and telecommunication cables would be relocated, service may be interrupted	Inform community at least two days in advance about service interruption	Included in Construction Contracts	Contractors	CSC, PMU
		Dust, noise from demolition of existing bridge Dust noise from demolition of temporary access road when bridge construction completed	Install fences to separate the construction sites with roads and residential areas Water the access road, particularly excavation area, in hot, dry, windy weather	Included in construction contract values	Contractors	CSC

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	surrounded by 3-m-high sheeting fence - The stream flow is low in dry season; - Access road and construction site is far from residential area.	Disrupt traffic and road congestion due to bridge blocking	Inform local community at least one week in advance before blocking the existing bridge Build temporary access road before blocking the existing bridge	Included in construction contract values	Contractors/PMU	CSC/PMU
		High noise levels from pile driving	Avoid pile driving between 6 pm and 6 am	No additional costs	Contractors	CSC
		Water pollution due to (52 m^3) bentonite from drilling	Direct and collect bentonite storage tank	Included in construction contract value	Contractors	CSC

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Water pollution due to earthwork from building and demolition of temporary access road and construction of pier under water	Setting up silt fence to protect the water flow from run-off water Complete the earthwork in dry season Maintain the water flow during construction of pier in the middle of stream		Contractors	CSC
		Safety risks for workers when working at height and on water surface	Install nets along the bridge, provide life vest and belts, hard hats and force the workers to use		Contractors	CSC
Rebuilt Vang bridge (Km144 +400) Construction duration is 8 months, of which 3.5 months for two abutments and one pier construction	- 250 m^3 construction waste from removal of existing bridge; - 200m3 only of excavated soil, of which 50m3 from earth work slope protection and 150m3 from building access road - Around 200 m^3 materials for building up temporary access road and bridge will be removed when construction completed;	Dust, noise from demolition of existing bridge Dust noise from demolition of temporary access road when bridge construction completed	Install fences to separate the construction sites with roads and residential areas Water the access road, particularly excavation area, in hot, dry, windy weather	Included in construction contract values	Contractors	CSC
		Run-off water from earthwork of temporary access road impacted on the agricultural land	Silt fence setting up along temporary access road during construction	Included in construction contract values	Contractors	CSC

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	- 10mx10m of workman building area surrounded by 3-m-high sheeting fence - The current stream is maintained in dry season; - Access road and construction site is far from residential area.	High noise levels from pile driving	Avoid pile driving between 6 pm and 6 am	No additional costs	Contractors	CSC
		Water pollution due to (105 m^3) bentonite from drilling	Direct and collect bentonite storage tank	Included in construction contract value	Contractors	CSC

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Water pollution due to earthwork from building and demolition of temporary access road and construction of pier under water	Setting up silt fence to protect the water flow from run-off water Complete the earthwork in dry season Maintain the water flow during construction of pier in the middle of stream	Included in construction contract value	Contractors	CSC
		Safety risks for workers when working at height and on water surface	Install nets along the bridge, provide life vest and belts, hard hats and force the workers to use		Contractors	CSC

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Rebuilt Le Can bridge (Km149+045) Construction duration is 6 months, of which 3.5 months for two abutments construction	- 250 m^3 construction waste from removal of existing bridge; - 500m^3 soil excavated will be reused at site - 300m^3 of excavated soil need to be disposed - Around 2500 m^3 materials for constructing temporary access road will be removed when construction completed;	Dust, noise from demolition of existing bridge Dust noise from demolition of temporary access road when bridge construction completed	Install fences to separate the construction sites with roads and residential areas Water the access road, particularly excavation area, in hot, dry, windy weather	Included in construction contract values	Contractors	CSC
	- 10mx10m of workman building area surrounded by 3-m-high sheeting fence - Streamflow is very slow in dry season; - Access road does not run closely to existing houses.	Increase safety risks	Install signboards, barriers and fences to separate the construction sites with roads and residential areas	Included in construction contract values	Contractors	CSC
		High noise levels from pile driving	Avoid pile driving between 6 pm and 6 am	No additional costs	Contractors	CSC
		Water pollution due to (110 m^3) bentonite from drilling	Direct and collect bentonite storage tank	Included in construction contract value	Contractors	CSC
		Safety risks for workers when working at height and on water surface	Install nets along the bridge, provide life vest and belts, hard hats and force the workers to use		Contractors	CSC

Table 62b - Site-specific Mitigation Measures along NH19 for Non-Priority Section

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Construction of new An Khê bypass including drains and six bridges	The bypass intersects with the existing NH19 at Km70+740 and Km83+600	Increased traffic safety risks at the intersections with the existing NH 19	Install "construction site" and speed limit signs at the two ends of each intersection; Arrange staff to direct traffic during busy hours Avoid loading materials and wastes at locations that may	Included in construction contracts	Contractors	CSC, PMU
		Power lines and poles at the ending point need to be relocated, power supply may be disrupted	Inform community two days in advance before power cut off for poles relocation	No cost incurred	Contractors	CSC, PMU
	+ Build six new bridges including Đá Lật, Suối Đá 2, Suối Vôi, Sông Ba, Suối Dồn 1 và Suối Dồn 2.	High noise levels from pile driving	Avoid piple driving between 10 pm and 6 am	No cost incurred	Contractors	CSC, PMU
		Water pollution due to bentonite from drilling	Direct and collect bentonite storage tank	Included in construction Contract	Contractors	CSC, PMU
		Safety risks for workers when working at height and on water surface	Install nets along the bridge, provide life vests and belts, hard hats and force the workers to use	Included in construction Contract		
		Over clearance of vegetation cover and trees at the construction sites	Do not load materials, wastes and machines on vegetated land outside construction areas.	No cost incurred		
	+ The bypass passing rice field, one	Some existing irrigation canals shall be affected	Rebuild and connect compensatory canals before blocking off the affected canal section	Included in construction Contract		

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	1400m will be filled to height 2.5- 7.5m higher than existing ground	Separate thus disrupt accessibility to agricultural land, particularly during seedling and harvesting seasons	Inform community about construction schedule at least one crop in advance Prioritise the construction of temporary/ permanent access to maintain accessibility from one to the other side of the road Arrange staff to assist local	Included in construction Contract	Contractors	CSC, PMU
		Increased safety risks for local people, particularly the farmers	Arrange specific locations for local passing the road, restrict access to construction sites	No additional costs	Contractors	CSC, PMU
		Construction materials and wastes may fill up agricultural land, irrigation canals	Minimise temporary loading of materials and wastes near crop land, levelling the materials as soon as possible	No additional costs	Contractors	CSC, PMU
		Flooding risks in rainy season due to embankment effect	Prioritise the construction of drainage along the road; build temporary drains	No additional costs	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	The bypass passing low hill, excavation to 3-4m deep at Km0-Km5, and to 6 m deep along 160 m at Km6+640- Km6+800	Separate agricultural land, particularly during the harvesting season of sugar canes and cassava during September to December	Build temporary and permanent access so as local people can move safely from one side to the other side of the road Schedule construction to avoid extensive excavation/filling during September – December	Included in construction Contract No costs incurred	Contractors	CSC, PMU
		Landslide risks at deeply excavated areas	Build temporary drains along the alignment Level and protect slops/walls	Included in construction Contract	Contractors	CSC, PMU
		Social conflicts between the workers and ethnic communities	inform community about construction schedule at least one month in advance Hire local labours to carry out manual works	No additional costs Included in construction	Contractors	CSC, PMU
	The bypass passing some residential areas.	Dust and noise level exceed limits three times and 11.5dB, respectively.	Water the disturbed areas in hot and dry days Minimise the volume of wastes and materials temporary loaded at the site	Included in construction Contract No additional costs	Contractors	CSC, PMU
		Power supply will be disrupted due to pole relocation.	Inform communities at least two days before power cut off	No additional costs	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Increased traffic and safety risks.	Install warning and 5km/h speed limit signs Arrange staff direct traffic in rush hours, Ensure adequate lighting at nighttime	Included in construction Contract	Contractors	CSC, PMU
	The bypass cut through some eucalyptus plantations at: Km0+ 150-400, Km0+750-1+150, Km1+600-2+200, 2+400- Km3+800	Damages to the trees and vegetation cover outside construction area	Train the workers on the codes of conduct and monitor compliance, particularly do not set fire if not authorised	Included in CSC and construction Contract	Contractors, CSC and PMU	CSC, PMU
		Increased bushfire risks, particularly in dry season during November to April	Establish fire prevention corridor along the section passing the forest	Included in construction Contract	Contractors	CSC, PMU
Access road to An Khe Bypass	Access road at Km2+800, 4+500, 9+800 and 12	Dust and noise;	Water the road section passing residential houses in dry weather Collect and clean up materials	Included in construction Contract	Contractors	CSC, PMU
		Increased traffic safety risks;	Place sign boards at the beginning point of the access road Arrange staff to direct traffic when there are bulky construction plants	Included in construction Contract	Contractors	CSC, PMU
		Damages or degrade existing roads	Rehabilitate the road when damages are caused Reinstate the road before construction is completed			

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Km 76 – Km 82+200: Resurfacing	NH19 passing An Khê populated residential area	Noise level exceed standard from 7- 11,5dB; Dust also exceed standards during road excavation	Inform communities about construction schedule at least two weeks in advance Avoid carrying out activities that generate high noise between 10	No additional costs Included in construction	Contractors	CSC, PMU
		Increase traffic and safety risks	Install warning signs and signboards Cover open holes and trenches Load materials and wastes tidily, remove the wastes from construction sites on daily basis Arranges staff to direct traffic in rush hours	No costs incurred Included in Construction Contracts	Contractors	CSC, PMU
	NH19 passing Mai Anh and Sơn Ca kindergartens and Nguyễn Khuyến high school.	Increased traffic and safety risks for students and teachers.	Inform school managers at least one week in advance. Install speed limit at 5km/h sign at the two ends of the section Arrange staff to direct traffic at school opening and school over time at sections in front of the school. Install fence and warning signs open holes, channels Do not load materials and wastes within 50 m from school gates Do not load or unload materials	No costs incurred Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Disrupt access access to the schools during pipe installation	Use pre-cased boxed drain to minimise construction period	Included in Construction Contracts	Contractors	CSC, PMU
	NH19 passing An Khe and Cho Do Churches	Aesthetical impacts Disturb church pray activities, particularly on Sunday and Christmas	Do not load materials within 50 m from the churches Avoid construction activities along this on Sunday, Christmas, and Easter	No costs Incurred	Contractors	CSC, PMU
	NH19 passing Đồn market	Disturb/disrupt business Dust affect public health Increased traffic safety risks	Inform businesses at least one week before construction commencement Water the road before excavation at least three times/day in dry season Do not load materials and wastes within 50 m of the market	No costs incurred Included in Construction Contracts	Contractors, local authorities Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Km 155 - Km 160: Road expansion, Drainage installation Bridge reconstruction	NH19 passing residential area at Km155- Km157, Km158- Km160 Houses are 7- 10 m from roadside, powerline runs on the right	Increased traffic and safety risks,	Install warning signs and signboards Arrange staff to direct traffic in rush hours Cover open holes and trenches Load materials and wastes tidily, remove the wastes from construction sites on daily basis	Included in Construction Contracts	Contractors	CSC, PMU
		Disrupt access to roadside houses and shops due to pipe trenching for drainage	Provide temporary access to houses and shops when access is disrupted Do not load materials and wastes in front of shops	Included in Construction Contracts	Contractors	CSC, PMU
		- Noise level exceed standard 7-11.5 dB, affecting residents.	Inform communities about construction schedule at least two weeks in advance Avoid carrying out activities that generate high noise between 10 pm and 6 am	Included in Construction Contracts	Contractors	CSC, PMU
		Power lines and poles must be relocated, power supply may be disrupted	- Inform community at least one week before power cut off.	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Weak/temporary structures at risks of being cracked/damages	- Carry out inventory of weak structures before compaction - Apply static instead of vibrating compaction method	Included in Construction Contracts	Contractors	CSC, PMU
	+ bridge An Mỹ (Km156+57)	Water pipes and telecommunication cables would be relocated, service may be interrupted	Inform community at least two days in advance about service interruption	Included in Construction Contracts	Contractors	CSC, PMU
		Disrupt traffic on the two existing bridges	Build temporary access road before demolishing the existing bridge for reconstruction Inform community at least one week before blocking the new bridges	Included in Construction Contracts	Contractors	CSC, PMU
		High noise levels from pile driving	Avoid pile driving between 10 pm and 6 am	Included in Construction Contracts	Contractors	CSC, PMU
		Water pollution due to bentonite from drilling	Direct and collect bentonite storage tank	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	+ NH19 passing Hoa sữa kindergarten, Nguyễn Khuyến Primary school,	Increased traffic and safety risks for students and teachers.	Inform school managers at least one week in advance. Install speed limit at 5km/h sign at the two ends of the section Arrange staff to direct traffic at school opening and school over time at sections in front of the school. Install fence and warning signs open holes, channels Do not load materials and wastes within 50 m from school gates Do not load or unload materials during rush hours	No costs incurred Included in Construction Contracts	Contractors	CSC, PMU
		Disrupt access to the schools during pipe installation	Use pre-cased boxed drain to minimise construction period Provide temporary access over open trenches	Included in Construction Contracts	Contractors	CSC, PMU
	+ NH19 passing An Mỹ church, Bửu Thọ Pagoda.	Disrupt access to the Church and pagoda to drainage installation	Use box drains for this section Provide temporary access crossing the trench	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		disturb religious activities at the Church and pagoda	Schedule construction of the section passing the Church to avoid Sunday and Christmas time Schedule construction of the section passing the pagoda to avoid the first and full moon of lunar months	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	+ NH19 passing An Phú, Chư Á markets	Dust affect public health	Water the area at least three times a day in dry days Avoid over loading materials in the area Collect and transport the waste away daily	Included in Construction Contracts	Contractors	CSC, PMU
		Increased traffic and safety risks	Place sign boards and warning signs Fence excavated areas and open holes, place warning signs provide adequate lighting at night	Included in Construction Contracts	Contractors	CSC, PMU
		Obstruct access to the market.	Provide temporary access over open trenches. Avoid loading materials within 20 m from the market.	Included in Construction Contracts	Contractors	CSC, PMU

