

**MINISTRY OF TRANSPORT
TRAFFIC SAFETY PROJECT MANAGEMENT UNIT**

**CENTRAL HIGHLAND
CONNECTIVITY IMPROVEMENT PROJECT**

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT

FINAL



April 2017

ABBREVIATIONS

AH	Affected Household
AP	Affected Person
BOT	Build-Operation-Transfer
BTNC	Dense Asphalt Concrete
CHCIP	Central Highland Connectivity Improvement Project
CSC	Construction Supervision Consultant
DONRE	Provincial Department of Natural Resources and Environment
ĐT	Provincial Road
ECOPs	Environmental Code Practices
ESIA	Environmental and Social Impacts Assessment
ESMP	Environmental and Social Management Plan
FS	Feasibility Study
HH	Household
IBRA	International Bank of Reconstruction and Development
IDA	International Development Association
IEMC	Independent Environmental Monitoring Consultant
JICA	Japan International Cooperation Agency
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
PMU	Project Management Unit
QCVN/TCVN	Vietnam National Technical Regulations/Standards
RP/RAP	Resettlement Plan
SA	Social Assessment
TOR	Terms of Reference
TSPMU	Traffic Safety Project Management Unit
USD	United States Dollar
USEPA	US Environmental Protection Agency
VND	Vietnam Dong
WB	The World Bank
WHO	World Health Organization

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EXECUTIVE SUMMARY

1 Introduction

The National Highway No.19 (NH19) is 243 km long, 7 to 12 m wide 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.

2. Project Description

The proposed Project comprises of two main components with the following main physical investments:

- Improve approximately 130 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.
- Newly construction 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.



Figure 1 - Location of NH19

It is estimated that construction will take place in 24 months and approximately 450 workers will be mobilized to work in the Project during construction phase.

3. Baseline Conditions

The National Highway 19 runs from the coastal area in the east to the central highland in the west. Ground elevation of the road change gradually in most sections following the Terrance. 9 km of NH19 from Km 67-Km76 on the An Khe pass have curvy sections with high mountain on one side and abyss on the other side. The existing NH19 also cut through a number stream and rivers which are usually relative short, narrow at the western part near the mountains and broader in the eastern part near the delta. NH 19 passing some popular residential areas with most houses and shops located 5-15 m from road side. Some sections of NH19 passing acacia, eucalyptus plantations on the An Khe Pass and pine forest.

The Project area has tropical moon climate with annual rainfall in the western part higher than that in the eastern part. Therefore, the mountainous areas on the western part if NH19 is subjected higher to soil subsident and land slide risks. That feature has been taken into account in the project proposals the thus climate resilience has been an integrated part of the Project design.

Air quality sampled at residential areas along the NH19 remains relative good with all parameters are within applicable Vietnamese standard. Surface water in rainy season has total suspended solid (TSS) nearly reach allowable limit. The project is not located in environmental sensitive areas as the nearest national park and natural reserve is located at 20-50 km from Project areas. Typical vegetation cover in the project area is formed by agricultural crop/farm land, some plantations and very limited pine forest. There are no known valuable, rare/endorsed aquatic species in the project area.

The NH19 sections covered by the Project pass two communes of Tay Son District and 34 communes in 9 districts/towns of Gia Lai province. Crop land accounts for 57% and plantation accounts for 30.5% of total land use in the Project area. Nearly 70% of the population in the Project areas have been living in rural areas. Populated residential centres of An Khe Town and Pleiku city are located along NH19. 10.5% of surveyed household has average monthly income of less than 2 millions VND, 21.6% has average monthly income between 2 and 3 millions VND and 66.7% earn from 3 milions VND monthly. There are some groups of ethnic minorities in the Project area, mainly in Gia Lai province with the Bahnar and Jrai group account from 30 to 70% of commune population. The Kinh group mostly settle along the existing NH19.

Common illness in the project area are dengue fever, influenza and eye disease. There are also cases dengue fevers. All Project communes have commune health care centres. There are 37 health care facilities along the project area including some provincial and district hospitals.

There are some locations and sections with traffic accident happen more frequently than the other parts of NH19. 11 black spots of traffic accidents in have been identified in the section from Km 140-Km 228. Four sections with higher frequency of traffic accidents are Km201-202, Km203, Km 207 and Km 213.

4. Potential Impacts and Mitigation Measures

With the proposed investments, the Project is expected to bring about major positive environmental impacts. These include:

- Create casual jobs and incomes for local people during construction phase
- Improve Traffic Safety along the National Highway 19 (NH19) in operation phase.
- Contribute to Socio-economic Development in the Project area in operation phase.

However, there are also potential negative impacts and risks during the construction and operation phases of the project. These potential impacts are mostly temporary, relative short term, at low to moderate level and manageable through the mitigation measures incorporated into project proposals and/or construction practices as summarized below.

- **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 billions VND (approximately 14 millions USD) have been estimated to pay for compensations and support to the affected households as detailed in Table 1 below.

Table 1 - Budget for 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 costs, independent monitoring, management costs and 10% contingency)	165,020,370,433	139,614,243,833

- There are **safety risks** related to some unexploded objects (**UXO**) may be left at the Project sites from the war. To manage this risks, the Project include a budget at around 6.6 billions VND (or approximately 300,000 USD equivalent) for mine clearance which will be carried out prior to construction commencement;
- **Common construction impacts**, including dust, exhaust emissions, noise, vibration; wastewater and solid waste generation; degradation of surface water quality, increased erosion and landslides risks; obstruction or interruption to agricultural production activities; cutting trees and removal of vegetation covers; disturbance to traffic and increased traffic safety risks; community and social disturbance; damages/degradation of existing infrastructure and related services such as roads, power supply, irrigation etc.; increased bush fires risks; increased localised flooding risks; health and safety issues of the public and the works. These common construction impacts would be manageable by the mitigation measures to be implemented by the Contractors as part of construction practice. Examples of such mitigation measures are watering the road, covering material and waste loads on the trucks, arranging for the collection and transportation of the wastes to disposal sites as soon as possible, minimising the volume of materials temporarily loaded at construction sites, tidying up construction sites daily, minimizing disturbed areas, arranging camps with adequate sanitation facilities for the workers, scheduling construction to avoid sensitive hours, providing temporary access to disturbed households etc. These mitigation measures were proposed in the form of Environmental Codes of Practices for convenience inclusion into construction bidding documents and contracts.
- Some **type-and site-specific impacts and risks**: during construction phase and corresponding mitigation measures were also have been identified. For example,

bentonite generated at bridge construction sites will be collected and disposed off 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 billions VND (or 2 millions 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.

- 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 in order to maintain accessibility for local communities. Engineering design also includes sloop stabilization with embankments or bio-engineering frames to prevent land slide risks at risky locations during operation phase of the road.

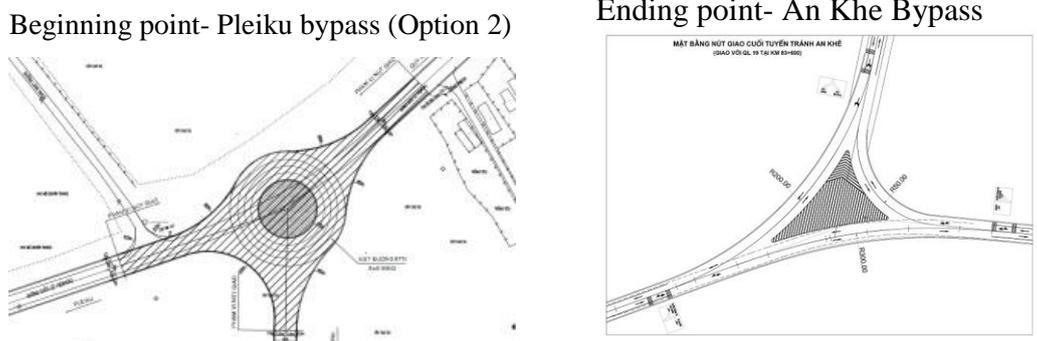


Figure 2 -Design of Intersections with Measures to Ensure Traffic Safety

5. Social and Environmental Management Plan

Based on the mitigation measures proposed, an Environmental and Social Management Plan has been prepared for the project. The main responsibilities of the key stakeholders have been identified and summarized in Table 2 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 and management
Traffic safety Project Management Unit (TSPMU)	Responsible for monitoring and supervision to ensure that the Project comply with the World Bank Safeguard Policies and Vietnamese legislations: <ul style="list-style-type: none"> - 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 in to engineering design, cost estimates, bidding documents and construction contract,
Construction Supervision Consultant (Engineer)	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - provide training to relevant project stakeholders, particularly TSPMU staff and Construction supervision engineers on project environmental management system - Carry out random compliance monitoring and prepare reports.
Contractors	<ul style="list-style-type: none"> - Prepare site specific ESMP - Implement mitigation measures in accordance with contract terms and conditions
Affected Communities	<ul style="list-style-type: none"> - Carry out voluntary environmental monitoring according to Decree 19/2015/ND-CP, in order to: - Cooperate with and Ward/Commune PC in all activities related to land acquisition, compensation, support and resettlement;
Provincial People’s Committee (PPC)	<ul style="list-style-type: none"> - Ensure that compensation resettlement and livelihoods restoration of affected households is implemented and monitored in accordance with RAP.
Provincial Project Management Unit	<ul style="list-style-type: none"> - Ensure the required budget for RAP implementation is timely and sufficiently allocated for planned compensation payment/resettlement – as

Stakeholders	Responsibility
(PPMU)	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 for 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 included an environmental quality monitoring program, project compliance framework and described grievance redress mechanism. The total costs for ESMP implementation is summarised in the Table below.

Table 3 - Estimated costs for ESMP Implementation

No.	Items	Unit	Quantity	Unit price (VND)	Total amount (VND)
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				1,402,870,752
		(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	Lum sum			132,000,000
		(as part of construction supervision contract)			
9	Independent monitoring, including:				635,000,000
	<i>Environmental supervision</i>	<i>Trip</i>	5	60,000,000	300,000,000
	<i>Social supervision</i>	<i>Trip</i>	5	60,000,000	275,000,000
	<i>Training on capacity building</i>	<i>Lum sum</i>		60,000,000	60,000,000

INTRODUCTION

1. Project Origin

The National Highway 19 (NH19) is 243 km long, existing cross sections are from 7 to 12 m wide. It passes Binh Dinh and Gia Lai provinces in which the section in Binh Dinh province is 67 km long and the section in Gia Lai is 176 km long. The beginning point of NH19 is at the Quy Nhon Seaport and the ending point is at the Le Thanh Border Gate in Gia Lai province. NH 19 is a critical road connecting the provinces in the Central Highland with the Quy Nhon Port in Quy Nhon City of Binh Dinh Province.

The Masterplan for Transport Development of the Central Key Economic Region to 2020 with direction toward 2030 and the revised Masterplan were approved by the Prime Minister at the 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 would be one of the five key transport routes of the region which connects Quy Nhon Seaport to the Central Highland provinces and the neighbouring countries, Laos, Cambodia and the North East of Thailand. The Quy Nhon-Central Highland corridor is planned to be based on the existing National Highway 19 (NH19).

Over the past years, 101 km out of NH19's total 243 km has been upgraded and maintained but not synchronous. Noticeably, two road sections (Km17+027 - Km50 and Km90 - Km131+300) passing by some towns and townships along the route have been invested under a BOT project with design cross section of 11-12 m wide. However, there are still many narrow sections with widths of 6 to 7 m, road surface has been degraded thus affecting road safety and not meeting the economic development needs of Binh Dinh and Gia Lai provinces. Therefore, upgradation of NH19 according to the masterplan is necessary.

The Central Highland Connectivity Improvement Project (NH19) has been proposed by the Government of Vietnam to the World Bank for financing by an IDA credit of US\$150 million. The Project will finance the following components:

Component 1 – Road Improvements (estimated cost of US\$145m)

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

2. Technical and Legal Basis

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.

- 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;
- 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 a number of 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 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 Labour - 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 Labour - 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 Labour - 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 Labour - Invalids and Social Affairs issuing list of jobs and work places 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 date 2 June 2014 regulations on allocation of land records, lease and transfer of land use, land acquisition.
- 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/QĐ-TTg, dated 17 November 2009, by the Prime Minister approving the Master Plan on vocational training for rural laborer by 2020;
- 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.

2.2 The World Bank's Safeguards Policies and Guidelines

The Social and Environmental Safeguards Policies are triggered for the Project as follows:

OP 4.01 – Environmental Assessment

OP4.11 – Physical Cultural Resources

OP4.10 – Indigenous People

OP4.12 – Involuntary Resettlement

OP/BP 4.01¹- Environmental Assessment

This policy requires that the social and environmental impacts and risks are screened from the early stage of Project preparation, Environmental and Social Impact Assessment (ESIA) is carried out and Environmental and Social Management Plan (ESMP) is prepared, in order to propose appropriate mitigation measures and management plan to minimize the negative adverse impacts during the Project implementation. The OP/BP 4.01 also requires that the affected communities are consulted during the preparation of the ESIA/ESMP. The ESIA/ESMP reports have to be disclosed locally for public access prior to project appraisal.

The Central Highland Connectivity Improvement Project has been classified as Environmental Category B by the World Bank, i.e. most of the potential impacts are at moderate level and manageable. Environmental and Social Impact Assessment (ESIA) which includes an Environmental and Social Management Plan (ESMP) has been prepared to meet OP4.01 requirements.

OP/BP 4.10²-Indigenous People

The Bank's OP4.10 objective is to ensure that indigenous peoples do not suffer adverse effects from Bank financed projects and that they receive culturally compatible social and economic benefits. Effectively the World Bank requires a project to develop a program for addressing issues based on the informed participation of the indigenous people themselves. Any project that affects indigenous peoples is expected to include components or provisions that incorporate an Indigenous People Plan.

There are ethnic minority peoples present in the project area in Gia Lai province. Therefore, an Ethnic Minority Development Plan (EMDP) has been developed by TSPMU for implementation.

OP/BP 4.11³-Physical Cultural Resources

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 by-passes near cemeteries, including that of the Gia Lai ethnic minority people. In addition, the Project will excavate soils in a large scale thus might find archaeological objects during construction stage. Therefore the PCR impact assessment and the responding mitigation measures will be integrated in the environmental management plan. A Chance Find Procedure will also be proposed in the Project's ESMP.

OP/BP 4.12⁴-Involuntary Resettlement

¹ 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>

² 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~pagePK:64168445~piPK:64168309~theSitePK:584435,00.html>

³ 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:584435,00.html>

The policy aims to avoid involuntary resettlement to the extent possible, or to minimize and mitigate its adverse social and economic impacts. The policy proposes a livelihood restoration program to ensure the affected households will restore their livelihood to the project living standards, or even improved. The project will have to acquire residential land and agriculture land of the local people and relocate some affected households. Therefore, two Resettlement Action Plans – one for Gia Lai and one for Binh Dinh province were prepared in accordance with Bank’s OP 4.12 prior to project appraisal for implementation.

The Project will also follow the World Bank Guidelines on Environment, Health and Safety⁵.

2.3 ESIA Review and Approval Authorities

ESIA will be appraised and approved by the Ministry of Natural Resources and Environment. This ESIA will also be submitted to the World Bank for review, comments and clearance .

3. Related Projects and Plans

3.1 Related Plans

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

The Masterplan for Vietnam Road Transport Development to 2020 with orientation towards 2030 was approved by the Prime Minister at the Decision No. 1327/QĐ-TTg on 24 August 2009 and the Adjusted Masterplan was approved at the decision No. 356/QĐ-TTg by the Prime Minister on 25 February 2013. The Masterplan covers the complete construction and upgradation 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. CHCIP has been proposed in accordance with these two 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 road way, railway and airway planning in which the NH19 would meet the standard for class III road (delta and mountain road) and will be bypassing the city. The proposals are in line with this masterplan.

c. Revised Master Plan of Pleiku City to 2020

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 which bypassing Pleiku City to the east (Figure 0-2) in accordance with the city’s land use plan.

The Project designs the NH19 Pleiku City bypass in accordance with the approved planning.

4OP/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>

⁵ accessible at http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/our+approach/risk+management/ehsguidelines



Figure 3 - Pleiku City Bypass

d. Masterplan of An Khe Town to 2020

The An Khe Town’s Materplan was approved by the Binh Dinh PPC at the Decison No. 05/2007/QĐ-UBND dated 16/01/2007. According to this Masterplan, NH19 bypassing An Khe town, running in the North. (Figure 3).The An Khe bypass was proposed under the Project in accordance with the approved masterplan of An Khe town.



Figure 4 - An Khe Town Bypass

3.2 Related Projects

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

The BOTProjectwas started in 2013 and completed in 2015. The Project upgraded56.27km of NH19in which 32.97km isin Binh Dinh Province and 23.3 km is in Gia Lai province.These two sections are located in betweenothersections which would be covered under the CHCIP.

The starting point of CHCIPis 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 financedby CHCIP.

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

The additional financing cover the upgradation of 18km of NH19 and expansion of 5 bridges along the route. The AF EIA was approved at the Decision No.3391/QĐ-BGTVT dated on 31/10/2016 by the Ministry of Transport. By early 2017 the construction under the Project (starting at Km 90) has not been started.

4. ESIA Implementation Arrangements

The Project Owner, the Traffic Safety Project Management Unit (TSPMU) has contracted the Institute of Transport Science and Technology to conduct Environmental and Social Impact Assessment during the Project preparation. The ESIA team comprises of the following members:

Table 4 - List of ESIA Team Members

No	Name	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 Toàn	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 Thăng		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

5. Methodologies

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 *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 reflected 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 essential information for EISA/EIA 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. Whereby, summarize feedbacks and expectations of local people and the authority about the project.
- Public consultation with local communities in the project area on ESIA are conducted through community meetings at the locality.

Field Survey Method: Field survey is compulsory for ESIA/EIA to identify the status of the project area, 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. These 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 natural, 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, hydrometeorological conditions and socio-economical 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 is used in chapter 2 providing information on quality of the environmental compartments and detailed information is provided in the Annex.

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.

5.2. Social Assessment Methods

Different methods were employed to conduct social assessment, screening of ethnic minorities, and estimation of magnitude of project impact, to prepare resettlement action plans for Gia Lai and Binh Dinh province, and 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 analysed using Microsoft Excel. Qualitative data obtained from consultation sessions (public meetings, focus group discussion, informant interview, etc..) were also analysed, by themes. Both method and data source triangulation are employed to ensuring 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 should be fully engaged in 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 an estimated 60 ethnic minority households - belonging to five EM groups, including Bahnar, Jarai, Nung, Thai, and Muong, that are potentially affected as a result of the subproject in Gia Lai province. Representatives of these groups have been invited to participate in a free, prior and informed consultation process during the RAP preparation to ensure they are consulted in accordance Bank's OP 4.10 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.

CHAPTER I. PROJECT DESCRIPTION

1.1. Background Information

Project name: Central Highland Connectivity Improvement Project

Project Owner: Traffic Safety Project Management Unit (TSPMU)

Represented by: Mr. Nguyễn Hữu Long - Position: General Director;

Address: No.2 Nguyen Cong Hoan Street, Ba Đình, Ha Noi;

Telephone: (84.4) 39429280; Fax: (84.4) 39427591.

The Project’s development objective is to improve safe and climate-resilient road connectivity along the National Highway 19 Central Highlands-Central Coast corridor in Vietnam.

1.2. Project Area

The National Highway 19 (NH19) has a total length of 243 km, of which the road section from Km0 to Km67 runs through Binh Dinh province and the road section from Km67 to Km243 runs through Gia Lai province. This Project will upgrade and expand 110km of the existing road and construct 2 new road sections bypassing An Khe Town, Dak Doa District Town and Pleiku City. These sections run through districts and communes presented in Table 5. The road alignment is illustrated by a map in Figure 5.

Table 5 –Communes/Wards along NH19 Sections under CHCIP

Road section	Province	District	Commune/Ward/District Town
Km50-Km67	Binh Đình	Tay Son	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 Djăng,
		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, ADok and Ia Bang,
		Pleiku City	An Phu and ChưH’ Drong
			Gao
Km180-Km241	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	

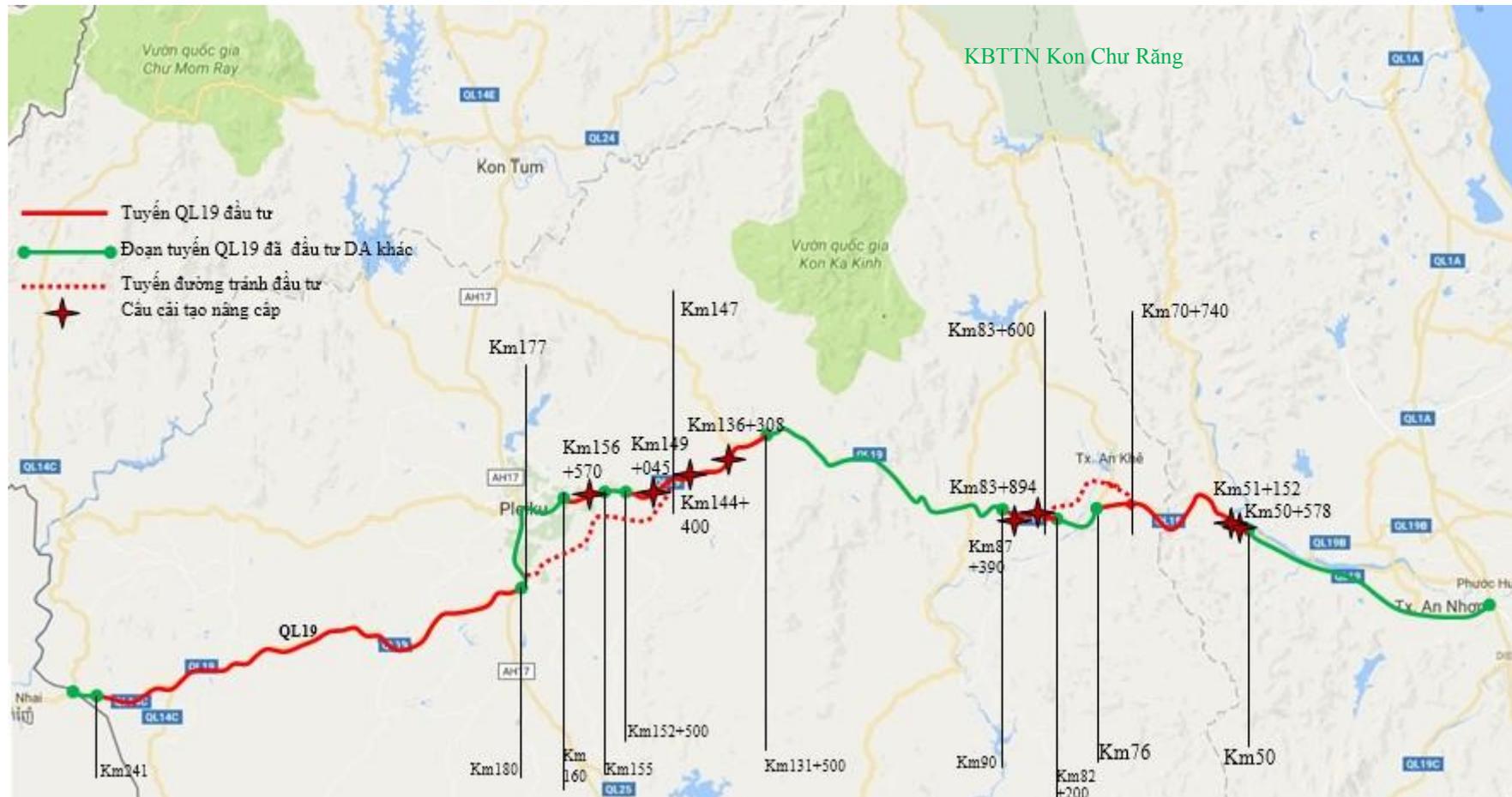


Figure 5. National Highway 19 Alignment

1.3. Scope of Investment

The Project will finance the following components:

Component 1 – Road Improvements (estimated cost of US\$145m including contingencies)

This component will support the physical improvement of three sections of NH19 including pavement rehabilitation, widening of the road with paved shoulders, widening of lanes and features for the safe sharing of the road by users, including through the addition of dedicated motorcycle lanes, and reinforcement of slopes, to improve road connectivity, safety and to ensure sustainability of road assets. The total length of these sections is approximately 130 km (out of a total length of 234km of NH19). The Project finance the construction of 26.9 km of two new urban bypasses.

As the proposed 130m section for financing contains sections which are highly prone to landslides and potential natural disasters, a targeted intervention on these sections contributes to the overall connectivity, resilience and safety along the entire corridor.

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

(a) *The preparation of the detailed design 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.

(b) *Road safety activities supported by technical assistance:*

(i) Conduct a Road Safety Audit (RSA) on.

(ii) Assess impacts of motorcycle lanes in Vietnam and update the draft manual for motorcycle lane design and specifications with incorporation of international best practices

(iii) Strengthen the institutional capacity for managing road safety and physical works to improve road safety measures of the road network

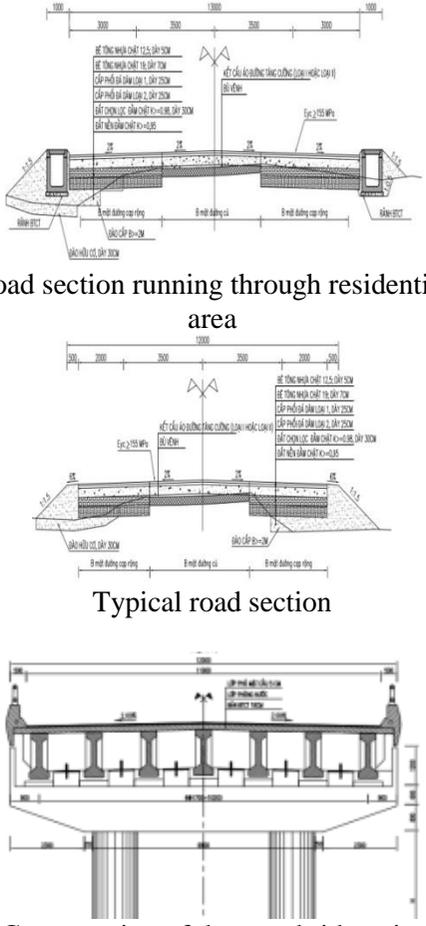
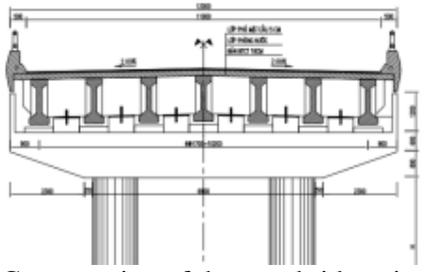
(c) *Climate resilient activities supported by technical assistance through a grant from the Global Facility for Disaster Reduction and Recovery (GDFRR) grants to:*

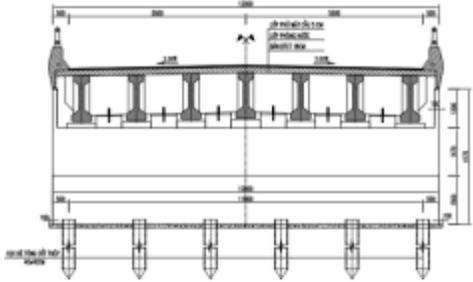
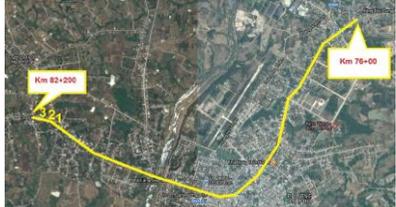
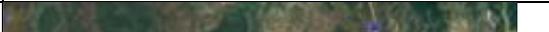
(i) Support the identification of suitable climate resilience measures to reduce the impact of landslides on NH19. Specifically, this sub-component will aim at strengthening the road specific detailed designs as key climate-related bottlenecks were identified along the NH19. The work under this activity 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.

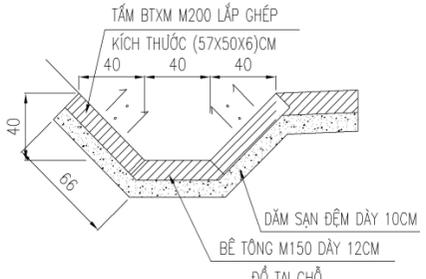
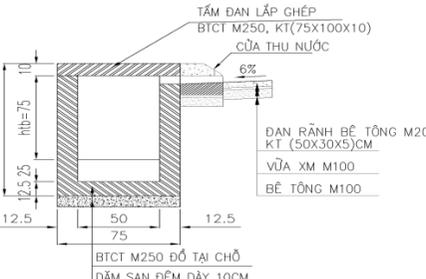
(ii) Review current technical standards, guidelines and planning tools for the road sector vis a vis climate change adaptation and disaster risk management with a view to strengthening the understanding of the possible effects of global climate change on road infrastructure and network.

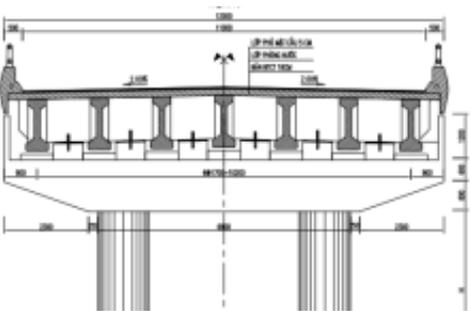
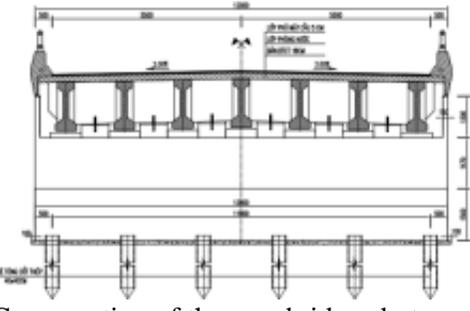
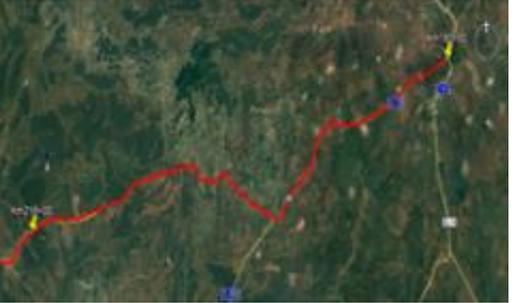
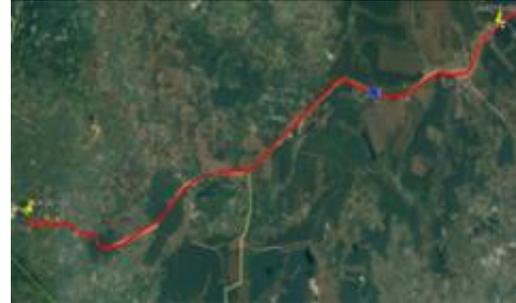
Brief description of existing roads and proposed investments are provided in Table 6.