	+ NH19 passing agricultural land at Km157- Km158	Construction material and waste fill up agricultural land and drains	Do not load materials and waste within 20 m from agricultural land Cover, protect materials and waste loads Create and maintain drains including sedimentation traps	Included in Construction Contracts	Contractors	CSC, PMU
	There are weak structures along the road right next to the expanded road	At risk of being cracked/damaged by vibration from excavation for road base construction and road compaction	Carry out inventory prior to construction Apply static compaction method instead of vibration compaction Apply supports such as sheet piles to prevent landslide at the walls/slopes created and structure subsident	No additional costs Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Pleiku Bypass:	Bypass intersect with NH19 at Km157+460 and Km177, power	- Increased traffic safety risks at the intersections	Install sign boards and speed limit signs at the intersections Provide adequate lighting at night	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Build new road and bridges	and telecommunication lines are low	Power and telecommunication lines must be risen so as and construction plants passing underneath, service may be	Inform affected households at least two days in advance before service interruption	No additional costs incurred	Contractors	CSC, PMU
	Nh19 passing paddy field at Km0-Km2, Km4+950 and Km8+900, ground will be elevated	Separate agricultural land thus disrupt accessibility from one to the other side of the road	Prioritise the construction of safe temporary/permanent access to local people to move from one to the other side of the roads	Included in Construction Contracts	Contractors	CSC, PMU
		Increased landside risks at wall/slopes created	Stabilise and protect slopes create adequate vertical and horizontal drains	Included in Construction Contracts	Contractors	CSC, PMU
		Dust affect rice and vegetable crops	Water dusty location cover materials and waste loads	Included in Construction Contracts	Contractors	CSC, PMU
		Interrupt irrigation service as some canals would be affected	Rebuild and reconnect compensatory canals before demolishing the affected sections	Included in Construction Contracts	Contractors	CSC, PMU
		Social conflict with ethnic community	Hire local labour for manual works	Included in Construction Contracts	Contractors	CSC, PMU
	An Mỹ 1 and 2 bridges will be built	High noise levels from pile driving	Avoid pile driving between 10 pm and 6 am	No costs incurred	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	at Km1+100 and Km8+900	Water pollution due to bentonite from drilling	Direct and collect bentonite storage tank	Included in Construction Contracts	Contractors	CSC, PMU
		Safety risks for the workers when working at height on on water	Install nets along the bridge Provide life vests and belts, hard hats and force the workers to use	Included in Construction Contracts	Contractors	CSC, PMU
	Bypass passing coffee and rubber plantations on low hills at Km2-Km4+900, Km5-Km8+400 and Km9-Km13+200	Separate agricultural land thus disrupt accessibility from one to the other side of the road	Prioritise the construction of safe temporary/permanent access to local people to move from one to the other side of the roads	Included in Construction Contracts	Contractors	CSC, PMU
		Increased landside risks at wall/slopes created	Stabilise and protect slopes create adequate vertical and horizontal drains	Included in Construction Contracts	Contractors	CSC, PMU
		Dust may affect coffee productivity if too much dust is on coffee flowers	Schedule construction to avoid extensive excavation near coffee plantations during February - March Water dusty areas in coffee flowering season (February – March) Cover materials and waste loads Carry out levelling as soon as possible	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Obstruct accessibility of farmers in coffee harvesting season (September - December).	Schedule construction to avoid extensive excavation/filling near coffee plantations during February – March Ensure that safe and convenient access near coffee plantations has been built before September	No additional costs incurred Included in Construction Contracts	Contractors	CSC, PMU
	The bypass pass Đồng Xanh tourist area and Bông Lar residential area in Ia Băng commune	Dust exceed standard three times.	Water dusty areas in coffee flowering season (February – March) Cover materials and waste loads Carry out levelling as soon as possible	Included in Construction Contracts	Contractors	CSC, PMU
		Increased traffic and safety risks	Place sign boards and warning signs Fence excavated areas and open holes, place warning signs Provide adequate lighting at night	Included in Construction Contracts	Contractors	CSC, PMU
		Landscape	Do not load materials and wastes within 50m from the tourist area and residential houses.	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Disturb tourist activities	Minimise materials loading and unloading at the week ends Daily collect all the wastes and tidy up the area near the tourist area, big clean up every Friday afternoon.	Included in Construction Contracts	Contractors	CSC, PMU
Access roads for Pleiku bypass construction sites	Access road near Đồng Xanh tourist area, Km0- Km1	Dust and noise;	Water the road section passing school and tourist area in dry weather Collect and clean up materials and waste dropped on the road	Included in Construction Contracts	Contractors	CSC, PMU
		Increased traffic safety risks;	- Place sign boards at the beginning point of the access road – Arrange staff to direct traffic at school opening and closing hours and when there are bulky construction plants entering/leaving the site	Included in Construction Contracts	Contractors	CSC, PMU
		Damage or degrade existing roads	Rehabilitate the road when damages are caused Reinstate the road before construction is completed	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	Access road from Chư Á commune to Km8 of the bypass	Dust and noise;	Water the road section passing school clusters and residential houses in dry weather Collect and clean up materials and waste dropped on the road	Included in Construction Contracts	Contractors	CSC, PMU
		Increased traffic safety risks;	Place sign boards at the beginning point of the access road Arrange staff to direct traffic at school opening and closing hours and when there are bulky construction plants entering/leaving the site	Included in Construction Contracts	Contractors	CSC, PMU
		Damages or degrade existing roads Damages to weak bridges	Strengthen the road or build temporary stream crossing to accomodate the truck loads Rehabilitate the road and/or bridges when damages are caused Reinstate the road and/or bridges before construction is completed	Included in Construction Contracts	Contractors	CSC, PMU
	Access road from Đắk Đoa town and Ham Rong T junction	Dust and noise;	Water the road section passing residential houses in dry weather Collect and clean up materials and waste dropped on the road	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Increased traffic safety risks;	Place sign boards at the beginning point of the access road Arrange staff to direct traffic when there are bulky construction plants entering/leaving the site	Included in Construction Contracts	Contractors	CSC, PMU
		Damages or degrade existing roads	Rehabilitate the road when damages are caused Reinstate the road before construction is completed	Included in Construction Contracts	Contractors	CSC, PMU
Km 180 – Km 218+500: road expansion, Build drainage	Plantations along some sections	Damages to the trees and vegetation cover outside construction area	Train the workers on the codes of conduct and monitor compliance, particularly do not set fire if not authorized	Included in Construction Contracts	Contractors	CSC, PMU
		Increased bushfire risks, particularly in dry season between November and April	establish fire prevention corridor along the section passing the forest	Included in Construction Contracts	Contractors	CSC, PMU
	NH19 passing residential areas at Km187- Km190, Km193- Km202, Km207- Km209, Km211- Km215 and Km216- Km218	Increased traffic and safety risks	Install warning signs and signboards Arrange staff to direct traffic in rush hours Cover open holes and trenches Load materials and wastes tidily, remove the wastes from construction sites on daily basis	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Disrupt access to roadside houses and shops due to pipe trenching for drainage	Provide temporary access to houses and shops when access is disrupted Do not load materials and wastes in front of shops	Included in Construction Contracts	Contractors	CSC, PMU
	Power lines running along the road	Noise level exceed standard 7-11.5 dB, affecting residents.	Avoid activities generating high level of noise between 10 pm to 6 am.	No costs incurred	Contractors	CSC, PMU
		Power lines and poles must be relocated, power supply may be disrupted	Inform community at least one week before power cut off.	No costs incurred		
		Weak/temporary structures at risks of being cracked/damages	Carry out inventory of weak structures before compaction Apply static instead of vibrating compaction method	No costs incurred	Contractors, PMU, CSC Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	NH19 passing Đôn School, Hoa Hồng, Hòa Thanh Bình kindergartents Trần Quốc Tuấn,Trần Phú, Lương Thế Vinh, Trưng Vương and Hùng Vương schools, Thanh Bình kindergarten.	Increased traffic and safety risks for students and teachers.	Inform school managers at least one week in advance. Install speed limit at 5km/h sign at the two ends of the section Arrange staff to direct traffic at school opening and school over time at sections in front of the school. Install fence and warning signs open holes, channels Do not load materials and wastes within 50m from school gates Do not load or unload materials during rush hours	No costs incurred Included in Construction Contracts	Contractors	CSC, PMU
		Disrupt access to the schools during pipe installation	Use pre-cased boxed drain to minimise construction period Provide temporary access over open trenches	Included in Construction Contracts	Contractors	CSC, PMU
	Bypass passing Đức Giang, Hồng Đức, Nguyên Sơn and Tha	Disrupt access to the Church and pagoda to drainage installation	Use box drains for this section Provide temporary access crossing the trench	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	Khánh Thiện pagodas, Đức Hưng and Thanh Bình Churchs, Đồng Tâm Parish	Disturb religious activities at the Church and pagoda	Schedule construction of the section passing the Church to avoid Sunday and Christmas time Schedule construction of the section passing the pagoda to avoid the first and full moon of lunar months	Included in Construction Contracts	Contractors	CSC, PMU
	Bypass passing coffee, tea, etc. plantations at Km182-190, Km199-200, Km202-205	Separate agricultural land thus disrupt accessibility from one to the other side of the road	Prioritise the construction of safe temporary/permanent access to local people to move from one to the other side of the roads	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ RisKs/Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Km 218+500 - Km 222: - Road resurfacing	NH19 passing residential area in Chư Ty town, houses are 5-7m from the roadside	Increased traffic and safety risks, particularly at the junction of Chu Ty town	Install warning signs and signboards Arrange staff to direct traffic in rush hours Cover open holes and trenches	Included in Construction Contracts	Contractors	CSC, PMU
		Disrupt access to roadside houses and shops due to pipe trenching for drainage	Provide temporary access to houses and shops when access is disrupted Do not load materials and wastes in front of shops	Included in Construction Contracts	Contractors	CSC, PMU
		Noise level exceed standard 7-11.5 dB, affecting residents.	Inform communities about construction schedule at least two weeks in advance Avoid carrying out activities that generate high noise between 10 pm and 6 am	No costs incurred	Contractors	CSC, PMU
		Urban landscape	Load materials and wastes tidily, remove the wastes from construction sites on daily basis	No costs incurred	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ RisKs/Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	NH19 passing Primary school Kim Đồng	Increased traffic and safety risks for students and teachers.	Inform school managers at least one week in advance. Install speed limit at 5km/h sign at the two ends of the section Arrange staff to direct traffic at school opening and school over time at sections in front of the school. Install fence and warning signs open holes, channels Do not load materials and wastes within 50 m from school gates Do not load or unload materials during rush hours	No costs incurred Included in Construction Contracts	Contractors	CSC, PMU
		Disrupt access to the schools during pipe installation	Use pre-cased boxed drain to minimise construction period Provide temporary access over open trenches	Included in Construction Contracts	Contractors	CSC, PMU
	NH19 passing Đức Cơ District Memorial	Landscape obstruct access of visitors, particularly on 27 July 22, 1st and full moon of lunar months	Do not load materials and wastes within 50 m from the Memorial	No costs incurred No costs incurred	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ RisKs/Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
			Schedule construction on this section to avoid 27 July, 22, 1st and full moon of lunar months			
	NH19 passing Đức Cơ market	Dust affect public health	Water the area at least three times a day in dry days Avoid over loading materials in the area Collect and transport the waste away daily	Included in Construction Contracts	Contractors	CSC, PMU
		Increased traffic and safety risks	Place sign boards and warning signs Fence excavated areas and open holes, place warning signs provide adequate lighting at night	Included in Construction Contracts	Contractors	CSC, PMU
		Obstruct access to the market	Provide temporary access over open trenches. Avoid loading materials within 20 m from the market.	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ RisKs/Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Km 222 - Km 241: - road expansion, - Build drainage	NH 19 passing residential areas Powerlines running along	Increased traffic and safety risks	Install warning signs and signboards Arrange staff to direct traffic in rush hours Cover open holes and trenches	Included in Construction Contracts	Contractors	CSC, PMU
			Load materials and wastes tidily, remove the wastes from construction sites on daily basis	No costs incurred	Contractors	CSC, PMU
		Disrupt access to roadside houses and shops due to pipe trenching for drainage	Provide temporary access to houses and shops when access is disrupted Do not load materials and wastes in front of shops	Included in Construction Contracts No cost incurred	Contractors	CSC, PMU
		Noise level exceed standard 7-11.5 dB, affecting residents.	Inform communities about construction schedule at least two weeks in advance Avoid carrying out activities that generate high noise between 10 pm and 6 am	No cost incurred	Contractors	CSC, PMU
		Power lines and poles must be relocated, power supply may be disrupted	Inform community at least one week before power cut off.	No cost incurred	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ RisKs/Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Weak/temporary structures at risks of being cracked/ damages	Carry out inventory of weak structures before compaction Apply static instead of vibrating compaction method	Included in Construction Contracts	Contractors	CSC, PMU
	Passing agricultural land	Separate agricultural land thus disrupt accessibility from one to the other side of the road	Prioritise the construction of safe temporary/permanent access to local people to move from one to the other side of the roads	No cost incurred	Contractors	CSC, PMU
	NH19 passing Kim Đồng Primary school, 18-4 kindergarten, Nguyễn Du, Chu Văn An, Nguyễn Trường Tộ, Nguyễn Trãi, Trần Phú schools, 20- 30m from roadside	Increased traffic and safety risks for students and teachers.	Inform school managers at least one week in advance. Install speed limit at 5km/h sign at the two ends of the section Arrange staff to direct traffic at school opening and school over time at sections in front of the school. Install fence and warning signs open holes, channels Do not load materials and wastes within 50 m from school gates Do not load or unload materials during rush hours	No cost incurred	Contractors	CSC, PMU

Proposed work	Noticeable Features	Impacts/ RisKs/Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Disrupt access access to the schools during pipe installation	Use pre-cased boxed drain to minimise construction period Provide temporary access over open trenches	Included in Construction Contracts	Contractors	CSC, PMU

Table 62c - Site-specific Mitigation Measures along NH19 for Disposal sites

Noticeable Features	Impacts/ RisKs/Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Disposal site at Bau Sen bridge Ta Giang 1 Hamlet, Tay Giang commune, Tay Son district, Binh Dinh province	Loss of crops. Some irrigation canal cut through the site materials overflow onto the surrounding agricultural land Increased erosion potentials from barren soil dumps Safety risks for local community	Notify communities about disposal schedule one month before the new crop. Re-build and connect compensatory irrigation canal before disposal. Fence the disposal site and install warning signboards. Level the disposal area and stabilize slopes formed during disposal process. Create drainage ditches surrounding the disposal area, including sedimentation traps.	No costs incurred Included in Construction Contracts	Contractors	CSC, PMU

Noticeable Features	Impacts/ RisKs/Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Disposal site at Km57+300 NH19	Damages to the existing earthen access road Traffic safety risk at the entrance from main road -	Notify communities about disposal schedule as soon as possible and not less than one month before start using the site. Strengthen the access road before starting to use the site Install warning sign and speed limit at 40km/h at the entrance	Included in Construction Contracts	Contractors	CSC, PMU
Disposal site at Km58+800 NH19	Loss one crop Materials overflow onto agricultural land and NH19 Traffic safety risk on NH19	Notify communities about disposal schedule one month before the new crop. Level the disposal area and stabilize slopes formed. Create drainage ditches surrounding the disposal area, including sedimentation traps.	Included in Construction Contracts	Contractors	CSC, PMU

Noticeable Features	Impacts/ RisKs/Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Disposal site at Km58+600	Lose one crop. Increased traffic and safety risks when trucks entering and leaving the site Materials overflow onto agricultural land and NH19.	Notify communities about disposal schedule one month before the new crop. Install warning and speed limit signs at the two ends of the road section passing the disposal site Fence the disposal site and install warning signboards. Install signs to restrict access to the site Level the disposal area and stabilize slopes formed. Create drainage ditches surrounding the disposal area, including sedimentation traps.	Included in Construction Contracts	Contractors	CSC, PMU
Disposal site at Bối village- Glar commune- near Km 4+500 of Pleiku bypass	Damages to the existing trees Increased erosion risks Increased sedimentation risks in existing canal and drains Dust, safety risks to residents along the access road Damage local access road	Avoid damages to the trees Level the disposal area, stabilize slopes Create drainage ditches including sedimentation traps around the foot of stockpiles.	Included in Construction Contracts	Contractors	CSC, PMU

Noticeable Features	Impacts/ RisKs/Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Disposal site at Km199+500 NH19	Materials overflow onto agricultural land and irrigation canal in the surrounding area.	Notify communities about disposal schedule one month before the new crop. Level the disposal area, stabilize slopes Create drainage ditches including sedimentation traps around the foot of stockpiles	Included in Construction Contracts	Contractors	CSC, PMU
Disposal site at Km230+650 of NH19	Damage on access road. Increased traffic safety risks when trucks entering and leaving the site from NH19 Traffic safety near the school Interrupt sport activities on the existing playground	Improve and reinstate the access road before and at the end of construction Install warning and speed limit sign boards at the intersection between the access road and NH19 Place warning sign and speed limit near school Arrange people to direct traffic during school opening and closing hours Level the site and hand over it back to local authority as soon as disposal and levelling is completed	Included in Construction Contracts	Contractors	CSC, PMU
Disposal site at Km193+300.	- Increased traffic safety risks when trucks entering and leaving the site from NH19.	Install warning and speed limit sign boards at the intersection between the access road and NH19	Included in Construction Contracts	Contractors	CSC, PMU

Noticeable Features	Impacts/ RisKs/Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Disposal site at Km206+600	- Increased traffic safety risks when trucks entering and leaving the site from NH19	Install warning and speed limit sign boards at the intersection between the access road and NH19	Included in Construction Contracts	Contractors	CSC, PMU
	- Dust, noise impact to nearby households.	No disposal activities at night Water spraying if necessary	Included in Construction Contracts	Contractors	CSC, PMU
Disposal site at Km 211+600	- Increased traffic safety risks when trucks entering and leaving the site from NH19 -	Install warning and speed limit sign boards at the intersection between the access road and NH19	Included in Construction Contracts	Contractors	CSC, PMU
	- Dust, noise impact to nearby households.	No disposal activities at night Water spraying if necessary	Included in Construction Contracts	Contractors	CSC, PMU

6.2 Implementation Arrangements, Roles and Responsibilities

6.2.1 Implementation Arrangements

The institutional arrangement and responsibility in this ESMP will be undertaken as part of overall project implementation. The organizational structure is presented in Figure 18: Environmental Management Institutional Chart below.