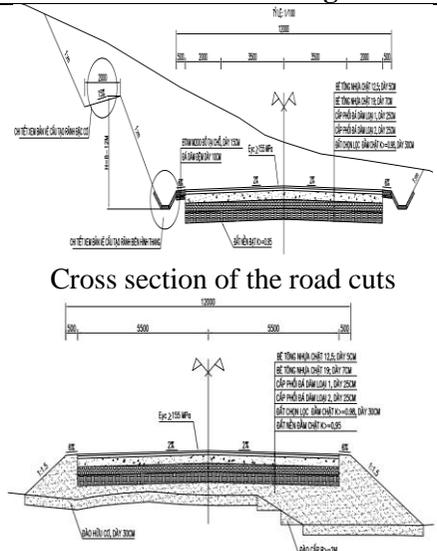
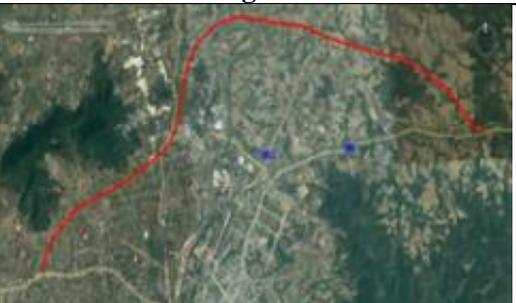
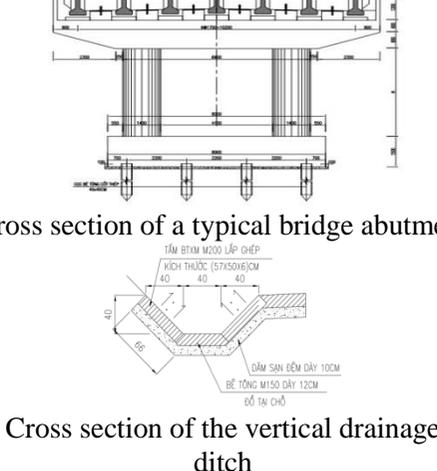
Table 6 - Existing Road Parameters and Proposed Investments

Section	Current Status	Proposed Investments	Cross Section Design	Alignment
<p>Km50 –59; L=9km,</p>	<p>B_{road surface} = 7m and B_{road base} = 10m. ground elevation at the starting point is 26m and at the ending point is 69m.</p>	<p>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</p>	<p>Cross Section Design</p> 	<p>Alignment</p> 
<p>Km59 – 67; L=8km</p>	<p>B =7m. The route goes through An Khe Pass Area with high mountains and abysses.</p>	<p>- Widen the road to B =8m - Install drainage system. - Buil new emergency exist - Cut curve to increase radius of curve road sections. - Stabilize slopes along the right side of the road.</p>	<p>Cross section of the new bridge pier</p> 	

Section	Current Status	Proposed Investments	Cross Section Design	Alignment
Km67 -76; L=9km,	B _{road surface} = 7m B _{road base} = 10m.	- 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	 <p>Typical abutment's cross section of new bridges.</p>	
Km76 – Km82+200 L = 6.2km	This goes through An Khe town. B _{road surface} = 7m B _{road base} = 24m.	Rehabilitate road surface layer		
Km82+200 - Km90 L = 7.8 km.	B _{road surface} = 7m, B _{road base} = 10m. 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	- 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 Reconstruction of 2 bridges with B= 12m: - Ta Ly bridge, 1 span x24m - Thau Dau bridge, 2 spans x24m		 <p>Km82+200-Km90</p>
Km131+300-	L= 23.7km	- Re-surfacing the sections		

Section	Current Status	Proposed Investments	Cross Section Design	Alignment
Km155	<p>$B_{road\ bed}=10m,$ $B_{road\ surface} = 7m.$</p> <p>Ground elevation at the starting point and at the ending point of the section is 710m and 740m, respectively.</p>	<p>crossing Kon Dong town (L= 2,5km) and Dak Doa town (L=2.5km), construct and install vertical and horizontal drainages;</p> <p>- Expand the road</p> <p>$B_{road\ surface} = 11m,$ $B_{road\ base} = 12m$</p> <p>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</p> <p>- Expand Km150-Km152</p> <p>$B_{road\ base} = 15m$ $B_{road\ surface} = 13m.$</p> <p>The elevation of new road surface is 20-27cm higher than that of the existing road.</p>	<p>Cross section of the bridge abutment</p>  <p>Typical cross section of the vertical drainage ditch</p>  <p>Typical Cross section of the vertical drainage ditch running through residential area</p>	
	<p>3 existing bridges on the road section, including:</p> <ul style="list-style-type: none"> - 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 	<p>Construct 3 new bridges with B = 12m:</p> <ul style="list-style-type: none"> - 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	Cross Section Design	Alignment
<p>Km155-Km160</p> <p>L = 5km</p>	<p>$B_{road\ surface} = 7m$, $B_{road\ base} = 10m$</p> <p>Ground elevation of the starting point is 710m and of the ending point is 720m.</p> <p>The An My bridge at Km156+570 has L= 24m, B = 9m, 1 span.</p>	<p>Widen the road with $B_{road\ surface} = 16m$ $B_{road\ base} = 21m$ install vertical and horizontal drainages.</p> <p>Ground elevation of new road surface is 20-27cm higher than that of the existing road.</p> <p>Reconstruction of An My bridge with B = 12m and 1 span of 33m long</p>	 <p>Cross section of the new bridge pier</p>	
<p>Km180-Km241</p> <p>L = 61km</p>	<p>$B_{road\ surface} = 7m$ $B_{road\ base} = 10m$,</p> <p>The ground elevation of the starting point is 890m and of the ending point is 230m.</p> <p>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)</p>	<p>- Resurface the asphalt concrete for the section passing Chu Ty district town (L = 3.5km),</p> <p>Widen the road $B_{road\ surface} = 11m$ and $B_{road\ base} = 12m$ install vertical and horizontal drainages.</p> <p>The elevation of new road surface is 20-27cm higher than that of the old road.</p> <p>No investments in the 4 existing bridges</p>	 <p>Cross section of the new bridge abutment</p>	<p>Road section Km180-Km218</p>  <p>Road section Km218-Km241</p> 

Section	Current Status	Proposed Investments	Cross Section Design	Alignment
<p>An Khe bypass L = 13.7 km</p>	<p>Agriculture land with no road and bridge</p>	<p>Construct a new city bypass $B_{road\ surface} = 11m,$ $B_{road\ base} = 12m$ Construct culverts and drainages</p> <p>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 $Km9+260$</p>	 <p>Cross section of the road cuts</p> <p>Cross section of the road fills</p>	
<p>Pleiku City Bypass L = 13.2 km</p>	<p>Agriculture land with no road and bridge</p>	<p>Construct new city bypass $B_{road\ surface} = 11m,$ $B_{road\ base} = 12m.$ Construct horizontal culverts and vertical drainages.</p> <p>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 $Km16+500$</p>	 <p>Cross section of a typical bridge abutment</p> <p>Cross section of the vertical drainage ditch</p>	

1.4 Machineries, Equipment and Workers to be mobilised

It is expected that during the peak period, there will be 450 workers working for the project, specifically:

- Road section between Km50 and Km67: 50 workers,
- Road section between Km82+200 and Km90: 50 workers,
- An Khe Bypass: about 80 workers,
- Road section between Km132+500 and Km160: about 100 workers,
- Pleiku Bypass: about 70 workers,
- Road section between Km180 and Km241: about 100 workers.

The construction contractors might hire about 150 local labors for simple construction activities.

List of machineries used by the project is provided in Table 7.

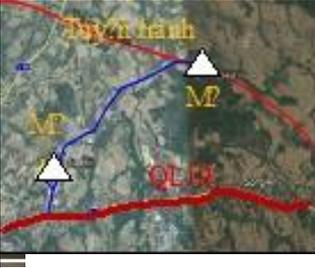
Table 7 - List of Machineries and Equipment

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

1.5 Borrow Pits and Quarries

The construction materials to be used in the Project will be purchased from existing licensed local sources. The locations of the borrow pits and the material transportation routes connecting to NH19 are presented in Table 8.

Table 8 - Material Sources

Type	Locations and Key Parameters	Transportation Route to NH19	
Rugged stone/gravel	<ul style="list-style-type: none"> - Hieu Ngoc quarry is in Phuc An village, Tay Xuan commune, Tay Son district, Binh Dinh province - Exploitation capacity: 40,000 m³/year. - Reserve: 680,600 m³ - Distance: 1.6 km to NH19. 		
	<ul style="list-style-type: none"> - Trang Duc quarry is in H'ra and Đăk Ta Ley commune, Mang Yang district, Gia Lai province. - Reserve: 539,954 m³, exploitation capacity: 60,000 m³/year, - Distance: near Km118+800 of NH19 		
	<ul style="list-style-type: none"> - Gia Hải quarry is in Ngo May Ward, An Khe Provincial Town, Gia Lai Province. - Reserve capacity: 249,678 m³, exploitation capacity 20,000 m³/year -The quarry is adjacent to the Km74+800 of NH19 		
	<ul style="list-style-type: none"> - Thang Long quarry is in Thong NHat Ward, Pleiku City, Gia Lai Province. - Reserve: 400.000m³, exploitation capacity 80,000m³/year - Transportation distance: 12km. 		
	<ul style="list-style-type: none"> - Tân Vĩnh Phát quarry is in Ia Dom commune, Duc Co District, Gia Lai Province. - Reserve: 350,000 m³, exploitation capacity 70.000 m³/year. - The quarry is adjacent to the Km238+600 of NH19 		
Sand	<ul style="list-style-type: none"> - Hieu Ngoc Sand pit is in Tay Xuan commune, Tay Son district, Binh Dinh province. - Reserve capacity 104,880 m³, exploitation capacity 15.000 m³/year - Transportation distance: 500 m to Km 39+400 of NH19 		

Type	Locations and Key Parameters	Transportation Route to NH19	
	<ul style="list-style-type: none"> - Trang Đức sand pit is in Ayun and Đăk Jo Ta communes, Mang Yang district, Gia Lai Province. - exploitation capacity: 15.000 m³/year. - Reserve: 104,880 m³. - Distance: 7 km on paved road to Km129 of NH19. 		
Borrow pits	<ul style="list-style-type: none"> - Hon Voi borrow pit is in Song An commune, An Khe. - Reserve capacity: 100,000 m³ - Distance: about 3 km to Km74+800 of NH19, and about 100m to Km 3 of An Khe bypass. - Coordinates: 13°59'21.08"N; 108°42'18.81"E 		
	<ul style="list-style-type: none"> - The borrow pit 76 is in Ha Bau commune, Đăk Doa district, Gia Lai province. - Reserve capacity: 100.000 m³ - Distance: about 13 km to Km153+700 of NH19. - Co-ordinates: 14° 3'20.87"N; 108° 4'6.62"E 		
	<ul style="list-style-type: none"> - The borrow pit is at Km191+500 in Thăng Hưng commune, Chư Prông district, Gia Lai. - Reserve capacity: 120,000m³ - Distance: on the right hand side, 1.8 km to NH19. - Co-ordinates: 13°51'20.80"N; 107°54'22.30"E. 		
	<ul style="list-style-type: none"> - The borrow pit is at Km239+500 in Ia Dom commune, Duc Co district, Gia Lai. - Reserve capacity: 120,000m³. - Distance: on the right hand side, 0.2 km to NH19. - Co-ordinates: 13°46'0.55"N; 107°32'11.88"E 		

Other construction materials such as steel, cement, asphalt and cement concrete will be purchased from local suppliers and transported to construction sites. Hot asphalt will be purchased from local mixing stations or made available from the mixing stations installed by the contractor at the quarries. The estimated volume of raw materials to be used under the Project are shown in Table 9.

Table 9 - 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	

1.6 Disposal Sites

Unused excavated soils will be disposed at locations as agreed with the local communities and authorities. These disposal sites along NH19 are described in Table 10 below.

Table 10 -Proposed Disposal Sites

Location	General Information	Transportation Route
Km50+800	<p>The site is about 50m from Bau Sen bridge with the area of about 5,000m². The site is at the elevation that is 1.5m below the current road’s elevation. Total receiving capacity is estimated about 10,000m³.</p> 	
Km57+300	<p>The site is adjacent to the current NH19 with the area of about 2,000m². The site is at the elevation that is 2m below the current road. Total receiving capacity is estimated about 5,000m³.</p> 	

Location	General Information	Transportation Route
Km58+600	The site is adjacent to the existing NH19 with its area of about 2,000m ² . The site is at the elevation that is 2m below the current road's elevation. Total holding capacity is receiving about 5,000m ³ .	
Km58+800	The site is adjacent to the existing NH19 with its area of about 2,000m ² . The site is at the elevation that is 2m below the current road's elevation. Total receiving capacity is estimated about 5,000m ³ .	
Near Km4+500 of the Pleiku Bypass	The site is about 300m away from the Pleiku bypass with the area of about 8,000m ² . The site is at the elevation that is 2m below the current road's elevation. Total receiving holding capacity is estimated about 20,000m ³ .	
Km199+500	The site is about 50m away from NH19 with the area of about 3,500m ² . The site is at the elevation that is 2.5m below the elevation of the surrounding area. Total receiving capacity is estimated about 10,000m ³ .	
Km230+650	The site is about 200m away from NH19 with the area of about 7,000m ² . The site is at the elevation that is 1.5m below the current road. Total receiving capacity is estimated about 15,000m ³ .	

1.7 ANCILLARY FACILITIES

1.7.1 Worker Camps

It is estimated that up to 450 workers would be mobilised to work in the Project's construction sites at peak construction periods. About 150 local labors are expected to be mobilized locally for manual work who would go home after their working shifts. Table 11 provides some

information about the locations proposed by local communities and authorities for worker camps.

Table 11 -Proposed Locations of Worker Camps

Section	Description	Section	Description
Km56- Km67	<p>Location 1 (Km56+800) The site is currently barren land, near the alignment and is 20m from the nearest houses. The proposed camp is expected to accommodate 30 worker)</p> 	Km132- Km160	<p>Location 1 (Km147+700): The site is currently barren land and is 20m from the nearest houses . The camp is expected to accommodate 40 workers.</p> 
	<p>Location2: (Km67+600) The site is currently barren land and is 300 from the nearest houses to the alignment and the Song An Animal Quarantine Station The camp is expected to accommodate 20 workers.</p> 		<p>Location 2 (Boi village- Glar commune (at Km4+500 on Pleiku bypass): The site is near Km4+500 of the proposed Pleiku bypass and is 30m from the nearest houses. The proposed camp is expected to accommodate 60 workers.</p> 
An Khe Bypass	<p>Location 1 (Junction between An Khe Bypass and DT669): The area is agriculture land and is 30m from the nearest houses to the propsed bypass and the provincial road 669 The camp is expected to accommodate 50 workers.</p> 	Pleiku bypass	<p>Location 1 (Boi village- Glar commune (at Km4+500 on Pleiku bypass): The site is near Km4+500 of the proposed Pleiku bypass and is 30m from the nearest houses. The proposed camp is expected to accommodate 30 workers.</p> 

Section	Description	Section	Description
	<p>Location 2 (At Km12 of An Khe bypass): The area is agriculture land and is 50m from the nearest houses to the proposed bypass. The camp is expected to accommodate 30 workers.</p> 		<p>Location 2 (Km183+100): The site is currently barren land, near and is within the residential area and 20m from the nearest houses. The camp is expected to accommodate 40 workers.</p> 
Km67-Km90	<p>Location 1 (Km67+600): The site is currently barren land and is 300m from the nearest houses to the alignment and the Song An Animal Quarantine Station The camp is expected to accommodate 30 workers.</p> 	Km180-Km241	<p>Location 1 (Km183+100): (the same location as location 2 of Pleiky bypass. The second camp is expected to accommodate 20 workers.</p> <p>Location 2 (Km223+100): The site is currently barren land, near NH19 and is within the residential area and 30m from the nearest houses. The camp is expected to accommodate 40 workers.</p> 
	<p>Location 2 (At Km12 of An Khe bypass): The area is agriculture land and is 50m from the nearest houses to the proposed bypass. The camp is expected to accommodate 20 workers.</p> 		<p>Location 3 (Km231+700): The site is currently barren land, NH19 and in the residential area and is 50m from the nearest houses. The camp is expected to accommodate 40 workers.</p> 

1.7.2 Access Road

The construction sites will be accessible from the existing NH19 and the internal roads in wards, communes and town where the alignment runs through. Except for An Khe bypass and Dak Doa-Pleiku bypass where no road is existed, the contractor will identify and design new access during construction phase.

1.7.3 Water and Power Supply

As the national power grid is available in the localities, the contractor will purchase electricity from the local power utility. Water for domestic and construction will be from the project sites.

1.8. Construction Methods

Road Construction:

- Alignment: The proposed alignment follows the terrain and minimizes site clearance and land acquisition.
- Construction of roadbase: 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: 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 under water concretization method. Excavating soils for the abutment foundation to the designed depth; constructing a pile base; pouring and flattening 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 under water concretization method. Excavating soils for the abutment foundation to the designed depth; installing the steel shell; pouring concrete and flattening 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, flattening 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 under water 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 concrete 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.

1.9 Project Implementation Schedule

Project Owner: The Ministry of Transport;

Project Management: The Traffic Safety Project Management Unit;

Total investment capital: VND3,463 billions which is equivalent to USD 153.7million

The Project implementation schedule is presented in Table 12 below.

Table 12 -Project Implementation Schedule

T	Activity	Duration	Timeline Grid																											
1	FS	3m	[Timeline bars for FS activity]																											
2	Detail Design	9m	[Timeline bars for Detail Design activity]																											
3	Detail Design approval	3m	[Timeline bars for Detail Design approval activity]																											
4	Site clearance	9m	[Timeline bars for Site clearance activity]																											
5	Bidding	6m	[Timeline bars for Bidding activity]																											
6	Construction	24m	[Timeline bars for Construction activity]																											
7	Payment and warranty	6m	[Timeline bars for Payment and warranty activity]																											

CHAPTER 2. ENVIRONMENTAL AND SOCIO-ECONOMIC CONDITIONS

2.1. Environmental Conditions

2.1.1. Geographical Conditions

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°56'48.3"N and 108°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 6 - Geographical Location of NH19

2.1.2. Topographical Conditions

The NH 19 runs from the East to the West, the terrain gradually transits from coastal delta to highlands. The topography along the road alignment varies as follows:

Km 50-59

NH19 runs from east to west through a delta area. Ground elevation at Km50 is 26m. Horizontal curve radius is more than 250m.



Km59-67

NH19 runs on An Khe Pass with mountainous terrain with deep pools. There are steep rocky and steep cliffs on one side and deep chasm on the other side. Along this section, the terrain gradually elevates.

Horizontal curve radius is more than 50m. Terrain conditions allow a redirection at $R_{min} = 125m$, there are 5 sharp curves with $R < 125m$. Some locations are subjected to landslide risk



Km 67-76

NH19 runs on flat highlands and low hills. Ground at altitude: vary from 495m amsl at Km67 to 424m amsl at Km76. There are some bridges and culverts crossing small stream.

Along the road are orchard gardens, rice farms combined with residential area. Some locations have horizontal curve radius of 150m. Terrain conditions allow a redirection with $R_{min} = 250m$. There are vertical stiff along some sections. Route across densely populated areas at Km69+319-Km69+600; Km73 -Km73+500; Km74+500 - Km760; There are vertical drain-ditch at Km75+500 - Km76 on the right hand side

**Km 76-82**

The area is relative flat and lower toward the Ba river. There are populated residential areas laong the route.

**Km135+300-Km152**

NH 19 follow Low hilly terrain with slops, there are som small springs crossing. Ground altitude along this section o NH 19 is 666m amsl (Km131) to 840m amsl (Km160).

Along the route are farms of coffee, rubber and pine forest Horizontal curve radius is more than 250 m. Selected route can be redirected. There are populated areas along Km139 Km141, Km146-Km148, Km151-Km152. Other section passing through coffee and rubber farms.

**Km135+300-Km152**

NH 19 follows low hilly terrain with slops, there are some small springs crossing. Ground altitude along this section of NH 19 is 666m amsl (Km131) to 840m amsl (Km160).

Along the route are farms of coffee, rubber and pine forest. Horizontal curve radius is more than 250 m. Selected route can be redirected.

There are populated residential areas along Km139-Km141, Km146-Km148, Km151-Km152. Other sections pass through coffee and rubber farms and some pine forest.

**Km 152-155**

The section running in a relative flat area, lowering toward Km155. There are populated residentials along the road



Km 155-160

The terrain is on flat plateau, lowering toward Km160. Curve radius are greater than 250m. There are populated residential areas along the sections Km155- Km158 and Km159-Km160, the remaining sections passing agricultural land.

**Km 180-243**

From Km180 to Km243, NH19 runs on low hill lowering from +870m at Km180 to +350m at Km241. Along the route are coffee, rubber and cashew nut farms.

Horizontal curve radius is greater than 250m. There are populated residential areas at Km182-Km190, Km193 Km202+200, Km207+300- Km212+700, Km213-Km222 Km225-Km229.

**2.1.3 Geological Condition**

The Project areas 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, redish 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, liquidified. 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 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 colours; (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 brittle 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 Km243: 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.

2.1.4. Climate and Meteorological Conditions

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

a. *Air temperature*: Binh Dinh province has average temperature of 27.3⁰C, in which the average temperature is highest in June, July, August, at around 30.6⁰C. January has the lowest average temperature, at around 22⁰C. Gia Lai area has average temperature of 22.4⁰C. Average monthly temperature is highest in May, at around 29-30⁰C, and is lowest in January, at around 22⁰C. Annual average temperature of Binh Dinh area is usually higher than that of Gia Lai, as presented in Table 13.

Table 13 - Air Temperature in Quy Nhon and Pleiku (Unit: ⁰C)

Station \ Year	2011	2012	2013	2014	2015
Quy Nhon	26.9	27.7	27.2	27.2	27.5
Pleiku	21.6	22.5	22.4	22.4	22.9

Source: General Statistical Office, 2016

b. *Humidity (RH%)*: Humidity in Binh Dinh area varies between 76.4% to 80%, averaging at 77.6%. Humidity in Gia Lai is around 80% to 82%, averaging at 80.6%.

Table 14 - Humidity (%)

Station \ Year	2011	2012	2013	2014	2015
Quy Nhon	76.4	75.2	79.0	77.5	80.0
Pleiku	82.0	80.8	80.0	80.2	80.1

Source: General Statistical Office, 2016

c. *Rainfall*: The total annual rainfall significantly fluctuated during 2011-2015. Precipitation is concentrated in the rainy season with over 50% of annual rainfall. For Binh Dinh area, the average annual rainfall is 1,578mm, in the most recent five years, the lowest annual rainfall was in 2015, at 1,351mm, and the highest annual rainfall was in 2013 at 1,905 mm. Rainy season in Binh Dinh lasts from August to November. For Gia Lai area, the average total rainfall is 2,222mm, with 2015 as the year with the lowest annual rainfall at 1,634mm, and with 2011 as the year with the highest annual rainfall, at 2,567mm. Rainy season in Gia Lai lasts from May to October. Rainfall in Gia Lai area is usually higher than that in Binh Dinh area.

Table 15 - Average Annual Rainfall

Unit: mm

Station \ Year	2011	2012	2013	2014	2015
Quy Nhon	1,525	1,483	1,905	1,628	1,351
Pleiku	2,567	2,208	2,244	2,458	1,634

Source: General Statistical Office, 2016

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

Table 16 - Average Number of Annual SunshineHours

Station \ Year	2011	2012	2013	2014	2015
Quy Nhon	2,179	2,568	2,341	2,638	2,858
Pleiku	2,215	2,470	2,310	2,549	2,757

Source: General Statistical Office, 2016

e. *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.

f. *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:

In 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 rainstormy days. Flooding usually occurs in the later months when rainfall reaches peak levels, and the Project area is one of the areas most easily affected by flood. The dry season lasts for 8 months, droughts usually take place in summer and fall (May to September).

In 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 rainstormy 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.

2.1.5. 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 river banks and therefore, the rivers have a high slope, floods come and go rapidly, and flooding time is short. In the delta section, the river beds 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 province, the Con river is the biggest river. It is 171km long, basin area is around 2,980km², 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. The majority of 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 Srepok 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 Kbang, 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 13,000km², of which the basin area inside Gia Lai province is around 11,450km².

The hydrological regime of the rivers in Gia Lai province 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.

The road sections of NH19 proposed to be invested by the CHCIP mainly follow hilly contours and cross small streams. The area along the road have simple hydrological regime, affected by floods from mountain side, of the basin and not affected by large rivers or tides.



Figure 7. Hydrological Map of Project Area

2.1.6. Environmental Quality

2.1.6.1. Quality of Air, Noise and Vibration

Air quality was sampled at every 2 hours during 16 hours at 12 locations (the map showing the sampling locations is in Annex 4). The test results shown in Table 17 indicated that the average concentrations of TSP, CO, NO₂, SO₂ in the Project area were still within the allowable limits according to Vietnamese Air Quality Standard QCVN 05:2013/BTNMT. Noise levels at the sampling locations were below the limit set in QCVN 26:2010/BTNMT. Vibration level were also below the allowable limits set in QCVN 27:2010/BTNMT6.

Table 17–Baseline Air Quality

No	Location	Air sample (sample A)($\mu\text{g}/\text{m}^3$)				Noise (N)	Vibration (V)
		TSP	CO	NO ₂	SO ₂	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 (TB 1h)		300	30.000	200	350	-	-
QCVN 26:2010/BTNMT		-	-	-	-	-	70
QCVN 27:2010/BTNMT		-	-	-	-	-	70

No	Sampling locations	Coordinates	Code	Characteristics
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

6QCVN 05:2013/BTNMT: National Technical Regulations on Ambient Air Quality;

QCVN 06:2009/BTNMT: National Technical Regulations on Hazardous Substances on Ambient Air;

QCVN 26:2010/BTNMT: National Technical Regulations on Noise

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	that most passing vehicles were motorcycles.
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, DakPo district, Gia Lai province	13°57'42,6"N, 108°37'19,2"E	A04, N04, V04	
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	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	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 district, Gia Lai province	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	

2.1.6.2. Surface Water Quality

Surface water were sampled at two locations (map in Annex 4). Test results presented in Table 18 show that all water quality parameters were within the limit set in QCVN 08-MT:2015/BTNMT7, column B1. As sampling was carried out in rainy season, the TSS content nearly reached the allowable limit.

Table 18 -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	BOD ₅	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	Sampling 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

7QCVN 08-MT:2015/BTNMT column B1 – National Technical Regulations on Surface Water Quality for Irrigation Usage

2.1.6.3. Groundwater Quality

Analysis results of groundwater sampled at 2 locations (shown in Annex4) indicate that all parameters fall within the allowable limits of QCVN 09-MT:2015/BTNMT8.

Table 19 -Groundwater quality

No	Parameter	Unit	Result		QCVN 09-MT:2015/BTNMT
			NN01	NN02	
1	Temperature	°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 water, wells 20-30m deep
2	Rote avoiding Pleiku city	13°55'48,7"N, 108°5'41,9"E	NN2	Clear, colorless, well depth at 15m

2.1.6.4. Soil Quality

Analysis results of soil sampled at two locations (shown in the map in Annex 4) indicates that that the contents of heavy metals were within the limits set in QCVN 03-MT:2015/BTNMT9. The analysis results of the soil quality in the Project area are presented in Table 20.

Table 20 -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

8 QCVN 09-MT:2015/BTNMT – National technical regulation on groundwater quality

9 QCVN 03-MT:2015/BTNMT: National technical regulation on the quality of soil used for agricultural purposes

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
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2.1.6.5. Sediments Quality

The analysis 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 21 below.

Table 21 - 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

2.1.7. Biological Resources

2.1.7.1 Terrestrial Ecosystem

The areas along the NH19 used to be affected by civil wars and then 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 advised 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 commonly found between Km50 and Km90. Production forests include eucalyptus species, acacia auriculiformis, acacia hybrid, these 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 gardens 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, mangos or industrial trees such as pepper, coffee, etc.

According to the 2011-2015 Environmental Status Reports of Binh Dinh and Gia Lai and interviews with local 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,... 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.

2.1.7.2 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.

During the surveys in August and December 2016, the following species were identified *Anabastestudineus*, *Chanastriatus*, *Monopterus albus*, *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).

2.1.7.3 National Parks, Conservations Areas near Project Area

The Kon Ka Kinh National Park and the Kon Chu Rang Nature Reserve located at least 20 km farway 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.

- **Kon Ka Kinh National Park:** located at Kon Phe, 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 hodginsii* (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 konkakinensis* – 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: *Leptobranchium banae*, *L. anthospilum*, *Rana attigua* and *Rhacophorus alioaster* (IUCN-SSC and CI-CABS 2003).



(2) **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).

2.2. Economic Conditions

Tay Son district – Binh Dinh. In 2015, total output value of key production sectors was estimated at VND3,253 billion, in which the value of agro-forestry-fishery production was VND428 billion. With regards to cultivation, the production value was estimated to have reached VND242 billion, total area of annual cultivation land was 19,077ha, and the output of seed plants was around 75,903 tonnes. In 2015, the district deployed 11 large paddy fields across a total area of 515ha. With respect to animal husbandry, total production value was estimated at VND144 billion with a herd of 957 buffaloes, 35,958 cows, 58,709 pigs, and

556,000 poultry. Regarding forestry, forest management and protection, wildfire prevention and firefighting continue to be enhanced. The production value of industry – small industry and handicrafts – construction in 2015 was estimated at VND682 billion, in which sugar production, at 33,044 tonnes, was one of the key sectors. Small industry and handicrafts contributed VND253 billion, construction VND184 billion. Total revenues from the sale of goods services were estimated at VND2,143 billion. Some programs, projects and policies on socio-economic development in mountainous areas have been deployed with encouraging results.

Pleiku City (Gia Lai Province). As of 2015, the share of the trade-service sector was 50.2%, industry-construction sector 44.4%, and agro-forestry-fishery sector 5.4%. The average income per every ha of production land was estimated to reach VND68 million. The average income per capita was around VND39.1 million/capita/year.

An Khe Town (Gia Lai Province). The share of the industrial sector in the economy is 61%, service sector 28%, and agriculture 11%.

Mang Yang District (Gia Lai Province). The production output share of the agro-forestry sector is 52.98%, industry-construction sector 24.25%, and services 22.77%.

Chu Prong District (Gia Lai Province). In 2016, total production value reached VND4,755.3 billion, of which the agro-forestry-fishery sector contributed VND2,933.17 billion, industry-construction sector VND773.6 billion, services sector VND988.53 billion.

Duc Co District (Gia Lai Province) has an average annual economic growth rate of 13.15%. The share of agro-forestry production in the local economy is 48.6%, of industry-construction 18.3%, of services 33.1%. Average income per capita reached VND27.9 million/capita/year.

Dak Doa District (Gia Lai Province) has a steadily growing economy, averaging at 11.5%/year. It is estimated that by late 2015, total production value reached VND4,770 billion, average annual income per capita VND30 million. Agricultural growth was registered at an average of 5.5%/year, agricultural production now heading into commodity production. It has been established and developed several production areas focusing on industrial plants with high economic value such as coffee, pepper. The district now has over 13,200ha of coffee, over 1,100 ha of pepper. With respect to animal husbandry, Dak Doa district currently has a cattle and poultry herds of around 196,725 units, of which 63,275 are cattle (41% being cows).

Dak Po District (Gia Lai Province). In 2016, total production output is estimated at VND36,362.5 billion. Agro-forestry-fishery production is now focused into sustainable development, with the production value having reached VND24,524 billion.

2.3. Existing Infrastructure and Services

2.3.1. Transportation

National Highway 19 connects the Quy Nhon Seaport with Central Highlands 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, $B_n=24m$, $B_m=14m$;
- Section from Km82+200 to Km90: Level IV delta road, $B_n=10m$, $B_m=7m$;
- 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 Chur 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 some other 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.

Based on the vehicle count conducted by the feasibility study consultant, the average traffic flow at selected locations is presented in Table 22 in the next page.

2.3.2. 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 m³/day) and local wells. Results of the surveys on water used for washing and personal hygiene of households affected by the Project reveal that 23.5% of households are using water from dugged wells, 5.88% from boreholes, 11.76% are using public water source, and the majority (58.82%) are using tap water. With respect to water for cooking, 70.6% are using tap water, 23.5% are using dugged wells, and 5.8% are using borehole wells. According to the surveys, 94.1% of the households shared that they have septic toilets, only 5.9% responded that they have temporary and understandard toilets.

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. Around 17.5% of the households affected by the Project are using water from dug wells, 29.4% from drilled wells, the rest are using tap water (53.1%). For cooking purposes, 67.6% of the households are using tap water, 13.5% are using water from dug wells, and 18.9% from boreholes. Statistics of Gia Lai province also show that, the ratio of households with access to sanitary toilets in the districts covered by the Project ranges from 49% to 100%, in which the highest ratio was registered for Pleiku city and lowest for Duc Co district. Based on direct surveys with affected households, 79.3% shared they have septic toilets, only 17.5% had temporary, substandard toilets, and 2.2% did not have their own toilets, had to rely on others' or defecate on the fields.

2.3.3. Drainage and Flooding

Drainage is available along some sections of NH19. Public consultations shows that the areas near the Ba La and Lo Gom bridges are the lowland areas of Tay Giang commune in Binh Dinh province 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 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.

Table 22 - 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	Motorcycles/ Three-wheeled motorcycles	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	0	0	1794	Binh Dinh - Gia Lai, Gia Lai - Binh Dinh
2	K'Dang	Km 142+040	515	340	549	192	129	427	256	138	0	0	2407	An Khe - PleiKu, PleiKu - An Khe
3	Chu Prong	Km 197+300	187	190	250	95	55	113	137	0	0	0	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

2.3.4. Domestic Solid Waste Treatment

Domestic waste collection services is available in most of the populated areas located along the NH19's sections to be supported by 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 Chity 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.

2.3.5. Power Supply and Communication

Overall, grid electricity is provided to all communes affected by the Project, thus, 100% of the households surveyed said that they had been using the national electricity grid for lightning and daily use. Furthermore, some respondents also shared that they use electricity for cooking purposes (such as rice cooking or induction cooker).

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.

2.4 Social Conditions

2.4.1 Land Use

The Project sites are in Tay Son district – Binh Dinh province; An Khe town, Dak Po district, Mang Yang district, Dak Doa district, Pleiku city, Chu Prong district and Duc Co district – Gia Lai province. Agricultural land usually accounts for alargest share. The detailed land use status in the districts within the Project areas is presented in Table 23 below.

Table 23 -Existing Landuse in the Project Area

Administrative unit		Agricultural land (ha)	Plantation (ha)	Specialized land (ha)	Residential land (ha)	Total (ha)
Binh Dinh	Tay Son	18,192	39,588	6,344	1,006	69,220
Gia Lai	An Khe Town	12,356	3,955	1,740	627	20,007
	Dak Po	24,071	18,017	3,799	378	50,253
	Mang Yang	49,408	51,870	5,892	2,010	112,718
	Dak Doa	65,237	20,904	3,801	1,174	98,530
	Pleiku City	16,461	2,269	3,395	2,726	26,077
	Chu Prong	105,461	45,354	3,487	1,027	169,391
	Duc Co	60,468	6,484	2,531	448	72,186
Land use structure		56.9%	30.5%	5.0%	1.5%	100.0%

Source: Binh Dinh and Gia Lai 2015 Statistical Yearbook

It is clear that agricultural land accounts for a large portion (nearly 57%) in the land use structure of the Project area, followed by plantations which accounts for 30.5%. Residential land represents only 1.5% of total natural land in the area.

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

Table 24 - Land-use Along NH19

Section	Section	Landuse 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 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 communes
	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
Km155 to Km160	Km151+500 to Km152+500	Residential land of Dak Doa town
	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
Pleiku Bypass	Km157+700 to Km160	Agricultural land of residential areas of An Phu and Chu A communes
	Km0-Km1+800	Ricefield and vegetable garden land
	Km1+800-Km4+930	Coffee plantation

Section	Section	Landuse Status
	Km4+930-Km4+970	Ricefield and vegetable garden land
	Km4+970-Km5+250	Coffee plantation
	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	

2.4.2 Labor and Income

Nearly 70% of the population of the Project communes reside in rural areas. Populated residential areas are only observed in the communes/wards of An Khe Town, Pleiku City and communecenters along the existing NH19.

For Binh Dinh, of the total affected people affected, 20.3% of people are engaged in agricultural production (9.7% are male vs 10.6% are female). 18.4% are involved in businesses (9.3% are male vs 9.1% are female). A small percentage of 5.5% of affected people are working as workers (2.9% are male vs 2.6% are female). There is 10% of them working as governmental staff (5.7% are male vs 4.4% are women). A small number of people are not working and remain at home doing housework (0.7% are male vs 3.6% are

female). A 6% of them work as hired labor (3.3% are male vs 2.7% are female). 5.8% are retired (2.6% are male vs 3.3% are female).