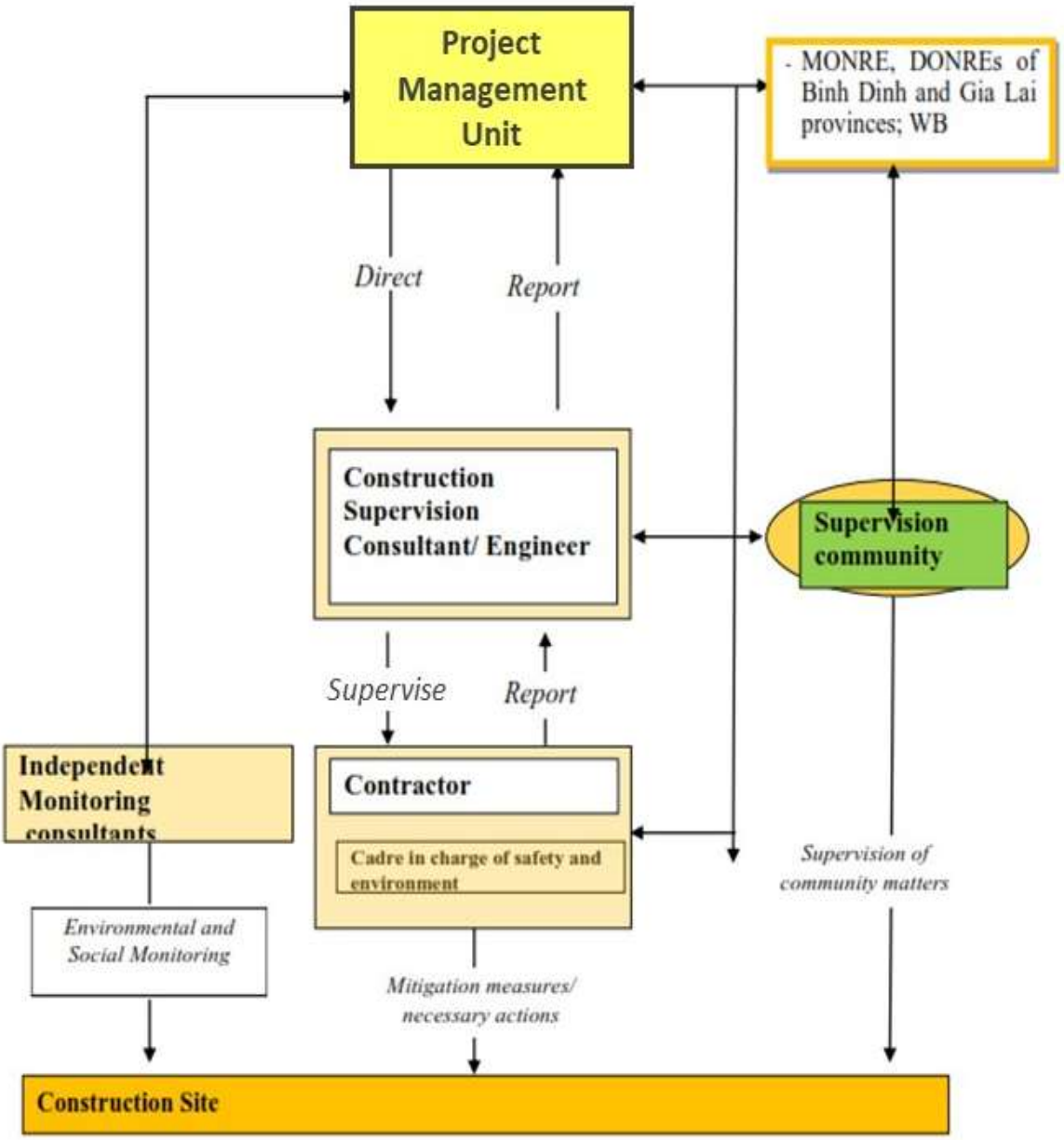


Figure 26 Environmental Management Institutional Chart

6.2.2 Roles and Responsibilities

Table 63 Roles and Responsibilities of Stakeholders

Stakeholders	Roles and Responsibilities
Ministry of Transport (MOT)	• Project owner. Overall responsibility for the project management and implementation including the implementation of environmental, social and gender instruments and ensure that adequate fund is allocated for safeguards activities.
(PMU2)	• Delegated by MOT to take the overall responsibility of day-to-day overseeing the implementation of the project and ensure that the Project complies with the World Bank Safeguard Policies and Vietnamese legislations. • Ensure timely and effective implementation and compliance of all safeguard's documents such as CESMP; Workers' Camp Management Plan and/or Labor Influx Management Plan; and Traffic Management Plan. • Ensure that management plans specially the CESMP is updated by the Contractor reflecting changes to the project and it will be disclosed to the public. • Ensure the implementation of the GRM and the grievances received is acted accordingly. • Supervise and provide necessary technical support to ensure smooth project implementation, including activities related to environmental, social and gender. • Review the internal and external monitoring reports and take follow up actions. • Coordinate with the Construction Supervisors to carry out due diligence review of additional sites such as borrow pits and quarries as and when required • Monitor and report on the implementation of RAPs, ESIA/ESMP and EMDP
PMU, Environmental Officer (EO)	• The EO will advise the PPMU on solutions for labor influx issues to ensure the compliance with WB's safeguard polices and regulations stipulated by Vietnamese Government. • The EO will coordinate with the CSC team and the contractors to carry out environmental due diligence review of borrow pits, quarries, disposal sites as well as any other sites required and approve whether they are eligible for use in the Project.
Design Consultant	• Incorporate mitigation measures into engineering design, cost estimates, bidding documents and construction contract.
Construction Supervision Consultant (CSC)/ ESMP Specialist	• Ensure compliance of ECOP/ESMP/CESMP as well as social, gender and ethnic minority issues developed in relevant documents (RAP, GAP and EMDP) • Monitor and supervise the Contractor's implementation of the works in accordance with the contract requirements and to ensure compliance with the CESMP, WCMP, LIMP and TMP.

Stakeholders	Roles and Responsibilities
	• Ensure that awareness training for contractor's workers on environment, occupational safety, HIV, AIDS, STD, nCOV-19 is provided. • Provide training on traffic safety for the communities along the two bypasses and around the new junctions between the bypasses and the existing NH19. • Arrange for environmental quality monitoring and report preparation for submission to relevant government authorities • Direct the Contractor to carry out corrective measures when non-compliant is detected and ensure that additional mitigation or corrective measures to address the issues/impacts to satisfactory level are implemented. • Advise PMU2 to suspend partially or entirely the construction work if a contractor fails to meet the requirements on safety and environmental protection as agreed or stated in the contract. • Prepare and maintain records on complaints and incidents • Provide frequent reports on contractor compliance and performance to the WB.
Independent/External Monitoring Consultant	• Monitor potential risks to the project community (specifically, those living in the communes directly adjacent to the project civil works and labor camps) as well as the general safety of these communities from any impact associated with construction activities. • Monitor the safety practices at construction sites to ensure that construction workers are adequately protected and that good worksite safety practices are implemented by contractors, adopted by workers, and enforced accordingly by the project implementing agencies and the construction supervision consultant • Responsible for the control and monitoring of the safeguard's requirements as mentioned in the approved Project's CESMP, WCMP and/or LIMP and TMP
Contractor/ Environmental and Social Management Specialist	• Prepare Site-specific CESMP • Implement civil works in accordance with CESMP including all works conducted by sub-contractors • Train workers on roles and responsibilities under the plans, policies and standards. • Carry out environmental and social site inspections to assess and audit the site practices, equipment and work methods and adequacy of mitigation measures to manage the risks and impacts implemented. • Implement remedial measures/corrective preventive actions and carry out alternative construction methodologies if required to minimize adverse impacts • Ensure compliance with environmental and social protection measures, pollution prevention and control measures and contractual requirements. • Keep detailed records of all site activities that may relate to the environment

Stakeholders	Roles and Responsibilities
Community	• Carry out voluntary or impromptu monitoring in accordance to Decree 19/2015/ND-CP • Cooperate with Ward/Commune PC in all activities related to land acquisition, compensation, support and resettlement
DONRE of Binh Dinh and Gia Lai	• Review the regular monitoring reports prepared and submitted by PMU • Ensure that the environmental impacts will be mitigated by proper and sufficient mitigation measure by random on-site inspection. • Sampling and monitoring on air, noise, surface water and wastewater, soil, and sediment when necessary. • Receive and handle complaints from local people and communities if any.
Provincial People's Committee (PPC)	• Ensure that compensation resettlement and livelihoods restoration of affected households is implemented and monitored in accordance with RAP.
Provincial Project Management Unit (PPMU)	• Ensure the required budget for RAP implementation is timely and sufficiently allocated for planned compensation payment/resettlement – as described in the RAP. • Prepare quarterly progress reports and submit to the WB • Conduct training and work closely with DPCs and District Board for Compensation and Land Acquisition (DBCLA) in updating RAPs and submit to the Bank for review
City/District People's Committee (C/DPC)	• Prepare annual land use plan and submit to authorities for review and approval of changed land use plan. • Settle complaints related to land acquisition, compensation, support, and resettlement in the district within its jurisdiction. • Approve compensation support and resettlement assessment to be carried out by the City/District BCLA
City/District Board Compensation & Land Acquisition	• Organize for compensation payment and provision of assistance to affected people • Cooperate with C/DBCLA in arranging compensation payment, resettlement and livelihood restoration implementation. • Provide documents related to the origin of land use of AHH; confirming the eligibility of affected persons and affected assets • Assist C/DPC to organize meetings and public consultations • Resolve complaints at the ward/commune level - as prescribed
Ward/Commune PC	• Cooperate with C/DBCLA in arranging compensation payment, resettlement, and livelihood restoration implementation • Provide documents related to the origin of land use of AHH • confirm the eligibility of affected persons and affected assets • Assist C/DPC, C/DBCLA to organize meetings and public consultations • Resolve complaints at the ward/commune level - as prescribed
Grievance Redress Committee	• Resolve problems and provide support to affected persons arising from various environmental issues that include dust, noise, utilities, waste disposal, landslides, traffic interference and public safety as

Stakeholders	Roles and Responsibilities
	well as social issues land acquisition (temporary or permanent); asset acquisition; and eligibility for compensation and entitlements • Resolve appeals against decisions on disciplinary measures against a worker or unsatisfactory disciplinary outcome from the complaint perspective. • Reconfirm grievances of affected persons, categorize, and prioritize them and aim to provide solutions • Report to the aggrieved parties about developments regarding their grievances and decisions of the GRC.

6.3 Environmental Compliance Framework

6.3.1 Environmental Duties of Contractor

The contractors firstly shall adhere to minimize impacts that may result from the project construction activities and secondly, apply the mitigation measures stated in the ESMP to prevent harm and nuisances on local communities and the environment caused the construction and operation phases.

Remedial actions that cannot be effectively carried out during construction should be implemented upon completion of the works (and before issuance of the Works Acceptance Certificates).

The Contractors' duties include but are not limited to:

- Comply with relevant legislative requirements governing the environment, public health and safety,
- Work within the scope of contractual requirements and other tender conditions,
- Organize representatives of the construction team to participate in the joint site inspections undertaken by the Environmental Supervisors (ES) of the CSC,
- Carry out any corrective actions instructed by the Environmental Officer (EO) of the PMU and the ES,
- In case of non-compliances/ discrepancies, carry out investigation and submit proposals on mitigation measures, and implement remedial measures to reduce environmental impacts, and
- Stop construction activities, which generate adverse impacts, upon receiving instructions from the EO and the ES. Propose and implement corrective actions and carry out alternative construction methods, if required, to minimize the environmental impacts; Non- compliance by the Contractor will be cause for suspension of works and other penalties until the non-compliance has been resolved to the satisfaction of the EO and the ES.

After contract signing, based on the approved ESIA and contractual conditions, contractors will prepare Contractor Social and Environmental Management Plan (CESMP) for each contract packages and submit to the CSC and PMU for review and clearance.

In case the contractor propose to use source of raw materials that have not been covered in subproject ESIA, the contractor will report to the CSCs and PMUs and coordinate with them in carrying out due – diligence environmental review of these materials sources to assess their compliance to national environmental requirements. Only complied sources can be used under CHCIP.

6.3.2 Contractor's Site Environment Officer

The Contractor shall be required to appoint a competent individual as the Contractor's Site Environmental Officer (SEO). The SEO must be appropriately trained in environmental management and possess necessary skills to transfer environmental management knowledge to all personnel involved in the contract. The SEO will be responsible for monitoring the contractor's compliance with the ESMP requirements and the environmental specifications. The duties of the SEO shall include but not limit to the following:

- Carry out environmental site inspections to assess and audit the contractors' site practice, equipment and work methods with respect to pollution control and adequacy of environmental mitigation measures implemented;
- Monitor compliance with environmental protection measures, pollution prevention and control measures and contractual requirements;
- Monitor the implementation of environmental mitigation measures;
- Prepare audit reports for the environmental monitoring data and site environmental conditions;
- Investigate complaints and recommend any required corrective measures;
- Advise the contractor on environment improvement, awareness and proactive pollution prevention measures;
- Recommend suitable mitigation measures to the contractor in the case of non- compliance. Carry out additional monitoring of noncompliance instructed by the EO/ES;
- Inform the contractor and ECO/ES of environmental issues, submit contractor's ESMP Implementation Plan to the ECO/ES, and relevant authorities, if required; and
- Keep detailed records of all site activities that may relate to the environment.

6.3.3 Independent Environmental Monitoring Consultant

The Independent Environmental Monitoring Consultant (IEMC) contracted by PMU shall carry out the monitoring.

- Provide training for PMU and the CSC, and the representatives of the Contractors on socio-environmental, health and safety issues related to construction.
- Evaluate environmental quality at the areas affected by the construction activities (including site observations, reviewing environmental quality data provided by the CSC, review of other available documents, and supplement sampling if necessary).
- Review contractor's environmental compliance including the implementation of mitigation measures and documentation.
- Review PMU and CSC compliance to ESMP.
- The IEMC will also provide technical advice and assistance to the PMU and the EO in environmental matters.

6.3.4 Environmental Supervision Consultant

During the construction phase, the Environmental Specialist (ES) engaged by the Construction Supervision Consultant (CSC) shall carry out environmental supervision as part of construction supervision. The ES will be mobilized before the commencement of any construction activities. The CSC

is responsible for inspecting and supervising all construction activities to ensure that mitigation measures adopted in the ESMP are properly implemented, and that the negative environmental impacts of the Project are minimized. Specifically, the ES will:

- Review and assess on behalf of the PMU whether the construction design meets the requirements of the mitigation and management measures of the ESMP;
- Review and clear the CESMP;
- Coordinate with PMU Environmental Officer (EO) in reviewing environmental compliance at newly proposed borrow pits and quarries and advise PMU on whether these are eligible for use by the Project;
- Verify and confirm with PMU environmental supervision procedures; parameters, monitoring locations, equipment and results;
- Supervise site environmental management system of the Contractors, including their performance, experience and handling of site environmental issues, and provide corrective instructions if needed;
- Provide training about TIP, STIs, HIV /AIDS awareness for the contractor's workers, CSC team and PMU officers;
- Provide training on traffic safety for the affected households, particularly those living along the bypasses and the four new intersections
- Implement the environmental quality sampling and prepare periodical environmental monitoring reports, including reports on ESMP implementation status to the PPMU and prepare environmental supervision statement during the construction phase; and
- Review payment requests related to environmental mitigation costs if applicable

Noting that the involvement of the community in the process of implementing the ESMP is an activity entirely voluntary in nature, for the benefit of the community and his family. Therefore, the involvement of communities in monitoring the ESMP will not be receiving salaries. However, in order to encourage the participation of the community, the cost of materials, tools and instruments to serve the monitoring activities and a liability remuneration for a few members who are representatives people are appointed to participate surveillance activities also need to be arranged layout. As stipulated in Decision No 80/2005/ QD-TTg dated 18/4/2005 of the Prime Minister issued the Regulation on supervision of community investment and joint circular guiding the implementation of Decision 80/2005/QD-TTg, "budget support monitoring of public investment in the commune / ward to be balanced in the cost estimates of the Fatherland Front Committee of the commune/ward budget and commune / precinct guarantee ; Funds to support the dissemination, organization of training courses, guidance, preliminary and final monitoring of community investment at provincial and district levels are balanced in the cost estimates of the Fatherland Front Committee district national, provincial and district budgets by province to ensure".

6.3.5 Compliance with Legal and Contractual Requirements

The constructions activities shall comply not only with contractual environmental protection and pollution control requirements but also with environmental protection and pollution control laws of the Socialist Republic of Viet Nam.

All the works method statements submitted by the Contractors to the CSC for approval shall also be sent to the EO to review whether sufficient environmental protection and pollution control measures have been included.

The CSC shall also review the progress and program of the works to ensure that relevant environmental laws have not been violated, and that any potential for violating the laws can be prevented.

The Contractors shall copy relevant documents to the EO and CSC. The documents shall at least include updated work progress reports, updated work measures, and application letters for different license/ permits under the environmental protection laws, and all valid license/ permits. The EO and CSC shall also have access, upon request, to the Site Logbooks.

After reviewing the documents, the EO or CSC shall advise and the Contractors of any non- compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the EO or CSC concludes that the status on license/ permit application and any environmental protection and pollution control preparation works may not comply with the work measures or may result in potential violation of environmental protection and pollution control requirements, they shall advise the Contractor accordingly.

6.3.6 Penalty System

In the compliance framework, if non-compliance with environmental regulations is discovered by the CSC during site supervision, 2% of interim payment value of the contractors of the month will be held back. The Contractors will be given a grace period (determined by the CSC) to repair violation. If the Contractors perform the repairs within the grace period (confirmed by the CSC), no penalty is incurred and the retained amount will be paid. However, if the Contractors fail to successfully make necessary repairs within the grace period, the Contractors will pay a third party to repair the damages (deduction from the retained amount).

In case that the CSC does not detect non-compliance with environmental regulations of the Contractors, they will be responsible for payment to repair the violation.

6.3.7 RAP and Gender Monitoring

Gender Monitoring. During RAP implementation, key indicators (outlined below) of gender should be monitored and reflected in internal and external monitoring reports.

- *Consultation participation:* Ensure women are invited to participate in public consultations and group discussions during the RAP updating and implementing process. At least 20% of participants in consultation meeting are women.
- *Compensation disbursement:* Ensure that the process of compensation disbursement is transparent, and that compensation is in the name of both spouses. Presence of both husband and wife at the compensation payment session should be encouraged.
- C/DBCLA must ensure that the affected persons are guided carefully on how the compensation would be made – in cash or through bank transfer so that affected households have sufficient time to prepare themselves and a safe reception of the compensation money.
- *Livelihoods Restoration:* Assess women's requirements for skills training to facilitate income restoration. 100% of severely affected households who confirm their need for job counseling/training/job introduction will be invited to consultation session(s) with participation from women representing these households.

Consider providing women with employment opportunities generated under the project. All contractors participating in project construction will inform PPMU of job opportunities appropriate for local women and men so that PPMU can inform the affected households.

Explore opportunities to link women to self-help groups and microfinance programs.

6.4 Environmental and Social Monitoring Program

The monitoring of environmental quality will be done during the construction phase according to Table 63 with costs estimated in Table 64.

Table 64 Environmental Quality Monitoring Program

Parameter and frequency	Location
Air quality Applicable Regulation: QCVN 26:2010/BTNMT, QCVN 27:2010/BTNMT, QCVN 05:2013/BTNMT	
Noise, vibration TSP dust, CO, SO2 and NO2 Monitoring frequency once every quarter	KK1- Tay Thuan commune residential area, Tay Son rural district, Binh Dinh province; Coordinates: 13□57'5,7"N, 108□50'12,1"E. KK2- Song An commune residential area, An Khe Town, Gia Lai province; Coordinates: 13□58'38,6"N, 108□42'51,3"E. KK3- An Phuoc ward residential area, An Khe Town, Gia Lai province; Coordinates: 13□59'47,3"N, 108□41'16,8"E. KK4- Cu An commune residential area , ĐăkPơ rural district, Gia Lai province; Coordinates: 13□57'42,6"N, 108□37'19,2"E; KK5- Kon Dơng town residential area, Mang Yang rural district, Gia Lai province; Coordinates: 14□02'36,8"N, 108□15'34,7"E. KK6- Glar commune residential area, Đắk Đoa rural district; Coordinates: 13□58'32,4"N, 108□07'34,9"E. KK7- Ia Băng commune residential area, Đắk Đoa rural district; Coordinates: 13□55'41,9"N, 108□03'58,5"E. KK8- Bau Can commune residential area, Chư Prông rural district; Gia Lai province; Coordinates: 13□51'24"N, 107□56'20,3"E. KK9- Thang Hung commune residential area, Chư Prông rural district; Gia Lai province; Coordinates: 13□49'24,7"N, 107□53'29,5"E. KK10- Ia Din commune residential area, Duc Co rural district, Gia Lai province; Coordinates: 13□50'13,6"N, 107□47'54,7"E. KK11- Chu Ty town residential area, Duc Co rural district, Gia Lai province; Coordinates: 13□48'2,1"N, 107□40'53,1"E.
B. Surface Water Quality Monitoring Regulation for reference: QCVN 08-MT:2015/BTNMT)	

Parameter and frequency	Location
pH, T, turbidity, DO, COD, BOD_5, TSS, Cu, Zn, Fe, Cd, AS, Pb, oil and grease, coliform Once every quarter	NM1 – Ba bridge (Ba River); Coordinates: 13□56'56,4"N, 108□50'38,4"E NM2 –Ba La bridge ; Coordinates: 13□57'15,4"N, 108□39'5,3"E NM 3 - Ba bridge – An Khe bypass (2km at downstream of An Khe hydropower dam) NM 4 - Suoi Da bridge – An Khe bypass NM 5 - Linh Nham bridge NM6 - Thau Dau bridge NM7 - An My 2 bridge – Pleiku bypass
C. Municipal wastewater Regulation for reference: QCVN 14:2008/BTNMT)	
pH, TDS, TSS, BOD_5, NH_4^+, NO_3^-, PO_4^{3-}, oil and Coliforms. Once every quarter	Randomly one sample per one workers 'camp of one construction contract package x 8 packages = 8 samples

Table 65 Estimated Costs for Environmental Quality Monitoring

No	Item	Unit	Quantity/ volume	Unit price (VND)	Amount (VND)
1.1	*11 locations x 8 samples x 8 times*				*507,450,944*
-	TSP	Sample	768	76,297	53,713,088
-	CO	Sample	768	164,224	115,613,696
-	NO2	Sample	768	185,742	130,762,368
-	SO2	Sample	768	210,554	148,230,016
-	Microclimate				
-	Temperature, humidity	Sample	768	28,065	19,757,760
-	Wind direction/wind speed	Sample	768	27,986	19,702,144
-	Pressure	Sample	768	27,943	19,671,872
1.2	Noise, vibration (11 locations x 16 samples/location (continuous measurement from 6 AM to 6 PM, 01 sample every hour) x 8 times)				*188,480,512*
-	Equivalent noise (Laeq)	Sample	1408	66,932	102,807,552
-	Acceleration of vibration	Sample	1408	66,932	102,807,552
1.3	*Surface water (7 samples x 8 times)*				*199,860,360*
-	Temperature	Sample	56	32,927	1,843,912
-	pH	Sample	56	33,902	1,898,512
-	Turbidity	Sample	56	73,486	4,115,216

No	Item	Unit	Quantity/ volume	Unit price (VND)	Amount (VND)
-	DO	Sample	56	69,661	3,901,016
-	COD	Sample	56	172,114	9,638,384
-	BOD_5	Sample	56	151,640	8,491,840
-	TSS	Sample	56	123,257	6,902,392
-	Copper (Cu)	Sample	56	292,330	16,370,480
-	Lead (Pb)	Sample	56	332,819	18,637,864
-	Zinc (Zn)	Sample	56	292,330	16,370,480
-	Iron (Fe)	Sample	56	292,330	16,370,480
-	Cadmium (Cd)	Sample	56	332,819	18,637,864
-	Arsenic (As)	Sample	56	392,052	21,954,912
-	Total oil and grease	Sample	56	572,726	32,072,656
-	Coliform	Sample	56	404,542	22,654,352
1.4	*Domestic/household water (1 samples/location x 8 locations x 8 times)*				89,733,440
-	pH	2,571,52	64	40,180	5,143,040
-	NH_3	7,016,70	64	109,636	14,033,408
-	Surfactant	19,710,2	64	307,972	39,420,416
-	BOD5	7,846,14	64	122,596	15,692,288
-	TSS	5,397,82	64	84,341	10,795,648
-	TDS	5,551,74	64	86,746	11,103,488
-	NO_3^-	7,731,26	64	120,801	15,462,528
-	Total oil and grease	19,710,2	64	307,972	39,420,416
-	PO_4^{3-}	7,192,76	64	112,387	14,385,536
-	Coliform	7,005,05	64	109,454	14,010,112
	Total				***985,525,256***

6.5 Capacity Building, Training

6.5.1 PMU Environmental Management Capacity

PMU has 15 years (2004 to 2020) experiences in managing construction of transport facilities in Vietnam, including projects funded by International organizations such as the Vietnam Road Traffic Safety financed by the World Bank, Project on Enhancing traffic safety on highways in northern of Vietnam funded by JICA, Technical assistance for traffic safety improvement and climate change adaptation in Ninh Thuan and Binh Thuan. PMU also successfully implemented many projects using national budget such as Expansion National Highway.1A the sections passing Ha Tinh - Vung Ang, Ninh Thuan province, Ninh Binh, Thanh Hoa, Nghe An, Dong Nai. In addition, PMU has managed multiple PPP transport projects

PMU2 currently has 69 employees, including 47 staff with university degree; 12 master's degree holders and 02 PhD.

PMU2's staff also have been familiarized with the project's potential environmental issues, impacts and risks as well as mitigation measures and management plan through their engagements during the preparation of the ESIA for CHCIP. PMU arranged and actively took part in field survey and affected community consultation during the preparation of CHCIP safeguard documents including ESIA, RAP and

EMDP. During the FS phase, PMU assigned staff with relevant qualifications to oversee social and environmental aspects of the projects.

PMU2's Environmental Officer has background in environmental technology with seven years of work experience at the PMU. She has also participated in training courses on environmental impact assessment, monitoring and supervision. She is also knowledgeable about environmental management system ISO 14001. She reviewed road safety reports and took part in the evaluation about various road and safety campaigns. Particularly, she monitored the preparation of environmental survey and impact assessment report. During the preparation of CHCIP ESIA preparation, she has reviewed the draft reports.

PMU's Social and Resettlement Officer. The project is not the first WB-finance project which implemented by PMU; however, regulations and procedures of WB have been updated over the time. Therefore, PMU's staffs need to have supplement training during the construction and operation phase.

6.5.2 Safeguard Capacity Building Program

PMU2's gap in practical construction safeguard management experience will be addressed by the mobilization of CSC who will also oversee environmental supervision during construction phase.

Prior to construction commencement PMU2 should organize Kick-off Training/Workshop (one for priority section and one for non-priority section) with participants of all parties. In the workshop, the leader/representatives and Site manager and Social-Environmental Staff of all Contractors, CSC (Engineer and Social/Environment Staff) are compulsory to attend. Specific guidance, opinion, CESMP requirement, Inspection etc. will be clearly delivered to all. CSC can prepare some presentation/guidance to discuss with contractor. Main objective is that basic requirement on CESMP from preparation to implementation/ monitoring should be agreed. Representative of local authorities (district level) can be invited also. Table 66 below provides a proposed training program covering the Safeguards Policies.

Table 66 Proposed Safeguards Policies Training

Trainees	**CONTRACTORS, LOCAL AUTHORITIES**
Topic	Safeguard Policies, Procedure and Implementation
Participants	Leader/representatives and Site manager and Social-Environmental Staff of all
Training frequency	One month prior to construction commencement
Duration	Full day training
Responsibility	CSC Environmental and Social Officer
Trainees	**CONTRACTORS**
Topic	CESMP specifically to construction contract packages
Participants	Contractor's workers
Training frequency	Within two weeks since construction commencement
Duration	A half of day training
Responsibility	CSC Environmental and Social Officer
Trainees	**COMMUNITIES ALONG THE NEW BYPASSES**

Topic	Traffic safety, safe driving
Participants	Residents along the new An Khe and Pleiku bypasses
Training frequency	During construction phase, at least three months before road technical
Duration	One session to each community
Responsibility	CSC Environmental Officer

6.6 Cost Estimation

Table 65 below provides estimated cost in implementing ESMP and will include (i) the costs of implementing mitigation measures by the contractor, (ii) expenses supervised by CSC, (iii) cost of environmental quality monitoring, (iv) cost of the independent environmental monitoring consultant (IEMC), (v) the cost of capacity building program, (vi) the cost of making detailed ESMP prior to construction. The costs of implementing mitigation measures during construction will be a part of the value of construction contracts and the costs of environmental supervision of CSC will be a part of the value of construction supervision contracts. Besides, cost to build capacity for environmental management is performed by IEMC will be calculated into the total cost of the independent environmental monitoring.

Table 67 Total Estimated Cost for Implementing ESMP

No.	Items	Unit	Quantity	Unit price (VNĐ)	Total amount (VNĐ)
1	Compensation and resettlement for affected households				362,000,000,000
2	UXO Clearance				6,567,032,960
3	Costs for repair/upgrading of existing local roads, bridges and construction of access roads to construction sites				50,555,392,712
4	Mitigation measures implementation	As a part of construction contracts values			
5	Environmental compliance monitoring	As a part of construction supervision contract value			
6	Environmental quality monitoring				985,525,256
		(as part of construction supervision contract)			
7	Training on HIV /AIDS for the workers	Sites	15	20,000,000	300,000,000
		(as part of construction supervision contract)			
8	Training on traffic safety for communities along the bypasses	Lumpsum			132,000,000
		(as part of construction supervision contract)			
	Independent monitoring incl:				775,000,000
	Environmental supervision	Trip	5	60,000,000	300,000,000

No.	Items	Unit	Quantity	Unit price (VNĐ)	Total amount (VNĐ)
9	Social supervision	Trip	5	60,000,000	300,000,000
	Kick-off workshop	Lumpsum	1	200,000,000	200,000,000

6.7 Grievance Redress Mechanism

Within the Vietnamese legal framework, citizen rights to complain are protected. As part of overall implementation of the project, a grievance redress mechanism (GRM) will be developed by the PMU with responding procedures, responsible persons and contact information. It will be readily accessible to ensure that grievances shall be handled and resolved at the lowest level as quickly as possible. The mechanism will provide a framework within which complaints about environmental and safety issues can be handled, grievances can be addressed, and disputes can be settled promptly. The GRM will be in place before construction commencement.

Onsite complaint addressing procedure

During construction, the GRM will be managed by the contractors under supervision of the CSC. The contractors will inform the affected communities and communes about the GRM availability to handle complaints and concerns about the project. This will be done via the community consultation and information disclosure process under which the contractors will communicate with the affected communities and interested authorities on a regular basis. Meetings will be held at least quarterly, monthly information brochures will be published, announcements will be placed in local media, and notices of upcoming planned activities will be posted, etc.

All complaints and corresponding actions undertaken by the contractors will be recorded in project safeguard monitoring reports. Complaints and claims for damages could be lodged as follows:

- Verbally: direct to the CSC and/ or the contractors' safeguard staff or representatives at the site offices.
- In writing: by hand-delivering or posting a written complaint to specified addresses.
- By telephone, fax, e-mails: to the CSC, the contractors' safeguard staff or representatives.

Upon receipt of a complaint, the CSC, the contractors' safeguard staff or representatives will register the complaint in a complaint file and maintain a log of events pertaining to it thereafter, until it is resolved. Immediately after receipt, four copies of the complaint will be prepared. The original will be kept in the file, one copy will be used by the contractor's safeguard staff, one copy will be forwarded to the CSC, and the fourth copy to the PPMU within 24 hours since receipt of the complaint.

Information to be recorded in the complaint log will consist of:

- The date and time of the complaint.
- The name, address, and contact details of the complainant.
- A short description of the complaint.
- Actions taken to address the complaint, including contact persons and findings at each step in the complaint redress process.
- The dates and times when the complainant is contacted during the redress process.

- The final resolution of the complaint.
- The date, time, and manner the complainant was informed thereof.
- The complainant's signature when resolution has been obtained.

Minor complaints will be dealt with within one week. Within two weeks (and weekly thereafter), a written reply will be delivered to the complainant (by hand, post, fax, e-mails) indicating the procedures taken and progress to date.

The main objective will be to resolve an issue as quickly as possible by the simplest means, involving as few people as possible, and at the lowest possible level. Only when an issue cannot be resolved at the simplest level and/ or within 15 days, will other authorities be involved. Such a situation may arise, for example, when damages are claimed, the to-be-paid amount cannot be resolved, or damage causes are determined.

Official GRM as Gov's regulation

Grievance Redress Mechanism for affected person who lose means of income/livelihoods, are summarized in the Table 68 below.

Table 67 Grievance Redress Mechanism

First Stage – Ward/Commune People's Committee (WPC):	PAP may submit their complaint – either in written or verbal, to the office of the Ward/Commune People's Committee. W/C PC will receive the complaints and will notify the W/C PC leaders of the complaint. The Chairman of the W/C PC will meet the complainant in person and will solve it within 15 days following the receipt of the complaint.
Second Stage – City/District People's Committee (C/DPC)	After 15 days since the submission of the complaints, if the aggrieved person does not have any response from the W/C PC, or if the aggrieved person is not satisfied with the decision taken on his/her complaint, the PAP may take the case, either in written or verbal, to the Reception Unit of City/District People's Committee. The City/District People's Committee will have 30 days since the date of receipt of the complaint to resolve the case. The City/District People's Committee will register all the complaints submitted and will inform the District Board for Compensation and Land Acquisition of the City/District PC's resolution/assessment results. Aggrieved person may elevate the case to the Courts of Law if they wish.
Third Stage – Provincial People's Committee):	After 30 days, if the aggrieved PAP does not hear from the City/District PC, or if the PAP is not satisfied with the decision taken on his/her complaint, the PAP may escalate the case, either in writing or verbal, provincial People's Committee, or lodge an administrative case with the City/District People's Court for resolution. The provincial PC will have 45 days to resolve the complaint to the satisfaction of all the concerned. The provincial PC secretariat is also responsible for registering all complaints that are submitted. Aggrieved person may elevate the case to the Courts of Law if they wish

Final Stage - Courts of Law:	After 45 days following the submission of the complaint at provincial PC, if the aggrieved PAP does not hear from the provincial PC, or if PAP is not satisfied with the decision taken on his/her complaint, PAP may take the case to a Courts of Law for adjudication. Decision by the court will be the final decision. Decision on solving the complaints must be sent to the aggrieved PAPs and concerned parties and must be posted at the office of the People's Committee where the complaint is solved. After 3 days, the decision/result on resolution must be made available at ward level and after 7 days at the district level.