For Gia Lai, There are 532 men and 480 women from the sample taken. The number of people at the working age (18 – 60) makes up 67.7%. There are 456 people (209 women and 247 men) who are currently engaged in agricultural production, accounting for 45.06% of total people from the sample. If disaggregated by gender, there is no big difference between men and women. The percentage of men and women participating in agriculture are 46.43% and 43.54%, respectively.

The number of people active in wage employment in private companies and private businesses is small (14 people, with 9 men and 5 women), making up 1.4%. Most of the household head (11 people) who work as hired labor is household head. Only 3 people who are not household heads. There are 2.87% (29 people, including 17 men and 12 women) who are working as hired labor, primarily in mechanical workshops (mainly young people).

There are 74 people (39 men and 35 women) who are working in the public sector (7.31%). Most of them are aged between 25 and 45 years old.

There are 75 people who are engaged in private businesses (7.41%) and 9 people (0.89%) in the field of transport. There are 54 persons (5.34%, including 20 men and 34 women) who are retired and/or do housework, or running occasional small business during off-farm season. There are 301 people who are students (156 male and 145 female), accounting for 29.74% of those affected in the sample.

The average income of 218 households affected is 11,230,000 VND/month. Compared between male headed households and female headed households, the average income from male headed households appears higher than that of female headed households - 3,750,000 VND/month for male headed households vs 1,600,000 VND/month for female headed households. The average income of all members of the affected household from the sample is 3,267,000 VND/month. Geographically, the average income appear to be higher in communes, towns of An Khe Town and Pleiko City compared to that of communes in the rural, remote areas.

Highest income are found among households in An Binh Commune with 15,104,000 VND/household/month whereas the lowest income are among communes of Ia Dok and Tay Giang with only 5,700,000 VND/household/month. The highest income per households is 550 million/year whereas the lowest income was 32 million/year.

Table 25–Affected Household Monthly Average Income in Gia Lai Province

<=2 Million VND		From 2 - 3 Million VND		From 3 Millions VND		TOTAL	
Households	%	Households	%	Households	%	Households	%
23	10.55	47	21.56	148	66.7	218	100.0

Source: RAP, 12/2016.

2.4.3 Population

The road sections to be supported by the Project runs through 2 communes of Tay Son district, Binh Dinh province with a total population of 22,038 people, and through 7 districts of Gia Lai province with a total population of 226,658 people. The population of the communes/wards/towns in the Project area is presented in detail in Table 26:

Table 26 - Population of Project Communes

Province	District	Commune/ Ward/Town	2015 Population			Area (km ²)	Density (person/ km ²)	No. of househol ds	Average person/ HH
			Total	% Male	% Female				
Binh Dinh	Tay Son	Tay Thuan	8,067	50.53	49.47	77.66	104	1,903	4.2
		Tay Giang	13,971	51.07	48.93	73.76	189	3,212	4.3
Gia Lai	Dak Po	Cu An	7,078	57.58	42.42	36.9	192	1,584	4.5
		Tan An	12,669	59.92	40.08	26.5	477	2,760	4.6
	An Khe town	Song An	5,442	49.76	50.24	44.2	123	1,197	4.5
		An Phuoc	3,545	48.58	51.52	13.2	269	778	4.6
		Thanh An	5,471	50.78	49.22	22.5	243	1,346	4.1
		An Binh	8,170	49.76	50.24	9.7	845	1,962	4.2
	Mang Yang	Ngo May	5,384	55.46	44.54	10.2	530	1,223	4.4
		Dak DJrang	5,019	50.95	49.05	50.5	99	1,324	3.8
	Dak Doa	Kon Dong	10,162	51.26	48.74	17.0	167	2,191	4.6
		Dak Doa	15,476	48.85	51.15	21.2	730	3,644	4.2
		Tan Binh	5,212	50.27	49.73	22.5	232	1,203	4.3
		K'dang	10,690	52.81	47.19	75.8	141	1,375	7.8
		A Dok	5,948	50.25	49.75	21.1	282	1,284	4.6
		Glar	8,984	51.25	48.75	41.7	216	1,978	4.5
	Pleiku City	Ia Bang	11,220	52.66	47.34	53.6	210	2,348	4.8
		Gao	4,093	54.19	45.81	58.0	71	1,345	3.0
		An Phu	10,887	52.12	47.88	11.2	976	2,602	4.2
		Chu H'Drong	2,494	53.77	46.23	13.2	190	573	4.4
	Chu Prong	Chu A	9,300	46.48	53.52	14.5	643	1,942	4.8
		Thang Hung	6,709	49.75	50.25	38.6	174	1,478	4.5
		Bau Can	6,370	47.55	52.45	33.8	189	1,605	4.0
	Duc Co	Binh Giao	6,642	44.84	55.16	41.9	159	1,585	4.2
		Ia Krieng	5,427	49.25	50.75	109.2	50	1,217	4.5
		Ia Kla	7,289	46.56	53.44	49.9	146	1,697	4.3
		Chu Ty	14,344	43.88	56.12	113.5	126	3,044	4.7
		Ia Pnon	4,672	49.25	50.75	116.0	40	4,672	1.0
		Ia Nan	8,673	51.95	48.05	90.2	96	1,880	4.6
		Ia Krel	8,313	49.26	50.74	53.1	157	1,960	4.2
Ia Dom		6,995	49.25	50.75	145.7	48	2,438	2.9	
Ia Din	3,980	50.15	49.85	43.98	90	885	4.5		

The Project area is home to some ethnic minority groups, the majority of which are Bahnar and Jrai people. Ethnic minority households are concentrated mainly in Gia Lai province, representing from 30% to 70% of the communal population. Furthermore, throughout Gia Lai province, the political role of the ethnic minorities has always been valued. Specifically, within the leadership of the communes and wards of the Project area, at least the Chairman or Vice-Chair of commune/ward People's Committee of the has to come from an ethnic minority group.

The Kinh communities reside in hamlets, villages, groups and are mostly settled along the key routes, particularly along the existing NH19. These communities live off agricultural activities, cultivating rice and industrial crops (pepper, coffee, rubber) and engage in trading activities and services to serve the needs of local residents.

Ethnic minority communities in the Project bypasses are allocated in the highlands and concentrated in villages; in medium -high mountains, sloped terrain or remote areas. The population lives dispersely. The density of villages and residents is not only influenced by landscape, topographical factors but is also linked to the level of cultivation and stability of life.

Milpa cultivation remains crucial to the provision of food and food products to the Central Highlands residents as paddy fields are limited and rice cultivation has been practiced by some groups of Ja Rai, Bahnar people who are living in areas with relative favorable conditions for rice cultivation. In practice, rice cultivation in Central Highlands remains primitive. Even though tractors, plowing machine and fertilizers have been used/applied, agricultural productivity in these communities remain less than that of Kinh people. Beside milpa and paddy fields, horticulture economy has become increasingly important, especially for villages that have settled permanently (instead of keep moving from one place to the other), however, horticulture does not play a key part in household's economy in the Central Highlands.

2.4.4 Education

There are 121 schools, including pre-school, primary, secondary and high schools within the project's communes.

Table 27 - Schools within the Project Area

Province	District	Commune/Ward/Town	School	Number of pupils				
				Pre-school	Primary	Secondary	High school	Total
Binh Dinh	Tay Son	Tay Thuan	4	221	426	290	625	1562
		Tay Giang	5	318	580	946	570	2414
Gia Lai	An Khê	An Phuoc	2	87	259	181	92	619
		Thanh An	3	219	439	310	510	1478
		An Binh	4	450	630	540	720	2340
		Ngo May	2	160	401	650	742	1952
		Song An	3	151	437	334	485	1407
	Dak Po	Cu An	3	244	563	294	464	1565
		Tan An	5	435	952	850	518	2755
	Mang Yang	Kon Dong	7	326	1378	979	285	2968
		Dak DJrang	3	379	612	345	534	1870
	Dak Doa	Dak Doa	6	1008	573	366	618	2565
		Ia Kla	6	198	1040	473	586	2297
		Ia Bang	4	512	1364	518	156	2550
		Tan Binh	4	186	466	330	260	1242
		Kdang	4	543	1166	469	525	2703
		Glar	4	310	869	552	25	1756
		A Dok	3	245	767	449	560	2021
		Pleiku	Gao	3	272	445	211	61
	An Phu		4	472	1313	633	120	2538
	Chu Hdrong		4	23	162	580	136	901
	Chu A		3	25	91	108	95	319
	Chu Prong	Thang Hung	4	272	697	412	550	1931
		Binh Giao	4	213	780	432	374	1799
		Bau Can	3	196	625	398	415	1634
Duc Co	Ia Krieng	4	564	1298	1354	1104	4320	
	Chu Ty	3	873	1822	1879	1137	5711	

Province	District	Commune/Ward/Town	School	Number of pupils				
				Pre-school	Primary	Secondary	High school	Total
		Ia Pnon	3	452	986	1245	998	3681
		Ia Nan	5	205	807	431	327	1770
		Ia Krel	5	548	781	444	412	2185
		Ia Dom	4	411	775	470	286	1942
		Ia Din	4	211	596	298	175	1280

Source: Survey Data Collected for RAP preparation, 12/2016

In Gia Lai, of the total 218 heads of households, there are 183 male-headed households and 35 female-headed households. Of these, there are 105 head of household (48.2%) who have completed secondary high school, 49 head of household (22.5%) have graduated primary school. At a higher level of education, there are 43 head of household (19.7%) who completed high school. The number of household heads completing vocational school, college, university is 17 people, making up 7.8%. The number of illiterate household heads are 4 people, accounting for 1.83%.

Comparing by gender, of the 105 householders completing highschool, the number of male head of household are 94 whereas female headed households are 11. Within the male headed household group, the number of households completing high school accounts for 51.37%. Within the female headed household group, the number of households completing high school makes up only 31.4% (11 person).

Similarly, at the primary school level, of 49 household heads, there are 37 male headed households and 12 female headed households. The male group accounts for 20.32% compared with total male headed households, and 17.0% compared with total household heads. The female group accounts for 34.29% compared with total male headed households, and 5.5% compared with total household heads.

At highschool level, this group include 43 persons, making up 19.7% compared to the total household heads. The female group accounts for 22.86% and male group accounts for 19.13%, respectively to female and male group. The group completing vocational highschool, college and university makes up 7.8%, of which male group making up 7.65% and female 8.57%.

There are four household heads (1.8%) who are illiterate. By gender, there are 3 male head householdls and 1 female headed households.

In Binh Dinh, a survey of 137 affected households at Tay Giang and Tay Thuan communes revealed that 34.3 percent of the surveyed people have completed high school, of which the percentage of male completing highschool is 29.9% vs female which is 4.4%. At vocational school, college and university level, the percentage of male completing the level is 14.9% vs female which is null. At secondary school, the percentage of male completing the level is 31.7% vs female which is 26.6%. At primary school level, the percentage of male completing the level is 8% vs female which is 5.8%. As the data from the household survey indicated, the higher the educational level is (primary school vs university), the lower level of participation the female is.

2.4.5 Health

There are 37 health care facilities, including clinics and hospitals in the Projectareas. Each project commune has at least one health care clinic. The Dak Doa town, Dak Doa district, Kon Dong town of Mang Yang District and Chu Ty of Duc Co District, that have three health

care facilities each. There are also number of General hospitals at regional, provincial, city and district levels located along the NH19 as listed below:

- Commune/ward/town clinic;
- General Hospital of Tây Sơn District and Health Care Centre of Tây Sơn District are located along the section from Km 50-67 of NH 19;
- An Khê Town General Hospital, An Khê Town Health Centre, Đăk Pơ District General Hospital, Đăk Pơ District Health Centre are located along the section from km 67-km 76 of NH19;
- Mang Yang and Dak Doa District General Hospitals, Mang Yang and Đăk Đoa District Health centres are located along the section from Km132-Km155 of NH19;
- Hoàng Anh Gia Lai Medical University Hospital, Gia Lai Province Hospital, Pleiku City Hospital, Duc Co District General Hospital, Duc Co District Health centre are located along the sections from Km 155-Km 241 of NH19;

The 2016 Statistic Report of Department of Health of Binh Dinh and Gia Lai Provinces shows that the most common infectious diseases in the Project area are dengue fever (13,374 cases were recorded in Gia lai), influenza (24,290 cases in Gia Lai), and eye diseases (7,250 cases in Gia Lai and 76,075 cases in Binh Dinh). In addition, the report also recorded that malaria affected 575 patients in Gia lai and 8 patients in Binh Dinh in 2016.

2.4.6 Traffic Accident

In 2015, there were 37 traffic accidents on the sections of NH19 in Binh Dinh Province, with 27 people died and 21 injured. In the NH19 road sections in Gia Lai Province, there were 243 traffic accidents, with 274 people killed and 148 injured. The accidents were caused by low traffic awareness of the road users and partly degraded road quality.

According to Official Letter No. 37/ATGT dated March 8, 2016 of the General Department of Roads, there were 11 black spots of traffic accident on the NH19, including the sections from Km 140 to Km144, from Km148+400 to Km152+7200, from Km 155 to Km 159+960, from Km190+500 to Km 191, Km 197, from Km 199 to Km200, from Km 202 to Km203, from Km 217+400 to Km218+600, from Km222+250 to Km223+200, from Km226 to Km228+350. The four sections that usually occur traffic accidents are from Km201+800 to Km202+200, Km203+100, from Km207+200 to Km207+600 and from Km213+400 – to Km213+700.

2.4.7 Physical Cultural Resources

Along the road sections to be supported under the project, there are members of cultural and physical resources such as 1) Xa Than Temple (Song An commune, An Khe town, Gia Lai province, about 20-30m away from NH19) is a small local temple for worshipping Snake God, ritual ceremony is on February 20 every lunar calendar, (2) Cho Dong Market's church (An Binh, An Khe, Gia Lai, about 20m away from NH19), (3) Minh Chau Pagoda (Kong Dong town, Mang Yang district, about 20 m away from NH19), (4) Buu Tan Pagoda (Pleiku City, Gia Lai Province, 10 m away from NH19), (5) Duc Giang Pagoda (Pleiku City, Gia Lai Province, about 20 m away from NH19), Nguyen Son Pagoda, Khanh Thien Pagoda (Chu Prong District, Gia Lai Province, about 20 to 25 m away from NH19).

In Gia Lai province, an estimated 20 graves (located in a cemetery in Glar commune of Đăk Đoa District) would be potentially affected. These graves belong to Bahnar ethnic minority group. Consultation with the grave owners indicate that the affected households support the project implementation and expect the appropriate compensation. Once the detailed design for

the subproject is available, inventory of loss and the detailed measures survey will be carried out to identify the exact number of graves to be affected. Relocation of the affected graves will be done on the basis of consultation with the affected households to meet their customs and habits of local peoples. Compensation payment for affected graves includes full costs associated with a) land for re-burial, b) excavation, c) relocation, d) reburial, e) construction of new tombs, and f) other reasonable related costs which are necessary to meet local customs.

2.5 Site-Specific Social and Environmental Conditions

The most noticeable of socio-environment features along the Route of the Project are presented in Table 28.

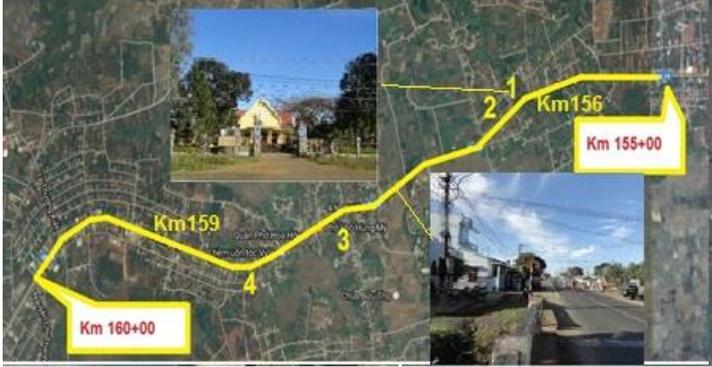
Table 28–Site-specific Features Along NH19

Station	Current Status
<p>Km 50 - Km 59</p>	 <p>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.</p> <p>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)</p> <p>Curved, vision is limited from Km56 to Km58</p> <p>The sections pass through residential areas at</p> <p>Km 50+800-Km52+100: Ta Giang 1 residential area, Tay Giang commune, 10-15 meters from the road</p> <p>Km53+200-Km54+900: Dong Pho residential area, Tay Giang commune, 7-10 meters from the road</p> <p>Km56+100-Km57+400: Trung Son residential area, Tay Thuan commune, 10-15 meters from the road</p> <p>Km57+700-Km58+300: Thuong Son residential area, Tay Thuan commune, 5-10 meters from the road</p> <p>-Sensitive sites on the route (see the map):</p> <p>Binh Khe Feudal Working Place (Huyện Đường): about 500 m from NH19</p> <p>No 3 Tay Giang Primary School: 35 m from NH19</p> <p>Vo Lai High School: 40 meter from NH19</p> <p>Tay Giang Secondary School: 30 meter from NH19</p> <p>Binh Giang – Tay Giang Martyrs Cemetery: 180 meter from NH19</p>
<p>Km 59 - Km 67</p>	 <p>An Khe Pass Area goes through high mountains and deep valleys. The route is along</p>

Station	Current Status
	<p>rocky and steep cliffs with many twists, corners with limited visions. High voltage lines of power of 220KV and 35KV run along the route with some intersections. L-shaped roadbed.</p> <p>Agricultural land for planting casava, acacia and eucalyptus (km59-km67)</p> <p>A Rescue Road at Km63+174</p> <p>7-meter-wide traveled way, 9-meter-wide roadbed, many damaged sections.</p> <p>Plantion forest areas locate along the An Khe bypass. And there are some landslide locations.</p>
<p>Km 67 - Km 76</p>	<div> </div> <p>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 handside, along the road is at the section from km 75+500 to km76.</p> <p>7-meter-wide road top, 10-meter-wide road embankment, heavily damaged (km72-km76)</p> <p>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</p> <p>- 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</p>
<p>An Khe By pass (13.7km long)</p>	<div> </div> <p>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.</p>

Station	Current Status
<p>Km 76 - Km 82+200</p>	 <p>An Khe Urban Town, densely populated area, relatively high traffic density, 14-meter-wide road surface, 24-meter-wide roadbed, good asphalted 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</p>
<p>Km 82+200 - Km 90</p>	 <p>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 Son cemetery: 20m from NH19</p>

Station	Current Status
Km 131+300 - Km 135	 <p>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</p> <p>Environmentally sensitive sites along the route include:</p> <ol style="list-style-type: none"> 1. Chau Khe Parish: 25m from NH19 2. Minh Chau, 20m from NH19 3. Primary School of Kon Dong 1 Town: 30m from NH19
Km 135 - Km 152+500	 <p>Low hilly and slopy area, famrs 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.</p> <p>The route passes residential areas at:</p> <p>Km136+308-Km138: Residential Areas at Linh Nham – Dak Djang commune; Residential areas and agricultural land, 10-15 m from the road</p> <p>Km138-Km139+200: Tan Phu Residential Area, Dak Djang, 10-15 m from the road</p> <p>Km139+200-Km139+700: Nam Dat Residential Area, Dak Djang, 7-10 meter from the road</p> <p>Km139+900-Km143+800: Residential Areas of Cay Diep and Ha Long 2 – K’ Dang commune, 7-10 m from the road</p> <p>Km144+600-Km146+600: Cau Vang Residential Area, K’Dang commune, 10-15 m from the road</p> <p>Km147+200-Km152+500: Residential Area of Hamlet 1, 2,3 at Tan Binh commune, 15 meter from the road.</p> <p>- Sensitive sites along the route include:</p> <ol style="list-style-type: none"> 1. Tran Phu Secondary School: 30m from NH19 2. K’ Dang Kindergarten: 20 m from NH19 3. Tan Binh: 5-10m from NH19

Station	Current Status
Km 152+500 - Km 155	 <p>Passing through Dak Doa town, 14-meter-wide alphalted 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</p> <p>- Sensitive sites along the route include:</p> <ol style="list-style-type: none"> 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	 <p>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)</p> <p>The rooa passes through residential areas at:</p> <p>Km155+700-Km157+300: Residential Areas of Hamlet 1, 2, and 3 at An Phu Commune, 5-7 m from the road</p> <p>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</p> <p>Km159-Km160: Residential Areas at the center of Chu A commune. The households are 15m from the road.</p> <p>Sensitive sites along the route include:</p> <ol style="list-style-type: none"> 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
<p>Dak Doa Pleiku Bypass (Length of bypass is 13.2km)</p>	 <p>New bypass road is to be constructed, passing through agricultural areas planting rubber, pepper, coffee, rice and vegetables.</p>
<p>Km 160- Km 167</p>	 <p>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</p>
<p>Km 180 - Km 218+500</p>	 <p>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 sections 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</p>

Station	Current Status
	<p>Km200+200-Km202+200: Thanh Binh Residential Area, Thanh An, Binh Giao commune, people’s houses are 10-15m from the road</p> <p>Km207+300-Km209+100: Thong Nhat Residential Area, Dong Tam, IA Din Commune, people’s houses are 10-15m from the road</p> <p>Km211+500-Km212+700: Thanh Tâm Residential Area , IA Krel; people’s houses are 10-15m from the road</p> <p>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</p> <p>Km216+200-Km218+700: Residential Areas of IA Lam, Lam Tok and Khop, IA Krel commune; people’s houses are 10m from the road.</p> <p>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 casava, coffee, cashew nuts, pepper and tea.</p> <p>Environmentally sensitive sites along the route include:</p> <ol style="list-style-type: none"> 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 14. 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
<p>Km 218+500 - Km 222</p>	<div> </div> <p>Chu Ty Town, 13-meter-wide road top, road embankmentwidth from 17 to 21 meter. Densely populated area. Medium traffic sensitivity. People’s houses are 10-15m from the road.</p>

Station	Current Status
Km 222 - Km 241	 <p>7-meter wide road top, 9-meter wide road embankment, good quality road surface, sparsely populated.</p> <p>The rooa passes through residential areas at:</p> <p>Km222+500-Km222+800: Residential Areas No 7, Chu Ty town. The people’s houses concentrate at the right hand side of the road and 7-10 meter from the road.</p> <p>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.</p> <p>Km228+800-Km229+100: IAMUT Residential Area, IADOM commune; people’s houses are 15m from the road.</p> <p>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;</p> <p>m235-Km236+300: Residential Areas of Bi village IaDom commune: people’s houses are at 15m from the road.</p> <p>Mixed with agricultural areas for coffee, rubber and casava</p> <p>Environmentally sensitive sites along the route include:</p> <ol style="list-style-type: none"> 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

2.6 Social and Environmental Conditions at the Ancillary Facilities

2.6.1 Disposal Sites

Location	Current Status	Photo
Km50+800	<p>At the right side of NH19 and 50 m from Bau Sen Bridge. 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.</p>	

Location	Current Status	Photo
Km57+300	0.2 km from NH19 on the left hand side. Accessible through A 2.5 meter-wide dirt road. Emptyland with bushes and plantationforest (eucalyptus). 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.	
Km58+800	At the left hand side of the NH19. Agricultural land for cassava. This area was reserved for residential area of Tay Thuan commune. There is no sensitive sites such as pagoda, church, hospital or school. The households locate at 50m from the site and at the opposite side of the road. However, there is an operating petroleum station adjacent to this landfill.	
Adjacent to Km4+500 of Pleiku Passby	300 meter from the Pleiku Passby 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.	
Km199+500	- 50 meter from NH19 at the left handside. 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.	
Km230+650	0.2 km from NH19 at the right hand side. 2.5-meter-wide asphalted road. A football playground of IA Dom that is lower than the existing road. The local authority is planning to make a higher roadbed. This playground is not close to hospital, church or pagoda. The closest house is at 350m from this site.	

2.6.2 Borrow Pits, Quarries and Mixing Stations

Type	Current Status	Image
Quarries	<p>Hieu Ngoc Rock Quarry located within the Industrial Complex of Phuc An, Tay Xuan Commune, Son District, Binh Dinh Province and at a distance of about 1.6km from NH19. The transportation road is asphalted with a width of 6m passing a residential area. The rock quarry is far from sensitive sites and 150 meter from the closest people's house.</p>	
	<p>Trang Duc Rock Quarry at Hra Commune and Dak Ta Ley Commune, Mang Yang District, Gia Lai Province is adjacent to National Road at Km118+800. 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.</p>	
	<p>- Gia Hai Rock Quarry is at Ngo May Ward, An Khe Town, Gia Lai Province. The quarry is 700 meter from the NH19 at the right hand side (Km74+800). The road is asphalted with a width of 4 meter and across residential areas. Surrounding this area is a vacant land with bushes. There is no sensitive site at this area and the closest people's houses locate at 500m far from this area.</p>	
	<p>Thang Long Rock Quarry locates at Thong Nhat Ward, Pleiku City, Gia Lai Province. Asphalted and cement concreted road with many households locating at the two sides. Around the quarry are vacant land and agricultural land. There are no sensitivity sites such as school, hospital, church or pagoda in this area. The people's houses locate right at the gate of the quarry and at 500m from the exploitation area.</p>	
	<p>Tan Vinh Phat 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 of local people. There is no sensitive site in this area. The closest house locates at 1 km from this area.</p>	
Sand pits	<p>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 arounding 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.</p>	

Type	Current Status	Image
	<p>Trang Duc Sand pit located at Ayun Commune and Dak Jo Ta Commune, Mang Yang District, Gia Lai Province. The pit is at the right hand side of NH19 (Km129). An 7km-long asphalted road across pine tree forest and residential area. Surrounded by agricultural and vacant land. There is no sensitive site at this area and the closest house is at a distance of 500m</p>	
Borrow pits	<p>The pit of Hon Voi Mountain at Song An Commune, An Khe town is 3 km from the NH19 at the right hand side (Km74+800). The pit is about 100m from An Khue town's Pass by at Km3. Accessible through asphalted access road with the width of 4m. Densely populated density along the road. The pit locates on empty land that local people plant eucalyptus. Therefore, the pit is not close to any sensitive sites and at a distance of 400 m from the closest people's house. Borrow pit locates at Hamlet 76, Ha Bau Commune, Dak Doa District, Gia Lai Province. An asphalted road with the width of 4m and about 13 km from National Road at Km153+700. Empty land with mostly bushes and coffee farms. There is no sensitive site close the pit. The closest household is about 600 m from the pit.</p>	
	<p>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.</p>	
	<p>Borrow pit is adjacent to National Road at Km239+500, Ia Dom Commune, Duc Co District, Gia Lai Province. This vacant land is reserved for building an industrial zone of Duc Co District and in the process of land clearance. Surrounding this area are mainly rubber farms. There is no sensitive sites. The closest household is at a distance of about 1km.</p>	

2.6.3 Worker Camp

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 Passby and DT669 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.	
Km147+700	Empty land is within a 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 – Glare Commune (at Km4+500 on Pleiku Bypass)	Adjacent to the planned Pleiku Bypass and the Glare Commune 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	Current Status	Image
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 and water discharge. Mainly covered by bushes.	

CHAPTER 3. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

3.1. 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 upgradation 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 localised flooding after new drains are installed along the highway/

Positive Impacts on Socio-economic Development. The upgradation 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.

3.2. Potential 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

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:

- 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
- construction of bridges and transport the wastes to disposal sites;

- Backfilling, 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 covers;
- Community disturbance, including disturbance to traffic, accessibility, daily activities, and business due to construction activities;
- social impacts related to mobilisation 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.

Table 29 - Project Potential Negative Impacts

Phase	Physical environment							Biological resources			Social environment				Others					
	Land Acquisition	Air quality, noise, vibration	Soil, surface water	Solid waste	Hazardous waste	Drainage, hydrology	Erosion, sedimentation, landslides risks	Trees, vegetation	Aquatic species	Bush fire risks	resettlement	Social disturbance	Traffic disturbance	Cultural, historical structures	UXO-related risks	Impacts on infrastructure and services	Health and Safety risks of workers	Fragmentation of residential and production land	Traffic safety	Emissions from transport
Pre-construction	M	L	L	L	L	N	N	L	N	N	M	M	N	M	M	L	L	N	L	L
Construction	M	M	L	S	L	M	M	L	L	M	N	L	M	L	S	M	M	M	M	M
Operation	N	L	N	L	N	L	L	N	N	N	N	N	N	N	N	N	N	N	M	M
<p>The impacts are categorized as follows:</p> <ul style="list-style-type: none"> - No (N) – Not affected - Low (L) - Low/small/partial/reversible /temporary impacts; - Medium (M) - impacts at medium level, most of which can be reversed or minimized, so still partial and temporary; - Significant (S) - irreversible or inability to be restored to its original status 																				

3.2.1. Pre-construction Phase

3.2.1.1. Land Acquisition, Site Clearance

In Binh Dinh province, the project will acquire approximately 19 ha of agriculture land from 188 land owners and 0.15 ha of rural residential land. In total, 810 persons in 180 households (HH) will be affected by land acquisition. Among these, 5 HH are belong to vulnerable group, 4 HH including 2 vulnerable HH will be relocated, 20 HH will lose both residential land and business, 70 HH will be affected due to loss of business. None of the affected HH would loose more than 10% of their total land holding.

Four household to be relocated are in Tay Thuan commune. Their main income (50-70% of their total income) is livestock raising (cow, pig, chicken) and cultivation (eucalyptus, lemon, banana, coconut, longan, papaya). These four households would like to relocate on their own and asked for appropriate compensation and support to buy new land to continue their animal husbandry activities. The loss of social network is anticipated. This comes along also with loss of usual access to public services and it will take time for the affected family to adjust themselves to new living environment. Resettlement, however, may be a chance for the family to build new house and improved living condition.

In Gia Lai province, the Project will acquired permanently approximately 181 ha of land including 5.5 ha of residential land, 174.5 ha of agricultural land and 0.7 ha of public land. 915 HH will be affected by residential land acquisition. Among these, 97 HH would be severely affected with 87 HH has to be relocated. 220 business households would be affected, among these are 10 vulnerable households.

The Project would require to relocate 51 power poles at Km180-Km241 in Gao commune (Pleiku City), Binh Giao, Bau Can, Thang Hung (Chu Prong district), Ia Nan, Chu Ty, Ia Pnon, Ia Krieng, Ia Kla, Krel Krel, Ia Dom and Ia Din (Duc Co district).

To minimize the potential impacts of land acquisition, the Project has prepared two Resettlement Action Plans (RAPs) and two Ethnic Minority Development Plans (EMDPs) and estimated the costs for compensation and support to the affected families. The key contents of RAPs and EMDPs are summarized in Chapter 5 of this ESIA.

3.2.1.2. Safety Risks Related to Unexploded Objects (UXO)

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 billions VND (approximately 300,000 USD)

3.2.2. Potential Negative Impacts and Risks of Construction Phase

3.2.2.1. Air Pollution

During construction phase, dusts would be generated from the demolition of the existing structures, site clearance, top soil removal, excavation and filling, loading and unloading of granular materials and waste, temporary storage and transportation of these materials

etc. Exhaust gases such as NO_x, SO₂, CO, CO₂ v.v 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 30.

Table 30 - Structures to be Demolished

	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 scatterly distributed 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, localised, at low level and last in relative short period of time. This local impact can be mitigated by commonly know method such as watering the materials before demolition and/or cover the areas/buildings to be demolished.

Dust generated from Earthworks and Transportation:

The volume of earthworks is presented in Table 31 below:

Table 31 -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 m³ of soil will generate around 0,075 kg of dust, 10% of which is suspended dust¹⁰. Given the pollution coefficient E = 0,075 kg/m³, and based on construction schedule, the expected amount of dust spread in the air during excavation, filling and leveling is shown in Table 32.

Table 32 - 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

The figures presented in Table 32 above indicated that the amount of dusts 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 (QCVN)01: 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 33

Table 33 - 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 32 and 33, the total amount of dust and emissions generated from excavation and transport activities in each construction item are summarized in Table 34 below:

Table 34 - 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 35 - 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	0.573	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	
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/m³, and within 10m from source, dust level would be from 1.17 to 19.1 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 Dong town, Mang Yang district), Buu Tan Pagoda (Pleiku – Gia Lai), Duc Giang Pagoda (Pleiku – Gia Lai), Nguyen Son 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 Djang, K'Dang, Tan Binh, An Phu, Chu Asian, Gào, Bau Can, Thang Hung Binh, Gao, 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 plan 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 36 below:

Table 36 - 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
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 $11L_{\Sigma} = 10lg$



Where: L_{Σ} is the total noise level; L_i 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 night time).

¹¹Pham Ngoc Dang, 2003. Air environment. Science Publishing House 2003

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 37. 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 37 - 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
Thuowng 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
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	Km155+700-	7-10	>11.5

Residential area	Locations	Distance to road/ bridge (m)	Excess to allowable limits (dB)
commune	Km157+300		
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
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:

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

- Whereby:
- L is vibration at a distance "r";
 - L_0 is vibration at a distance " r_0 ". Vibration at a distance $r_0 = 10\text{m}$ 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 38 below:

Table 38 - Vibration Levels by Distance from Construction Equipment

No	Equipment	Source vibration ($r_0 = 10\text{m}$)		Vibration decreasing levels with distance							
				r=12m		r=14m		r=16m		r=18m	
		L_{aeq} (dB)	L_{veq} (mm/s)	L_{aeq} (dB)	L_{veq} (mm/s)	L_{aeq} (dB)	L_{veq} (mm/s)	L_{aeq} (dB)	L_{veq} (mm/s)	L_{aeq} (dB)	L_{veq} (mm/s)
1	Excavator	80	1,72	70,5	0,58	61,1	0,20	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
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.

Vibration may also affect the stability of existing structures. 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.



Some weak structures along Km155-160

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.

3.2.2.2. 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 properly 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 450 workers would be mobilised during construction phase of the project as shown in Table 39. 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 39 below.