The World Bank's Grievance Redress Service

Communities and individuals who believe that they are adversely affected by a WB-financed project may submit complaints to the available project-level grievance redress mechanism or the WB's Grievance Redress Service (GRS). The GRS will ensure that complaints received are promptly reviewed to address project-related concerns. The affected communities and individuals of the project may submit their complaints to the WB's independent Inspection Panel that will determine whether harms occurred, or can occur, because of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the WB's attention, and the Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit www.worldbank.org/grs. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

7. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

7.1 Consultation Process

According to the World Bank's Environmental Assessment Policy (OP / BP 4.01) and Involuntary Resettlement Policy (OP / BP 4/12), the project has conducted public consultation and information disclosure to the affected people and local authorities on the environmental and social issues during the project preparation. The public consultation during the preparation of the project's ESIA also complies with the requirements in the Government's Decree No. 18/2015/ND-CP dated 14 February 2015 on environmental protection planning, strategic environmental assessment, environmental impact assessment and environmental protection plan, and Circular No. 27/2015/TT-BTNMT dated 29 May 2015 of the Ministry of Natural Resources and Environment on strategic environmental assessment, environmental impact assessment and environmental protection plan. The objectives of public consultation for this ESIA are: (i) to share all information related to the investments to be supported under the project to local community and stakeholders, including potential environmental and social impacts associated to project's activities, mitigation measures, management plan; and (ii) to gather opinions/comments and concerns from local authorities and the communities on site specifics and environmentally sensitive issues in the project area, especially matters that the environmental assessment impact consultant has not been aware of. On such basis, the concerns and suggestions of the local communities are addressed appropriately in the ESIA and the project design options.

7.1.1 Consultation with Local Authorities at Communes and Town Level

In implementing the Vietnam Law on Environmental Protection 2014 and the World Bank's OP4.01 Policy, representative of the Project Owner – the PMU2 has sent the official document no. 809/PMU-DA1 dated on 16/8/2016 to the People's Committees of communes and district towns on the public consultation process conducted during the development of the ESIA report for the Central Highland Connectivity Improvement Project. The recipients include:

- Pleiku City (Gia Lai Province): Gao, Chu H'Drông, Chu A, An Phu communes.
- Duc Co District (Gia Lai Province): Ia Nan commune, Chu Ty township, Ia Pnon commune, Ia Krieng, Ia Kla, Ia Krêl, Ia Dom and Ia Din communes.
- Chu Prong District (Gia Lai Province): Binh Giao, Bau Can, Thang Hung communes.
- Dak Doa (Gia Lai Province): Dak Doa town, Ia Bang, Glar, Ia Bang, K"Dang, A Dok and Tan Binh communes.
- Mang Yang District (Gia Lai Province): Kon Dong town, Dak Djrang commune
- Dak Po District (Gia Lai Province): Tan An, Cu An communes.
- An Khê Provincial Town (Gia Lai Province): Song An, Thanh An, An Phuoc, Ngo May and An Binh wards and communes
- Tay Son District (Binh Dinh Province): Tay Thuan and Tay Giang communes.

7.1.2 Consultation with Local Communities

PMU2 has collaborated with the People's Committees of the Communes/Townships in the project areas to organize consultation meetings with the relevant organizations and the local communities about the content of the project, the potential positive and negative environmental and social impacts associated with project activities and the proposed mitigation measures. The consultation meetings were held in August and December 2016 during the FS and May and June 2020 during the DDD. Participants in the

consultation meetings are representatives of the investment owner, the local authorities, the FS, DDD and ESIA consultants and the affected communities.

The contents discussed at the consultation meetings are of the following (i) Dissemination of the project information and maps on the construction work in the commune; (ii) Presenting the positive and negative environmental impacts of proposed project activities; (iii) Proposing mitigation measures for social and environmental impacts. The local authorities and affected people have provided their views on the environmental and social issues and their comments are provided in Table 69.

Table 69 Consultation Meetings with Local Organizations

Date	Meeting location, Total number of participants /Women/ Ethnic Minority people	Participation
Gia Lai Province		
17/8/2016	Gao Commune's People Committee, Pleiku City 10/1/5	- Vice Chairman of CPC, Chairman of Father Front Land, Women Union, Farmer Union and Veteran Union, Head of the commune health station - Representatives of local affected residents in group 4, A Village
19/8/2016	Chu A Commune's People Committee, Pleiku City 7/2/0	- Chairman's of CPC, Father Front Land, Youth Union Leader, Head of the commune health station, cadastral land registration officer - Representatives of local affected residents: Village 1 and 2.
18/8/2016	Chư Hdrong Commune's People Committee, Pleiku City, 9/2/3	- Chairman's of CPC, Father Front Land, Women Union, Farmer Union, Veteran Union, Youth Union Leader. - Representatives of local affected residents: Village Heads of Ham Rong, Chăm Nerh, Ngol Tả
22/8/2016	An Phu Commune's People Committee 10/5/0	- Chairman's of CPC, Father Front Land, Women Union, Farmer Union, Veteran Union, Youth Union Leader. - Representatives of affected households.
18/8/2016 and 15/12/2016	Đăk Đoa Township's People Committee, Đăk Đoa district 26/05/10	- Chairman of CPC, Vice Chairman of CPC, Chairman's of Father Front Land, Women Union, Veteran Union, Farmer Union, Youth Union Leader, Deputy head of the commune health station; - Representatives of local residents: village heads of Piơn, Klok and affected households of Piơn, Klok village in group 1, 2, 3, 4, 5, 7.

Date	Meeting location, Total number of participants /Women/ Ethnic Minority people	Participation
19/8/2016 and 17/12/2016	K'Dang Commune's People Committee, Đăk Đoa District 26/03/10	- Chairman and Vice Chairman of CPC, Chairman of Father Front Land, Youth Union Leader, Farmer Union Chairman, Women Union, veterans, urban officer, commune health officer; - Representatives of residents: village heads of Cau Vang, Aluk village and affected households in Cau Vang, Aluk, Cay Điep and Ha Long 2 villages.
18/8/2016 and 28/12/2016	Ia Băng Commune's People Committee, Đăk Đoa District 24/03/01	- Chairman of CPC, Chairman of Father Front Land, Youth Union Leader, Chairwoman of Women Union, cadastral land registration officer, commune health officer; - Representatives of residents: village head of Ia Klai and affected households in Ia Klai village and Village 5.
19/8/2016 and 20/12/2016	Adơk Commune's People Committee, Đăk Đoa District 15/01/10	- Vice Chairman of CPC, Chairman's of Father Front Land, Farmer Union Chairman, Women Union, Veteran Union, Farmer Union Vice Chairman, cadastral land registration officer; Youth Union Leader, - Representatives of residents: village head and affected households at Piơng, Djrông, Broch 1, Biatih 1, Biatih 2 villages
20/8/2016 and 19/12/2016	G'Lar Commune's People Committee, Đăk Đoa District 17/01/15	- Chairman and Vice Chairman of CPC, Chairman's of Father Front Land, Farmer Union, Women Union, Youth Union Leader, Head of Commune Health Station; - Representatives of residents: village head and affected households of Tươh Ktu, Tươh Klah, Bối, Bái villages
17/8/2016	Binh Giao Commune People's Committee, Chư Prong District 8/2/2	- Vice Chairman of CPC, Chairman's of Father Front Land, Farmer Union, Women Union, Head of Commune Health Station. - Representatives of local affected residents: Tân Lạc, Thanh Bình villages
26/8/2016	Ia Nan Commune People's Committee, Duc Co District 8/2/1	- Vice Chairman of CPC, Chairman's of Father Front Land, Farmer Union, Women Union, Veteran Union, Youth Union Leader, Head of Commune Health Station, cadastral land registration officer, affected households.
17/8/2016	Chư Ty Township People's Committee, Duc Cơ District 9/4/0	- Chairman of CPC, Chairman's of Father Front Land, Farmer Union, Women Union, Youth Union Leader, Head of Commune Health Station, commune police. - Representatives of residents: affected households
24/8/2016	Ia Pnôn Commune, Duc Co district 8/6/6	- Vice Chairman of CPC, Vice Chairman of Father Front Land, Chairwoman of Women Union, Chairman of Farmer Union, commune police - Representatives of affected households.

Date	Meeting location, Total number of participants /Women/ Ethnic Minority people	Participation
23/8/2016	IaKrieng Commune People's Committee, Duc Cơ District 10/0/1	- Chairman of CPC, Chairman's of Father Front Land, Farmer Union, Youth Union Leader, cadastral land registration officer. - Representatives of local affected residents: Village heads of Thanh Tân, Thanh Giáo, Ia Lâm, Ia Lâm Teek, Ia Kăm villages.
20/8/2016	Ia Kla Commune People's Committee, Duc Co District 4/2/0	- Chairman of CPC, Vice head of Communist Party - Representatives of local affected residents: Chư Bồ 1, Chư Bồ 2 villages
19/8/2016 and 21/12/2016	Ia Krêl Commune People's Committee, Duc Cơ District 16/04/01	- Vice Chairman of CPC, Head of Commune Health Station; - Representatives of local affected residents: village head of Thanh Tân and affected households in Thanh Tân, Thanh Giáo, Ia Lâm Tôk and Ia Lâm villages.
20/8/2016	Dak Djrăng Commune's People's Committee, Mang Yang District 9/4/0	- Vice Chairman of CPC, Chairman of Father Front Land, Chairman of Women Union, Farmer Union, Head of Commune Health Station, commune officer. - Representatives of local affected residents: Tân Phú and Hà Ra villages.
22/8/2016 and 26/12/2016	Cu An Commune's People's Committee, Đăk Pơ District 31/05/0	- Vice Chairman of CPC, Chairman of Father Front Land, Women Union, Cadastral land registration officer – environment, commune officer; - Representatives of local residents: affected households of An Bình, Hiệp Phú and An Sơn villages.
22/8/2016 and 23/12/2016	Song An Commune's People's Committee, An Khe District 26/07/0	- Chairman of CPC, Vice Chairman of CPC, Chairman of Father Front Land, Vice Head of Communist Party, Farmer Union Chairman, Chairwoman of Women Union, cadastral land registration officer; - Representatives of local residents: affected households of An Thượng 2, An Thượng 3 and Thượng An 1 villages.
22/8/2016 and 23/12/2016	Thanh An Commune's People's Committee, An Khe District 37/11/0	- Vice Chairman of CPC, Chairman of Father Front Land, Head of Communist Party, Youth Union Leader, Vice Chairwoman of Women Union, Farmer Union Chairman, Veteran Union, Cadastral land registration officer, Head of Commune Health Station; - Representatives of local residents: affected households in Village 2 and 6

Date	Meeting location, Total number of participants /Women/ Ethnic Minority people	Participation
22/8/2016 and 22/12/2016	An Phuoc Commune's People's Committee, An Khe Town 24/02/0	- Chairman and Vice Chairman of CPC, Chairman of Father Front Land, Youth Union Leader, Chairwoman of Women Union, Farmer Union, Veteran Union, Cadastral land registration officer, Head of Commune Health Station; - Representatives of local residents: village head of village 1 and affected households of group 1 and 2.
22/8/2016 and 22/12/2016	Ngo May Commune's People's Committee, An Khe town 22/9/0	- Chairman of CPC, Vice Chairman of CPC, Chairman of Father Front Land, Women Union, Farmer Union, Veteran Union, Cadastral land registration officer, Head of Commune Health Station, Youth Union Leader; - Representatives of local residents: affected households of village 1, 2, 3, 4, and 6.
22/8/2016 and 23/12/2016	An Binh Commune's People's Committee, An Khe town 35/07/01	- Vice Chairman of CPC, Vice Head of Communist Party, Chairman of Father Front Land, Farmer Union Chairman; - Representatives of local residents: affected households of Hiệp Phú village at group 4, 5, 7, 10.
20/8/2016	Kon Dơng township People's Committee, Mang Yang District 9/4/0	- Chairman of CPC, Chairman of Father Front Land, Women Union, Farmer Union, Veteran Union, Youth Union Leader, Head of Commune Health Station, cadastral land registration officer. - Representatives of local affected residents: Village head 1
22/8/2016	Tay Son Commune People's Committee, An Khe Town 9/2/0	- Chairman of CPC, Chairman of Father Front Land, Women Union, Farmer Union, Veteran Union, Youth Union Leader. - Representatives of local affected residents: Group 5,6,7
18/12/2016	Tân Bình Commune People's Committee, Đắc Đoa District 8/2/0	- Chairman of CPC, commune officer. - Representatives of local residents: Village head 1, 2 and some affected households
2/3/2017	Thanh An commune	- Representatives of affected households and commune's PC
3/3/2017	K'Dang commune	- Representatives of affected households and commune's PC
5/3/17	Đak Djrang commune	- Representatives of affected households and commune's PC
4/3/2017	Ia Bang commune	- Representatives of affected households and commune's PC
8/3/2017	Ia Krel commune	- Representatives of affected households and commune's PC
Binh Dinh Province		

Date	Meeting location, Total number of participants /Women/ Ethnic Minority people	Participation
22/8/2016	Tay Giang Commune People's Committee, Tay Son District 10/1/0	- Chairman of CPC, Chairman of Father Front Land, Women Union, Farmer Union, Veteran Union, Youth Union Leader, Head of Commune Health Station. - Representatives of local affected residents of Thượng Giang 1, Thượng Giang 2, Tả Giang 1, Tả Giang 2 villages
22/8/2016	Tay Thuan Commune People's Committee, Tay Son District 8/1/0	- Chairman of CPC, Chairman of Father Front Land, Farmer Union, Veteran Union, Youth Union Leader. - Representatives of local affected communities of Trung Sơn and Thượng Sơn villages.
2-4/3/2017	Tay Giang and Tay Thuan People's Committee, Tay Son District	- Representatives of affected households and commune's PC

The consultation activities will be continued during the project's pre-construction and construction phases.

7.1.3 Consultation at Provincial Level

The consultation meeting on the project, including the environmental and social issues was organized in Pleiku City on January 18, 2017. This meeting received the participation of representatives from the local authorities of some townships and communes, MOT, PMU, the FS consultants, the environmental and safeguard consultants, and the World Bank task team. Most of the comments focused on the scope and scale of the project investment. The feedback confirms that the project investment is necessary to ensure traffic safety and boost up the socioeconomic growth of the localities. Besides, there are some suggestions for additional investment items in the project scope such as (1) Gia Lai DOT proposed that the section between Km155 and Km160 to be expanded into an urban standard road; (2) Binh Dinh DOT proposed an additional investment for a bypass for Phu Phong township. In addition, the vice-chairman of An Khe Town People's Committee confirmed that the forest within the vicinity of the bypass is a plantation land managed by households renting the land in the area. There are no significant physical cultural and historical resources in the proposed project area. The local governments were asked to provide support to the consultants in field survey and identification of construction material quarries and disposal sites so that they can finalize the report during the project preparation stage.

7.2 Feedback Receive from Public Consultation during FS Stage

7.2.1 Responses from Commune/Town People's Committees

The People's Committees of the relevant communes have received the official document No.09/PMU-DA1 dated on 16/8/2016 from the Project Management Unit for Traffic Safety informing on the key investment items, environmental issues and environmental protection solutions. Based on this correspondence, the relevant documents and the dialogue between the investment owner, leaders and officers of the localities, the People's Committees have reviewed and sent their responses in writing to the project's investment owner. Consolidated feedback from the PCs is presented in Table 70 below.

Table 68 Responses from People's Committees of Communes, Wards and District Towns

Commune/ Ward/District Towns	Responses from People's Committees of Communes, Wards and District Towns in the project area		
	On potential impacts	**On mitigation measures to mitigate the potential impacts**	**Recommendations**
Gao Commune - Pleiku City- Gia Lai Province	- Dust polluti on affecting households near the project construction site - Traffic	- Pay attention to reduce dust by watering. - Implement mitigation measures as committed in the report and regulations.	- Assign traffic control person to regulate the traffic in the area of influence by construction work.
Chư Á Commune - Pleiku City - Gia Lai Province	- Impacts on the surrounding air, water and soil environment	- Mitigation measures should be implemented as proposed in the project ESIA.	- It is recommended that occupational and traffic safety is to be ensured throughout the construction phase. - Ensure the construction meet the progress timeline.
Chư H'Đrông Commune, Pleiku City	- Impacts on air environment, noise	- Having effective measures to reduce dust (on site watering, covered trunks of materials transportation vehicles) - The construction should be implemented in a successive and fast manner.	- Implement the environmental protection regulations - Implement the mitigation measures as specified in the ESIA
An Phu Commune - Pleiku City - Gia Lai Province	- Impacts on the surrounding environment such as soils, water, air and noise…	- Mitigation measures should be implemented as committed in the project ESIA.	- It is recommended that traffic safety and occupational safety is to be ensured throughout the construction phase. - Ensure the construction meet the project timeline.
- Đak Đoa township - Đak Đoa District - Gia Lai Province	- Agreed with the negative impacts in the ESIA sent to the commune	- Agreed with the mitigation measures proposed in the project's ESIA	- Implement the propose mitigation measures - Attention given to the construction work in rainy season, affecting traffic safety - Need segregate traffic lane ensure traffic safety during the construction period.

Commune/ Ward/District Towns	Responses from People's Committees of Communes, Wards and District Towns in the project area		
	On potential impacts	**On mitigation measures to mitigate the potential impacts**	**Recommendations**
K'Dang, Đắk Đoa District	- Agreed to have the project - Attention given to house cracking issue, local access road, water drainage ditch	- Need to apply appropriate compensation policy for affected households	- Limit the construction activities during people's rest hour - Ensure the traffic connectivity of the local access road, upgrade the drainage ditches and culverts - Ensure water drainage as a result of project activities
Ia Băng Commune, - Đak Đoa District	- Impact on the surrounding environment such as air and noise - Related impacts from construction worker's gathering and impact from material transportation	- Having effective measure to reduce dust (on site watering, covered trunks of material transportation vehicles) - Register with the local authority on the temporary residency for the workers as per Government regulation	- Provide advance notice to the local authority on the construction work in the area - Address timely the concern of local people; provide appropriate compensation to the affected households.
Adơk Commune, Đắk Đoa District	- Impacts on the surrounding environment such as air and noise	- Construction progressively and as fast as possible - Adopt effective measures for dust suppression	- Implement the environment protection regulations - Implement mitigation measures as specified in the ESIA
Glar Commune, Đắk Đoa District	- Impacts on the surrounding environment such as air and noise and vibration - Vehicle transportation of construction	- Suppress dust by watering - Use equipment to minimize noise - Cover vehicles transporting materials - Provide compensation, support and resettlement in accordance with the regulations	- Pay attention to mitigation of impacts on the surrounding environment such as, air and noise, and vibration - Mitigate the impacts due to vehicle transportation of construction materials

Commune/ Ward/District Towns	Responses from People's Committees of Communes, Wards and District Towns in the project area		
	On potential impacts	**On mitigation measures to mitigate the potential impacts**	**Recommendations**
Binh Giao - Chu Prong District - Gia Lai Province	- Impacts on air quality, fugitive dust, and wastewater should be reduced by appropriate mitigation measures.	- Implement adequately the mitigation measures as specified in the ESIA	- Impacts on air quality, fugitive dust, and wastewater should be reduced by appropriate mitigation measures.
Ia Nan commune - Đuc Co District - Gia Lai Province	- Agreed with the environmental impacts identified in the ESIA	- Agreed with mitigation measures as specified in the ESIA.	- Agreed with the environmental impacts identified in the ESIA.
Chu Ty town - Duc Co District - Gia Lai Province	- Impacts on the surrounding environment such as, air, vibration and noise - Impacts on traffic safety. - Impacts from solid waste, waste generated from worker camp, construction machineries and equipment.	- Implement construction fast and successively - Proper finish and recover the construction site, site cleaning to ensure environment and sanitation - Assess the housing structures of local houses to avoid complaints on the house cracks during construction.	- To have appropriate mitigation measures for potential impacts on the surrounding environment such as, air, vibration and noise - Ensure traffic safety. - Need to have mitigation measures to minimize impacts from solid waste, waste generated from worker camp, construction machineries and equipment. - Consult carefully with local authority and communities for suitable site of workers' camp - Register workers residence with local authority.
Ia Pnon Commune - Đuc Co District - Gia Lai Province	- Agreed with the environmental impacts identified in the ESIA. - Impacts on security of the area during construction period.	- Suppress dust by on site watering during the construction. - Register the temporary residency for workers.	- Implement the construction fast and successively and ensure the traffic safety. - The trucks transporting materials should be covered to minimize dust emission.

Commune/ Ward/District Towns	Responses from People's Committees of Communes, Wards and District Towns in the project area		
	On potential impacts	**On mitigation measures to mitigate the potential impacts**	**Recommendations**
Ia Kriêng Commune - Đuc Co District - Gia Lai Province	- Impacts on air environment. - Impacts due to workers gathering	- Implement the mitigation measures as proposed in the ESIA.	- Ensure traffic safety - Register temporary residency for workers with the local authority.
Ia Kla Commune - Đuc Co District	- Agreed with the environmental impacts identified in the ESIA.	- Implement the mitigation measures appropriately as proposed in the ESIA.	- Compensate adequately (if feasible). - Implement the construction activities as fast as possible.
Ia Krêl Commune - Đuc Co District - Gia Lai Province	- Noise pollution impacts on nearby households during the construction period. - Site clearance cause socio-economic impacts.	- Agreed with the environmental mitigation measures proposed in the ESIA.	- Apply appropriate measures to mitigate negative impacts to the environment and routine activities of the local people. - Need the project's commitment to implement the construction in accordance to the procedures and the regulations.
Đắk DJ rang Mang Yang District	- Impacts on air environment, noise and vibration - Impacts to traffic safety on NH19	- Suppress dust by on site watering during the construction in dry and hot days - Carry out construction activities as fast as possible	- Coordinate with local authority during construction period - Register temporary residency and temporary leave for the workers with local authority
Tan An Commune - Đak Po District - Gia Lai Province	- Impacts on air environment by dust and noise. - Impacts due to disposal soil materials during construction.	- Agreed with the environmental mitigation measures proposed in the ESIA. Request the contractor to implement the committed measures fully. - Assign a traffic control person	- Request that the contractor dispose soil waste at proper site with agreement from the local authority and community. - Suppress dust by on site watering during the construction in dry and hot days.

Commune/ Ward/District Towns	Responses from People's Committees of Communes, Wards and District Towns in the project area		
	On potential impacts	**On mitigation measures to mitigate the potential impacts**	**Recommendations**
Cu An Commune - Đak Po District	- Construction activities cause impacts on daily routine of the local people. - Impacts due to noise, dust, vibration and traffic safety.	- Suppress dust by on site watering during the construction in dry and hot days. - Assign traffic control person to assist traffic routing in NH19.	- Register temporary residency and temporary leave for the workers and people coming from other places with local authority. - Comply with the Law on Environmental Protection - Construct as fast as possible
Song An Commune - An Khe Provincial Town - Gia Lai Province	- Impacts on air environment due to noise and dust. - Agreed with the impacts listed in the ESIA.	- Agreed with the environmental mitigation measures proposed in the ESIA.	- Request that the project is implemented soon. - Construct in progressive manner and water regularly to reduce fugitive dust. - Implement the mitigation measures as specified in the ESIA.
Thanh An Commune – An Khe Provincial Town - Gia Lai Province	- Impacts on air environment (dust). - Deposited soils, gravels during transportation process. - Deposited and buried soils/ gravels to the low agriculture land	- Water regularly to reduce fugitive dust and impacts to local people - Transport residual soils to the gathering as accordance to the regulations.	-Site clearance, compensation and resettlement according to the regulations - Implement mitigation measures per regulations.
An Phuoc Ward – An Khe Provincial Town - Gia Lai Province	- Basically agreed with the contents of the report.	- security and socioeconomic conditions during the project.	- Compensation and construction are implemented in compliance with regulations; Properly finish the site.

Commune/ Ward/District Towns	Responses from People's Committees of Communes, Wards and District Towns in the project area		
	On potential impacts	**On mitigation measures to mitigate the potential impacts**	**Recommendations**
Ngo May Ward – An Khe Provincial Town - Gia Lai Province	- Impacts on traffic activities and daily life of local households in the project vicinity. - Dust, noise and vibration impacts during construction period	- The contractor is required to implement the committed environmental mitigation measures	- During construction period, if cracks, soil subsidence to the local houses happen, it is requested that the project coordinate with the local authority and community to resolve the issues.
An Binh Ward, An Khe Provincial Town	- Impacts on the business activities and daily life of local people during the road surface layering (short-term); - Impacts on traffic safety and traffic on NH19 route.	- Construct in fast and successive manner ensuring traffic safety along NH19 route. - Assign a traffic control person to assist traffic and install warning sign. line.	- Implement the mitigation measures as proposed in the ESIA. - Comply with the Law on Environmental Protection.
Tay Thuan Commune - Tay Son District – Binh Dinh Province	- Impacts on air environment caused by dust and noise pollution - Traffic safety issues.	- Implement the compensation policies and site clearance according to the regulations. - Implement the mitigation measures as proposed in the ESIA.	- Coordinate with the local authority during the construction period. - Register temporary residency and temporary leave for the workers with local authority

7.2.2 Feedback from Local Communities and Mass Organizations

The consultation meetings were organized with the participation of representatives from the Project Management Unit for Traffic Safety (now PMU2), the ESIA consultants, the leaders and officers of the local authorities, representatives from the Father Front Land and the affected communities in order to collect their feedback on the project and on the related environmental issues. Consolidated feedback from local communities is summarized in Table 71 below.

Table 69 Feedback from Community Representatives

Commune/ Ward/ Town	Feedback from the Local Communities
Đak Đoa District Town- Đak Đoa District - Gia Lai Province	- Expanding the NH19 section running through Dak Doa district town is necessary because the section has narrow cross-section, is downgraded and no longer meets the travel needs of vehicles and people in the area. The construction period can affect business/ small trading activities, living and travelling of the local people if the contractor does not implement traffic routing, flagging and alternative/temporary pass for the local people living along the roadsides. - Request that the contractor to implement traffic routing, assign a person as a traffic controller and place warning signs to ensure traffic safety in the vicinity of the construction site. - Local households living along the roadsides might suffer from dust and vibration when the road is expanded. The contractor is required to have appropriate solutions to ensure environment and sanitation. - It is required that the contractor construct in a fast and neatly manner, not blocking the access road by machineries and construction materials.
Tan An Commune - Đak Pơ District - Gia Lai Province	- NH19 running through Tan An commune does not meet the current travel needs of local people as traffic flow increases. Therefore the upgrading and expansion of NH19 are necessary. During the implementation of the project, there might be impacts on air environment, dust and traffic safety as the road will be in operation at the same time with the upgrading process. Thus the contractor is requested to properly implement the environmental protection measures as proposed in the ESIA. - During the upgrading of NH19, some environmental, traffic and security issues will not be avoidable. The contractor is required to ensure the traffic flow of vehicles on NH19, not affecting business/trading activities of local households living along the roadsides. - The contractor is required to have a detailed construction plan. The construction work should be conducted in a successive way, not taking up on the transport corridor. Warning signs, flaggers and lighting should be provided. - Compensation due to land acquisition on NH19 is negligible in the commune as most households comply with the regulations, not occupying the transport corridor. However, the project information and land inventory should be made publicly available and the land acquisition and site clearance need in compliance with the Government regulations. - The investment owner/ contractor is suggested to study the option of making a drainage ditch along the residential area, provide street lighting if necessary and

Commune/ Ward/ Town	Feedback from the Local Communities
Binh Giao commune - Chư Prông District - Gia Lai Province	- Completely agreed with the content of the ESIA presented by the project's investment owner. - During the construction period, the contractor needs to pay attention to the traffic safety issues - The investment owner needs to finish the construction completely; avoid prolonged work that affects local people's travel and daily life. - Pay attention and have measures to mitigate project impacts on business activities of local households in the vicinity of the project. - The project might cause noise, dust and vibration impacts that need appropriate mitigation measures. - Material transportation vehicles need to be safely covered to avoid dropping materials along the way. - It is required that the investment owner complies with the environmental mitigation measures. - Prior to the construction, the project needs to properly conduct field survey and assess the surrounding environment. - During construction period, if soil subsidence and house cracks happen, corrective actions need be taken to minimize the loss of local people's properties.
Gao commune- Pleiku City - Gia Lai Province	- The community are supportive to the project - There will be dust pollution that needs to have appropriate mitigation measures such as watering or covering of materials during the construction period. - Collaborate strongly with the local authority during the project implementation. - Ensure traffic safety; assign a traffic control officer, place warning signs clearly. - Register temporary residency of incoming workers with the local authority. - Keep the construction site clean and sanitation at the minimum requirements, preventing the workers and local people in the area from infection diseases. - Manage the workers well, avoid social disturbance to the local people - Complete the construction in a successive manner and comply with the state regulations.
Chư Ty District Town – Duc Co District - Gia Lai Province	- Agreed with the project information - During the construction, gathering of materials should be in appropriate places. - Wastewater treatment should be conducted in accordance with the right procedures. - Minimize the noise, dust and vibration impacts. Mitigation measures should be put in place such as watering. - Employ local construction workers to minimize workers coming from other places that might cause social disturbance and security upset to the local community. - Register temporary residency for workers with the local authority - Proper finish the construction work and recover the surrounding environment

Commune/ Ward/ Town	Feedback from the Local Communities
Ia Pnôn Commune - Duc Co District - Gia Lai Province	- Ensure traffic safety during the construction period. Place warning signs and arrange traffic control person. - Conduct the site clearance as according to the State regulations - Register temporary residency for workers with the local authority. - Construct in progressive manner as per activities timeline, avoiding prolonged work that will result in impacts to local people. - Proper finish the construction work and ensure the surrounding environment is maintained properly as before construction activities take place.
Ia Kriêng Commune - Duc Co - Gia Lai Province	- The investment owner should be implementing the commitments made in the report to minimize the negative impacts to the environment. - Implement the project as committed progress timeframe, avoid prolonged work. - Implement site clearance as according to the regulations; publicize the compensation and support policies - Provide advance notice to the locality for the best collaboration during the construction, especially in the rainy season the construction work might affect the people's travel. - Materials during transportation process need to be covered and not be overloaded. - The project construction work might cause house cracks to adjacent houses to the construction site. Therefore, the investment owner and the contractor are requested to conduct the site survey thoroughly and apply appropriate construction technology. - Agreed with the contents presented in the ESIA. It is requested that the contractor implement the approved ESIA appropriately. - The contractor needs to gather the construction materials into the specified locations as agreed with local authority and community and recover the site after the construction.
Cu An Commune - Dak Po District	- The construction of the road will affect the traffic activities and the transport of passengers and goods. - The locality will enable the project implementation. - Register temporary residency for workers with the local authority. - The project implementation must comply with the government regulations. - Reduce dust pollution by watering in the dry and hot weather - Assign a traffic control person to assist the traffic passing by the construction site. - Select the construction methods that help to minimize the impacts on household businesses and living conditions of local people

Commune/ Ward/ Town	Feedback from the Local Communities
Ia Băng Commune - Đak Đoa District	- Fully implement the environmental mitigation measures as specified in the project ESIA. - If land acquisition is required, there need to be compensation policies in place and implemented as according to the government regulations. - During the construction phase, there will be impacts of dust, noise and air environment. Therefore, the appropriate mitigation measures need to be applied, especially watering regularly to reduce dust. - Collaborate with local authorities to resolve issues emerging during the project implementation. - Recover the site after the construction.
Ia Kla commune- Duc Co District- Gia Lai Province	- Support the project management unit - It is requested that PMU and the investment owner commit to implement the project per the state regulations. - There should be specific mitigation measure to minimize the negative impacts - Ensure traffic safety during the construction, especially at Chu Bo pass where traffic accidents often happen. - Construction implemented as according to the plan and progress timeline. The commune people's committee and local community need to be informed about the construction plan.
Tay Thuan commune – Tay Son District – Binh Dinh Province	- Agreed with the project contents - The contractor should collaborate with the local authorities and community on site clearance work - Register temporary residency for the workers with local authority as per the government regulation - Ensure traffic safety during the construction phase - There should be specific mitigation measure to minimize the dust, noise and vibration impacts, especially reduce dust by watering and covering construction materials - Dispose waste in the appropriate disposal sites as according to the regulations. - Recover the site after the construction.
Song An Commune- An Khe Provincial Town - Gia Lai Province	- There should be specific mitigation measures to minimize the noise and vibration impacts. Agreed with the mitigation measures proposed in the report - It is requested that the project is soon to be implemented - Regular water to reduce dust and ensure traffic safety - The construction sites need to be kept at minimum sanitation standard in order to prevent pollution spread to the surrounding environment - Register temporary residency for the incoming workers and mobilize local workers
Thanh An Commune - An Khe Provincial Town - Gia Lai Province	- Minimize dust and air pollution - Excavated soils should be transported away and disposed at the appropriate disposal sites as according to the regulations - Suggest to water regularly especially during hot and dry days to reduce dust - The transportation vehicles need to comply to the traffic safety rules - Compensation, support and resettlement need to be provided and addressed appropriately to the affected and relocated households. - Maintain the security in the area.