Table 39 -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	30	2.4	72	1,728
	Km67+600	20	1.6	48	1,152
Km82-Km90	Km67+600	30	2.4	72	1,728
	At Km12 in An Khe bypass	20	1.6	48	1,152
An Khe bypass	Junction between An Khe bypass and ĐT669 (Km4+500)	50	4	120	2,880
	At Km12 in An Khe bypass	30	2.4	72	1,728
Km132-Km160	Km147+700	40	3.2	96	2,304
	Boi village- Glar commune at Km4+500 on Pleiku bypass	60	4.8	144	3,456
Pleiku bypass	Boi village-Glar commune at Km4+500 in Pleiku bypass	30	2.4	72	1,728
	Km183+100	40	3.2	96	2,304
Km180-Km241	Km183+100	20	1.6	48	1,152
	Km223+100	40	3.2	96	2,304
	Km231+700	40	3.2	96	2,304

With 20-50 workers living at each camp, 1.6 to 4.8 m³ of wastewater would be generated each day or 48-144 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 40 - 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 BOD₅, ammonia, total phosphorus, TSS, lubricant in wastewater would be high and exceed standard.

The relative 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 ground of 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.

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:

$$q = \frac{A.(1+C.lgP)}{(t+b)^n} \quad (\text{l/s.ha})$$

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 runoff 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 localised 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 stream at Km16+500.
- Km180-Km241: the area is 140ha, calculated surface runoff is 21.6m³/s. Stormwater containing impurities from construction sites may affect residential areas.

The main potential impacts related to surface runoff is localised 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, relative large amount of bentonite solution with high solid contents will be generated as shown in Table 41.

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 m³) and the Le Can bridge (277 m³) 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 m³, 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 41 - Volume of Bentonite Generated from Bridge Construction Sites

	Bridge	Bàu Sen	Ba La	Ta Ly	Thàu Dầu
	Length (m)	12	99	24	48
Bridge reconstruction along existing NH19	Location (Km)	50+578	51+152	83+894	87+390
	Betonie 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
Pleiky bypass	Bridge	Dồn stream 1	Dồn stream 2		
	Length (m)	33	33		
	Location (Km)	8+906	9+260		
	Volume (m3)	123	123		
	Bridge	An Mỹ 1	An Mỹ 2		
	Length (m)	33	99		
	Location (Km)	7+900	16+500		
	Volume (m3)	112	172		

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 42 presents the estimated volume and quality of wastewater generated from the maintenance of construction equipment

Table 42 - 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
<i>QCVN40:2011/BTNMT, column B</i>		<i>100</i>	<i>10</i>	<i>100</i>

The figures given in Table 42 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 are usually not carried out on-site but in registered workshops with their own drainage system.

Level of Impact: moderate and manageable

3.2.2.3. Surfacewater 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 properly 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 properly managed, would also mainly cause increased turbidity at the receiving surface water bodies.

Baseline data on surfacewater quality of the Ba La and Song Ba rivers (Chapter 2) 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.

3.2.2.4. Erosion and Landslide Risks

As described in Chapter 2, the annual rainfall in the Project area is relative 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 usually 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.

3.2.2.5. Solid Waste Generation

a. Waste from demolition of existing structures

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.

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: 305,568 m³ of excavated materials and 53,343 m³ top soil;
- km131-km160: 16,772 m³ of excavated materials and 8,062 m³ top soil;
- km180-km241: 209,150 m³ of excavated materials and 19,876 m³ top soil;
- An Khe Bypass: 309,207 m³ of excavated materials and 112,381 m³ top soil;
- Pleiku Bypass: 69,554 m³ of excavated materials and 39,184 m³ top soils.

Thus, the estimated volume of solid waste generated is 1,117,743 m³ of excavated materials and 152,340 m³ top soil.

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.

a. 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 43 below:

Table 43 - Estimated Solid Waste Generation

Camp sites		Number of workers	Solid Waste Generated (kg)		
			Per day	Per Month	24 months
Km50- Km67	Km56+800 Km67+600	30 20	15 10	450 300	10,800 7,200
Km82- Km90	Km67+600 At Km12 in An Khe bypass	30 20	15 10	450 300	10,800 7,200
An Khe bypass	Junction between An Khe bypass and ĐT669 (Km4+500) At Km12 in An Khe bypass	50 30	25 15	750 450	1,8000 10,800
Km132- Km160	Km140+700 Boi village- Glar commune at Km4+500 on Pleiku bypass	40 60	20 30	600 900	14,400 21,600
Km180- Km241	Km183+100 Km223+100 Km231+700	20 40 40	10 20 20	300 600 600	7,200 14,400 14,400

As shown in Table 43 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 relative large after 24 months, at least several tones.

Solid waste would generate bad odour, 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. As solid waste collection service have been 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.

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

3.2.2.6. 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 $(290 \text{ vehicles} \times 7 \text{ liters})/3 = 677 \text{ liters}$. 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

3.2.2.7. Impacts on Agricultural Production

There are 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 land 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 prioritising the construction of alternative permanent access

to farm lands.

3.2.2.8. 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 scatterly 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 very limited and compensable.

On the other hand, during construction phase, there is a risk 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 known valuable aquatic species in the project area.

Habitat lost 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 lost 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.

3.2.2.9 Community Disturbance

There are 330 household businesses located along the sections of existing NH19 to be upgraded/expanded, concentrated 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 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, temporary 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.

3.2.2.10 Social Disturbance Related to Mobilisation of Workers

As indicated in Section 1.7.1, the number of workers living at each camp varies from 30 to 80 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 (Chur 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 local 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 road side. On the other hand, worker'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 assault of girls 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 of the fact that 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 believes there will be no conflict and inconvenience caused to local people due to labour 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 peoples 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 issues 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 peoples houses if needed to help creating some temporary additional income for local households.

Therefore, social consflict risk is expected to be relative 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 labour 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 labour management measures presented in the ESMP and these will be incorporated into construction contracts.

3.2.2.11 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. On the other hand, the 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.

3.2.2.12. 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 many 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 44.

Table 44 -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 upto 12m and construction of vertical drainage ditch
Thuowng An residential area - Song An commune	Km71+700-Km73+200	
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	Km83+894- Km87	

Residential area	Section	Potential traffic-affecting Activities
Commune		
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	
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	
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. ½ 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 are new ones but 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.

3.2.2.13 Increased localised Flooding Risks

The project site is located in mountainous area with narrow and short rivers. Therefore, floods frequently appear during rainy season. If large materials and waste loads are not properly 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 localised 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.

3.2.2.14 Increased BushFire Risk

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' behaviours. 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.

3.2.2.15 Potential 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 Dong town, Mang Yang district), Bửu Tân Pagoda (Pleiku – Gia Lai), Đức Giang Pagoda (Pleiku – Gia Lai), Nguyễn Sơn Pagoda, and Khánh Thiện Pagoda (Chư Prông – Gia Lai). Despite of not being affected by land acquisition, these sites still suffer partially from construction activities. Potential impacts includes 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. So the 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.

3.2.2.16 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; NO₂ penetrates into lung through respiratory tract and absorb into lung membranes. Long-term and high exposure to NO₂ 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, and risk of diseases such as hepatitis, HIV, gonorrhea or syphilis.

Level of risk: Moderate, manageable

3.2.2.17 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 are not managed well, waste and stagnant wastewater will cause pollution to the surrounding environment and affect public health.

Mobilisation 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 sexually transmitted diseases.

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.

3.2.2.18 Potential Impacts related to Disposal Site

As presented in Table 10, seven 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 have 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, seven disposal sites with total land area of 2.75 ha have been identified to accommodate 70,000 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 very low. However, under the impacts of surface runoff and wind, erosion potential would be increased when vegetated ground surface are covered with granular materials. This 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, localised drainage pattern in the area will be changed, localised 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 disposal 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 signs and restrict access to the site, and levelling the disposed materials regularly.

3.2.2.19 Impact of Blasting

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

Table 45 - 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 46 - 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: 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 46, 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 a distance of 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/m³12 for dust and from 75-80 dB for noise13

One of the important factor 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:

$$r_{min} = K_c \alpha \sqrt{Q}$$

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 47 -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:

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

When:

- r_c is safety distance (m);
- K_c is dependent coefficient and ground nature of protected buildings ($K_c=8$)
- α is a coefficient dependent on exploding impact indicator n ($\alpha = 1,2$)

Also according to the research results of Dong Nai Department of Industry (2006), a safe

12 QCVN 05:2013/BTNMT-National standards on ambient air quality with dust volume limit per hour of 0,3 mg/m³.

13 QCVN 26:2010/BTNMT-National standards on noise limits in normal areas in a day (70dB).

distance is calculated for blasting in the quarries Dong Nai province as follows.

Table 48 - 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

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.

3.2.2.20 Site-Specific Impacts

Table 49 - Site-specific impacts, risks and issues

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
<i>Km 50 - Km 59: (1) Road expansion, (2) Install drains, (3) Rebuild two bridges</i>		
NH19 passing residential areas at Km50-Km52, Km53-Km54 and và Km57-Km58	Tả Giang residential area at Tây Giang Commune Km51-Km52 Đông 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.
Rebuild Bàu Sen and Ba La bridges	- Existing Bàu 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.

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
+ NH19 passing some schools	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - 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.
NH19 passing agricultural land at Km58-Km59.	<ul style="list-style-type: none"> - Agricultural land along the road - Cassava crop land 	<ul style="list-style-type: none"> - 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.
<i>Km 59 - Km 67 (On An Khe pass): Road expansion, Install drains, Build new emergency exist, Slop stabilisation</i>		
The Pass is on high mountain with abyss, many curves with limited visions. Some sections have HV power poles run near by, and crossing NH19 at one location	<ul style="list-style-type: none"> - Curvy sections, blasting will be carried out 	<ul style="list-style-type: none"> - Increased traffic safety risks at curvy sections. - Safety risks 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	<ul style="list-style-type: none"> - Landslide happening 	<ul style="list-style-type: none"> - Increased landslide risks in rainy weather and during construction due to slop cutting activity. - Potential risks of traffic safety and health safety for road travellers and construction workers. - Temporary disruption of road traffic.
Plantations along the side	<ul style="list-style-type: none"> - Acacia and eucalyptus plantations along the road 	<ul style="list-style-type: none"> - Bush fire risks related to workers's behaviours, particularly in dry season. - Safety risks to workers related to toxic/harmful insects such as snakes or bees
<i>Km 67 - Km 76: (1) Road expansion, (2) Install drains</i>		
+ NH19 passing residential area at Km69-Km71 and Km72-Km76	<ul style="list-style-type: none"> - 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. - Infrastructures of 	<ul style="list-style-type: none"> - 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

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
	utility companies such as water supply and communications.	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 Hoa Mai and Tuoi Tho kindergartens, Trần Phú primary school	- Tuổi Thọ 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 wastes 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 during November to April due to workers's 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 và 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. - 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

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	<ul style="list-style-type: none"> - The Bypass passing area subjected to flooding at Km0+100, - The bypass cutting through rice field at Km3 	<ul style="list-style-type: none"> - Some existing irrigation canals shall be affected - Separate thus disrupt accessibility to agricultural land, particularly during seedling and harvesting seasons - Increased safety risks 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 6 m deep along 160 m at Km6+640-Km6+800	Agricultural land and farmers	<ul style="list-style-type: none"> - 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.	<ul style="list-style-type: none"> - Residential area at the ending section of the bypass, - An existing house at Km4+500 	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Plantation at Km2+200, - Eucalyptus plantation at Km3+800 - 	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - B = 3-4 m, Residential houses at the beginning section, 5 m from main road, then passing agricultural land Km4+500 	<ul style="list-style-type: none"> - 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
	<ul style="list-style-type: none"> - Asphalt road B = 4m. Residential houses at 5-7m from the road - An Khê-huyện K' Bang Interdistrict 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 	<ul style="list-style-type: none"> - 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.
<i>Km 76+00 - Km 82+200: Resurfacing</i>		
NH19 passing An Khê populated residential area	<ul style="list-style-type: none"> - An Khê residential area, houses are 5-10m from roadside - Kanak intersection 	<ul style="list-style-type: none"> - 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 Son Ca kindergartens and Nguyễn Khuyến highschool.	<ul style="list-style-type: none"> - Son Ca, Mai Anh kinder-gartents located 20m from roadside - Nguyễn Khuyến highschool located at 20 m from roadside 	<ul style="list-style-type: none"> - 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.
NH19 passing An Khe and Cho Do Churches	<ul style="list-style-type: none"> - An Khê Church located at 30m from roadside - Chợ Đồn Church located at 20m from roadside 	<ul style="list-style-type: none"> - 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.

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
		<ul style="list-style-type: none"> - Increased construction wastes and waste water. - Conflicts between workers and visitors. - Disturb church pray activities, particularly on Sunday and Christmas
NH19 passing Đồn market	- Đồn market located at 10m from roadside	<ul style="list-style-type: none"> - 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
<i>Km 82+200 - Km 90: (1) Road expansion, (2) Install drains, (3) Rebuild two bridges</i>		
<p>Nh19 passing popular residential areas located 10-15m from road side at Km82-Km88</p> <p>Power lines running along and passing the section</p>	- Cư An và Tân An Residential area 10m from roadside)	<ul style="list-style-type: none"> - 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 two new bridges, Ta Ly và Thầu Dầu	<ul style="list-style-type: none"> - Existing Ta Ly bridge at Km83+894 - Existing Thầu Dầu bridge at Km87+390 - Lê Quý Đôn primary school, 30m from roadside 	<ul style="list-style-type: none"> - 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, 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 school and kindergartens	<ul style="list-style-type: none"> - Tuổi Thơ kindergartent, 20m from roadside - Hoa Mai kindergartent, 30m from road side 	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - An Sơn Church, 10m from roadside - An Sơn cemetery, 40m from roadside - 	<ul style="list-style-type: none"> - 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 waste water. - Conflicts between workers and visitors. - Disturb church pray activities, particularly on Sunday and Christmas
<i>Km 131+300 - Km 135: Resurfacing</i>		
Passing populated areas in Kon Dông town	<ul style="list-style-type: none"> - T junction at Kon Dông town - Central garden at Kon Dông town - Kon Dông primary school, 30m from roadside 	<ul style="list-style-type: none"> - Increased traffic and safety risks, particularly at the main T junction of Kon Dông town - Noise level exceed limits from 7 to 11.5 dB. - Visual impacts on urban landscape - 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
NH19 passing school	Kon Dông 1 primary school	<ul style="list-style-type: none"> - Increased traffic and safety risks for students and teachers. - Disrupt access access to the schools during pipe installation
NH19 passing Minh Châu pagoda and Châu Khê church	<ul style="list-style-type: none"> - Châu Khê paris 35m from road side, - Minh Châu Pagoda 20m from road side 	<ul style="list-style-type: none"> - 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 waste water. - Conflicts between workers and visitors.
<i>Km 135+00 - Km 152+500: road expansion, Build drainage, Rebuild bridges</i>		
NH19 passing populated residential areas at	Residential area at Năm Đát T junction (Km139)	<ul style="list-style-type: none"> - Increased traffic safety risks. - Disrupt access to roadside houses and shops due to pipe trenching for drainage.

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
7-15m from road side at Km136-Km139, Km144-Km146 and Km147-Km152. Powerline running on the right	<ul style="list-style-type: none"> - Residential area, some weak/ temporary structures, power lines must be relocated 	<ul style="list-style-type: none"> - 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, Lê Cần and Vàng	<ul style="list-style-type: none"> - Linh Nham Bridge at Km136+308 - Vàng Bridge at Km144+400 - Lê Cần Bridge at Km149+045 	<ul style="list-style-type: none"> - 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 kindergartents	<ul style="list-style-type: none"> - Trần Phú highschool, 30m from road side - K' dang kindergartent, 5-10m from roadside - Tân Bình kindergarten, 50m from roadside 	<ul style="list-style-type: none"> - 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.
NH19 passing Bửu Tân pagoda	<ul style="list-style-type: none"> - Pagoda Bửu Tân, 10-20m from road side 	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Residential area at Đak Đoa town 	<ul style="list-style-type: none"> - 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

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
		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 Đắc Đoa 2 Primary school, Đắc đoa and Nguyễn Huệ high schools	- Primary school số 2 Đắc Đoa (cách 20m) - Secondary School dân tộc nội trú Đắc Đoa (cách 20m) - Nguyễn Huệ High school , 20m from roadside -	- 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.
<i>Km 155 - Km 160: (1) Road expansion, (2) Drainage installation, (3) Bridge reconstruction</i>		
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 kindergartent, Nguyễn Khuyến Primary school,	- Nguyễn Khuyến high school at 50m from roadside - Hoa Sữa Kindergartent 20m from roadside)	- 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.

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
		- Disturb or disrupt access to schools during drainage installation.
+ NH19 passing An Mỹ church, Bửu Thọ Pagoda.	- An Mỹ Church, 30m from road side - Bửu Thọ Pagoda 30m from road side	- 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 waste water. - Conflicts between workers and visitors.
+ NH19 passing An Phú, Chư Á markets	- An Phú market, 7-10m from roadside - Chư Á market, 50m from road side	- 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
<i>Pleiku Bypass: Build new road and bridges</i>		
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 on water

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
Bypass passing coffee and rubber plantations on low hills at Km2-Km4+900, Km5-Km8+400 and Km9-Km13+200	<ul style="list-style-type: none"> - Excavation to 4-5m deep crossing coffee plantation at Km6 - Excavation to 6-7m crossing coffee plantation at Km13 	<ul style="list-style-type: none"> - 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).
The bypass pass Đồng Xanh tourist area and Bông Lar residential area in Ia Băng commune	<ul style="list-style-type: none"> - Đồng Xanh tourist area, 30m from road side - Bông Lar village 30m from road side 	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - Dust and noise; - Increased traffic safety risks; - Damages or degrade existing roads
Access road from Chư Á commune to Km8 of the bypass	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - 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 road	<ul style="list-style-type: none"> - Dust and noise; - Increased traffic safety risks; - Damages or degrade existing roads
<i>Km 180 +00 - Km 218+500: (1) road expansion, (2) Build drainage</i>		
Plantations along some sections	<ul style="list-style-type: none"> - Plantations, 20 m from roadside at Km180-Km182 - Plantations, 30 m from road side at 	<ul style="list-style-type: none"> - Damages to the trees and vegetation cover outside construction area - Increased bushfire risks, particularly in dry season during ovember to April

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
	Km190-Km193	
NH19 passing residential areas at Km187-Km190, Km193-Km202, Km207-Km209, Km211-Km215 and Km216-Km218 Powerloines running along the road	<ul style="list-style-type: none"> - Residential area, 10-15m from road side at Km193-Km198 - Residential area, 10-15m from road side at Km198-Km199 - Residential area 10-15m from road side at Km200-Km202 - Residential area, 10-15m from road side at Km211-Km215 	<ul style="list-style-type: none"> - 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 ,	<ul style="list-style-type: none"> - Trung Vương and Hùng Vương primary schools, Secondary School Lê Hồng Phong - Đôn HeroSecondary School, 20m from road side - Secondary School Trần Quốc Tuấn 20m from roadside - High school Trần Phú, Lương Thế Vinh 20m from road side - Thanh Bình Hoa Hồng, Hòa Bình kindergartents 	<ul style="list-style-type: none"> - 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.
Bypass passing Đức Giang, Hồng Đức, Nguyễn Sơn and Khánh Thiện pagodas, Đức Hưng and Thanh Bình Churches, giáo họ Đồng Tâm	<ul style="list-style-type: none"> - Thanh Bình Church, 30m from road side - Đức Hưng church 30m from road side - Nguyễn Sơn pagoda 30m from road side - Khánh Thiện pagoda 30m from road side 	<ul style="list-style-type: none"> - 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 waste water. - Conflicts between workers and visitors.
Bypass passing coffee, tea, cashew nuts and peppep plantations at	<ul style="list-style-type: none"> - Coffee and cashew nut plantation - Peper and cashew nut plantation 	<ul style="list-style-type: none"> - Separate agricultural land thus disrupt accessibility from one to the other side of the road -

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
Km182-Km190, Km199-Km200, Km202-Km205...		
<i>Km 218+500 - Km 222: Road resurfacing</i>		
NH19 passing residential area in Chur Ty town, houses are 5-7m from road side	<ul style="list-style-type: none"> - Towm Intersection - Residential area 	<ul style="list-style-type: none"> - 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. - Incresed 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	<ul style="list-style-type: none"> - Primary school Kim Đồng 30m from roadside 	<ul style="list-style-type: none"> - 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. <p>Disturb or disrupt access to schools during drainage installation.</p>
NH19 passing Đức Cơ District Memorial	<ul style="list-style-type: none"> - Đức Cơ District Memorial 50m from roadside 	<ul style="list-style-type: none"> - landscape - obstruct access of visitors, particularly on 27 July, 22 , 1st and full moon of lunar months
NH19 passing Đức Cơ market	<ul style="list-style-type: none"> - Đức Cơ market, 30m from road side 	<ul style="list-style-type: none"> - 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.
<i>Km 222 - Km 241: (1) road expansion, (2) Build drainage</i>		

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
<p>NH 19 passing residential areas</p> <p>Powerlines running along</p>	<ul style="list-style-type: none"> - Residential area, 7 - 15m from roadside, power lines running along 	<ul style="list-style-type: none"> - 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.
<p>Passing agricultural land</p>	<ul style="list-style-type: none"> - Cashew nuts and cassava cop land along the road 	<ul style="list-style-type: none"> - Separate agricultural land thus disrupt accessibility from one to the other side of the road
<p>NH19 passing Kim Đồng Primary school, 18-4 kindergartent, Nguyễn Du, Chu Văn An, Nguyễn Trường Tộ, Nguyễn Trãi, Trần Phú schools, 20-30m from road side</p>	<ul style="list-style-type: none"> - Primary school Trần Phú 30m from road side - Secondary school Nguyễn Du (cách đường 20m) - Chu Văn An Primary school 30m from road side - Nguyễn Trường Tộ High school 20 m from roadside - Secondary School Nguyễn Trãi 30m from road side - Kindergartent 18-4, 20m from roadside 	<ul style="list-style-type: none"> - 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.
Disposal sites		
<p>Disposal site at Bau Sen bridge Currently agricultural land Land area = 5,000 m². Accomodae = 10,000 m³ Height of dump = 2m.</p>	<p>The nearest house is 30 m from the site and next to the road</p> <p>Existing ground level is 1.5 m lower than the surroundings.</p>	<ul style="list-style-type: none"> - 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
<p>Disposal site at Km57+300 NH19 Currently plantation on hilly area. Land</p>	<p>The nearest house is 50 m from the site, 300 m from NH19, there are only several houses along</p>	<ul style="list-style-type: none"> - Damages to the existing earthen access road - Traffic safety risk at the entrance from main road

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
area = 2,000 m ² Accomodate = 5,000 m ³ . Height of dump = 2.5 m.	the access road Existing ground level is 2 m lower than the surroundings.	
Disposal site at Km58+300 NH19 Currently cassava crop land. Land area = 2,000 m ² . Accomodate = 5,000 m ³ . 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	<ul style="list-style-type: none"> - 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 m ² . Accomodate = 5,000 m ³ . 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	<ul style="list-style-type: none"> - 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 Bôi village- Glar commune- Dak Doa district Currently barren land, near coffee and pepper farm land, Land area = 8,000 Accomodate = 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 scatterly distributed along the access road, some business along the route Existing ground level is 2 m below the surround ground.	<ul style="list-style-type: none"> - 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
Disposal site at Km199+500 NH19 Currently barren low land with holes. Land area = 8,000 Accomodate = 20,000. Height of	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	<ul style="list-style-type: none"> - Materials overflow onto agricultural land and irrigation canal in the surrounding area.

Noticeable Features	Sensitive receptors	Potential Impacts/ Risks
dump = 2.5 m	land next to the site from NH19	
Disposal site at Km230+650 of NH19 Currently low-laying football ground, CPC wanted to level Land area = 7,000 m ² . Accomodate = 15,000 m ³ . 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.	<ul style="list-style-type: none"> - 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 play ground

3.2.3 Impacts and Risks during the Operating phase

3.2.3.1. 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/m³)
- α : 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 50 - 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 $z = 2\text{m}$. Results of air pollution forecast per vehicle types are presented in the following Table 51:

Table 51 - Results of air pollution forecast per vehicle types ($\mu\text{g}/\text{m}^3$)

Year	Air	Distance					QCVN	
		5m	15m	20m	25m	30m	05:2013/BTNMT:	06:2009/BTNMT:
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 52 below.

Table 52 - 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.

3.2.3.2. 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 whereroad 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 road sides become also more difficult when there is a height difference between the current situation surrounding roads.

3.2.3.3. Disturb Existing Drainage

The two new bypasses will change the natural drainage direction in the area due to the effects 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.

3.2.3.4. 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.

CHAPTER 4. 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 2030¹⁴, the Vietnam Road Transport Development Adjusted Planning¹⁵; (ii) Gia Lai Provincial Transportation Network Development Planning to 2020¹⁶ on Roadway, Railway and Airway; (iii) the Adjusted Pleiku City Master Planning to 2020¹⁷; (iv) An Khe Provincial Town's Detailed Construction Planning to 2020¹⁸.

4.1 "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 NH1919. 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;

14 The planning was approved at the Decision no. 1327/QĐ-TTg by the Prime Minister on 24/8/2009

15 The adjustment to the planning was approved at the Decision No. 356/QĐ-TTg by the Prime Minister on 25/02/2013

16 The planning was approved at the Decision No. 39/2011/QĐ-UBND by Gia Lai Provincial People's Committee on 28/12/2011

17 The adjusted planning was approved at the Decision No. 104/2005/QĐ-UB dated on 15/8/2005 by Gia Lai Provincial People's Committee

18 The planning was approved at the Decision No. 05/2007/QĐ-UBND dated 16/01/2007 by Gia Lai Provincial People's Committee

19 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 occurs are at Km 201+800-202+200, 203+100, 207+200-207+600 and 213+400-213+700

- Erosion risks continue to exist. Every year, embankment erosion often happens at a number of 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.

The comparison between environmental and social issues associated with the With and Without Project alternative is described in Table 53 below.

Table 53 - Analysis of “With” and “Without Project” Alternative

No	Environmental and Social Problems	Without the Project	With the Project
1	Air quality	<p>It is not affected by the construction work.</p> <p>Vehicle emission will increase as the traffic density increases while the road is narrow and degraded.</p>	<p>Noise and dust impacts will be increasing during the construction period however these impacts are temporary, localized and controllable.</p> <p>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.</p>
2	Surface water quality	<p>It is not affected by the construction work and there are no additional impacts during the operational period.</p>	<p>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.</p> <p>During the operational period: Level of surface water turbidity depends on the quality of water runoff over the entire catchment therefore the installation of culverts will not change the water quality.</p>
3	Groundwater quality	Not affected	Not affected
4	Soil	Not affected	<p>The project will change very little the quality of soils in the project area.</p> <p>Land slide, soil erosion risks will be reduced as road embankment will be strengthened, upgraded or embanked.</p>

²⁰During the project preparation, the technical consultant has been working with Binh Dinh Department of Transport to identify level of erosion and specific locations where soil erosion often occurs.

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.
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.

4.2 Analysis of Road Options

4.2.1 Options for the Pleiku City 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.

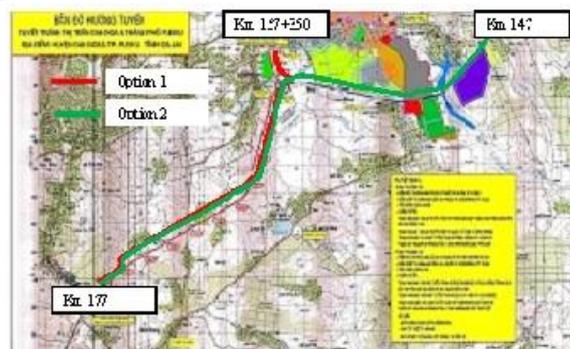


Figure 8 - Pleiku Bypasses

The level of impacts of the bypass options is presented in Table 54.

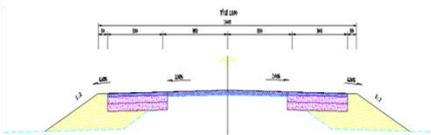
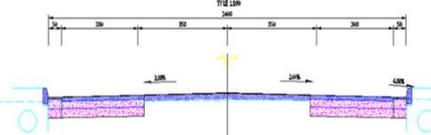
Table 54 - Alternative analysis of the bypass around Pleiku City

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.

4.2.2 Alternative Analysis for the Section from Km155 to Km160

The cross-sections of road embankment and road top are 10 m and 7 m 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 55 below.

Table 55 –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.

4.2.3 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 56 below. Based on the analysis, option 2 is selected.

Table 56 - Alternative Analysis for Bridges on NH19

Content	Option 1	Option 2 (Selected)
Proposed option	<p>Cross section of the new bridge</p> <p>Cross section of the expanded bridge</p>	<p>Cross section of the existing bridge</p> <p>Cross section of the new bridge</p>
Solution	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - 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.
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.	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,

Content	Option 1	Option 2 (Selected)
	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.	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.

4.2.4. Solutions for at Km 65+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 57:

Table 57 -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 55,000m ³	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 of soil eroded locations.

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.

CHAPTER 5. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

With the potential impacts and risks identified and assessed in Chapter 4, an Environmental and Social Management Plan (ESMP) has been prepared 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.

5.1 MITIGATION MEASURES

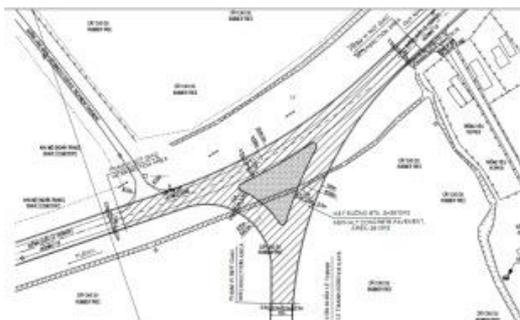
5.1.1 Measures Incorporated in the Feasibility Study and Detailed Design

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

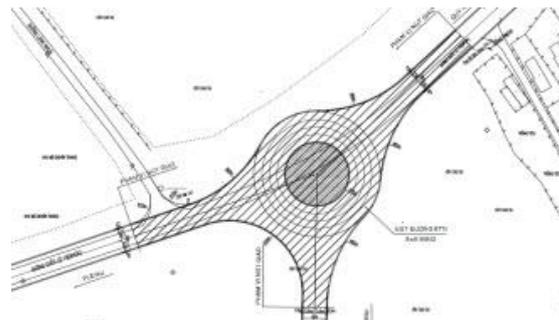
- The route closely follows the terrain. The designs ensure the technical and safety requirements (curve radius, longitudinal and horizontal slope etc.) are met. At the same time, minimise site clearance requirements. Specifically, the Pleiku bypass has shortest possible length with smallest possible 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 road side) 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 in order to enhance traffic safety along NH19:
- Raise curve radius at some sections, particularly on An Khe bypass
- Build four additional escape lanes will be built 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
- Plan trees such as bamboos outside the hard barriers installed at curvy section to stop vehicles from falling into abysses when accidents happen
- Protect slopes with vegetation cover and concrete frames and/or embankments
- Install additional vertical and longitudinal drains to enhance stability of the roads

- Build underpass or feeder roads 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 billions VND for repair, upgrade/build access road to construction sites including existing weak bridges on local roads

Figure 9 shows the design of the intersections between NH19 and the bypasses in which traffic and safety control measures included



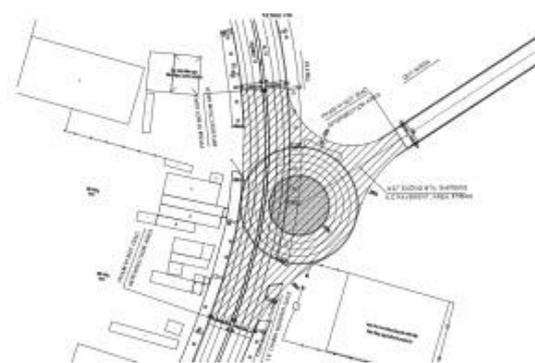
Beginning point- Pleiku bypass (Option 1)



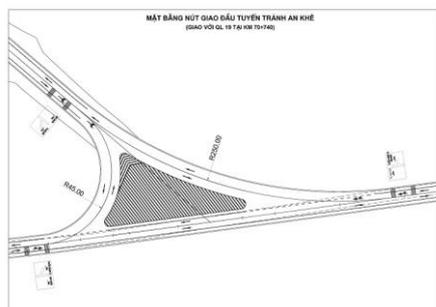
Beginning point- Pleiku bypass (Option 2)



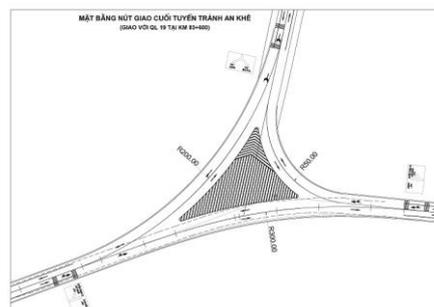
Ending point- Pleiku bypass (Option 1)



Ending point- Pleiku bypass (Option 2)



Beginning point- An Khe Bypass



Ending point- An Khe Bypass

Figure 9. Design Intersections between An Khe and Pleiku Bypasses

5.1.2 Measures to be Implemented in Pre-construction Phase

5.1.2.1. 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).

5.1.2.2. Measures to address the Impacts of Land Acquisition and Resettlement

As discussed in Chapter 3, the Project would acquire permanently approximately 198 ha of land including 5.6 ha of residential land and 191.7 ha of agricultural land, and 0.7 ha of public land. 0.6 ha of agricultural land will also be acquired temporarily during construction phase. 1,103 households (915 HHs in Gia Lai and 188 HHs in Binh Dinh) will be affected by land acquisition. A total of 1.6 ha of acacia and eucalyptus plantations dispersedly planted on agricultural land will be acquired for construction of a new section to bypass An Khe town.

To mitigate the potential impacts of land acquisition, Resettlement Actions Plans were (RAPs) were prepared for two provinces with estimated budget of approximately 304 billions VND. This budget will cover the costs of compensation and support, monitoring, management costs and contingencies. Details about compensations and supports paid to the affected households are presented below.

Table 58- 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 costs, independent monitoring, management costs and 10% contingency)	165,020,370,433	139,614,243,833

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 losing 20% or more of their land will have to 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 directly 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 TSPMU 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 Dongs. 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 millions/location. The total budget for implementing the EMDP is estimated at around VND 10,000,000,000.

Compensation will be made to the affected households for the assets that are lost/affected, including their loss of income as a result 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.
- On the basis of gender based consultations, 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 cultural 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.

5.1.3 Measures to be Implemented During Construction Phase

As discussed in Chapter 3, 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; (v) impact on agricultural production; (vi) 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; (xiv) 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 Site-Specific Environmental and Social Management Plan (SESMP) and submit to the Construction Supervision Consultant and the Traffic Safety Project Management Unit for review and approval at least two weeks prior to construction commencement. The SESMP will be prepared to meet the mitigation requirements described in below.

5.1.3.1. Environmental Codes of Practice (ECOP)

The mitigation measures for common negative impacts during the construction phase are presented in Tables 59 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 TSPMU and the Contractor. In addition, each contractor will be required to prepare Site-specific Environmental Management Plan (SEMP) 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
- Flooding risks
- 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 59 - Environmental Codes of Practices (ECOP)

Environmental-social issues	Mitigation measures	Vietnamese regulation	Responsibility	Supervised by
1) Generated dust, emission, noise, vibration	<p>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.</p> <p>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</p> <p>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 25oC, or in windy weather. Avoid overwatering as this may make the surrounding muddy.</p> <p>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.</p> <p>Dust masks should be used by workers where dust levels are excessive</p> <p>There should be no burning of waste or construction materials on site.</p> <p>Cement processing plants should be far from residential areas.</p> <p>Only use transportation vehicles with valid registry.</p> <p>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.</p> <p>Do not overload the materials/soils and stones to extreme heights 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 so as to restrict scattering along transportation routes.</p> <p>Put temporarily gathered materials and waste heaps with a volume of about 20m³ within barriers or covered so as to avoid dust dispersion.</p> <p>Transport wastes out of construction sites to the designated locations for reuse or to the disposal sites in the soonest possible time.</p> <p>Do not put vehicles and machines to run idle in more than 5 minutes.</p> <p>Avoid preparations of construction materials such as mixing concrete near local people’s houses or other sensitive works like pagodas, school gates, or offices.</p> <p>Locate vehicle washing stations at the exit/entrance of big construction sites.</p>	<p>QCVN 05: 2013/MONRE: National technical regulation on ambient air quality</p> <p>QCVN 26:2010/BTNMT: National technical regulation on noise</p> <p>QCVN 27:2010/BTNMT: National technical regulation on vibration</p> <p>TCVN 6438-2005: Road vehicles. Maximum permitted emission limits of exhaust gas</p> <p>Decision No. 35/2005/QD-BGTVT on inspection of quality, technical safety and environmental protection;</p>	Contractor	PMU, CSC, IEMC

Environmental-social issues	Mitigation measures	Vietnamese regulation	Responsibility	Supervised by
	<p>Periodically wash the trucks used for transporting materials and construction wastes.</p> <p>Avoid construction operations generating great vibration and loud noise within the time between 6pm and 7am when construction takes place near residential areas. Night construction must be informed to the community at least 2 days in advance.</p> <p>Perform the method of successive construction for each sewer section in construction sites of long sewer lines.</p> <p>Observe and secure construction progress correctly.</p> <p>Set up 2.5m-high fences of corrugated iron around the construction sites.</p> <p>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</p> <p>Avoiding or minimizing transportation through community areas and avoiding as well as material processing areas (such as cement mixing).</p>			
2) Wastewater management	<p>The Contractor must be responsible for compliance with Vietnamese legislation relevant to wastewater discharges into watercourses.</p> <p>Employ local workers to limit the amount of generated domestic wastes and wastewater.</p> <p>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</p> <p>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.</p> <p>Clear ditches around the workers' camps every week.</p> <p>Build sedimentation ponds and ditches to receive stormwater runoff at the construction sites such as the areas for Lam Ha 1 Lake, stormwater and wastewater pumping stations.</p> <p>Make appropriate arrangements for collecting, diverting or intercepting</p>	<p>QCVN 14:2008/BTNMT: National technical regulation on domestic wastewater;</p> <p>QCVN 40: 2011/ BTNMT: National technical regulation on industrial wastewater</p>	Contractor	PMU, CSC, IEMC

Environmental-social issues	Mitigation measures	Vietnamese regulation	Responsibility	Supervised by
	<p>wastewater from households to ensure minimal discharge or local clogging and flooding.</p> <p>Before construction, all necessary wastewater disposal permits/licenses and/or wastewater disposal contracts have been obtained.</p> <p>At completion of construction works, wastewater collection tanks and septic tanks shall be safely disposed or effectively sealed off</p>			
<p>3) Solid waste management</p>	<p>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.</p> <p>Before construction, all necessary waste disposal permits or licenses must be obtained.</p> <p>Solid waste may be temporarily stored on site in a designated area approved by the Construction Supervision Consultant and relevant local authorities prior to collection and disposal through a licensed waste collector.</p> <p>Waste storage containers shall be covered, tip-proof, weatherproof and scavenger proof.</p> <p>No burning, on-site burying or dumping of solid waste shall occur.</p> <p>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.</p> <p>Limit waste pollution from litter and drop of materials. Place dustbins at the workers' camps.</p> <p>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.</p> <p>Perform concrete mixing on impermeable ground. Collect waste and wastewater containing cement through drainage ditches with sedimentation pits in construction sites before being discharged into receiving waters.</p> <p>Separate the components and parts which can be reused or recycled in the construction wastes before transporting the waste to Thung Dam Gai landfill in accordance with design documents acceptable to the supervision engineer.</p>	<p>- Decision No, 59/2007/NĐ-CP on garbage management;</p> <p>- Decision No, 38/2015/NĐ-CP dated 24/04/2015 on waste and scrap management</p>	<p>Contractor</p>	<p>PMU, CSC, IEMC</p>

Environmental-social issues	Mitigation measures	Vietnamese regulation	Responsibility	Supervised by
	<p>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.</p> <p>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 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.</p> <p>The Contractor will sign a contract with URENCO from Binh Dinh and Gia Lai 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 waste materials.</p>			
4) Hazardous waste management	<p>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.</p> <p>Collect and temporarily store used oil and grease separately in specialized containers and place in safe and fire-free areas with impermeable floors roofs, at a safe distance from fire sources. Sign contracts with for oil and grease to be delivered to suppliers/ manufacturers</p> <p>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.</p> <p>The removal of asbestos-containing materials or other toxic substances shall be performed and disposed of by specially trained and certified workers.</p> <p>Used oil and grease shall be removed from site and sold to an approved used oil recycling company.</p> <p>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.</p> <p>Used oil or oil-contaminated materials that could potentially contain PCBs shall be securely stored to avoid any leakage or affecting workers.</p>	<p>- Circular No. 36/2015/TT-BTNMT on hazardous waste management;</p> <p>- Decision No. 38/2015/ND-CP dated 24/04/2015 on waste and scrap management</p>	Contractor	PMU, CSC, IEMC

Environmental-social issues	Mitigation measures	Vietnamese regulation	Responsibility	Supervised by
	<p>Unused or rejected tar or bituminous products shall be returned to the supplier's production plant.</p> <p>Relevant agencies shall be promptly informed of any accidental spill or incident</p> <p>Store chemicals appropriately and with appropriate labeling</p> <p>Appropriate communication and training programs should be put in place to prepare workers to recognize and respond to workplace chemical hazards</p> <p>Prepare and initiate a remedial action following any spill or incident. In this case, the contractor shall provide a report explaining the reasons for the spill or incident, remedial action taken, consequences/damage from the spill, and proposed corrective actions.</p>			
<p>5) Water pollution</p>	<p>The Contractor is responsible for controlling the surface water quality when discharging it out of the construction site, in accordance with QCVN 08-MT:2015/BTNMT – National Technical Regulation on surface water quality and QCVN 14:2008/BTNMT – National Technical Regulation on domestic wastewater quality.</p> <p>Provide preliminary sedimentation ponds and ditches of stormwater runoff at the construction sites such as the areas for roads, regulation lake.</p> <p>Provide construction workers on site with mobile toilets.</p> <p>Avoid excavation and backfilling during rains.</p> <p>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.</p> <p>Do not allow temporary gathering of bulk materials and mixing of concrete within 50m from ponds, lakes, rivers, streams, or other water sources. Maintain maximum distances possible between the gathering points to water sources in the construction of Chau Giang river southern embankment.</p> <p>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, lakes, rivers, and streams.</p> <p>Collect and transport excavated soils from the construction of sewers and ditches out of the construction site within 24 hours.</p> <p>Only perform maintenance work of motored vehicles and equipment, including oil replacement or lubrication in designated areas, without allowing chemicals,</p>	<ul style="list-style-type: none"> - 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 	<p>Contractor</p>	<p>PMU, CSC, IEMC</p>

Environmental-social issues	Mitigation measures	Vietnamese regulation	Responsibility	Supervised by
	<p>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. Collect and discard wastes in accordance with hazardous waste management regulation.</p>			
<p>6) Impacts on plants and aquatic species</p>	<p>The Contractor shall prepare a Clearance, Re-vegetation and Restoration Management Plan for prior approval by the Construction Engineer, 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.</p> <p>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.</p> <p>Use sheet pile driving method using Larsen piles to limit impacts on the water quality.</p> <p>If possible, green trees should be moved and replanted in other places if the trees are in the way of the pipelines to be constructed.</p> <p>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.</p> <p>Trees cannot be cut down unless explicitly authorized in the vegetation clearing plan.</p> <p>When needed, temporary protective fencing will be erected to efficiently protect the preserved trees before commencement of any works within the site.</p> <p>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.</p> <p>The Contractor shall ensure that no hunting, trapping, shooting, poisoning of fauna takes place.</p>	<p>Law on environmental protection No. 55/2014/QH13</p>	<p>Contractor</p>	<p>PMU, CSC, IEMC</p>

Environmental-social issues	Mitigation measures	Vietnamese regulation	Responsibility	Supervised by
7) Impacts on urban landscape and beauty	<p>Carefully cover transport vehicles for materials and waste and periodically wash and clean the vehicles.</p> <p>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.</p> <p>Do not temporarily gather construction materials and wastes within 20m from the gate of schools, offices temples, pagodas, etc.</p> <p>The Contractor will have to work out construction plans in such a way as to avoid the 1st and 15th days of each lunar month if construction is to be carried out near historical and cultural works such as pagodas, churches, temples, etc.</p> <p>Regularly collect materials and wastes and tidy up the construction site.</p> <p>Materials and waste around the construction site must be regularly collected and construction sites are to be neatly tidied up.</p>	<ul style="list-style-type: none"> - 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	<p>Avoid disturbances and damage to the existing vegetation and green trees.</p> <p>Periodically and thoroughly remove soils, stones and wastes from drainage sewers and ditches inside and around the construction site.</p> <p>Neatly gather materials and wastes so as to limit them being swept away by stormwater.</p> <p>Carry out ground leveling and rolling after discarding materials at disposal sites.</p>	<ul style="list-style-type: none"> - TCVN 4447:1987: Construction regulation - Circular No. 22/2010/TT-BXD: Regulation on construction safety - QCVN 08:2008/BTNMT – National technical regulation on surface water quality 	Contractor	PMU, CSC, IEMC
9) Traffic management	<p>Before construction, carry out consultations with local government and community and with traffic police.</p> <p>Arrange and provide separate passageway with safe and easy access for pedestrian and for people with disability and mobility issues especially the areas in proximity of schools, including easy wheel chair access and hand rail. Make staff available any time for helping people with disability if needed.</p> <p>Set up traffic and maintain instruction signs and warnings to secure safety for people and means of transport during construction.</p> <p>Put speed limit signs at a distance of 200m from the construction site.</p> <p>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</p>	<ul style="list-style-type: none"> - 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 	Contractor	PMU, CSC, IEMC

Environmental-social issues	Mitigation measures	Vietnamese regulation	Responsibility	Supervised by
	<p>to dust and endangering road users. Collect spilt soils and materials at the construction site each day to avoid slippery incidents for vehicles.</p> <p>Do not park vehicles in the roads longer than necessary. Do not allow construction vehicles and materials to encroach upon the pavements.</p> <p>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.</p> <p>Install night lighting of all construction sites.</p> <p>Significant increases in number of vehicle trips must be covered in a construction plan previously approved. Routing, especially of heavy vehicles, needs to take into account sensitive sites such as schools, hospitals, and markets.</p> <p>Installation of lighting at night must be done, if necessary, to ensure safe traffic circulation.</p> <p>Employ safe traffic control measures, including road/rivers/canal signs and flag persons to warn of dangerous conditions.</p> <p>Avoid material transportation for construction during rush hours.</p> <p>Passageways for pedestrians and vehicles within and outside construction areas should be segregated and provide for easy, safe, and appropriate access.</p> <p>Signposts shall be installed appropriately in both water-ways and roads where necessary.</p>	<p>construction investment</p> <p>- Circular No. 22/2010/TT-BXD on regulation on construction safety</p>		
<p>10) Influence to existing infrastructure and services</p>	<p>Provide information to affected households on working schedules as well as planned disruptions (at least 2 days in advance).</p> <p>The Contractor must only use vehicles of sizes and loads within permissible limits for the roads along such vehicles' route.</p> <p>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.</p> <p>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.</p> <p>Reinstall the road surface and sidewalks at construction sites after the</p>	<p>Decree No. 73/2010/ND-CP on administrative penalization of violations related to security and social affairs</p>	<p>Contractor</p>	<p>PMU, CSC, IEMC</p>

Environmental-social issues	Mitigation measures	Vietnamese regulation	Responsibility	Supervised by
	<p>construction of sewer lines has been completed.</p> <p>The contractor should ensure alternative water supply to affected residents in the event of disruptions lasting more than one day.</p> <p>Any damages to existing cable utility systems shall be reported to the authorities and repaired as soon as possible.</p>			
<p>11) Social mitigation measures through worker management</p>	<p>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.</p> <p>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.</p> <p>The subproject 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.</p> <p>The subproject 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.</p> <p>The subproject will cooperate with the local health agency in developing and implementing plans for control of diseases among workers.</p> <p>Workers temporarily residing at the camps and rented houses must be registered with the local authorities for temporary residence.</p> <p>Provide training on issues related to social security, social evils, diseases and epidemics, prostitution and drug use, environment, safety and health, 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.</p> <p>Prohibit workers from:</p> <ul style="list-style-type: none"> 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 	<p>Decree No. 73/2010/ND-CP on administrative penalization of violations against security and social affairs</p>	<p>Contractor</p>	<p>PMU, CSC, IEMC</p>

Environmental-social issues	Mitigation measures	Vietnamese regulation	Responsibility	Supervised by
12) Control of impacts on physical cultural resources	<p>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.</p> <p>Do not use machines generating loud noise and high vibration levels near cultural, historical, and religious works.</p> <p>In case of archeological objects being unearthed during the implementation of earthwork, all parties will conform to the following procedures:</p> <ol style="list-style-type: none"> 1. In case of archeological objects being unearthed during the implementation of earthwork, all parties will conform to the following procedures: 2. Suspend construction operations at the place of discovery; 3. Preliminarily describe the area where the archaeological objects are to be unearthed; 4. 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, Sports and Tourism or the Institute of Archaeology takes over these unearthed objects; 5. Inform the Supervision Engineer of the event and who in turn will immediately inform the subproject owner, the local authorities in charge of the case and the Institute of Archaeology (within 24 hours or less); 6. Local relevant agencies and the Vietnam National Administration of Tourism 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 preliminary 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; 7. 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); 8. The implementation of such decision by competent agencies related to the management of discovered objects will be communicated in writing by local 	<ul style="list-style-type: none"> - 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 regulation	Responsibility	Supervised by
	<p>competent agencies; and</p> <p>9. Only resume construction activities at the site after being permitted by the local competent agencies and the PMU in relation to safeguarding such relics</p>			
13) Community's safety and health	<p>The Contractor will have to conform to regulations in Circular No. 22/2010/TT-BXD by the Ministry of Construction on safety in construction.</p> <p>The subproject 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.</p> <p>The subproject owner and contractor are to cooperate with local authorities in preventing and fighting against social evils.</p> <p>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.</p> <p>Limit the speed of transport means to 20km/h within 200m from the construction site so as to minimize dust and noise.</p> <p>Keep noise-generating machines and vehicles at such suitable distances that noise transmitted to residential areas will not be higher than 70dBA.</p> <p>Use static compacting when the road base is constructed near areas with many households and weak temporary works to restrict vibration.</p> <p>The subproject will cooperate with the local health agency in developing and implementing plans for control of diseases among workers.</p>	<p>Circular No. 22/2010/TT-BXD regulation on construction safety</p> <p>Directive No. 02/2008/CT-BXD on safety and sanitation issues in construction units</p> <p>TCVN 5308-91: Technical regulation on construction safety</p> <p>Decision No. 96/2008/QD-TTg on clearance of UXOs</p>	Contractor	PMU, CSC, IEMC
14) Workers' health safety	<p>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.</p> <p>Provide workers with and request them to use adequate safety gear such as masks, helmets, shoes/boots, goggles, etc. depending on job characteristics.</p> <p>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.</p> <p>Place outdoor electric panels in protection cabinets.</p> <p>Limit the speeds of vehicles traveling inside construction sites to be 5km/hour.</p> <p>Provide fire-extinguishers, first-aid bags, and medical cabinets with sufficient medicines for treating general diseases in the locality must be provided at</p>	<p>Decree No. 22/2010/TT-BXD on regulation of construction safety;</p> <p>Directive No. 02 /2008/CT-BXD on safety and sanitation issues in construction units;</p> <p>TCVN 5308-91: Technical regulation on safety in construction;</p> <p>Decision No. 96/2008/QD-TTg on</p>	Contractor	PMU, CSC, IEMC

Environmental-social issues	Mitigation measures	Vietnamese regulation	Responsibility	Supervised by
	<p>construction sites.</p> <p>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.</p> <p>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 the injured person must be rushed to the nearest medical station for healthcare, and at the same time the case must be informed to the Supervision Engineer 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 Subsequent to 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 Supervision Engineer 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 every 25 workers, with separate toilets for males and females. Workers' beds must be provided with mosquito nets so as to prevent dengue fever. Temporary tents will be unacceptable. Clean camps, kitchens, baths, and toilets and sanitize regularly, and keep 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.</p>	<p>clearance of UXOs.</p>		
<p>15) Management of warehouses and borrow pits</p>	<p>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.</p>		<p>Contractor</p>	<p>PMU, CSC, IEMC</p>

Environmental-social issues	Mitigation measures	Vietnamese regulation	Responsibility	Supervised by
	<p>Retaining walls are to set up around disposal areas if necessary.</p> <p>The use of new sites for stockpiling, gathering or exploiting materials necessary for construction operations must obtain prior approval from the Construction Engineer.</p> <p>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.</p> <p>If access roads are needed for these new sites, they must be considered in the environmental assessment report.</p> <p>PMU's Environment Officer should conduct due diligence to make sure that borrow pits and quarries are legally operating by undertaking a rapid review of quarry sites to assess if operations are in compliance with Vietnamese laws and Bank requirements prior to construction.</p> <p>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.</p>			
<p>16) Communication to local community</p>	<p>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).</p> <p>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.</p> <p>Subproject information will be disseminated to affected parties (e.g. local authorities, enterprises and affected households, etc.) through community meetings before construction commencement.</p> <p>A contact address will be provided to the community.</p> <p>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.</p> <p>Community concerns and requested information are to be monitored as the</p>	<p>Decree No. 73/2010/ND-CP on administrative penalization of violations related to security and social affairs</p>	<p>Contractor</p>	<p>PMU, CSC, IEMC</p>

Environmental-social issues	Mitigation measures	Vietnamese regulation	Responsibility	Supervised by
	<p>subproject progresses.</p> <p>Inquiries must be responded by telephone and written correspondence in a timely and accurate manner.</p> <p>Local 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.</p> <p>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.</p> <p>Notification boards shall be erected at all construction sites providing information about the subproject, 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.</p>			

5.1.3.2. 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 in order 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;
- 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 a 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
- Children under 14 years of age will 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;
- Provision and installation in all buildings of firefighting equipment and portable fire extinguishers.

Any construction worker, office staff, Contractor's employees or any other person related to the project found violating these 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 located in 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 accommodations. They have to 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.
- 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;
- 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 waste water

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 \div 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 demolition, 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 temporarily 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, whose 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;

5.1.3.2. 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 top soil 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 top soil 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 TSPMU 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:

- Land owners 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 night time.
- 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 4 pm to 6 pm.
- 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 night time.
- 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 Kheand Pleiku bypass. 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.
- Maximise 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.

5.1.3.3. Site-specific Mitigation Measures along NH19 and disposal sites

The relevant site-specific mitigation measures along NH19 listed in Table 60 will be included into construction bidding and contractual documents of each bid package

Table 60 - Site-specific Mitigation Measures along NH19

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
Km 50 - Km 59 - Road expansion - Install drains - Rebuild two bridges	NH19 passing residential areas at Km50-Km52, Km53-Km54 and via Km57-Km58	Tà Giang residential area, Km51-Km52 	Increased traffic safety risks	Install fences and sign surround disturbed areas to separate construction areas provide adequate lighting at night 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
		Đồng Phó residential area at Km53-Km54, houses are 7-10m from roadside 	Disrupt access to roadside houses and shops for drainage construction	Provide temporary access to houses and shops when access is disrupted			
		Thường Sơn residential area at Km57-8, houses located at 5- 10m from roadside)	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 10 pm and 6 am Water the road, particularly excavation area, in hot, dry, windy weather			
			Potential risks of electrical shocks	Arrange staff to direct crane drivers	No cost	CSC	

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by	
			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 cost	PMU/ CSC/ Contractors/ Local authorities		
			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	Included in construction contract values	Contractors	CSC	
		Weak houses/structures may be being cracked due to vibration	Some weak structures at risk of being cracked	Carry out inventory of weak structures before compaction Apply static compaction method at these sections only	No additional costs	PMU, Contractors	CSC, PMU, Contractors	
								
		Rebuild Bàu Sen and Ba La bridges	Existing Ba La bridge at Km51+152	Water pipes and power poles would be relocated, service may be interrupted	Inform community at least two days in advance about service disruption, at at least one week before blocking the new bridges	No additional costs	PMU/ CSC/ Contractors/ Local authorities	PMU/ CSC/ Contractors/ Local authorities
				Existing Bàu Sen bridge at Km50+578	Increase safety risks	Install signboards, barriers and fences to separate the construction sites with roads and residential areas	Included in construction contract values	Contractors
			Disrupt traffic on the two existing bridges	Build temporary access road before demolishing the existing bridge for reconstruction	Included in construction contract values	Contractors	CSC, PMU	

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
			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	Avoid pile driving between 10 pm and 6 am Direct and collect bentonite from storage tank Install nets along the bridge, provide life vest and belts, hard hats and force the workers to use	No additional costs Included in construction contract values		
	NH19 passing some schools	  <p>Tây Giang, Võ Lai High School, 35-40m from road side at Km 54+150 and Km54+250</p>  <p>Tây Giang Kinder gartent, located 30m from roadside</p>	Increased traffic and safety risks for students and teachers. Disturb or disrupt access to schools during drainage installation	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 Use pre-cased boxed drain to minimise construction period	Included in construction contract values	Contractors	CSC, PMU

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	NH19 passing agricultural land at Km58-Km59.	 Agricultural land	Construction materials and wastes may fall into agricultural land and damage the trees	Install fences separate temporary loading areas with agricultural land Do not load construction waste within 10 m from crop land	Included in construction contract values	Contractors	CSC, PMU
Km 59 - Km 67 (On An Khe pass): - Road expansion - Install drains - Build new emergency exist - Slope stabilisation	The Pass is on high mountain with abyss, many curves with limited visions Some sections have HV power poles run near by, and crossing NH19 at one location	  Curvy sections, blasting will be carried out	Increased traffic safety risks at curvy sections Safety risks 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	 Landslide happening	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			

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	Plantations along the side	 <p>Acacia and eucalyptus plantations along the road</p>	<ul style="list-style-type: none"> - Bush fire risks related to workers's behaviours, 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
Km 67 - Km 76: Road expansion, Install drains	+ NH19 passing residential area at Km69-Km71 and Km72-Km76	 <p>Residential area at Ngô Mây road, located 10-15m from roadside</p>	Increased traffic safety risks	Install fences and sign surround disturbed areas to separate construction areas provide adequate lighting at night Ensure adequate lighting at night Do not load materials and wastes on the road, tidy up the sites daily daily	Included in construction contract values	Contractors	CSC, PMU
		 <p>Residential area at Song An commune, located 10-15m from roadside</p>	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 10 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

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
			Relocation of electrical poles and wires, water pipes, 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
	NH19 passing Hoa Mai and Tuoi Tho kindergartens, Trần Phú primary school	 <p>Tuoi Tho Kindergarten, 30 m from roadside at Km 75+850</p> <p>Trần Phú school, 30 from roadside at Km72+700</p>	Increased traffic and safety risks for students and teachers.	<p>Inform school managers at least one week in advance.</p> <p>Install speed limit at 5km/h sign at the two ends of the section</p> <p>Arrange staff to direct traffic at school opening and school over time at sections in front of the school.</p> <p>Install fence and warning signs open holes, channels</p> <p>Do not load materials and wastes within 50 m from school gates</p> <p>Do not load or unload materials during rush hours</p>	No costs incurred Included in Construction contracts	Contractors, PMU Contractors	CSC, PMU
			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

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	NH 19 passing Ngoc 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 authorised	Included in Construction and CSC Contract values	Contractors, CSC and PMU	CSC, PMU
			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 authorities
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	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 block the views of drivers.	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

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	+ Build six new bridges including Đá Lật, Suối Đá 2, Suối Vôi, Sông Ba, Suối Dồn 1 và Suối Dồn 2.	 <p>Proposed location of Sông Ba bridge at Km6+108</p>	High noise levels from pile driving	Avoid pile 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
		 <p>Proposed location of Suối Đá Lật at Km0+155</p>	Safety risks for workers 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	Included in construction Contract	Contractors	CSC, PMU
			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	Contractors	CSC, PMU
+ The bypass passing rice field, one 1400m will be filled to height 2.5-7.5m higher than existing ground	 <p>The Bypass passing area subjected to flooding at Km0+100</p>  <p>The bypass cutting through rice field at Km3</p>	Some existing irrigation canals shall be affected	Rebuild and connect compensatory canals before blocking off the affected canal section	Included in construction Contract	Contractors	CSC, PMU	
		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 people when carrying heavy loads crossing the roads	Included in construction Contract	Contractors	CSC, PMU	
		Increased safety risks for local people, particularly the	Arrange specific locations for local passing the road, restrict access to construction sites	No additional costs	Contractors	CSC, PMU	

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
			farmers				
			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	Priority the construction of drainage along the road; build temporary drains	No additional costs	Contractors	CSC, PMU
	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	 Km4	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
		 Km6+700	Landslide risks at deeply excavated areas	Build temporary drains along the alignment Level and protect slopes/walls created from landsliding risks	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 Contract		

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	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
		Residential area at the ending section of the bypass	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
			Increased traffic and safety risks.	Install warning and 5km/h speed limit signs Arrange staff direct traffic in rush hours, Ensure adequate lighting at night time	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 and waste dropped on the	Included in construction Contract	Contractors	CSC, PMU

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		 houses 5 m from main road  	Increased traffic safety risks; Damages or degrade existing roads	road 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 Rehabilitate the road when damages are caused Reinstate the road before construction is completed			
Km 76 - Km 82+200: Resurfacing	NH19 passing An Khê populated residential area	 houses are 5-10m from roadside	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 pm and 6 am Water the road before excavation	No additional costs Included in construction Contract	Contractors	CSC, PMU
		 Kanak intersection	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

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	NH19 passing Mai Anh and Son Ca kindergartens and Nguyễn Khuyển highschool.	 Son Ca, Mai Anh kindergarten located 20m 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 costs incurred Included in Construction Contracts	Contractors	CSC, PMU
		 Nguyễn Khuyển, 20 m from roadside	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	 An Khê Church, 30m from roadside; Chợ Đồn Church, 20m from roadside	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	 Đồn market located at 10m	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	No costs incurred Included in Construction	Contractors, local authorities Contractors	CSC, PMU

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		from roadside		Do not load materials and wastes within 50 m from the market	Contracts		
Km 82+200 - Km 90: Road expansion Install drains 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	 <p>Cư An và Tân An Residential area 10m from roadside)</p>	Increased traffic safety risks	Install fences and sign surrounding disturbed areas to separate construction areas provide adequate lighting at night time 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 10 pm and 6 am Water the road, particularly excavation area, in hot, dry, windy weather	No costs incurred	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	Photos	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
Rebuild two new bridges, Ta Ly và Thầu Dầu		 <p>Existing Ta Ly bridge at Km83+894</p>	power poles would be relocated, service may be interrupted	Inform community at least two days in advance about power cut off	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 at least one week before blocking the new bridges	Included in Construction Contracts	Contractors	CSC, PMU
		 <p>Existing Thầu Dầu bridge at Km87+390</p>	High noise levels from pile driving	Avoid pile driving between 10 pm and 6 am	No costs incurred	Contractors	CSC, PMU
			Water pollution due to bentonite from drilling	Direct and collect bentonite storage tank	Included in Construction Contracts	Contractors	CSC, PMU
			Safety risks for workers 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	Included in Construction Contracts	Contractors	CSC, PMU
			NH19 passing school and 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	No costs incurred

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Lê Quý Đôn primary school, 30m from roadside 		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		
		Tuổi Thơ kindergartent, 20m from roadside 					
		Hoa Mai kindergartent, 30m from road side)					
NH 19 passing a church and a cemetery		 An Son Church, 10m from roadside)	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
		 An Son cemetery, 40m from roadside at Km	disturb religious activities at the Church and other activities at the cemetery	Schedule construction to avoid Sunday and Christmast time, the first and fullmoon of lunar months Arrange staff to direct traffic when there are vehicles entering or leaving cemetery	Included in Construction Contracts	Contractors	CSC, PMU
Km 131+300 - Km 135: Resurfacing	Passing populated areas in Kon Dông town	 T junction at Kon Dông	Increased traffic and safety risks, particularly at the main T junction of Kon Dông 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

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		town 		Load materials and wastes tidily, remove the wastes from construction sites on daily basis			
		Central garden at Kon Dong 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 10 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
	NH19 passing Kon Dong 1 primary school	 Kon Dong primary school, 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	No costs incurred Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
				materials during rush hours			
			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 Minh Châu pagoda and Châu Khê church	 Châu Khê paris 35m from road side	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
		 Minh Châu Pagoda 20m from road side	disturb religious activities at the Church and pagoda	Schedule construction of the section passing the Church to avoid Sunday and Christmast 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
Km 135 - 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	 Residential area at Năm Đạt T junction (Km139)	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	Provide temporary access to houses and shops when access is disrupted	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	running on the right	 Residential area, some weak/ temporary structures, power lines must be relocated	trenching for drainage				
			- 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
	Rebuild 3 bridges namely Linh Nham, Lê Cản and Vàng	 Linh Nham Bridge at Km136+308  Vàng Bridge at Km144+400	power poles would be relocated, service may be interrupted	Inform community at least two days in advance about power cut off	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 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	No costs incurred	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	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		 <p>Lê Cần Bridge at Km149+045</p>	Safety risks for the workers when working at height on on water	Install nets along the bridge, provide lifevest and belts, hard hats and force the workers to use	Included in Construction Contracts	Contractors	CSC, PMU
	NH19 passing Trần Phú Secondary School, K’Dang and Tân Bình kindergartents	<p>Trần Phú</p>  <p>highschool, 30m from road side</p>  <p>K’ dang kindergartent, 5-10m from roadside</p>  <p>Tân Bình kindergartent, 50m from roadsid</p>	Increased traffic and safety risks for students and teachers.	<p>Inform school managers at least one week in advance. Install speed limit at 5km/h sign at the two ends of the section</p> <p>Arrange staff to direct traffic at school opening and school over time at sections in front of the school.</p> <p>Install fence and warning signs open holes, channels</p> <p>Do not load materials and wastes within 50 m from school gates</p> <p>Do not load or unload materials during rush hours</p>	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 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

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Pagoda Bửu Tân, 10-20m from road side	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
Km 152+500 - Km 155: Resurfacing	Nh19 passing Đak Đoa town with high population density	 <p>Residential area at Đak Đoa town</p>	Increased traffic and safety risks, particularly at the main T junction of Kon Dông 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 carrying out activities that generate high noise between 10 pm and 6 am Water the road before excavation	Included in Construction Contracts	Contractors	CSC, PMU
			- Impacts on urban landscape and sanitation	CoCollect and transport the waste to disposal site daily	Included in Construction Contracts	Contractors	CSC, PMU
	NH19 passing Đak Đoa 2 Primary school, Đak đoa and Nguyễn Huệ		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	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	high schools	 <p>Primary school No.2 Đák Đoa, Secondary School, Nguyễn Huệ High school , 20m from roadside</p>		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			
			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
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
		 <p>Residential area, power lines and poles will be relocated</p>					
					- Noise level exceed standard 7-11.5 dB, affecting residents.	Inform communities about construction schedule at least two weeks in advance	Included in Construction Contracts