Commune/ Ward/ Town	Feedback from the Local Communities
Thang Loi Ward- Pleiku City - Gia Lai Province	- The work conducted in Thang Loi ward involves only to resurfacing the asphalt layer. Therefore, the project should pay attention to the work guidelines and select the contractor that is complied with the environmental protection regulations. - Ensure traffic safety during the construction work. Assign a traffic control person to assist traffic, making flagging line and place warning signs. - Construct in a fast and progressive manner. Ensure the sanitation and urban landscape requirements. - It is recommended that the project soon to be implemented as in accordance with the contents presented in the ESIA report. - Agreed with the report contents and it is required that the project implementation aligns with the report's content. - The project investment owner should collaborate with relevant state departments to monitor and supervise the work of contractors. - Do not gather the equipment and machineries on the road lanes and pavements
Chư Á Commune – Pleiku City - Gia Lai Province	- Agreed with the EIA report presented by the investment owner - There are households doing business in the vicinity of the project therefore mitigation measures should be applied to reduce the impacts on them - Pay attention to the mitigation of air pollution, dust, noise and vibration impacts during the construction phase - Need to minimize affect to traffic activities - Implement the committed mitigation measures - Work with the local authority before rolling out the construction - If there are issues with house cracks or subsidence during the construction period there need to be effectively corrective measures in place - It is suggested that the project coordinates strongly with the local authority to timely resolve the emerging issues, avoiding complaints from the local people.
Ia Krêl Commune- Duc Co District- Gia Lai Province	- During the construction period, mitigation measures for reducing dust, noise and vibration impacts should be applied and monitored regularly. - Excavated soils should be transported away and disposed at the appropriate disposal sites. - Agreed with the mitigation measures proposed in the report - Ensure traffic safety during the construction phase. - Compensate adequately to the affected and resettled households - Need project's commitment to construct the work quickly in accordance with the project implementation timeline

Commune/ Ward/ Town	Feedback from the Local Communities
An Phươc Ward- An Khê Town - Gia Lai Province	- Need to minimize the resettlement and impacts to the living and livelihood activities of local community, (need to compensate adequately per regulations in case land acquisition is needed) - Ensure environment and sanitation, especially the air environment in order to eliminate the health effects to the local people during the construction period - Minimize noise pollution to ensure it does not affect people's daily life - If vibration impact causes damage to the local houses, compensation per government regulation must be paid to affected household. - Follow technical procedure for waste transportation and disposal at appropriate disposal site - The project is required to provide notice regularly prior to, during and after the construction to the local authority and community so that they are well informed about the construction progress. - Fully register temporary residency for the workers
Ngo May Ward- An Khe Provincial Town- Gia Lai Province	- Compensation cost norm should be considered thoughtfully for the households who are doing business within the vicinity of the project. - Water shortage in dry season should be considered during the project implementation - There are unavoidable environmental impacts and traffic impacts during the project implementation - It is required that the committed mitigation measures will be implemented - Prior to the construction, the project needs to conduct a site survey thoroughly - If cracks are caused to houses adjacent to construction site, and land subsidence happen to the local houses, appropriate correction measures need to be made - Need to pay attention to the needs of recovering the construction site and transportation road after the construction - PMU should coordinate with the local authority to properly address the local complaints throughout the construction phase.
Ia Nan commune – Duc Co District- Gia Lai Province	- The commune is ready to coordinate with the project in doing land acquisition, site clearance and administrative management - Recover the site after the construction - Inform the commune about the specific construction plan throughout the construction phase - There should be mitigation measures for emerging social issues (the area is populated with Cambodians who are doing business and trading) - Generally, the commune agreed with the proposed environmental mitigation measures. The construction should be properly finished. - Ensure the order and security; employ local workers and register temporary residency for workers coming from different places

Commune/ Ward/ Town	Feedback from the Local Communities
An Bình Ward, An Khe Provincial Town	- The investment owner is required to coordinate with the local authority to address issues rising during the construction work. - Assign a traffic control person to assist the traffic. - Minimize dust, noise and vibration impacts during construction phase. - Recover the site environment after the construction - Implement the mitigations measures in accordance with the law and regulations on environmental protection.
K"Dang Commune, Đắk Đoa	- Agreed with the contents of the EIA report. - Restrict the construction work during peak hours to avoid the traffic congestion and impacts to the rest hours of the local people. - The unused soil materials can be transported to the areas where people have a need for backfilling. - Construct quickly, meeting the progress timeline - Have a compensation plan for the affected households - Ensure water drainage capacity of the canal network during the construction period. - If house cracks or subsidence happen, corrective measures need to be applied appropriately. - Recover the site environment and transportation road after the construction
Đắk Djrăng commune, Mang Yang District	- Fully agreed with the contents of the EIA report. - When dust, noise and vibration impacts are unavoidable, affecting the local business and traffic, mitigations measures should be in place to minimize those impacts. - Temporary residency registration for workers should be done - PMU should coordinate with the local authority to properly address the issues emerging during the construction phase. - Construct quickly, meeting the progress timeline. - Suppress dust by watering during dry season - Material transportation vehicles should be covered.
Glar commune, Đắk Đoa District	- The investment owner has presented fully the impacts and the mitigation measures. - The investment owner is required to implement the project as committed in the report. - Register temporary residency for the workers coming from other places. - Project owner should coordinate with the local authority to ensure the social security and properly address the local complaints during the construction phase.
Chư H'Đrông Commune, Pleiku City	- It is hardly to avoid negative impacts to the environment during the construction phase. The project's owner should implement mitigation measures as committed. - Construct quickly, meeting the progress timeline. - Ensure traffic for local people throughout the construction period - Material transportation vehicles should be covered - Project owner should coordinate with the local authority to properly address the local complaints if any during the construction phase. - Return the material transportation route in appropriate condition after construction activities completed.

Commune/ Ward/ Town	Feedback from the Local Communities
Adơk commune, Đắk Đoa District	- Agreed with the presented content of the EIA. - Dust, noise and vibration impacts are unavoidable therefore mitigations measure should be in place to minimize those impacts. - The project's owner is required to pay attention to thee social security issues throughout the construction period - Register temporary residency for the workers coming from other places - Ensure traffic safety during the material transportation process. - If house cracks or subsidence happen, provide corrective actions and adequate compensation to the affected households - Material transportation vehicles should be covered to minimize the material drops in the road creating traffic safety risks. - There should be a plan to recover the site environment after the construction

7.2.3 Responses and Commitments by the Project Owner

The PMU has considered and incorporated the comments from CPC, representatives from mass organizations and local communities into the project design and ESIA report. It clearly mentions the following:

- Regarding the comments to ensure environmental sanitation and public health: The PMU and the contractor will fully implement the mitigation measures specified in the ESIA report. At the same time the project will coordinate with the local authority to disclose publicly the environmental and social impacts and mitigation measures to minimize the impacts of the project to ensure the people in the project areas know about them.
- On the issue of traffic safety: With the aim to reduce traffic congestion, to ensure traffic safety and to prevent community loss and damages due to the transportation of soil materials, the project will adopt the following measures (the details will be presented in chapter 4 of the EIA report)
- Transportation vehicles would conform within the loading capacity and speed limits specified on the transportation route.
- Materials will be covered during the transportation process.
- Coordinate closely with the local authorities of the communes/wards/ district towns to properly address the emerging issues, ensuring the order and security in the area throughout the construction phase.
- With regards to the construction progress: The project will be implemented in accordance with the proposed progress.
- PMU2 (formerly the TSPMU) will ensure the local people in project areas have the access to the public facilities.
- The PMU and the contractor will recover the site environment upon the completion of the construction work.
- Comply with the government regulations and the World Bank Policies in providing adequate compensation and support to the affected households.
- Commit to ensure the water drainage and recover the site environment

- The PMU will direct the contractors to fully implement the committed mitigation measures to minimize the negative environmental impacts as specified in the ESIA.

7.3 Information Disclosure

The final ESIA report has been made publicly available in the project areas prior to the Project's Appraisal so that affected, benefitting, or concerned people can access to it at the end of February 2017. The final ESIA in both English and Vietnamese has been submitted to the World Bank for review and comments. The final ESIA has incorporated the Bank's comments and made available on Bank's website and local communities during April 2017. Equally, updated ESIA/ESMP will be will disclosed in the project areas and in the MOT/PMU2 and WB websites once approved.

7.4 Stakeholder Engagement/Public Consultations during Detailed Design

Another round of stakeholder engagement, public consultations and Free, Prior, Informed Consultation (FPICon) were conducted during the DDD including the Needs Assessment for Women.

Stakeholder Training Workshop. Training Workshop/Consultation in Gia Lai Province was conducted to build understanding and capacity of relevant local authorities in the World Bank safeguard requirements and project implementation and to develop a better understanding about the implementation of the RAP and EMDP along with its implementation requirements and to enhance the capacity of implementing office/agency and local authorities to ensure that the implementation of RAP/EMDP complies with the requirements and safeguards policy of the WB and the GOV. In addition, the Grievance Redress Mechanism (GRM) to address grievances and complaints that may arise during project implementation was discussed. Social impacts, and gender issues/Gender Action Plan (GAP) to address the gender-based differences in the needs, constraints, and opportunities for participation in the development and implementation of the resettlement and EMDP programs was also disseminated and discussed. Further, workshop was carried out to come-up with commitments and agreements, define and clarify the roles and responsibilities of the local authorities in relation to land acquisition and other associated tasks and seek stakeholder input and to highlight any concerns/issues/mitigation strategies into the finalization of safeguards plans. Information was also collected to support updating of the RAP, EMDP and preparation of the Gender Equality and Social Inclusion (GESI) Plan.

Table 71 Stakeholder Training Number of Participants in a Place Disaggregated by Sex, Gia Lai Province

Date	Time	Venue	Number of Participants	
			Male	Female
May 12	2:00PM-5:30PM	Meeting Hall of DONRE, Gia Lai	23	4
May 14	8:30AM-12:00NN	Meeting Hall of Dak Doa District Peoples' Committee	27	7
May 15	8:30AM-12:00NN	Headquarter of Duc Co DPC	25	7
May 16	8:30AM-12:00NN	Headquarter of An Khe town People's Committee	20	10
TOTAL			**95**	**28**

The Training Modules delivered in Vietnamese language were:

Module 1: Project Introduction

Module 2: Objectives and Principles of RAP and EMDP

Module 3: Difference between WB's and GOV policies on Involuntary Resettlement

Module 4: Steps in the Implementation of RAP and WB's Requirements

Module 5: Implementation of EMDP and WB's Requirements

Module 6: Implementation Arrangement, Roles and Responsibilities and the Grievance Redress Mechanism (GRM)/Grievance Redress Committee (GRC)

Module 7: Social Impacts and Gender Issues

Module 8: Gender Action Plan/Gender Equality and Social Inclusion

Public Consultations. Further rounds of Public Consultation were undertaken on June 1-5, 2020 in the coverage areas of the Priority Sections and on June 18-19, 2020 for Non-priority Sections. Likewise, FPICon was held on June 16-17, 2020

The objectives of the public consultations included (i) disseminating all the information and activities related to the project including the Environmental and Social Management Plan (including the RAP, LRP and EMDP) and Gender related; (ii) collecting the idea, concern, need or priority of community and affected people; (iii) ensuring that all the PAPs notified on all the decision which is related directly to their income and living standard; (iv) ensuring the transparency in implementation of the ESMP, land Acquisition, compensation and assistance payment, and relocation; (v) adoption of the Grievance Redress Mechanism for this project.

Table 72, 73 and 74 present the consultation schedules and number of participants per location disaggregated by sex.

Table 72 Public Consultations (Priority Section) Participants

Date	Time	Venue	Number of Participants	
			Male	Female
June 1	8:30AM-12:00NN	Head quarter of Tan An CPC	22	11
	2:00PM-5:30PM	Headquarter of Cu An CPC	30	7
June 2	8:30AM-12:00NN	Head quarter of Song An Commune	18	8
June 3	8:30AM-12:00NN	Head Quarter of Da Ya CPC	13	13
June 3	2:00PM-5:30PM	Head quarter of Kon Dong Town people's committee	16	10
June 4	8:00PM-10:00PM	Head quarter of Dak DJang CPC	14	20
	2:00PM-5:30PM	Head quarter of K Dang CPC	23	13
	8:30AM-12:00NN	Head quarter of Dak Doa DPC	17	11
June 5	8:30AM-12:00NN	Head quarter of Tan Binh CPC	14	7
TOTAL			167	100

Table 73 Public Consultations (Non-Priority Sections) Participants

Date	Time	Venue	Number of Participants	
			Male	Female
June 18	8:30AM-12:00NN	Head Quarter of Tay Son DPC Stakeholder Training	13	2
June 19	8:30AM-12:00NN	Head Quarter of Tay Thuan CPC	21	21
	2:00PM-5:30PM	Head Quarter of Tay Giang CPC	21	14
June 29	8:30AM-12:00NN	Head Quarter of Cuu An CPC, An Khe town, Gia Lai	27	15
	2:00PM-5:30PM	Community House of An Binh ward, participation of An Binh ward and Thanh An commune, An Khe Town, Gia Lai	24	15
June 30	8:30AM-12:00NN	Headquarters of An Phu ward, participation of An Phu and Chu A communes, Pleiku city, Gia Lai	25	17
	2:00PM-5:30PM	Headquarters of Chi Lang ward with participation of Chi Lang ward and Gao commune, Pleiku city, Gia Lai	26	7
July 01	8:30AM-12:00NN	Headquarters of Thang Hung CPC, with participation of Thang Hung, Bau Can and Binh Giao communes, ChuProng district, Gia Lai	27	21
	2:00PM-5:30PM	Headquarters of IaKrel CPC with participation of IaKrel, IaDin and IaKrieng communes, Duc Co district, Gia Lai	41	14
July 02	8:30AM-12:00NN	headquarters of Chu Ty Town with participation of Chu Ty Town and IaPnon commune, Duc Co district, Gia Lai	21	8
	2:00PM-5:30PM	headquarters of IaDom CPC with participation of IaDom and IaNan communes, Duc Co district, Gia Lai	20	13
TOTAL			266	147

The following social issues were identified during the consultations:

1. Policy in the determination of compensation and other entitlements to be accorded to PAPs regardless of gender or ethnic origin.

2. Land Use Rights Certificate (LURC) 85.67% households with LURC issued from 1999-2000 in the name of the household head but from 2004, the LURC issued have both name of spouses.

3. Inquiry who will finance compensation cost and site clearance activities, separation/measurement cost for this project. There is a provincial regulation that the district charged the cost to be incurred to the compensation value for a certain percentage.

4**.** For Compensation Council - As per Vietnam Law, the locality will carry out site clearance and compensation but if there are changes from this policy to address gaps with the WB policy, official letter will be provided to locality prior to implementation.

5**.** All Districts have the capacity to develop a Resettlement Site from there land fund in reconciliation to the district annual land use plan but it will take time besides no verification yet on the impact/number and identity of the affected person to be relocated.

6. Roles and responsibilities of the local authorities in the measurement cost/DMS/SES/, compensation plan/arrangements, all associated costs to be incurred and fund for the District Compensation Council must be clarified. (refer to Article 4, Circular No. 74/2015/TT-BTC dated May 15, 2015 and Circular No. 74/2015/TT-BTC and decision No. 15/2016/QD-UBND of Gia Lai Provincial Peoples Committee)**.**

Free, Prior, Informed Consultation. Another round of FPICon was carried out to ensure that EMs are informed and consulted and mobilized during the development process. Communication was translated into the main ethnic language through their village elders, village heads, spiritual leaders, and mass organizations, particularly member of women's unions and the fatherland front for EMs that face language barriers

The schedule and venues with the corresponding number of participants are presented below.