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
				Avoid carrying out activities that generate high noise between 10 pm and 6 am			
			Power lines and poles must be relocated, power supply may be disrupted	- Inform community at least one week before power cut of.	Included in Construction Contracts	Contractors	CSC, PMU
			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 Mÿ (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
		An Mÿ bridge at Km156+570	Disrupt traffic on the two existing bridges	Build temporary access road before demolishing the existing bridge for reconstruction Inform community at at least one week before blocking the new bridges	Included in Construction Contracts	Contractors	CSC, PMU
			High noise levels from pile driving	Avoid piple 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	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	+ NH19 passing Hoa sũa kindergartent, Nguyễn Khuyển Primary school,	 Nguyễn Khuyển high school at 50m 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 costs incurred Included in Construction Contracts	Contractors	CSC, PMU
		 Hoa Sũa Kindergartent 20m from roadside)					
		Disrupt access access to the schools during pipe installation					
	+ NH19 passing An Mỹ church, Bửu Thọ Pagoda.	 An Mỹ Church, 30m from road side	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
		 Bửu Thọ Pagoda 30m from road side	disturb religious activities at the Church and pagoda	Schedule construction of the section passing the Church to avoid Sunday and Christmast 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	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	+ NH19 passing An Phú, Chur Á markets	 An Phú market, 7-10m from road side	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
		 Chur Á market, 50m from road side	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	 Agricultural land	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	No additional costs incurred Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
				structure subsident			
Pleiku Bypass: Build new road and bridges	Bypass intersect with NH19 at Km157+460 and Km177, power and telecommunication lines are low		- 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
		Intersection on the right at the beginning point  Intersection on the right at the ending point	Power and telecommunication lines must be risen so as and construction plants passing underneath, service may be interrupted	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	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	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
			Interrup 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 labours for manual works	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	Ân Mÿ 1 and 2 bridges will be built at Km1+100 and Km8+900		High noise levels from pile driving	Avoid pile driving between 10 pm and 6 am	No costs incurred	Contractors	CSC, PMU
			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 lifevests 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	 <p>Excavation to 4-5m deep crossing coffee plantation at Km6</p>  <p>Excavation to 6-7m crossing coffee plantation at Km13</p>	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	Photos	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 convenience access near coffee plantations have been built before September	No additional costs incurred Included in Construction Contracts	Contractors	CSC, PMU
The bypass pass Đông 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
		Đông Xanh tourist area, 30m from road side)					
			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
		Bông Lar village 30m from road side)	Landscape	Do not load materials and wastes within 50m from the tourist area and residential houses.	Included in Construction Contracts	Contractors	CSC, PMU
			Disturb tourist activities	Minimise materials loading and unloading at the week ends Collect all the wastes and tidy up the area near the tourist	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
				area daily, big clean up every Friday afternoon.			
Access roads for Pleiku bypass construction sites	Access road near Đồng Xanh tourist area, Km0-Km1	 <p>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</p>	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
			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
	Access road from Chư Á commune to Km8 of the bypass	 <p>- Asphalt/concrete road, B= 3-4 m;</p>	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

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		<p>-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</p>	<p>Increased traffic safety risks;</p>	<p>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</p>	<p>Included in Construction Contracts</p>	<p>Contractors</p>	<p>CSC, PMU</p>
			<p>Damages or degrade existing roads Damages to weak bridges</p>	<p>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</p>	<p>Included in Construction Contracts</p>	<p>Contractors</p>	<p>CSC, PMU</p>
	<p>Access road from Đák Đoa town and Ham Rong T junction</p>		<p>Dust and noise;</p>	<p>Water the road section passing residential houses in dry weather Collect and clean up materials and waste dropped on the road</p>	<p>Included in Construction Contracts</p>	<p>Contractors</p>	<p>CSC, PMU</p>
		<p>Asphalt road B =4 m, there</p>	<p>Increased traffic safety risks;</p>	<p>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</p>	<p>Included in Construction Contracts</p>	<p>Contractors</p>	<p>CSC, PMU</p>

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		are residential clusters at 7m from the road	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	 Plantations, 20 m from roadside at Km180-Km182	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 Construction Contracts	Contractors	CSC, PMU
		 Plantations, 30 m from road side at Km190-Km193	Increased bushfire risks, particularly in dry season during ovember to 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	Residential area, 10-15m from road side at Km193-198, Km200-02		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
		 Residential area, 10-15m	Disrupt access to roadside houses and shops due to pipe	Provide temporary access to houses and shops when access is disrupted	Included in Construction Contracts	Contractors	CSC, PMU

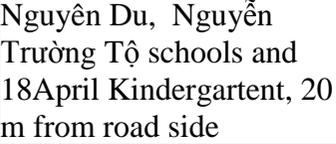
Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	Powerlines running along the road	from road side at Km198-Km199, Km211-Km215	trenching for drainage	Do not load materials and wastes in front of shops			
Noise level exceed standard 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	Contractors	CSC, PMU	
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	
NH19 passing Đôn School, Hoa Hồng, Hòa Thanh Bình kindergartents Trần Quốc Tuấn, Trần Phú, Lương Thế Vinh, Trung Vương and Hùng Vương schools, Thanh Bình kindergartent.		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 access to the schools during	Use pre-cased boxed drain to minimise construction period	Included in Construction		

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
			pipe installation	Provide temporary access over open trenches	Contracts	Contractors	CSC, PMU
	Bypass passing Đức Giang, Hồng Đức, Nguyễn Sơn and Khánh Thiện pagodas, Đức Hưng and Thanh Bình Churches, Đồng Tâm Parish	 <p>Thanh Bình, Đức Hưng Churches, 30m from road side</p>  <p>Nguyễn Sơn Khánh Thiện pagodas 30m from road side</p>	<p>Disrupt access to the Church and pagoda to drainage installation</p> <p>disturb religious activities at the Church and pagoda</p>	<p>Use box drains for this section</p> <p>Provide temporary access crossing the trench</p> <p>Schedule construction of the section passing the Church to avoid Sunday and Christmast time</p> <p>Schedule construction of the section passing the pagoda to avoid the first and fullmoon of lunar months</p>	<p>Included in Construction Contracts</p> <p>Included in Construction Contracts</p>	<p>Contractors</p> <p>Contractors</p>	<p>CSC, PMU</p> <p>CSC, PMU</p>
	Bypass passing coffee, tea, etc. plantations at Km182-190, Km199-200, Km202-205	 <p>Coffee and cashew nut plantation</p>	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
Km 218+500 - Km 222: Road resurfacing	NH19 passing residential area in Chu Ty town, houses are 5-7m from road side	 <p>Town Intersection</p>	Increased traffic and safety risks, particularly at the junction of Chu Ty town	<p>Install warning signs and signboards</p> <p>Arrange staff to direct traffic in rush hours</p> <p>Cover open holes and trenches</p>	Included in Construction Contracts	Contractors	CSC, PMU
			Disrupt access to roadside houses and shops due to pipe trenching for	<p>Provide temporary access to houses and shops when access is disrupted</p> <p>Do not load materials and</p>	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		 Residential area	drainage	wastes in front of shops			
			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
	NH19 passing Primary school Kim Đồng	 Primary school Kim Đồng 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 costs incurred Included in Construction Contracts	Contractors	CSC, PMU
			Disrupt access access to the schools during	Use pre-cased boxed drain to minimise construction period	Included in Construction		

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
			pipe installatio	Provide temporary access over open trenches	Contracts	Contractors	CSC, PMU
	NH19 passing ĐứC Cơ District Memorial	 ĐứC Cơ District Memorial 50m from roadside	landscape	Do not load materials and wastes within 50 m from the Memorial	No costs incurred	Contractors	CSC, PMU
			obstruct access of visitors, particularly on 27 July, 22 , 1st and full moon of lunar months	Schedule construction on this section to avoid 27 July, 22 , 1st and full moon of lunar months	No costs incurred	Contractors	CSC, PMU
	NH19 passing ĐứC Cơ market	 ĐứC Cơ market, 30m from road side	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 marke.	Provide temporary access over open trenches. Avoid loading materials within 20 m from the market.	Included in Construction Contracts No costs	Contractors	CSC, PMU
Km 222 - Km 241: - road expansion,	NH 19 pasing residential areas Powerlines		Increased traffic and safety risks	Install warning signs and signboards Arrange staff to direct traffic in rush hours Cover open holes and	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
- - Build drainage	running along	 <p>Residential area, 7 -15m from roadside, power lines running along</p>		trenches Load materials and wastes tidily, remove the wastes from construction sites on daily basis	No costs incurred		
			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		Contractors	CSC, PMU
			Power lines and poles must be relocated, power supply may be disrupted	Inform community at least one week before power cut of.		Contractors	CSC, PMU
			Weak/temporary structures at risks of being cracked/ damages	Carry out inventory of weak structures before compaction Apply static instead of vibrating compaction method		Contractors	CSC, PMU
Passing agricultural land	 <p>Cashew nuts and cassava cop land along the road</p>	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		Contractors	CSC, PMU	

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
	NH19 passing Kim Đồng Primary school, 18-4 kindergartent, Nguyễn Du, Chu Văn An, Nguyễn Trường Tộ, Nguyễn Trãi, Trần Phú schools, 20-30m from road side		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			
			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
Disposal sites	In addition to the common mitigation measures applicable to all disposal sites listed in the ESMP, the following specific mitigaition measures will be applied to each disposal site as described below						
	Disposal site at Bau Sen bridge		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	Notify communities about disposal schedule one month before the new crop. Re-build and connect compnsatory irrigation canal before disposal. Fence the disposal site and install warning signboards. Level the disposal area and stabilize slopes formed during	No costs incurred Included in Construction Contracts	Contractors	CSC, PMU
		Currently agricultural land Land area = 5,000 m2 Accomodaes = 10,000 m3					

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		Height of dump = 2m Existing ground level is 1.5 m lower than the surroundings. The nearest house is 30 m from the site and next to the road	community	disposal process. Create drainage ditches surrounding the disposal area, including sedimentation traps.			
	Disposal site at Km57+300 NH19	 Currently plantation on hilly area Land area = 2,000 m ² Accommodate = 5,000 m ³ Height of dump = 2.5 m Existing ground level is 2 m lower than the surroundings The nearest house is 50 m from the site, 300 m from NH19, there are only several houses along the access road	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	 Currently cassava crop land Land area = 2,000 m ² Accommodate = 5,000 m ³ Height of dump = 2.5 m Existing ground level is 2 m lower than the surroundings The site is next to NH19, nearest	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

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		house is 50 m from the nearest house					
	Disposal site at Km58+600	 <p>Currently the site is agricultural 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, the nearest house is 50 m from the site</p>	Loss 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	 <p>Currently barren land, near coffee and pepper farm land, 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 1.2 km from NH 19, 100m from the nearest house</p>	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

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		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 scatterly distributed along the access road, some business along the					
	Disposal site at Km199+500 NH19	 <p>Currently barren low land with holes. Land area = 8,000. Accomodae = 20,000 m3. 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</p>	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	 <p>Currently low-laying football ground, CPC wanted to level Land area = 7,000 m2 Accomodae = 15,000 m3 Height of dump = 2.1m Existing ground level is 1.5 m</p>	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 play ground	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	Included in Construction Contracts	Contractors	CSC, PMU

Proposed work	Noticeable Features	Photos	Impacts/ Risks/ Issues	Specific Mitigation Measures	Cost	Implemented by	Monitored by
		below the ground at the surroundings. 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		Level the site and hand over it back to local authority as soon as disposal and levelling is completed			

5.2 IMPLEMENTATION ARRANGEMENTS, ROLES AND RESPONSIBILITIES

5.2.1 Institutional Arrangements

The key stake holders in environmental management of the Project include the Traffic Safety Project Management Unit, the Construction Supervision Consultant, the Contractor, the Ministry of Transport, Ministry of Natural Resources and Environment, Binh Dinh and Gia Lai Provincial Department of Natural Resources and Environment, People’s Committees at town/districts and communes levels. The relationships and contacts between the key stakeholders in the environmental management of the project are shown in Figure 10.

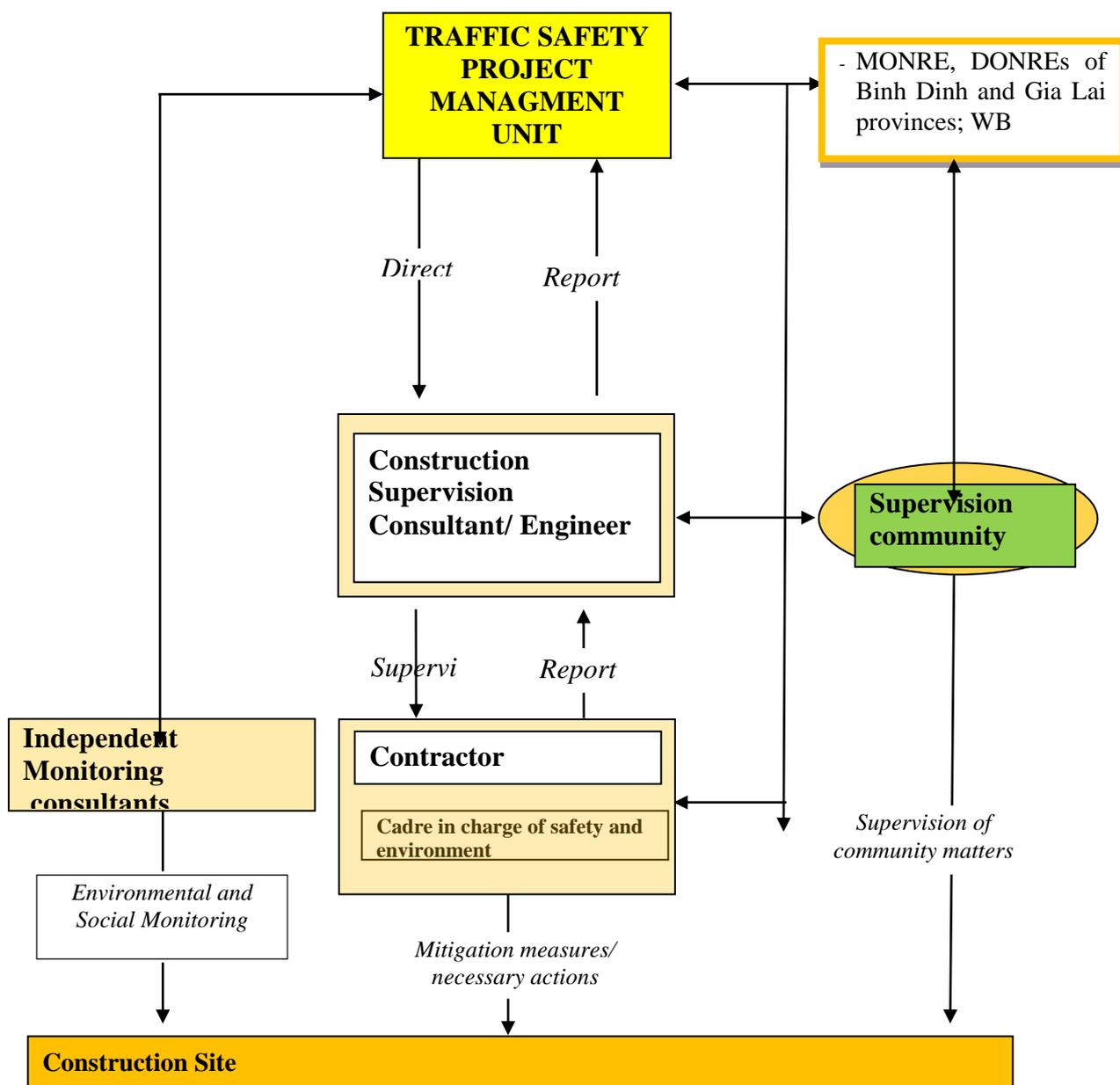


Figure 10. Environmental Management Institutional Chart

5.2.2 Roles and Responsibilities

Specific responsibility of stakeholders are shown in Table 61 below.

Table 61 - Roles and responsibilities of stakeholders

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 and management
Traffic safety Project Management Unit (TSPMU) - Project Owner	The TSPMU is 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 Ensure that adequate environmental and safety training, monitoring and supervision tasks are included in the Terms of References of the Construction Supervisors 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 to ensure timely and effective implementation of the ESMP: (a) Monitor environmental compliance; (b) Carry out unannounced inspections; (c) Review periodical reports submitted by the construction supervision consultant (CSC) and IEMC and take follow up actions (d) Submit periodical safeguard reports to WB and MONRE. TSPMU assign an Environmental Officer (EO) in charge to monitor the implementation and compliance of ESMP and at least a Social and resettlement Officer (EO) to oversee resettlement and compensation issues assure all resettlement activities will take place in compliance with this RAP. Specifically, TSPMU will: Cooperate with PPCs, and relevant local competent agencies to conduct compensation and resettlement. Organize training and building capacity activities for PPMUs. Cooperate with PPMUs to monitor compensation, resettlement; Report periodically on resettlement progress to MOT and the WB.
PMU Environmental Officer (EO):	The EO will advise the PMU leaders on solutions for environmental issues to ensure the compliance with WB's safeguard policies and regulations stipulated by Vietnamese Government. The EO will coordinate with the CSC team and the contractors to carry out due diligence review of borrow pits, quarries identified during construction phase and decide whether they are eligible for use in the Project Coordinate with the Environmental Officer of the Construction Supervision team to carry out environmental due diligence review of borrow pits, quarries, disposal sites as well as any other sites required

Stakeholders	Responsibility
	under the Project
PMU Social and Resettlement Officer	The Social and Resettlement Officer in charge will help with solving social and resettlement issues of the Project, supervising the compliance with RAP, participate in investigation and solvings complaints related to social issues and land acquisition.
Design consultant	Incorporate mitigation measures in to engineering design, cost estimates, bidding documents and construction contract,
Construction Supervision Consultant/Engineer (CSC/CSE)0	<p>Provide training for contractor’s workers on environment, occupational safety, HIV/Aids training</p> <p>Provide training on traffic safety for the communities along the two bypasses and around the new junctions between the bypasses and the existing NH19</p> <p>Arrange for environmental quality monitoring and report preparation for submission to relevant government authorities</p> <p>Monitor and supervise the Contractors to ensure compliance with ESIA/ESMP</p> <p>Direct the Contractors to carry out corrective measures when excessive pollution or any non-compliant is detected</p> <p>Carry out due diligence review of additional sites such as borrow pits and quarries as and when required</p> <p>When detecting any excessive pollution or any non-compliant contractor, the construction supervision consultant shall propose and direct related contractors to implement additional mitigation or corrective measures to address the issues/impacts to satisfactory level.</p> <p>Propose the TSPMU 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.</p> <p>Prepare and maintain records on complaints and incidents</p>
Independent Monitoring Consultant	<p>provide training to relevant project stakeholders, particularly TSPMU staff and Construction supervision engineers on project environmental management system</p> <p>Carry out random compliance monitoring and prepare reports.</p>
Contractors	<p>Appoint staff responsible for environmental, health and safety issues</p> <p>Prepare site specific ESMP</p> <p>Implement mitigation measures in accordance with contract terms and conditions</p>
Community	<p>Carry out voluntary environmental monitoring according to Decree 19/2015/ND-CP, in order to:</p> <p>Participate in consultation activities</p>
Provincial People’s Committee (PPC)	<p>Ensure that compensation resettlement and livelihoods restoration of affected households will be implemented and monitored in accordance with this RAP.</p>
Provincial Project Management Unit (PPMU)	<p>Take lead in recruitment of two consultants for replacement costs survey and periodical social monitoring of RAP implementation.</p> <p>Ensure budget for RAP implementation is timely and sufficiently allocated.</p> <p>Update RAP and conduct internal monitoring of RAP implementation;</p> <p>Allocate staff to act as a social safeguards focal point for PPMU.</p> <p>Recruit a social safeguards consultant to support PPMU and</p>

Stakeholders	Responsibility
	resettlement boards, at district level, for implementation of RAP; Prepare quarterly progress reports and submit to the WB; Conduct training on requirements of project’s RAP; work closely with District People’s Committee and District Board for Compensation and Land Acquisition (DBCLA) in updating RAPs; Appoint a staff responsible for administering grievance mechanism.
City/District People’s Committee (C/DPC)	Prepare annual land use plan and submit to competent authorities for review and approval of changed land use plan . Issue Notice of Land Acquisition and direct City/District Board for Compensation and Land Acquisition,. Adjusting or grant a new land use right certificate for the land to be acquired, and for relocated households. 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 for Compensation and Land Acquisition (C/DBCLA):	Coordinate with PPMU and CPCs to disseminate information and policies on project’s policies on compensation and support; Organise for compensation payment and support to affected people; Arrange resettlement for relocated households, land acquisition, and handover of acquired land to the construction units; Lead and coordinate with PPMU and CPCsto implement Livelihood Restoration Program; Assist DPCs to settle complaints concerning land acquisition, compensation and resettlement. Support C/DPC in issuance of LURCs for land plot in the resettlement site. Support the external monitoring consultant for conducting independent resettlement monitoring.
Ward/Commune People’s Committee:	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, C/DBCLA to organise meetings and public consultations; Resolve complaints at the ward/commune level - as prescribed by the existing law; Assist authorities to resolve land disputes and complaints.

With regards to compensation, support and resettlements, the following stakeholders will undertake their respective responsibility which are with their line of authorities.

5.3 Environmental Compliance Framework

5.3.1 Environmental Duties of the Contractors

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 not limit 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 TSPMU 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;
- 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, the contractors will prepare a Site-specific Environmental Management Plan (SEMP) for each contract packages and submit to the CSC and TSPMU 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.

5.3.2 Contractor's Site Environment Officer (SEO)

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;
- Keep detailed records of all site activities that may relate to the environment.

5.3.3 Independent Environmental Monitoring Consultant (IEMC)

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.

5.3.4 Environmental Supervision during Construction

During the construction phase, a team of qualified Environmental Supervisors (ES) as part of the Construction Supervision Consultant (CSC) shall carry out environmental supervision as part of construction supervision. Both the CSC and 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 TSPMU whether the construction design meets the requirements of the mitigation and management measures of the ESMP;
- Review and clear contractor's SEMP;
- Coordinate with TSPMU Environmental Officer (EO) in reviewing environmental compliance at newly proposed borrow pits and quarries and advise TSPMU on whether these are eligible for use by the Project;
- Verify and confirm with TSPMU 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 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

Detail ToR of the ES team are included in Annex 4 of this ESIA/ESMP.

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 ".

5.3.5 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 ES for approval shall also be sent to the EO to review whether sufficient environmental protection and pollution control measures have been included.

The ES 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 the ES. 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 the ES shall also have access, upon request, to the Site Log-Books.

After reviewing the documents, the EO or the ES 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 the ES 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.

5.3.6 Penalty System

In the compliance framework, if non-compliance with environmental regulations is discovered by the CSC/ ES 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/ ES) to repair violation. If the Contractors perform the repairs within the grace period (confirmed by the CSC/ ES), 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/ES do not detect non-compliance with environmental regulations of the Contractors, they will be responsible for payment to repair the violation.

5.3.7 RAP and Gender Monitoring

Gender Monitoring. During RAP implementation, key indicators (underlined 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 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.

RAP Monitoring

5.4 Environmental and social Monitoring Program

The monitoring of environmental quality will be done during the construction phase according to Table 62 with costs estimated in Table 63. Monitoring locations is presented in Annex 3.

Table 62 - 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, SO ₂ and NO ₂ 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 Dong 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, Đăk Đoa rural district; Coordinates: 13°58'32,4"N, 108°07'34,9"E. KK7- Ia Băng commune residential area, Đăk 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. KK8- 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)	
pH, T, turbidity, DO, COD, BOD ₅ , TSS, Cu, Zn, Fe, Cd, AS, Pb, oil and grease, coliform Once every quarter	NM1 – Ba La bridge; Coordinates: 13°56'56,4"N, 108°50'38,4"E NM2 – Song Ba (Ba River) bridge ; Coordinates: 13°57'15,4"N, 108°39'5,3"E
C. Munciple 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	NTSH1- Site hut at Km56+800. NTSH2- Site hut at Km67+600. NTSH3- Site hut at the intersection between An Khe by-pass route and Provincial road 669. NTSH4- Site hut at Km147+700 NTSH5- Site hut at Boi hamlet - Glar commune (at Km4+500 on the Pleiku city by-pass route). NTSH6- Site hut at Km183+100

NTSH7- Site hut at Km223+100
NTSH8- Site hut at Km231+700

Table 63 - Estimated Costs for Environmental Quality Monitoring

No	Item	Unit	Quantity/ volume	Unit price (VND)	Amount (VND)
1.1	<i>12 locations x 8 samples x 8 times</i>				553,582,848
-	TSP	Sample	768	76,297	58,596,096
-	CO	Sample	768	164,224	126,124,032
-	NO2	Sample	768	185,742	142,649,856
-	SO2	Sample	768	210,554	161,705,472
-	Microclimate				
-	Temperature, humidity	Sample	768	28,065	21,553,920
-	Wind direction/wind speed	Sample	768	27,986	21,493,248
-	Pressure	Sample	768	27,943	21,460,224
1.2	Noise, vibration (12 locations x 16 samples/location (continuous measurement from 6 AM to 9 PM, 01 sample every hour) x 8 times)				205,615,104
-	Equivalent noise (Laeq)	Sample	1536	66,932	102,807,552
-	Acceleration of vibration	Sample	1536	66,932	102,807,552
1.3	<i>Surface water (2 samples x 2 bridges (Ba La and Song Ba) x 8 times</i>				114,205,920
-	Temperature	Sample	32	32,927	1,053,664
-	pH	Sample	32	33,902	1,084,864
-	Turbidity	Sample	32	73,486	2,351,552
-	DO	Sample	32	69,661	2,229,152
-	COD	Sample	32	172,114	5,507,648
-	BOD ₅	Sample	32	151,640	4,852,480
-	TSS	Sample	32	123,257	3,944,224
-	Copper (Cu)	Sample	32	292,330	9,354,560
-	Lead (Pb)	Sample	32	332,819	10,650,208
-	Zinc (Zn)	Sample	32	292,330	9,354,560
-	Iron (Fe)	Sample	32	292,330	9,354,560
-	Cadmium (Cd)	Sample	32	332,819	10,650,208
-	Arsenic (As)	Sample	32	392,052	12,545,664
-	Total oil and grease	Sample	32	572,726	18,327,232
-	Coliform	Sample	32	404,542	12,945,344
1.4	<i>Domestic/household water (2 samples/location x 8 locations x 8 times)</i>				179,466,880
-	pH	Sample	128	40,180	5,143,040
-	NH ₄ ⁺	Sample	128	109,636	14,033,408
-	Surfactant	Sample	128	307,972	39,420,416
-	BOD ₅	Sample	128	122,596	15,692,288
-	TSS	Sample	128	84,341	10,795,648
-	TDS	Sample	128	86,746	11,103,488
-	NO ₃ ⁻	Sample	128	120,801	15,462,528
-	Total oil and grease	Sample	128	307,972	39,420,416

-	PO ₄ ³⁻	Sample	128	112,387	14,385,536
-	Coliform	Sample	128	109,454	14,010,112
	Total				1,402,870,752

5.5 Capacity building, training

5.5.1 TSPMU Environmental Management Capacity

TSPMU has 12 years (2004 to 2017) experiences in managing construction of transport facilities in Vietnam, including projects funded by International organisations 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. TSPMU 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, TSPMU has managed multiple PPP transport projects

TSPMU currently has 69 employees, including 47 staff with university degree; 12 master's degree holders and 02 PhD.

TSPMU's staff also have been familiarised 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. TSPMU arranged and actively took part in field survey and affected community consultation during the preparation of CHCIP safeguard documents including ESIA, RAP and EMDP. In the FS phase, TSPMU has also assigned staffs with relevant qualifications to be in charge of social and environmental aspects of the projects.

TSPMU's Environmental Officer has background in environmental technology with seven years of work experience at the TSPMU. She also have 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.

The projects is not the first WB-finance project which implemented by TSPMU; however, regulations and procedures of WB have been updated over the time. Therefore, TSPMU's staffs need to have supplement training during the construction and operation phase.

5.5.2 Safeguard Capacity Building Program

TSPMU's gap in practical construction safeguard management experience will be addressed by the mobilisation of Construction Supervision Consultants who will also be in charge of environmental supervision during construction phase. Independent Monitoring Consultant are also expected to provide some environmental training for the CSC and the contractors

Table 64 provides a proposed training program on safeguards policies.

Table 64 -Training on Environmental Management

Trainees	PMU, CSC
Topic	Environmental supervision, monitoring and reporting
Participants	Environmental staffs, CSC chief engineers, CSC site engineers, Site Engineer of contractors (if mobilised), community leaders
Training frequency	Immediately after the project becomes effective and at least one month prior to construction commencement of the first bid package. Refresh training will follow after six months.
Duration	One day each training
Responsibility	Independent environmental Monitoring Consultant (IEMC) deliver the training.
Trainees	CONTRACTORS
Topic	Implementation of mitigation measures, health and safety
Participants	Constructor’s workers
Training frequency	Within two weeks since construction commencement
Duration	A half of day training
Responsibility	CSC Environmental 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 opening
Duration	One session to each community
Responsibility	CSC Environmental Officer

5.6 Cost Estimation

The below table will provide 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. Estimated cost for implementing ESMP will be summarized in Table 65 below.

Table 65 -Total estimated cost for implementing ESMP

No.	Items	Unit	Quantity	Unit price (VNĐ)	Total amount (VNĐ)
1	Compensation and resettlement for affected households				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				1,402,870,752
		(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	Lumsum			132,000,000
		(as part of construction supervision contract)			
9	Independent monitoring, including:				635,000,000
	<i>Environmental supervision</i>	<i>Trip</i>	5	60,000,000	300,000,000
	<i>Social supervision</i>	<i>Trip</i>	5	60,000,000	275,000,000
	<i>Training on capacity building</i>	<i>Lumsum</i>		60,000,000	60,000,000

5.7 Grievance Redress Mechanism (GRM)

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 ESU of the PPMU, according procedures, responsible persons and contact information will be developed. 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.

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 in which 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.

Grievance Redress Mechanism for affected person who lose means of income/livelihoods, are Summarised in the Table 66 below.

Table 66 - 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	-After 15 days since the submission of the complaints, if the aggrieved

<p>City/District People's Committee (C/DPC):</p>	<p>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.</p>
<p>Third Stage Provincial People's Committee):</p>	<p>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</p>
<p>Final Stage - Courts of Law:</p>	<p>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.</p> <p>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.</p>

The World Bank's Grievance Redress Mechanism: 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, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at anytime 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.

CHAPTER 6. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

6.1 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.

6.1.1 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 Project Management Unit for Traffic Safety (TSPMU) has sent the official document no. 809/TSPMU-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'Đrông, 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 Djang 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.

Consultation meetings were held with these local authorities during project preparation. They have sent their feedback to the Project Owner, TSPMU, which is summarized in the Table 68.

6.1.2 Consultation with Local Communities

TSPMU 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. Participants in the consultation meetings are representatives of the investment owner, the local authorities, the FS 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 67.

Table 67 - 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	- Chairmans 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	Chur Hdrong Commune's People Committee, Pleiku City, 9/2/3	- Chairmans 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	- Chairmans 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, Chairmans 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 Pion, Klok and affected households of Pion, Klok village in group 1, 2, 3, 4, 5, 7.
19/8/2016 and 17/12/2016	K'Dang Ward'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 local residents: village heads of Cau Vang, Aluk village and affected households in Cau Vang, Aluk, Cay Điep and Ha Long 2 villages.

Date	Meeting location, Total number of participants /Women/ Ethnic Minority people	Participation
18/8/2016 and 28/12/2016	Ia Bãng Commune's People Committee, Đăk Đoa District 24/03/01	<ul style="list-style-type: none"> - Chairman of CPC, Chairman of Father Front Land, Youth Union Leader, Chairwoman of Women Union, cadastral land registration officer, commune health officer ; - Representatives of local residents: village head of Ia Klai and affected households in Ia Klai village and Village 5.
19/8/2016 and 20/12/2016	Adok Commune's People Committee, Đăk Đoa District 15/01/10	<ul style="list-style-type: none"> - Vice Chairman of CPC, Chairmans of Father Front Land, Farmer Union Chairman, Women Union, Veteran Union, Farmer Union Vice Chairman, cadastral land registration officer; Youth Union Leader, - Representatives of local residents: village head and affected households at Piong, 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	<ul style="list-style-type: none"> - Chairman and Vice Chairman of CPC, Chairmans of Father Front Land, Farmer Union, Women Union, Youth Union Leader, Head of Commune Health Station; - Representatives of local residents: village head and affected households of Tuoh Ktu, Tuoh Klah, Bôi, Bái villages
17/8/2016	Binh Giao Commune People's Committee, Chư Prong District 8/2/2	<ul style="list-style-type: none"> - Vice Chairman of CPC, Chairmans of Father Front Land, Farmer Union, Women Union, Head of Commune Health Station. - Representatives of local affected residents: Tân Lạc, Thanh Binh villages
26/8/2016	Ia Nan Commune People's Committee, Duc Co District 8/2/1	<ul style="list-style-type: none"> - Vice Chairman of CPC, Chairmans 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	<ul style="list-style-type: none"> - Chairman of CPC, Chairmans of Father Front Land, Farmer Union, Women Union, Youth Union Leader, Head of Commune Health Station, commune police. - Representatives of local residents: affected households
24/8/2016	Ia Pnôn Commune, Duc Co district 8/6/6	<ul style="list-style-type: none"> - Vice Chairman of CPC, Vice Chairman of Father Front Land, Chairwoman of Women Union, Chairman of Farmer Union, commune police - Representatives of affected households.
23/8/2016	IaKrieng Commune People's Committee, Duc Cơ District 10/0/1	<ul style="list-style-type: none"> - Chairman of CPC, Chairmans 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	<ul style="list-style-type: none"> - Chairman of CPC, Vice head of Communist Party - Representatives of local affected residents: Chư Bô 1, Chư Bô 2 villages
19/8/2016 and 21/12/2016	Ia Krêl Commune People's Committee, Duc Cơ District 16/04/01	<ul style="list-style-type: none"> - 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

Date	Meeting location, Total number of participants /Women/ Ethnic Minority people	Participation
		Giáo, Ia Lâm Tôk and Ia Lâm villages.
20/8/2016	Dak Dtrăng Commune's People's Committee, Mang Yang District 9/4/0	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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
22/8/2016 and 22/12/2016	An Phuoc Commune's People's Committee, An Khe Town 24/02/0	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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 Dong township People's Committee, Mang Yang District 9/4/0	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Chairman of CPC, Chairman of Father Front Land, Women Union, Farmer Union, Veteran Union, Youth Union Leader.

Date	Meeting location, Total number of participants /Women/ Ethnic Minority people	Participation
	9/2/0	- Representatives of local affected residents: Group 5,6,7
18/12/2016	Tân Bình Commune People's Committee, Đắc Đoà 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 Djang 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		
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 Son and Thượng Son 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 detailed design and implementation process.

6.1.3 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, TSPMU, 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.

6.2 Feedback Received from Public Consultation

6.2.1 Responses from Commune/Town People's Committees

The People's Committees of the relevant communes have received the official document no. 809/TSPMU-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 the Table 68 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	<ul style="list-style-type: none"> - Dust pollution affecting households near the project construction site - Traffic congestion at peak hours. 	<ul style="list-style-type: none"> - Pay attention to reduce dust by watering. - Implement mitigation measures as committed in the report and regulations. 	<ul style="list-style-type: none"> - Assign traffic control person to regulate the traffic in the area of influence by construction work.
Chur Á Coomune - Pleiku City - Gia Lai Province	<ul style="list-style-type: none"> - Impacts on the surrounding air, water and soil environment 	<ul style="list-style-type: none"> - Mitigation measures should be implemented as proposed in the project ESIA. 	<ul style="list-style-type: none"> - It is recommended that occupational and traffic safety is to be ensured throughout the construction phase. - Ensure the construction meets the progress timeline.
Chur H'Đrông Commune, Pleiku City	<ul style="list-style-type: none"> - Impacts on air environment, noise 	<ul style="list-style-type: none"> - 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. 	<ul style="list-style-type: none"> - Implement the environmental protection regulations - Implement the mitigation measures as specified in the ESIA
An Phu Commune - Pleiku City - Gia Lai Province	<ul style="list-style-type: none"> - Impacts on the surrounding environment such as soils, water, air and noise... 	<ul style="list-style-type: none"> - Mitigation measures should be implemented as committed in the project ESIA. 	<ul style="list-style-type: none"> - It is recommended that traffic safety and occupational safety is to be ensured throughout the construction phase. - Ensure the construction meets the project timeline.
Dak Đoa township - Đak Đoa District - Gia Lai Province	<ul style="list-style-type: none"> - Agreed with the negative impacts 	<ul style="list-style-type: none"> - Agreed with the mitigation measures 	<ul style="list-style-type: none"> - Implement the proposed mitigation measures

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
	identified in the ESIA sent to the commune	proposed in the project's ESIA.	- Attention given to the construction work in rainy season, affecting traffic safety. - Need segregate traffic lane ensure traffic safety during the construction period.
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 hours 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 - Đắk Đoa District	- Impacts on the surrounding environment such as air and noise. - Related impacts from construction workers' gathering, and impacts from material transportation	- Having effective measures to reduce dust (on site watering, covered trunks of materials transportation vehicles) - Register with the local authority on the temporary residency for the workers as per the Government regulation.	- Provide advance notice to the local authority on the construction work in the area. - Address timely the concerns of local people; provide appropriate compensation to the affected households.
Adok Commune, Đắk Đoa District	- Impacts on the surrounding environment such as, air and noise	- Construct progressively and as far as possible - Adopt effective measures for dust suppression	- Implement the environmental protection regulations - Implement the 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 materials	- 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
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.

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 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.
Chur Ty town Đuc 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.
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 socioeconomical 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.
Đák DJ rãng,	- Impacts on air	- Suppress dust by on site	- Coordinate with local authority

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
Mang Yang District	environment, noise and vibration - Impacts to traffic safety on NH19	watering during the construction in dry and hot days - Carry out construction activities as fast as possible - Provide advance notice to the local authority and communities on construction activities	during construction period - Register temporary residency and temporary leave for the workers with local authority
Tan An Commune - Dak Pơ 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.
Cu An Commune Đak Pơ 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	- Basically agreed	- Ensure public health,	- Compensation and construction

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
An Khe Provincial Town - Gia Lai Province	with the contents of the report.	security and socioeconomic conditions during the project.	are implemented in compliance with regulations; Properly finish the site.
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

6.2.2 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, 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 69 below.

Table 69 - Feedback from the Local Community Representatives

Commune/ Ward/ Town	Feedback from the Local Communities
Dak Doa District Town- Dak Doa 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.

Commune/ Ward/ Town	Feedback from the Local Communities
	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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 NH 19 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 and the land acquisition and site clearance need to be 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 reduce dust by watering regularly.
Binh Giao commune - Chư Prông District - Gia Lai Province	<ul style="list-style-type: none"> - Completely agreed with the content of the ESIA presented by the project's investment owner. - During the construction period, the contractor need to pay attention to the traffic safety issues - The investment owner need 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 need 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 Pleiku City - Gia Lai Province	<ul style="list-style-type: none"> - 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.

Commune/ Ward/ Town	Feedback from the Local Communities
	<ul style="list-style-type: none"> - 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.
Chur Ty Disitric Town – Duc Co District - Gia Lai Province	<ul style="list-style-type: none"> - 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
Ia Pnôn Commune - Duc Co District - Gia Lai Province	<ul style="list-style-type: none"> - 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 impactsto local people. - Proper finish the construction work and ensurethe surrounding environment is maintained properly as before construction activities take place..
Ia Kriêng Commune - Duc Co - Gia Lai Province	<ul style="list-style-type: none"> - 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, avoidprolonged 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 need 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	<ul style="list-style-type: none"> - 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

Commune/ Ward/ Town	Feedback from the Local Communities
	businesses and living conditions of local people
Ia Bång Commune - Đak Đoa District	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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.
Thang Loi Ward- Pleiku City - Gia Lai Province	<ul style="list-style-type: none"> - 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

Commune/ Ward/ Town	Feedback from the Local Communities
	<p>assist traffic, making flagging line and place warning signs.</p> <ul style="list-style-type: none"> - 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
<p>Chur Á Commune - Pleiku City Gia Lai Province</p>	<ul style="list-style-type: none"> - 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.
<p>Ia Krêl Commune- Duc Co District- Gia Lai Province</p>	<ul style="list-style-type: none"> - 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
<p>An Phuroc Ward- An Khê Town - Gia Lai Province</p>	<ul style="list-style-type: none"> - 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
<p>Ngo May Ward- An Khe Provincial Town- Gia Lai Province</p>	<ul style="list-style-type: none"> - 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

Commune/ Ward/ Town	Feedback from the Local Communities
	<p>implementation</p> <ul style="list-style-type: none"> - It is required that the committed mitigation measures will be implemented - Prior to the construction, the project need 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 Nán commune – Duc Co District- Gia Lai Province	<ul style="list-style-type: none"> - 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
An Bình Ward, An Khe Provincial Town	<ul style="list-style-type: none"> - 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, Đắ Đoa	<ul style="list-style-type: none"> - 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 - Material transportation vehicles need to be covered.
Đắ commune, Mang Yang District	<ul style="list-style-type: none"> - 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,	<ul style="list-style-type: none"> - The investment owner has presented fully the impacts and the mitigation measures.

Commune/ Ward/ Town	Feedback from the Local Communities
Đắk Đoa District	<ul style="list-style-type: none"> - 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. - If house cracks or subsidence happen, provide adequate compensation to the affected households.
Chư H'Đrông Commune, Pleiku City	<ul style="list-style-type: none"> - 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.
Adok commune, Đắk Đoa District	<ul style="list-style-type: none"> - 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 the 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 period.

6.2.3 Responses and Commitments by the Project Owner

The TSPMU has taken into account and incorporated the comments from CPC, representatives from mass organizations and local communities into the project design and ESIA report. It mentions clearly the following:

- Regarding the comments to ensure environmental sanitation and public health: The TSPMU 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 publically 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.
- The Project Management Unit for Traffic Safety will ensure the local people in project areas have the access to the public facilities.
- The TSPMU 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 TSPMU will direct the contractors to fully implement the committed mitigation measures to minimize the negative environmental impacts as specified in the ESIA.

6.3 Information Disclosure

The final draft ESIA report has been made publicly available in the project areas prior to the Project's Appraisal so that the affected, benefitted or concerned people can have an 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.

ANNEXES

ANNEX 1 – DUE DILIGENCE REVIEWS

DULLIGENCE REVIEW OF BOT PROJECTS

Project for Rehabilitation of the National Way 19 from Km17+027 to Km50 in Binh Dinh Province and Km108 to Km131+300 in Gia Lai Province under a BOT Contract (BOT Project) and the BOT Additional Financing Project

The Environment Impact Assessment (EIA) for the BOT Project has been conducted by the Scientific Technological Center for Environmental Protection in Transportation (CEPT) who also have prepared the EIA for the Central – Central Highland Transportation Connectivity Project. The Ministry of Natural Resources and Environment (MONRE) has approved the EIA of the BOT Project at the Decision No. 1255/QĐ-BTNMT dated June 26, 2015 and the EIA for the BOT Additional Financing Project at the Decision No.3391/QĐ-BGTVT dated October 31, 2016. The key potential environmental and social impacts and risks identified in these two assessments are summarized below.

a. The BOT Project

The construction of the BOT Project started in December 2013 and completed in December 2015. By January 2017, the upgraded and expanded road has already been put into use, contributing to improving transport efficiency and reducing traffic safety risks and land/soil subsidence.

The National Highway 19 (NH19) has a total length of 243km, starting at the Quy Nhon Port (Quy Nhon City, Binh Dinh Province) and ending at the Le Thanh border gate (Gia Lai Province). The road segment in Gia Lai Province is 169.5 km long and the one in Binh Dinh is 70.5 km long.

The BOT project provides rehabilitation for 55.7 km of the NH19, of which 33.1km running through Binh Dinh province and 22.6 km running through Gia Lai province. The upgraded road would have two lanes for motorbikes and two lanes for four-wheel vehicles. The proposed upgraded road would be from 9 to 15m wide with 173 culverts, 2 toll gates and 11 bridges. The BOT project has been completed and in its operation phase. The route passes 12 communes/wards of Binh Dinh and Gia Lai provinces.



(1)



(2)



(3)



(4)

After the construction, the road was widened with two separated motorbike lanes along the two roadsides, and road surface is in good condition (1). The roadside slopes were reshaped and the horizontal and vertical drainage ditches were constructed (2). The stepped concrete embankment was constructed to stabilize the areas where landslide used to be often occurred at km 108th (3). One rest stop is provided in the area that is opposite the constructed embankment (4)

Photos of the National Way 19 after the road rehabilitation

The NH19 route under the BOT project runs mainly through agriculture land, forestry land, residential land, road surface and abandon land. Population density is at moderate level and people's main jobs are associated with agriculture and small trading. There are some physical and Spiritual Cultures (PCRs) along the route such as Huynh Kim Church (at Km16+800, Nhon Hoa ward), Khuat Tam Church (at Km23+700 of Nhon Tho commune), Dieu Quang Pagoda (at Km23+800 in Nhon Tho commune), and Châu Khê Parish (at Km130+600).

Most of the baseline environmental quality parameters (ambient air, vibration, surface water, groundwater and sediment) in the BOT project area meet the acceptable limits²¹. Some parameters such as noise level was above the acceptable limits at some locations such as a close vicinity to NH19, at intersection between NH1 and the railway; total suspended solids in surface water in Gia Lai exceeds the acceptable standards from 1.1-1.45 times; Coliform and BOD₅ in springs and rivers in Binh Dinh province are 1.2 to 1.8 times above the standard; and COD exceeds the standards from 1.06 to 1.5 times. There are no known biologically or economically valuable species exist in the project area.



The NH19 before being rehabilitated.

The Project acquired permanently about 11.9 ha of agriculture land (garden, cash crop land), 6.0ha of residential land and 4.7ha of other land (road side land and abandon land). There were 264 households affected due to land acquisition of which 25 households were relocated (14 households in Gia Lai and 11 households in Binh Dinh). The project had to relocate 20 electrical poles, 33,251m of telecommunication cable and carried out clearance for mines and unexploded ordnances (UXOs) left from the war.

To manage the potential impacts in the pre-construction stage, the BOT project has prepared a resettlement plan which was complied with the Vietnamese regulations. The total amount for compensation, support and resettlement was VND 166.090 billions (among which VND76.705 billions were allocated to Binh Dinh and VND89.385 billions were allocated to Gia Lai province). The amount spent for UXOs clearance was VND15,000,000,000. 25 households were resettled on-situ. Land acquisition and compensation and resettlement were completed prior to the project's construction stage.

The potential environmental impacts during construction stage specified in the EIA include: (i) dust and exhaust gases from site clearance, road base leveling and backfilling and vehicle transportation of construction materials; (ii) noise and vibration from soil compacting and leveling activities; (iii) waste generation, comprising of 175kg solid waste daily from the worker camp, 39,073m³ excavated soil and 11,453 m³ of soils mixed with bentonite and bentonite clay that need to be disposed; (iv) 119litres/month of waste oil; (v) Generation of 19.6 m³ domestic wastewater and 5,588 m³ construction wastewater; (vi) potential natural soil erosion and soil erosion due to heavy rain; (vii) localized flooding; (viii) damages to the

²¹Environmental Quality Standards used to compare with the environmental baseline sampling results are: Ambient Air Quality, QCVN 05:2013/BTNMT; Vibration, QCVN 27:2010/BTNMT; noise, QCVN 26:2010/BTNMT; Surface Water, QCVN 08-MT:2015/BTNMT (column B1); Sediments, QCVN 43:2012/BTNMT; Groundwater, QCVN 09-MT:2015/BTNMT, Soil Quality, QCVN 03-MT:2015/BTNMT.

existing infrastructure and disrupt associated services such as traffic, drainage, electricity supply (viii) Disturb traffic and increase traffic safety risks; (ix) soil erosion, land slide, siltation and blockage of water flow during bridge construction, backfilling road base; (x) incident risks to the community and workers during construction phase; and (xi) social security and social disturbance issues.

The main ecosystems in the project area is agriculture ecosystem in most sections, and the road segment running through Mang Yang Pass (Km109-Km113) has planted forest ecosystem. The project area is not a habitat of any known vulnerable, threatened or endangered species. The distance from the project to the nearest natural forest is 3km, therefore the potential impacts and risks to ecosystem and nature habitats are small. However during the construction phase, there is a bush fire risk, soil/embankment erosion at Mang Yang Pass area.

Most of the general environmental and social impacts during construction phase are localized, short-term, at low to moderate level, and manageable through the commonly practiced mitigation measures such as watering to reduce dust, requesting the contractors to use low emission machineries including trucks and maintain regularly; placing warning signs and fence at the site, assigning persons to regulate traffic; minimizing vehicle movement at peak hours in the morning and afternoon at sections passing residential areas; washing trucks before leaving the site; employing local labors and providing adequate accommodation with clean water sanitation facilities at worker camps; provide protective gears to the workers such as clothes, hats, masks, gloves, towels, first aid kits; providing garbage bins and contracting with environmental service contractors for collecting and transporting the waste to the disposal sites that are agreed by local authorities at Son Trieu landfill (An Nhon township), Binh Nghi landfill (Tay Son district), Tay Giang landfill (Tay Son district); storing hazardous waste separately and treat according to MONRE's regulations specified at the Circular No.36/2015/TT-BNTMT about hazardous waste management; the temporary storage of waste should be at least 20m from the water source; not constructing bridges in rainy and flooding season; collecting domestic wastewater done under contracts with Environmental Service Companies in Binh Dinh and Gia Lai; reusing of demolition materials; having filter tank and small ditch to channel the wastewater from construction site for further treatment; constructing embankment, strengthening the embankment or using stone baskets to make revetment to prevent erosion.

The social impacts are managed through the following measures: Register with local authorities about temporary residency for the workers, minimizing the disturbed areas, not using land outside the boundary of the construction site without the agreement from the community and local authority, having in place the workers' code of conduct such as prohibition of gambling, drinking, drug abuse, fighting or any activities that may affects local security; and providing training on HIV/AIDS.

The ESIA also identified site-specific mitigation measures for some project sites. At the section running through Mang Yang Pass, the contractor will work with the local authority and Forest Guards to do an inventory of trees within the project area and minimize tree cutting; In order to prevent and early detect forest fire risks during the construction phase, the Contractor will set up a fire lookout station at the height of 30-35 m at Km 109-Km112 of Mang Yang Pass to watch out and alert for bush fire during the construction. The station will guarded 24h/24h, equipped with communication tools and forest fire fighting kits such as water pump, fire hose, fire nozzles to cease the fire when detected.

Other potential environmental and social impacts during the road's operational phase are considered, including: i) Dust and exhaust gases, ii) noise and vibration, iii) river bed erosion

due to new bridge pier installation, iii) traffic safety issues. To mitigate these impacts, the measures proposed includes placing speed limit warning signs, regular maintenance of road surface, tree planting as segregation line, upgrading road surface, reducing friction with asphalt layering, periodic road washing, collecting waste on the road maintenance of drainage system, interceptor, filter tanks to ensure the water drainage capacity.

An environmental monitoring and supervision plan to ensure environmental compliance during the construction phase and the first 1-2 years was approved. The scope of environmental monitoring and supervision includes monitoring the implementation of mitigation measures by the contractors, monitoring of waste and wastewater, monitoring the quality of ambient air, surface water, ground water and soil. An environmental monitoring consulting company would conduct the work. The Ministry of Transport plays the role of the state management for the environment. The Project Management Unit 5, BOT Project Investment Owner will deliver environmental report on every 3 months to MOT, DONRE of Binh Dinh and Gia Lai. The budget allocated for environmental monitoring and supervision is VND3.95 billions.

During the preparation of the EIA report, the project has consulted with People's Committees of 12 communes/ wards, including Nhon Hoa ward, Nhon Tho, Nhon Tan communes of An Nhon town, Binh Dinh Province; Binh Nghi commune, Tay Xuan, Binh Tuong, Tay Giang, Tay Thuan communes of Tay Son district, Binh Dinh Province; Ham Tam commune of Dac Po district, Gia Lai Province, H'Ra commune, Dak Taley, Dak Ya communes of Mang Yang district, Gia Lai Province and the local communities. The CPCs requested that the Project owner coordinate with the local authority during the land acquisition and site clearance process and fully comply with the commitments made in the EIA report.

During the project implementation, the periodical environmental sampling results showed that the air quality indicators are within the acceptable limits set in QCVN 05:2013/BTNMT; dust and noise at some locations exceed the limits due to the ongoing construction activities. Surface water quality indicators met the QCVN 08:2008/BTNMT-B1 except for Coliform. Groundwater quality are within the acceptable standards of QCVN 09-MT:2015/BTNMT. All heavy metal indicators (As, Cu, Pb,Zn) are under the standards set in QCVN 03-MT:2015/BTNMT. Regular environmental monitoring is fully conducted. The contractor implemented the project's committed measures for environmental protection, labor safety, traffic safety, social security order however there are still some issues to be considered, as follows: (1) construction of road base emits large amount of dust, (2) some site locations are not managed properly, causing impacts to living and production activities of people along road sides, (3) some construction locations are not having a lane separated by pillars and lines for people traversing. However the contractors have promptly undertaken correction actions after comments are received. There are no serious environmental incidents, labor accident or complains received during construction phase. The last supervision mission showed that when the project completed the dust, noise and vibration impacts have been significantly reduced due to the road quality has been improved.

In conclusion, the EIA of the BOT Project complies with the Vietnamese regulation and compatible with the World Bank Safeguard Policies.

b. Environmental Impact Assessment for the BOT Additional Financing Project

By January 2017, the BOT additional financing project has not started the construction work.

The proposed additional financing project would upgrade 18 km of the NH19 passing Gia Lai province (Đăk Pơ towns, Ha Tam commune, An Thanh commune of Đăk Pơ district) from Km90 to Km108, expanded five existing bridges (An Cu, Ca Tung, Luc Kuc, Xa Huong and Ha Tam bridge) and upgraded three junctions along the route. The rehabilitated road will be class III- road in plain area having 2 lanes for motorbikes and two lanes for four wheel vehicles. The road is 12 m wide with drainage and lighting system, side protection and traffic safety.



NH19 before being upgraded under the additional financing project

The existing road section of the additional financing project has been degraded and damaged significantly (especially at section Km96-Km107), making difficult for traffic movements. People reside densely at the section between Km90-94. The ending point of the additional financing project is at Km108, connected to the section upgraded under the parent BOT Project. The land to be acquired under the AF project includes agriculture land, residential land, bare land and water drainage ditches.

There are no biosphere reserves, national parks or nature reserve in the project area. The Kon Ka Kinh National Park is located 20 km to the West of the Project areas, in A Yun commune, Mang Yang district. The Bac An Khe watershed protected forest with mostly pine trees and eucalyptus trees (for MDF timber production) and a young natural forest (regerminated after being burnt for cultivation) are located more than 5km from the project area. The valuable natural forest is 5-10 km far from the road. The road passes 5 main water bodies at the locations of 5 bridges along the route.

Most of baseline environmental parameters are within allowable limits except for the TSS of surface water at Luc Kuc bridge area. There are no known biological or economical valuable species in the project area.

The project would acquire 2.58 ha of residential land, 4.34 ha of cash crop land, 2.58ha of industrial cropland, 0.6 ha of pond/lake, 4.24 ha of paddy rice land and 1.1 ha of fruit garden. There are 4 households of Ha Tam commune to be resettled and 9 households whose small shops and business would be affected due to land acquisition. In addition, the project will have to relocate 25 electrical poles, 4 telecommunication poles and 1,190 m cable. The project has to conduct landmines and UXOs clearance.

Similarly to the BOT parent project, this project has developed an overall site clearance plan and a resettlement plan according to the requirements of Vietnamese regulations with total budget for compensation, support and resettlement is VND24.718 billions and budget for mine clearance is VND 10,000,000,000. Partial affected households are resettled on site and the relocated households will resettle in the available residential area of Ha Tam commune or they can receive the compensation in cash and self arrange their new homes. The project will reconstruct the electricity poles, communication pole, return the water supply pipes, test the new setting operation and request the service providers switch to the new installations.

The key potential environmental impacts during construction phase identified in the EIA are similar with those in the EIA of the BOT parent project. The differences among the two are in terms of waste generation volumes, including 53 kg of solid waste from worker camp, 34,601 m³ of dredging organic soil materials, 77l waste oil/month, 11m³ of wastewater from

machinery maintenance, 8m³/day of domestic wastewater, and soil erosion risk. The EIA of the additional financing project proposed the mitigation measures similar to those proposed in the EIA of the parent project in order to mitigate the identified potential social and environmental impacts and risks. The differences are in the disposal site at Km86+550, and the requirement that the sites for temporary gathering of construction materials and waste must be at least 100 m from any sensitive receptors including residential clusters along the route; The bridge construction work should not be implemented during flooding season.

The key potential social and environmental impacts during the road operation phase are considered, including: i) dust and exhaust gases, ii) noise and vibration, iii) fragmenting agriculture land, of which the use of machineries in small and fragmented agricultural land could be difficult; iv) traffic safety issues and soil erosion risks. To mitigate these impacts, the measures proposed includes placement of speed limit warning signs, regular maintenance of road surface, tree planting as segregation line, upgrading road surface, reducing friction with asphalt layering, periodic road washing, collecting waste on the road, maintenance of drainage system, interceptor, filter tanks to ensure the water drainage capacity. To mitigate the land fragmentation impact, the project will also acquire and compensate for the pieces of remaining land which is too small for cultivation.

An environmental monitoring and supervision plan to ensure environmental compliance during the construction phase and the first 1-2 years was proposed similarly to the plan of the parent project however the environment supervising work will be conducted by the construction supervisor in every 3 months. Environmental monitoring and supervision report would be submitted every 3 months to MOT and Gia Lai DONRE. The budget allocated for environmental monitoring and supervision is VND375 millions. During the operation, the monitoring for river bank erosion, road base subsidence will be conducted one every 6 months in 2 years.

During the preparation of the EIA report, the project has consulted with the People's Committees of three communes and towns, including Dak Po town, Ha Tam commune, An Thanh commune, and with the local communities. The CPC requested that the Project owner to coordinate with the local authorities during the land acquisition and site clearance process and fully comply with the commitments made in the EIA report.

In conclusion, the EIA of the BOT Additional Financing Project complies with the Vietnamese regulations and compatible with the World Bank Safeguard Policies.

DUE DILLIGENCE REVIEW OF BORROW PITS AND QUARRIES

I. Quarries

1.1 Hieu Ngoc Quarry – Hieu Ngoc General Construction Limited Liability Company

Mr. Toan: Quarry Manager; Telephone: 0962358782

No.	Main content	Detailed description
1	General information	<p>Address: Tay Xuan Commune, Tay Son Rural District, Binh Dinh Province</p> <p>Access road from National Road 19 to Phuc An Industrial Complex</p> <p>Exploiting unit: Hieu Ngoc General Construction Limited Liability Company</p> <p>Operation start: Year 2013, exploitation time 19 years</p> <p>Total exploitation area: 4,5 ha</p> <p>Exploitation output: 40,000 m³/year</p> <p>Usable reserves: 680,600 m³</p> <p>Licenses issued by the State: Exploitation permit No. 63/GP-UBND dated 9december 2013</p> <p>Exploitation technology: Remove surface level, - Drilling and exploding - Power shoveling - Transport of blasted stone to crushing and screening station - Classification of finished stone - Customer's means of transportation.</p>
2	Main environmental issue	<p>Dust: Generated from activities such as drilling and blasting, power shoveling, transport and processing.</p> <p>Noise: Generated from the operation of crushing and screening assembly and transport means.</p> <p>Blasting safety: Dust, noise, shocks, fly rock prevention</p> <p>Occupational safety: Accidents may happen due to failed compliance with technical processes, occupational safety.</p> <p>Distance to the residential area: minimum 150m.</p> <p>Greenery: Adequate planting of greenery at the site.</p> <p>Solid waste: Generated from the stripping of overburden material.</p> <p>Domestic waste: Generated from daily activities of workers and staffs.</p>
	Main machinery/equipment	Quantity and type: 01 crushing and screening station, 04 excavators, 02 wheel loaders and 04 trucks.
3	Measures for controlling the pollution	<p><u>Dust:</u></p> <ul style="list-style-type: none"> - Installation of 2 water spray nozzles, 2 pump with 5 Hp motor, crushing and screening station and construction of 1 water well. - Planting acacia trees at the processing site - Investment in 1 small trucks to spray water for prevention of dust along the transport road. <p><u>Blasting safety:</u></p> <p>The blasting is done by a functional unit namely Corporation for Economic Defense Engineering Industry.</p> <ul style="list-style-type: none"> - Use of explosives permitted for use and circulation. - Blasting according to the current most advanced method of non-electric differential blasting. <p><u>Occupational safety:</u></p> <ul style="list-style-type: none"> - Rules of occupational safety must be posted in office. - Safety protective tools must be fully equipped, such as: Protective clothes, helmet, gloves, gauze mask, - Workers operating directly any construction machine must be trained for proper practices, especially in case of any trouble. They

		<p>be must always present at their working location to operate, check and run the machine properly according to the technical requirements.</p> <p><u>Solid waste:</u> A dumping site of around 1,500 m² must be arranged for storing waste soil arisen from the stripping of overburden material.</p> <p><u>Domestic waste:</u> Installation of 3 dumpsters of 100 liters each to store daily domestic waste disposed by workers and staffs, which will be transported to the landfill of Tay Son rural district –Binh Dinh Provincefor disposal.</p> <p><u>Environmental supervision:</u> Periodically in every 6 month, Center for Monitoring of Natural Resources and Environment (Binh Dinh province) survey and supervise the quality of the environment in the quarry and make a report for submitting to the Binh Dinh province Department of Natural Resources and Environment and the People’s Committee of Tay Son rural district for monitoring.</p>
4	Hazardous waste	<p>Quantity: 200 liters waste oil for engine, gearbox and lubrication/year (Code: 17 02 03).</p> <p>Waste collection unit: Reuse to lubricate the gear system the crushing and screening station.</p>
5	Deposit to the environmental fund	<p>Term of deposit: 19years</p> <p>Amount: VND 5,262,080,000, annual deposit before 31 January</p> <p>Schedule/responsibility for implementation: According to the scheme of environmental improvement and reinstatement from the investment project in exploiting - processing construction stone in Hieu Ngoc quarry approved by Decision No. 2559/QĐ-UBND of Binh Dinh province People’s Committee dated 13 September 2013.</p>
6	Rock blasting	<p>Corporation for Economic Defense Engineering Industry is hired to carry out the blasting with the process of blasting as follows:</p> <p>Method of watching/noticing the community:</p> <ul style="list-style-type: none"> - Install signs to warn the boundaries of blasting area - Announce the signal of blasting: Red flag, whistle + Erect a red flag at a top peak: Start loading explosive + Order to prepare the blasting: 3 whistles + Order to blast: 2 long whistles + Announcement about no more blasting: 1 long whistle - Time of blasting: + Morning from 11:00 AM - 01:30 PM + Afternoon from 04: 00 PM - 05:30 PM
7	Photo	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Quarry</p> </div> <div style="text-align: center;">  <p>Area for accommodation huts of workers and gathering machineries and equipments.</p> </div> </div>
8	Labor force	<p>Number of workers: 12 persons</p> <p>Quantity/costs of occupational protection: Occupational protective clothes: 30 sets, labor protective shoes: 30 pairs, Fabric cap: 30 pieces, plastic helmet with screw stopper: 15 pieces, Canvas gloves:</p>

		<p>30 pairs, gauze mask: 30 pieces, Glasses: 15 pairs, Welding shield: 5 pieces, Noise protective capsules and plugs: 12 sets</p> <p>Periodical overall health check: Once a year at Center for medical of Tay Son rural district, Binh Dinh province</p> <p>Periodical training in occupational safety: Twice a year.</p> <p>Trainer: Department of Occupational Safety and Sanitation of the Company.</p> <p>Facilities: Toilet fully built.</p>
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1.2 Gia Hai quarry - Gia Hai Private Enterprise

Mr. Tuan Quarry Manager; Telephone: 0972 041 999

No.	Main content	Detailed description
1	General information	<p>Address: Ngo May ward, An Khe town, Binh Dinh province</p> <p>Approach road from National Road 19 to An Khe town landfill.</p> <p>Exploiting unit: Gia Hai Private Enterprise</p> <p>Operation start: In 2012 and extension in 2015 with the term of production of 13 years</p> <p>Total exploitation area: 0.9 ha</p> <p>Exploitation output: 20,000 m³/year</p> <p>Usable reserves: 249,687 m³</p> <p>Licenses issued by the State: Exploitation license No. 197/GP-UBND dated 7 April 2015</p> <p>Process mining technology: Stripping of overburden material - Drilling and blasting - Power shoveling - Transport of blasted stone to crushing and screening station - Classification of finished stone - Customer's means of transportation.</p>
2	Main environmental issue	<p>Dust: Generated from activities such as drilling and blasting, power shoveling, transport and processing. Use of 01 water tank truck to spray water for reducing dust.</p> <p>Noise: Generated from the operation of crushing and screening assembly and transport means.</p> <p>Blasting safety: Dust, noise, shocks, fly rock prevention</p> <p>Occupational safety: Accidents may happen due to failed compliance with technical processes, occupational safety.</p> <p>Distance to the residential area: minimum 500m</p> <p>Greenery: Adequate planting of greenery at the site.</p> <p>Solid waste: Generated from the stripping of overburden material.</p> <p>Domestic waste: Generated from daily activities of workers and staffs.</p>
	Main machinery/equipment	Quantity and type: 03 air-drills, 01 crushing and screening station, 02 water pumps, 03 excavators and 02 trucks, Hyundai brand.
3	Measures for controlling the pollution	<p><u>Dust:</u></p> <ul style="list-style-type: none"> - Installation of 1 water spray nozzle, 02 water pumps and construction of 1 water well. <p><u>Blasting safety:</u></p> <ul style="list-style-type: none"> The blasting work is done by a functional unit namely Tay Nguyen Mining Chemical Company - Use of explosives permitted for use and circulation. - Blasting according to the current most advanced method of non-electric differential blasting. <p><u>Occupational safety:</u></p> <ul style="list-style-type: none"> - Rules of occupational safety must be posted in office. - Safety protective tools must be fully equipped, such as: Protective clothes, helmet, gloves, gauze mask, Noise protective capsules and plugs...