Table 74 FPICon Participants

Date	Time	Venue	Number of Participants	
			Male	Female
June 16	8:30AM-12:00NN	Cham Prong Hamlet, IaBang commune, Dak Doa District	24	13
	7:00PM-10:PM	Community House of Cham Bom Hamlet, Ia Bang Commune, Dak Doa District	7	34
June 17	8:30AM-12:00NN	Community House of Bia Tih Hamlet, ADok Commune, Dak Doa District	46	5
June 17	2:00PM-5:30PM	Community house of Cham Prong Hamlet, IaBang commune, Dak Doa District	29	13
TOTAL			**106**	**65**

From the above schedule and number of participants, it is interesting to note that consultations at night are dominated by women like on June 4, 2020 held in Head quarter of Dak DJang CPC at 8:00-10:00 in the evening, there are 20 female participants while 14 are male participants. Another case is the FPICon June 16, 2020 held in the Community House of Cham Bom Hamlet, Ia Bang Commune, Dak Doa District at 7:00-10:00 in the evening, females outnumbered males with 34 and 7, respectively. It is therefore concluded that to ensure active participation of women in every stage of RAP/EMDP preparation and implementation, public consultations will be held at nighttime as women are busier to their household's chores and farm activities during daytime.

The consultation and FPICon process is a half-day activity. 2 hours is the general consultation attended by all the target participants - the men and women while the other 2 hours is exclusively for women to give them free-will to air their issues and concerns and to let them know that their voices are being heard. Equally, transport gender interview and needs assessment was carried out to seek inputs in updating the LRP and GAP.

Issues and concerns of the EMs evolved with the following:

1. Alignment of the two bypasses (An Khe and Pleiku) for the early determination of affected assets and persons – ***It was stated that once the Detailed Design is approved, it will be presented to the community.***

2. Where to lodge complaints? – ***Grievance Redress Mechanism was presented including the Committee /local authorities to lodge grievances***

3. Determination of compensation and entitlements (how are affected assets on land compensated and assisted) – ***It was mentioned that compensation will be based at full replacement cost/WB policy.***

4. Support program of the project for people whose productive land will be acquired by the project.- ***It was mentioned that LRP is designed and severely affected persons and vulnerable group that includes the EMs will participate in the proposed livelihood program.***

5. The project involves geological drilling; ***attention should be paid to Well-water used by the people so that such drilling may not affect groundwater or might not be polluted.***

Focus Group Discussions (FGD) including need assessment for potentially affected women together with representative of Women's Union was carried out by the DDD Social Safeguards and Gender Team after each Public Consultation session to assess the specific need of women to fully restore their livelihood.

In general, the women requested the following training to be included in the Livelihood Restoration Program:

1. Training on business (production) development/management/Poverty Reduction
2. Training on agricultural extension, forestry, and fishery cultivation techniques through programs of the government and with the guidance of agricultural extension staffs of commune and districts
3. Provided technical assistance and credit support for development of production activities through the National fund for Employment Support of District Department of Labour- Invalid and Social Affairs (DOLISA) and Agriculture and Rural Development Bank
4. Training on Traffic Accident prevention
5. Training on preventing social evils, HIV/AIDS
6. Training on gender Equality and Community Supervision
7. Vocational Trainings for family members such welding, electronics, motorcycle repairs so they could apply to work in companies or open small repairing shops.

Public Information Booklet (PIB). PIB was distributed during the stakeholder training and public consultations. The PIB includes a brief description of the project and summarizes the main provisions of the RAP such as the project impacts, tentative implementation schedule of the RAPs, implementation arrangements, the compensation principles and policies and entitlements of PAPs, grievance procedures and the monitoring and evaluation. Contact person/information of MOT-PMU2 and Client's Executing Agency-PMC is also included being part of the DDD.

The PIB will be updated during the project implementation.

Table 75 Feedback from the Public Consultation on Environment

Commune/ Ward/ Town	Feedback from the Local Communities	Response of Consultant team
General comment/advice from community		
	(C1) In some communes in An Khe town, water scarcity happens in dry season. The main source of water supply is from drinking well but mainly used for washing/bathing, the drinking water have to be bought from mobile tank trucks with price of 5,000 – 10,000 VND (equivalent to 20 cents to 40 cents) for each bottle of 20 litter. The tap water from An Khe water supply plant is available, but mainly located along main road, not yet accessible to local house in alleys. In other communes, source of water are from wells at high quality for drinking.	(R1) Noted, this information will be provided to Contractor so as they actively prepare solution for water consumption demand of both construction activities and campsites.
	(C2) Except for Communes Dak Doa district, there are a huge demand of land filling in the commune areas that should be considered as solution for reuse of excavated soil from the project with storing capacity of around 2000 – 5000 cubic meter per site. The local community is willing to guide Contractor to find suitable location for disposal.	(R2) Noted. This is particularly useful information. Contractor will be required to work closely with local community to define suitable location for disposal of excavated soil which should be treated as reusable materials rather than waste.
	(C3) Local people are ready to provide services such as accommodation, food, energy, power to construction workers. With the estimated volume of around 20 workers per campsite, renting local house is considered as much better option rather than establishing new campsite. Almost all the local houses have septic tanks.	(R3) Noted. It is useful information to be provided to contractors.
	(C4) Drainage/sewerage system does not exist. Wastewater is mainly discharged to garden, vacant land which is constructed far from water sources. A few houses are connected to existing ditch along the small road.	(R4) Drainage/sewerage from campsite (if any) can be followed to existing situation but the discharge point must be consulted with local people and accepted by local authorities

Commune/ Ward/ Town	Feedback from the Local Communities	Response of Consultant team
	(C5) They are willing to provide human resource to construction site if requested. But the project should manage contractors to make sure that they provide sufficient payment to laborers.	(R5) Noted. It is useful information. Contractors are encouraged to hire as many local people as possible. Payment accountability as well as other labor policy of contractors are defined as significant indicator which will be inspected and monitored by stakeholders involved in management of ESMP (such as CSC, Independent Monitoring Consultant, PMU2 etc.)
	(C6) The local people are quite concerned on the elevation of new road on the fear that their houses will be flooded due to new ground level. This information should be publicly disclosed to local community.	(R6) Noted. After approval of the design, the technical documents (including ground elevation) will be officially provided to local authorities and then disclosed to local community. The ethnic and/or vulnerable groups have enough chance/opportunities to access this information with support of ethnic group leaders and village leaders.
	(C7) Except for drinking water issue, surrounding environment including noise, air, soil is quite good.	(R7) Noted. Additional sampling will be conducted prior to construction phase and result will be used as input for evaluation of contractors' compliance.
	(C8) The list of quarries, borrow pit and sand mine as well as asphalt/cement (sourced from Detailed Design) are presented and checked by community. Up to now, there is no any issue/community's complaint related to operation of facilities.	(R8) Noted. Again, the responsibility of contractor is to manage their material suppliers to ensure that no negative impacts generated from construction of the road, from construction site, along the transportation route/local roads also the material exploitation areas. The suppliers have to follow international standard and

Commune/ Ward/ Town	Feedback from the Local Communities	Response of Consultant team
		national regulation on environment and social responsibilities.
	(C9) There is no any complaint/concern and/or question on the list of disposal sites. The participant fully agreed that excavated soil should be reused on site or treated as landfilling material rather than transported and disposed to other places which is far from the construction site. However, based on the local circumstance, the demand of land filling is different by communes.	(R9) The list of communes which have high demand of land filling will be provided to PMU2. Contractors are encouraged to consult the local people to find suitable disposal sites close to project sites. However, the final selection of new disposal sites (if any) must be accepted by local authorities (CPC). Necessary mitigation measures must be developed and applied to minimize impacts to local community.
	(C10) Available functional unit in charge of collecting, transporting, and treating solid waste at landfill.	(R10) Noted. When construction executes, contractors are required to sign contract with functional units to treat solid waste from campsites and construction sites.
	(C11) Serious concern are provided on the risk of house/structure to be cracked due to vibration from road compaction and/or pile driving. This impact used to occur at K'Dang commune when the Toll Station was built. Consequently, house/structure of 13 households in Cay Diep village are cracked but no sufficient compensation is paid by contractor. The grievance redress has been implemented for years without effective responds from stakeholders. They really do not expect that this risk will reoccur in this project.	(R11) As consulted with local community, the following mitigation measure for this risk includes: - During technical design, all location with high risk must be defined, then consulted with local authorities and then included in bidding document - The contractors have responsibility to verify existing situation and develop suitable construction method for high risk section. - The status of existing house/structure along road section of high risk of collapse

Commune/ Ward/ Town	Feedback from the Local Communities	Response of Consultant team
		should be officially documented with photos and video, with participation of local house owners and representative of local authorities. - If necessary, the contractors have responsibility to purchase the assurance service for these house/structure before construction executed. - The Information Board should be established onsite, providing sufficient information on Contractor, CSC and PMU2 so that local people can understand who are responsible for damage generated (if any). - This risk should be carefully controlled by all inspection units including CSC, PMU2 and Independent Monitoring Consultant as well as other stakeholders.
Specific comment/advice at community		

Commune/ Ward/ Town	Feedback from the Local Communities	Response of Consultant team
Tan An Commune, An Khe district, Gia Lai province	Water scarcity happens in dry season. Local people have to pay 10,000 VND per each bottle of 20 litter of drinking water. Local people have high demand of land filling.	Noted. Contractor should be informed to prepare water supplying plan for both domestic and construction usage. They are also required to keep the water price balanced, to minimize social conflict with local community. If necessary, they have to buy water from supplier located far from this commune. The policy of water saving at construction site and campsites are compulsorily applied. Noted, response as R2 and R9 above.
Cu An Commune, An Khe district, Gia Lai province	Local people pay much attention on the RoW which require land acquisition and policy/process of inventory and compensation.	The social expert provided specific guidance on this topic. No more comment collected.
So An Commune, An Khe district, Gia Lai province	Local people have high demand of land filling.	Noted, response as R2 and R9 above.
Dăk Ya Commune, Mang Yang district, Gia Lai province	At Km 131+645, there is not drain/culvert on the local road connected directly to NH19. As a result, surface water together with mud/sediment are reaching to NH19 after heavy rain, leading to high risk of traffic accident due to vehicles/motors slipping. There is high demand of land filling.	Noted. Consultant team with Road engineer visited site to record the issues and will propose solution. Noted, response as R2 and R9 above.
Kon Dong Town, MangYang district, Giai Lai province	There is high demand of land filling, with 2000-5000m2 each site	Noted, response as R2 and R9 above. This proposal used to be recorded and considered during FS but it was not approved due to limit of project fund. However, it will

Commune/ Ward/ Town	Feedback from the Local Communities	Response of Consultant team
	Traffic congestion and accident often occur in rush hour. They expect to expand the road base because the existing pavement on both sides is very wide. Both tap water and wells are so abundant in volume and good at quality. Water scarcity does not happen here. There is the gap between elevation of existing culver of NH19 and connecting drain, leading to partial flooding. This technical issue should be reviewed and solved during upgrading works	be continued to be reported to PMU2 and PMC for re-consideration. Noted. This information will be provided to contractors. This finding is noted by road engineer to find suitable solution.
Dak Doa Town, Dak Doa District, Gia Lai province	Tap water is abundant in volume and good at quality. There is not demand of land filling. Excavated soil should be disposed at suitable location.	Noted. Noted.
K'Dang commune, Dak Doa district, Gia Lai province	Serious concern on vibration impact generated from road compaction. They agreed with mitigation measure introduced by consultant.	Responds as R11 above.
Dak D'jrang commune, Dak Doa district, Gia Lai province	Water from Linh Nham stream are being used for irrigation. The mitigation measure should be provided to control water quality. Serious concern on vibration impact generated from road compaction. They agreed with mitigation measure introduced by consultant, especially regarding Assurance Services. Water from drilling wells is good and abundant.	Noted. Mitigation are provided as presented. Sampling will be conducted prior to construction execution. Responds as R11 above.

Commune/ Ward/ Town	Feedback from the Local Communities	Response of Consultant team
	No demand of landfilling. Mitigation measures should be provided to minimize excavated soils and/or construction wastewater reaching to paddy field/garden.	Noted. This information will be provided to contractors. Noted. Sediment trapping will be provided along the road section close to paddy fields/garden.
Tan Binh commune, Dak Doa district, Gia Lai province	Major concern provided to vibration impact and agreed with mitigation measures of project. Water from drilling wells is good and abundant. High demand of landfilling with estimate volume of few thousand cubic meters.	Responds as R11 above. Noted. This information will be provided to contractors.
Cuu An commune, An Khe town	The bypass only goes through agricultural area. Due to the recent adjustment of administrative boundary, the landowner are living in Cuu An commune but their land are located in Song An commune. It is confirmed that one disposal site located in An Dien Nam village which has storing capacity of dozens of thousand cubic meters. Nearly 80% households have septic tanks, the remainder have sanitary toilets also. Water from drilling wells is good and abundant. They also have access to Tap water provided by Sai Gon An Khe Water Supply.	Noted. This information will be integrated into RAP report for tracking and inspection during implementation. Noted. This information will be provided to contractors. Good condition, contractors can rent a house for accommodation services and easily access to existing sanitation facilities rather than setting up new campsite. Noted. This information will be provided to contractors.

Commune/ Ward/ Town	Feedback from the Local Communities	Response of Consultant team
Thanh An Commune and An Binh ward, An Khe Town, Gia Lai	There is high demand of materials for land filling. Local people are ready to introduce specific location to contractor when they come.	Noted. This information will be provided to contractors.
An Phu and Chu A communes, Pleiku city, Gia Lai	90% household already constructed septic tank. Local people willing to provide accommodation service to contractor. Water is mainly sourced from drinking well. Sometime water scarcity occurs and local people have culture of sharing water in community. There is high demand of materials for land filling. Local people are ready to introduce specific location to contractor when they come.	Noted. This information will be provided to contractors.
Chi Lang ward and Gao commune, Pleiku city, Gia Lai	Disposal site at village No 4, Gao commune has a small area, not suitable for large scale disposal. Water is mainly sourced from digging well with the average depth of 10m, very abundant and good, water scarcity rarely happens here.	Noted. This information will be provided to contractors.
Thang Hung, Bau Can and Binh Giao communes, ChuProng district, Gia Lai	In Thang Hung commune, new disposal site is proposed by local community at Km193+300. It is formerly the domestic waste dumping site and needs to be closed. This area has storing capacity of around 10,000 m3. This site located on the right side of NH19. In Bau Can and Binh Giao, less demand of material for land filling is defined during community consultation. The existing soil pit is under good operation. No claim is provided so far.	Environmental consultant and Engineer together with representatives of Thang Hung commune visited site and confirmed that this is good location for disposal. Information is integrated in the report. This site should be additionally recommended in the updated ESIA/ESMP. Noted.

Commune/ Ward/ Town	Feedback from the Local Communities	Response of Consultant team
Ia Krel, Ia Din and Ia Krieng commune, Duc Cơ district, Gia Lai	Disposal site at km 206+010: Public consultation helped to confirm the disposal site which is planned to build a market. Disposal site at Km 210+200 is also verified on site. New disposal site at Km206+600, located on left side of NH19, this is currently the planting area of one local household who have demand for landfilling with storing capacity of 15,000m3. Disposal site at Km 211+600 is located in Thanh Tan village, IaKrel. This area is under high threat of erosion. A new culver conveying rainy water were constructed here. In order to extend the length of culver to minimize erosion, it is expected to receive at least 50,000m3 material for landfilling.	Site visit with local authorities already conducted and confirmed that this is suitable site for disposal. However, the existing access road is seriously degraded and should be improved during implementation Site visit with local authorities already conducted and confirmed that this is suitable site for disposal. Site visit with local authorities already conducted and confirmed that this is suitable site for disposal, contributed to protect the existing NH19. However, the access road is quite small, and it need to develop proper disposal plan for implementation. Information is integrated in the report.
Chu Ty Town and Ia Pnon communes, Duc Co district, Gia Lai	There are some sites which may demand landfilling material; this will be defined specifically when contractor is operational.	Noted. This information will be provided to contractors
Ia Dom and Ia Nan Communes, H'Drai District, Gia Lai	Disposal site at km 230+200 (135,000m2) is situated in O village, Ia Dom commune with storage capacity of 135,000m^2. This site is confirmed by local community.	Site visit with local authorities were conducted and this disposal site is confirmed.

Photographs taken in strategic locations during Stakeholder Training and Public Consultations (DDD stage)

STAKEHOLDER TRAINING

	
Gia Lai, DONRE Meeting Hall	***Dak Doa District PC Meeting Hall***
	
Headquarter of Duc Co DPC	***Headquarter of An Khe Town People's Committee***

Figure 27 Photographs of Training and Consultation Activities

PUBLIC CONSULTATIONS

		
Tan An CPC	Cu An CPC	Song An Commune
		
Dak Ya Commune	Kon Dong	Dak Doa
		
K' Dang	Dak DJang	Tan Binh

FOCUS GROUP DISCUSSION WITH WOMEN

FPIConsultations with Ethnic Minorities