		<p>- Workers operating directly any construction machine must be trained for proper practices, especially in case of any trouble. They be must always present at their working location to operate, check and run the machine properly according to the technical requirements.</p> <p><u>Solid waste</u>: A dumping site of around 2,000 m² within the precinct of the quarry must be arranged for storing waste soil arisen from the stripping of overburden material.</p> <p><u>Domestic waste</u>: Installation of 2 dumpsters of 150 liters each to store daily domestic waste disposed by workers and staffs, which will be transported to the landfill of An Khe town.</p> <p>Due to its size, the quarry of Gia Hai Private Enterprise is exempted from making a report on environmental impacts and thus the monitoring of the environment is not carried out.</p>	
4	Hazardous waste	<p>Quantity: 250 liters waste oil for engine, gearbox and lubrication/year (Code: 17 02 03).</p> <p>Waste collection unit: Reuse to lubricate the gear system the crushing and screening station.</p>	
5	Deposit to the environmental fund	<p>Term of deposit: 13 years</p> <p>Amount: VND 98,700,000</p> <p>Schedule/responsibility for implementation: According to the Commitment to protect the environment of the project to exploit 20,000m³ of construction stone that was approved by the Chairman of An Khe town People's Committee in the announcement No. 326/TB-UBND dated 27 October 2014.</p>	
6	Rock blasting	<p>Gia Hai Private Enterprise hires Tay Nguyen Mining Chemical Company to carry out the blasting through the process of ensuring the safety of blasting as follows.</p> <p>Method of watching/noticing the community:</p> <ul style="list-style-type: none"> - Install signs to warn the boundaries of blasting area - Announce the signal of blasting: Red flag, whistle + Erect a red flag at a top peak: Start loading explosive + Order to prepare the blasting: 3 whistles + Order to blast: 2 long whistles + Announcement about no more blasting: 1 long whistle - Time of blasting: + Morning from 11:00 AM - 01:30 PM + Afternoon from 04: 00 PM - 05:30 PM 	
7	Photo	 <p>Crushing area of the quarry</p>	 <p>Area for accommodation huts of workers and gathering machineries and equipments.</p>
8	Labor force	<p>Number of workers: 10 persons</p> <p>Quantity/costs of occupational protection: Occupational protective clothes: 20 sets, labor protective shoes: 20 pairs, Fabric cap: 20 pieces, plastic helmet with screw stopper: 10 pieces, Canvas gloves: 20 pairs, gauze mask: 30 pieces, Glasses: 10 pairs, Welding shield: 5 pieces, Noise protective capsules and plugs: 10 sets</p> <p>Periodical overall health check: Twice a year at General Hospital of An Khe</p>	

		town, Gia Lai province Periodical training in occupational safety: Once a year. Trainer: Department of Occupational Safety and Sanitation of the Enterprise. Facilities: Toilet fully built.
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1.3 Trang Duc Quarry - Trang Duc One-member LLC

Mr. Hao: Engineer at the quarry; Telephone 0977 390 552

No.	Main content	Detailed description
1	General information	Address: H'ra commune and Đăk Ta Ley commune, Mang Yang rural district, Gia Lai province. Approach road from the National Road No. 19: Adjacent to the National Road No. 19 at Km118+800. Exploiting unit: Trang Duc One-member LLC Operation start: Year 2014, exploitation time 9.5 years Total exploitation area: 3.62 ha Exploitation output: 60,000 m ³ /year Usable reserves: 539,954 m ³ Licenses issued by the State: Exploitation license No. 345/GP-UBND dated 18 June 2014 Process mining technology: Stripping of overburden material - Drilling and blasting - Power shoveling - Transport of blasted stone to crushing and screening station - Classification of finished stone - Customer's means of transportation.
2	Main environmental issue	Dust: Generated from activities such as drilling and blasting, power shoveling, transport and processing. Use of 01 water tank truck to spray water for reducing dust. Noise: Generated from the operation of crushing and screening assembly and transport means. Blasting safety: Dust, noise, shocks, fly rock prevention Occupational safety: Accidents may happen due to failed compliance with technical processes, occupational safety. Distance to the residential area: minimum 150m. Greenery: Adequate planting of greenery at the site. Solid waste: Generated from the stripping of overburden material. Domestic waste: Generated from daily activities of workers and staffs.
	Main machinery/equipment	Quantity and type: 01 bucket loader, 01 truck, 01 excavator, 03 drill machines, 02 water pumps and 01 stone crusher.
3	Measures for controlling the pollution	<u>Dust:</u> - Installation of 3 water spray nozzles, 2 pumps with 5 Hp motor, crushing and screening station and construction of 1 water well. - Planting acacia trees at the processing site - Investment in 1 small trucks with 3 m ³ water tank (self-made tank truck) to spray water for prevention of dust along the transport road. <u>Blasting safety:</u> The blasting is done by a functional unit namely Tay Nguyen Mining Chemical Company. - Use of explosives permitted for use and circulation. - Blasting according to the current most advanced method of non-electric differential blasting. <u>Occupational safety:</u> - Rules of occupational safety must be posted in office. - Safety protective tools must be fully equipped, such as: Protective clothes, helmet, gloves, gauze mask,

		<p>- Workers operating directly any construction machine must be trained for proper practices, especially in case of any trouble. They be must always present at their working location to operate, check and run the machine properly according to the technical requirements.</p> <p><u>Solid waste:</u> 1 dumping site of about 3,000 m² for storing waste soil from stripping of overburden material.</p> <p><u>Domestic waste:</u> Installation of 4 dumpsters of 100 liters each, to store daily domestic waste disposed by workers and staffs, which will be transported to the garbage collection area of the quarry.</p> <p>Environmental supervision: Periodically, Gia Lai Environmental Monitoring Center is hired to survey and supervise the quality of the environment in the quarry on quarterly basis and make a report for submitting to the Gia Lai province Department of Natural Resources and Environment and the People's Committee of Mang Yang rural district for monitoring.</p>	
4	Hazardous waste	<p>Quantity: 200 liters waste oil for engine, gearbox and lubrication/year (Code: 17 02 03).</p> <p>Waste collection unit: Reuse to lubricate the gear system the crushing and screening station.</p>	
5	Deposit to the environmental fund	<p>Term of deposit: 9.5 years</p> <p>Amount: VND 410,455,854, annual deposit before 31 January</p> <p>Schedule/responsibility for implementation: According to the scheme of environmental improvement and reinstatement from the project of investment in exploiting - processing construction stone in approved by the People's Committee Chairman of Gia Lai province in the Decision No. 1029/GP-UBND dated 12 November 2014 of Gia Lai province People's Committee.</p>	
6	Rock blasting	<p>Trang Duc One-member LLC hires Tay Nguyen Mining Chemical Company to carry out the blasting through the process of ensuring the safety of blasting as follows.</p> <p>Method of watching/noticing the community:</p> <ul style="list-style-type: none"> - Install signs to warn the boundaries of blasting area - Announce the signal of blasting: Red flag, whistle + Erect a red flag at a top peak: Start loading explosive + Order to prepare the blasting: 3 whistles + Order to blast: 2 long whistles + Announcement about no more blasting: 1 long whistle - Time of blasting: + Morning from 11:00 AM - 01:30 PM + Afternoon from 04: 00 PM - 05:30 PM 	
7	Photo	 <p>Crushing area of the quarry</p>	 <p>Area for accommodation huts of workers and gathering machineries and equipments.</p>
8	Labor force	<p>Number of workers: 15 persons</p> <p>Quantity/costs of occupational protection: Occupational protective clothes: 30 sets, labor protective shoes: 30 pairs, Fabric cap: 30 pieces, plastic helmet with screw stopper: 15 pieces, Canvas gloves: 30 pairs, gauze mask: 40 pieces, Glasses: 15 pairs, Welding shield: 5 pieces, Noise protective capsules and plugs: 15 sets</p>	

	Periodical overall health check: 1 time/year at Hoang Anh Gia Lai Medicine and Pharmacy University Hospital, Pleiku City, Gia Lai province Periodical training in occupational safety: Twice a year. Trainer: Department of Occupational Safety and Sanitation of the Company. Facilities: Toilet fully built.
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1.4 Tan Vinh Phat Quarry - Tan Vinh Phat Trade LLC

Ms. Thuy: Accountant; Telephone: 0976685749

No.	Main content	Detailed description
1	General information	Address: Ia Nan commune, Duc Co rural district, Gia Lai province. Approach road from the National Road No. 19: Adjacent to the National Road No. 19 at Km238+600. Exploiting unit: Tan Vinh Phat Trade LLC Operation start: Year 2012, exploitation time 10 years Total exploitation area: 1.4 ha Exploitation output: 46,000 m ³ /year Usable reserves: 280,000 m ³ Licenses issued by the State: Decision No. 50/QD-UBND dated 19 January 2015 of Gia Lai province People's Committee. Process mining technology: Stripping of overburden material - Drilling and blasting - Power shoveling - Transport of blasted stone to crushing and screening station - Classification of finished stone - Customer's means of transportation.
2	Main environmental issue	Dust: Generated from activities such as drilling and blasting, power shoveling, transport and processing. Noise: Generated from the operation of crushing and screening assembly and transport means. Blasting safety: Dust, noise, shocks, fly rock prevention Occupational safety: Accidents may happen due to failed compliance with technical processes, occupational safety. Distance to the residential area: minimum 1km Greenery: In the surroundings of the quarry Solid waste: Generated from the stripping of overburden material. Domestic waste: Generated from daily activities of workers and staffs.
	Main machinery/equipment	Quantity and type: 01 bucket loader, 03 truck, 02 excavator, 03 drill machines, 03 water pumps and 01 stone crusher.
3	Measures for controlling the pollution	<u>Dust:</u> - Installation of 1 water spray nozzle, 3 pumps with 5 Hp motor, crushing and screening station and excavation of a pond of 500m ² for water supply. - Planting acacia trees at the processing site - Investment in 1 small truck with 5 m ³ water tank (self-made tank truck) to spray water for prevention of dust along the transport road. <u>Blasting safety:</u> License of blasting No. 596/GP-UBND dated 30 July 2014 issued by the People's Committee of Gia Lai Province - Use of explosives permitted for use and circulation. - Blasting according to the current most advanced method of non-electric differential blasting. <u>Occupational safety:</u> - Rules of occupational safety must be posted in office. - Safety protective tools must be fully equipped, such as: Protective clothes, helmet, gloves, gauze mask, - Workers operating directly any construction machine must be trained for

		<p>proper practices, especially in case of any trouble. They be must always present at their working location to operate, check and run the machine properly according to the technical requirements.</p> <p><u>Solid waste:</u> A dumping site of around 1,000 m² must be arranged for storing waste soil arisen from the stripping of overburden material.</p> <p><u>Domestic waste:</u> Installation of 2 dumpsters of 100 liters each, to store daily domestic waste disposed by workers and staffs, which will be transported to the garbage collection area of the quarry.</p> <p><u>Environmental supervision:</u> Periodically, every 06 months, the Gia Lai Environmental Monitoring Center surveys and supervises the quality of the environment in the quarry and submits a report to Gia Lai province Department of Natural Resources and Environment and the People's Committee of Duc Co rural district for monitoring.</p>	
4	Hazardous waste	<p>Quantity: 200 liters waste oil for engine, gearbox and lubrication/year (Code: 17 02 03).</p> <p>Waste collection unit: Reuse to lubricate the gear system the crushing and screening station.</p>	
5	Deposit to the environmental fund	<p>Term of deposit: 10 years</p> <p>Amount: VND 1,436,430,192, annual deposit before 31 January</p> <p>Schedule/responsibility for implementation: According to the scheme of environmental improvement and reinstatement, from the investment project in exploiting construction stone at Ia Nan, Duc Co rural district, Gia Lai province, approved by the People's Committee Chairman of Gia Lai province in the Decision No. 304/GP-UBND dated 09 April 2012 of Gia Lai province People's Committee.</p>	
6	Rock blasting	<p>Tan Vinh Phat Trade LLC implement the blasting by itself according to the License of blasting No. 596/GP-UBND dated 30 July 2014 with the process ensuring the safety for the blasting, as follows.</p> <p>Method of watching/noticing the community:</p> <ul style="list-style-type: none"> - Install signs to warn the boundaries of blasting area - Announce the signal of blasting: Red flag, whistle + Erect a red flag at a top peak: Start loading explosive + Order to prepare the blasting: 3 whistles + Order to blast: 2 long whistles + Announcement about no more blasting: 1 long whistle - Time of blasting: + Morning from 11:00 AM - 01:30 PM + Afternoon from 04: 00 PM - 05:30 PM 	
7	Photo	 <p>Crushing area of the quarry</p>	 <p>Area for accommodation huts and gathering machineries of the quarry</p>
8	Labor force	<p>Number of workers: 15 persons</p> <p>Quantity/costs of occupational protection: Occupational protective clothes: 30 sets, labor protective shoes: 30 pairs, Fabric cap: 30 pieces, plastic helmet with screw stopper: 15 pieces, Canvas gloves: 30 pairs, gauze mask: 40 pieces, Glasses: 15 pairs, Welding shield: 5 pieces, Noise protective capsules and plugs: 15 sets</p>	

		Periodical overall health check: Once a year at General Hospital of Duc Co rural district, Gia Lai province Periodical training in occupational safety: Twice a year. Trainer: Department of Occupational Safety and Sanitation of the Company. Facilities: Toilet fully built.
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Conclusions: Quarries under production and anticipated to supply stone to the project comply with the regulations of Vietnamese laws on the exploitation of mineral products, establishment of environmental dossier and implementation of means to minimize the environmental impacts according to the contents proposed in the report. At the same time, the Company which owns the sand pit has made a deposit to the environmental improvement fund according to the legal regulations.

Above is the assessment on the compliance with the issues concerning the environment and health safety of quarries. During the implementation of the project, for using other mines of material, it is needed to carry out the additional evaluation of the compliance with the issues concerning the environment and health safety of those quarries

II. Sand Pits

1. Hieu Ngoc Sand Pit – Hieu Ngoc General Construction LLC

Mr. Toan: Quarry Manager; Telephone: 0962358782

No.	Main content	Detailed description
1	General information	Address: Phu Phong township, Tay Son Rural District, Binh Dinh Province Approach road from National Road 19 to Con river in Phu Phong township. Exploiting unit: Hieu Ngoc General Construction Limited Liability Company Operation start: Year 2016, exploitation time 10 years Total exploitation area: 5. ha Exploitation output: 1,500 m ³ /year Usable reserves: 115,500 m ³ Licenses issued by the State: Exploitation license No. 09/GP-UBND dated 28February 2016 Process mining technology: Stripping of overburden material - Surface sand exploitation - Customers' means of transport.
2	Main environmental issue	Dust: Generated from activities such as drilling and blasting, power shoveling, transport and processing. Noise: Generated from the operation of bucket loader and water pump. Distance to the residential area: minimum 300m. Solid waste: Generated from the stripping of overburden material and non-standard sand. Domestic waste: Generated from daily activities of workers.
	Main machinery/equipment	Type: 02 excavators, 02 diesel operated water pumps, 02 trucks, 01 electric operated water pum
3	Measures for controlling the pollution	<u>Dust:</u> - 01 diesel operated water pump. <u>Occupational safety:</u> - Rules of occupational safety must be posted in office. - Safety protective tools must be fully equipped, such as: Protective clothes, helmet, gloves, gauze mask,... - Workers operating directly any construction machine must be trained for proper practices, especially in case of any trouble. They be must always present at their working location to operate, check and run the machine

		<p>properly according to the technical requirements.</p> <p><u>Solid waste</u>: 1 dumping site of about 2,000 m² for storing waste soil from stripping of overburden material.</p> <p><u>Domestic waste</u>: Installation of 2 dumpsters of 200 liters each to store daily domestic waste disposed by workers and staffs, which will be transported to the landfill of the commune.</p> <p><u>River bank erosion</u>: Prevention of river bank erosion at the exploitation site by dropping rock gabions laced together and driving piles along the river bank on both sides</p>
4	Hazardous waste	<p>Quantity: 150 liters waste oil for engine, gearbox and lubrication/year (Code: 17 02 03).</p> <p>Waste collection unit: Reuse to lubricate the gear system the crushing and screening station.</p>
5	Deposit to the environmental fund	<p>Term of deposit: 10 years</p> <p>Amount: VND 219,906,000, annual deposit before 31 January</p> <p>Schedule/responsibility for implementation: According to the scheme of environmental improvement and reinstatement from the investment project in exploiting - processing construction stone in Hieu Ngoc quarry approved by Decision No. 300/QĐ-UBND of Binh Dinh province People's Committee dated 18 December 2016.</p>
6	Photo	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Area of sand exploitation</p> </div> <div style="text-align: center;">  <p>Sand area</p> </div> </div>
7	Labor force	<p>Number of workers: 8 persons</p> <p>Quantity/costs of occupational protection: Occupational protective clothes: 20 sets, labor protective shoes: 20 pairs, Fabric cap: 20 pieces, plastic helmet with screw stopper: 20 pieces, Canvas gloves: 20 pairs, gauze mask: 20 pieces, Glasses: 15 pairs.</p> <p>Periodical overall health check: Once a year at Center for chemical of Tay Son rural district.</p> <p>Periodical training in occupational safety: Twice a year.</p> <p>Trainer: Department of Occupational Safety and Sanitation of the Company.</p> <p>Facilities: Toilet fully built.</p>

2. Trang Duc Sand pit - Trang Duc One-member LLC

Ms. Tien: Sand pit Manager and accountant; Telephone 01227496673

No.	Main content	Detailed description
1	General information	<p>Address: Ayun commune and Đăk Jơ Ta commune, Mang Yang rural district, Gia Lai province.</p> <p>Approach road from National Road 19 at mile post Km129 to about 7 km ahead.</p> <p>Exploiting unit: Trang Duc One-member LLC</p> <p>Operation start: Year 2014, exploitation time 7.5 years</p> <p>Total exploitation area: 5.7 ha</p> <p>Exploitation output: 15,000 m³/year</p> <p>Usable reserves: 104,880 m³</p>

		Licenses issued by the State: Exploitation license No. 690/GP-UBND dated 01 December 2014 Process mining technology: Stripping of overburden material - Surface sand exploitation - Customers' means of transport.	
2	Main environmental issue	Dust: Generated from the shoveling and transportation of sand Noise: Generated from the operation of bucket loader and water pump Occupational safety: Accidents may happen due to failed compliance with technical processes, occupational safety. Distance to the residential area: minimum 500m Solid waste: Generated from the stripping of overburden material and non-standard sand. Domestic waste: Generated from daily activities of workers.	
	Main machinery/equipment	Type: 02 excavators, 02 diesel operated water pumps, 03 trucks, 01 electric operated water pump	
3	Measures for controlling the pollution	<u>Dust:</u> - 01 diesel operated water pump. <u>Occupational safety:</u> - Rules of occupational safety must be posted in office. - Safety protective tools must be fully equipped, such as: Protective clothes, helmet, gloves, gauze mask,... - Workers operating directly any construction machine must be trained for proper practices, especially in case of any trouble. They be must always present at their working location to operate, check and run the machine properly according to the technical requirements. <u>Solid waste:</u> 1 dumping site of about 3,000 m ² for storing waste soil from stripping of overburden material. <u>Domestic waste:</u> Installation of 2 dumpsters of 100 liters each to store daily domestic waste disposed by workers and staffs, which will be transported to the landfill of the commune. <u>River bank erosion:</u> Prevention of river bank erosion at the exploitation site by dropping rock gabions laced together and driving piles along the river bank on both sides	
4	Hazardous waste	Quantity: 100 liters waste oil for engine, gearbox and lubrication/year (Code: 17 02 03). Waste collection unit: Reuse for lubrication and selling to a collector of waste oil.	
5	Deposit to the environmental fund	Term of deposit: 7.5 years Amount: VND 210,958,575, annual deposit before 31 January Schedule/responsibility for implementation: According to the scheme of environmental improvement and reinstatement, from the investment project in exploiting construction sand at Ayun commune and Đäk Jơ Ta commune, which was approved by the Department of Natural Resources and Environment of Gia Lai province in the Decision No. 114/QĐ-STNMT dated 20 November, 2014.	
6	Photo		
		Area of sand exploitation and gathering	Existing conditions of the road for transport

7	Labor force	Number of workers: 10 persons Quantity/costs of occupational protection: Occupational protective clothes: 20 sets, labor protective shoes: 20 pairs, Fabric cap: 20 pieces, plastic helmet with screw stopper: 10 pieces, Canvas gloves: 20 pairs Periodical overall health check: Once a year at Hoang Anh Gia Lai Medicine and Pharmacy University Hospital, Pleiku City, Gia Lai province Periodical training in occupational safety: Once a year. Trainer: Department of Occupational Safety and Sanitation of the Company. Facilities: Temporary toilets built in the mining area.
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Conclusions: Sand pits under production and anticipated to supply sand to the project comply with the regulations of Vietnamese laws on the exploitation of mineral products, establishment of environmental dossier and implementation of means to minimize the environmental impacts according to the contents proposed in the report. At the same time, the Company which owns the sand pit has made a deposit to the environmental improvement fund according to the legal regulations. However, as the level of the exploitation size is only subject to the commitment of environmental protection, the project owner is not obliged to carry out any periodical survey of the environment.

Above is the assessment on the compliance with the issues concerning the environment and health safety of sand pits. During the implementation of the project, for using other mines of material, it is needed to carry out the additional evaluation of the compliance with the issues concerning the environment and health safety of those sand pits.

ANNEX 2- PHOTOS of COMMUNITY CONSULTATION



Interviewing an ethnic minority community



Consultation meeting in the local communities



Consultation meeting in an affected household



Consultation meeting in commune people's committee



Interviewing a female head household



Home visit at affected households with local officials



ANNEX 4 –DRAFT TERMS OF REFERENCES FOR ENVIRONMENTAL SUPERVISION

General

In order to prevent harm and nuisances on local communities, and to minimize the impacts on the environment during the rehabilitation, upgradation, construction and operation of the National Highway No.19 under the Central Highland Connectivity Improvement Project (CHCIP), the following documents have been prepared which should be adhered to by all Contractors and his employees:

- The Environmental and Social Impact Assessment (ESIA) which include the Environmental and Social Management Plan (ESMP), and the type-specific and site specific measures.
- The mitigation measures included in project design and bill of quantities;
- The Resettlement Action Plans (RAPs) and the Ethnic Minority Development Plan for the Project

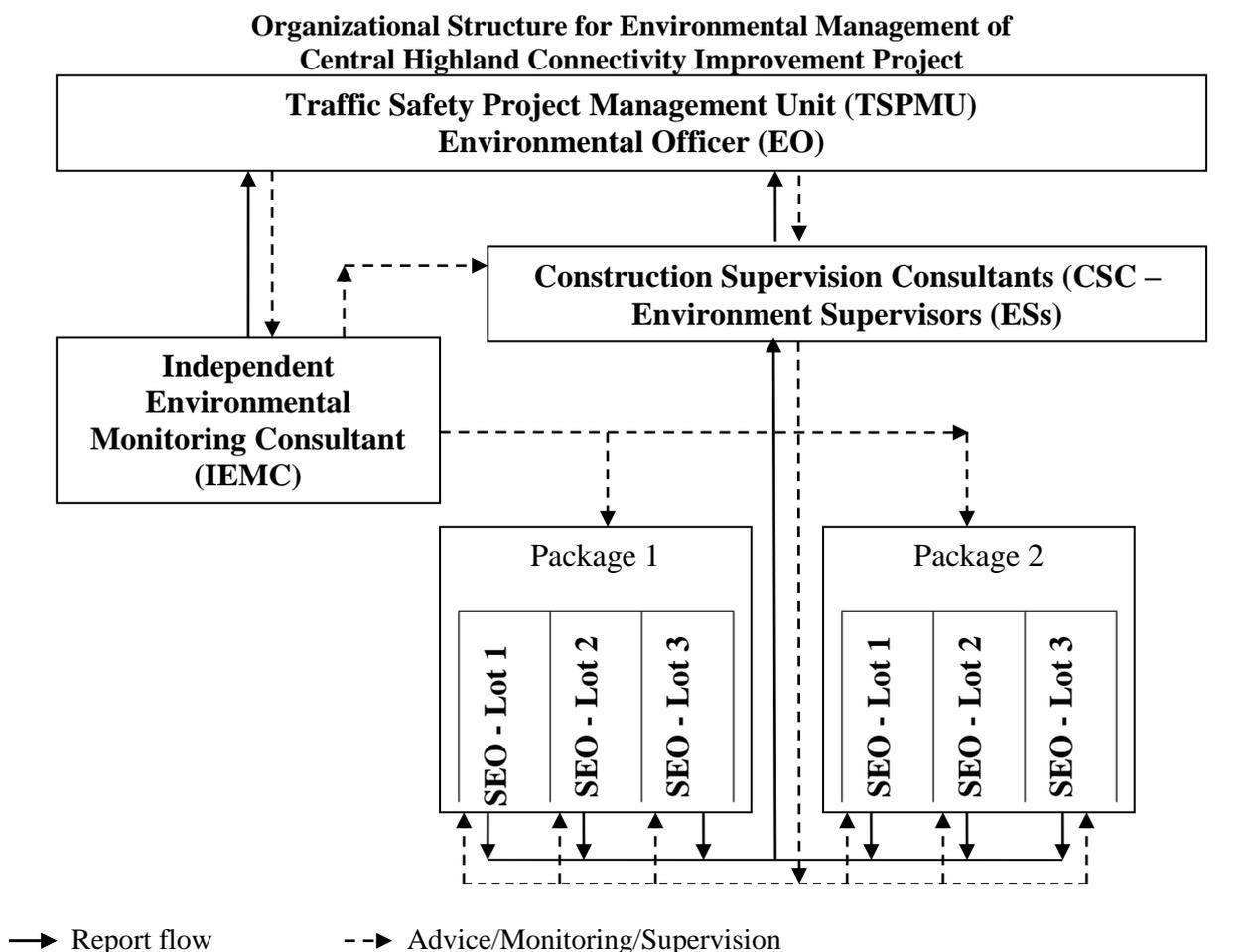
Objective of the Assignment

The Consultant is to provide professional technical services (“the Services”) to help ensure effective implementation of the Environmental and Social Management Plan (ESMP) during the construction phase of CHCIP

In order to achieve the goal of minimizing the negative environmental impacts of the Project, the ESMP has been integrated into the feasibility study and will be incorporated into engineering design of the National Highway (NH19), particularly the city bypasses, the technical specifications and contract documents. It will need to be closely followed and implemented by the contractors. The implementation of the ESMP will therefore involve four parties:

- The **Environmental Officer (EO)** appointed directly by the TSPMU.
- The Contractor’s **Site Environmental Officer (SEO)** responsible for implementing the ESMP and other construction related environmental, health and safety issues.
- The **Environmental Supervisors (ESs, part the Construction Supervision Consultant (CSC) team)** who are responsible for:
 - i) Review and approve, on behalf of TSPMU, the Site Environmental and Social Management Plan (SESMP) prepared by the Contractors;
 - ii) Carry out due diligence review of borrow pits, quarries and other sites that have not been covered under the ESIA prepared at project preparation stage (April 2017);
 - iii) providing training for the contractor’s workers, CSC team and TSPMU Officers on environmental, Health and Safety, particularly awareness raising on HIV/AiDs. Providing training for the affected communities living along the bypasses and near the four new intersections about traffic safety;
 - iv) supervising and monitoring all construction activities for ensuring that contractors comply with the requirements of the contracts and the ESMP;
 - v) carry out periodical environmental sampling and monitoring program in accordance with the Project’s ESMP, prepare periodical monitoring reports for submission to TSPMU and DONRE/MONRE, and to the WB as and when required;
- An **Independent Environmental Monitoring Consultant (IEMC)**, who monitor the Project’s Environmental Compliance and provide initial training for the TSPMU and CSC Team on project environmental issues and requirements.

The organizational structure for the supervision of environmental issues during the construction of CHCIP is presented below



This Terms of Reference is for the **Environmental Supervisors (ESs)** to be part of the Construction Supervision Consultants (CSC).

Scope of Services

The general services to be provided by the Environmental Supervisors (ESs) are to review, approve relevant project documents; provide training for project personnels including the contractor’s workers, the Engineers in the CSC teams, affected communities and TSPMU Officers on environmental, health and safety and traffic safety issues; carry out environmental due dilligence review of project sites not covered by the Project ESMP; inspect and monitor the construction activities²² to ensure that mitigation measures proposed in the approved ESMP are properly implemented, and that the negative environmental impacts of the project are minimized; carry out environmental monitoring program and prepare periodical reports for submission to TSPMU, DONRE/MONRE and the WB. The Scope of Services shall include, but not limited to the tasks described in detail below.

As part of the CSC, the ESs area expected to perform the following duties:

Task 1: Review of Project Document.

²² The term ‘construction activities’ in this TOR pertains to all aspects related to the Cental Highland Connectivity Iprovement Project (CHCIP) during the construction phase including, but not limited to, all construction sites, permanent and temporary camps, off-site activities (disposal sites, borrow pits), all associated facilities (crushing plants, asphalt plants, maintenance yards), access roads, traffic and disturbances (dust, noise) in local roads, and areas of impact away from the project site. The ESIA and ESMP of the project contain a full description of these activities.

The CSC/ESs shall review the ESIA, ESMP, RAP, project designs and technical specifications and confirm in writing that there have been no major omissions of mitigation measures. If any issues are identified, the ESs shall propose to the EO/TSPMU updates to the ESMP and the design and technical specifications to address these issues. Once approved, the ESs shall update the ESMP.

The SES shall provide the final review and recommend clearance of the Site-Specific Environmental and Social Management Plan (SESMP) prepared by the contractors for each bid package. SESMP shall cover all site plans which may affect the environment. These include, but are not limited to: borrow pit and disposal sites plans, worker's camp plans. Where these plans are found not to comply with the ESMP, ESIA or RAP, the SES shall work with the CSC and Contractor to establish a suitable solution. Note that the SESMP must be submitted to the CEC/ES at least two weeks before construction commencement. In cases where the contractors are required to prepare *Health and Safety plan*, the the SES shall provide the final review and recommend clearance of all Contractors' Safety Plans. The Safety Plans shall include procedures such as management of explosions, safety during construction, the prevention of slope slide/soil erosion during the rainfall season, etc.

The ES/CSC shall review the Independent Monitoring Report (IMR) prepared by the Independent Monitoring Consultant, and follow up with issues raised in the IMR to ensure that additional mitigation measures or corrective actions are implemented adequately in a timely manner.

The ESs will inspect, monitor and carry out environmental review of all road and bridge contracts packages and lots. The ESs shall have extensive knowledge and experience in environmental and social monitoring and supervision, objective, and can provide professional advice to the client on the environmental performance of the Project. The ESs team leader shall be familiar with the Project works through review of the relevant reports, including the ESIA, ESMP as well as project technical specifications and contract documents.

Task 2: Provide/arrange Training.

While some environmental training mainly on the project issues, requirements and procedures will be provided by the Independent Monitoring Consultant (IMR) for TSPMU, CSC including the ES, and the Contractors site Engineers, the ESs in the CSC team are expected to provide the types of trainings listed below, some of the training can be outsourced under the arrangements of the CSC team if CSC team does not have enough expertise in certain areas:

- Compulsory training on environmental mitigation requirements and measures, health and safety issues for CSC engineers, all contractor's workers within two weeks since construction commencement of each bid package; Particularly:
 - **SEMP:** The CSC should be trained on requirements of the SEMP, the agreed environmental monitoring checklist, the environmental monitoring form, how non-compliance with the SEMP will be handled, and all other key issues shall be covered. Particular attention will be paid to the specific provisions in each contract's technical specifications indicating how the SEMP is to be complied with;
 - **Health and Safety:** The health and safety requirements of the project shall be clearly identified and communicated with the Contractors and EO.
- Compulsory training on HIV/AIDs awareness raising for all contractor's workers, CSC team, TSPMU. This training should be provided to all CSC engineers and TSPMU within two weeks since mobilisation of the CSCs, and within four weeks since mobilisation of workers of each bid packages to the sites;
- Compulsory training on traffic safety for the residents of all communes living along the An Khe and Pleiku bypasses and nearby four new intersections; This training must be provided at least six month and refresher within two weeks before the opening of the new bypasses and intersections.

Task 3: Carry out Due Dilligence Review.

During construction phase, new locations of borrow pits, quarries, disposal sites, camps etc. may be identified. The ES of the CSC team will coordinate with TSPMU to carry out due diligence review of these sites that have not been considered under the project's approved ESIA. Due diligence review should include social, environmental, health and safety, compliance and monitoring. The result of due diligence review must be documented and filed at TSPMU Office.

Task 4. Carry out Compliance Monitoring and Supervision.

The ES shall carry out daily and periodical monitoring and inspection all the construction activities²³ to ensure that mitigation measures proposed in the approved ESMP are properly implemented, and that the negative environmental impacts of the project are minimized:

Environmental Supervision Checklist: The ES shall establish a comprehensive checklist which will be used during the construction of the project to monitor the contractor's performance. This shall cover major aspects of the project, required mitigation/control measures and their implementation schedule.

Log-Book: The ESs shall keep a log-book of each and every circumstance or change of circumstances which may affect the environmental impact assessment and non-compliance with the recommendations made by the ESs to remediate the non-compliance. The log-book shall be kept readily available for inspection by all persons assisting in the supervision of the implementation of the recommendations of the ESIA and Contract. The IEMC shall verify the log-book as part of his environmental audit.

On behalf of the EO and the Chief Supervision Consultant, the SES will ***supervise construction activities:***

- Review, and inspect in an independent, objective and professional manner in all aspects of the implementation of the SEMP;
- Carry out random monitoring checks, and review on records prepared by the Contractor's SEO;
- Conduct regular site inspections;
- Review the status of implementation of environmental protection measures against the SEMP and SESMP and contract documents;
- Review the effectiveness of environmental mitigation measures and project environmental performance;
- As needed, review the environmental acceptability of the construction methodology (both temporary and permanent works), relevant design plans and submissions. Where necessary, the SES shall seek and recommend the least environmental impact alternative in consultation with the designer, the Contractor(s), and TSPMU;
- Verify the investigation results of any non-compliance of the environmental quality performance and the effectiveness of corrective measures; and
- Provide regular feedback to EO and CSC according to the procedures of non-compliance in the ESMP and SESMP;
- Provide training programs at minimum six monthly intervals and every time there are new workers or new Contractors coming into the site, including CSC and TSPMU staff, to appraise them of issues identified and how to improve environmental compliance;
- Instruct the Contractor(s) to take remedial actions within a specified timeframe, and carry out additional monitoring, if required, according to the contractual requirements and procedures in the event of non-compliances or complaints;

²³ The term 'construction activities' in this TOR pertains to all aspects related to the Central Highland Connectivity Improvement Project (CHCIP) during the construction phase including, but not limited to, all construction sites, permanent and temporary camps, off-site activities (disposal sites, borrow pits), all associated facilities (crushing plants, asphalt plants, maintenance yards), access roads, traffic and disturbances (dust, noise) in local roads, and areas of impact away from the project site. The ESIA and ESMP of the project contain a full description of these activities.

- Instruct the Contractor(s) to take actions to reduce impacts and follow the required SEMP procedures in case of non-compliance / discrepancies identified;
- Instruct the Contractor(s) to stop activities which generate adverse impacts, and/or when the Contractor(s) fails to implement the SEMP requirements / remedial actions instructed by the SES or the IEMC.

Task 5. Environmental monitoring and periodical reports preparation.

The ES team will carry out periodical environmental quality sampling and monitoring in accordance with the ESMP. Sampling should be carried out at quantity, time, frequency, locations etc. as specified in the ESMP. The ES will also prepare Quarterly Environmental Monitoring Report (QEMR) which includes both Environmental monitoring and compliance supervision Environ for submission to TSPMU, DONRE/MONRE, and to the WB as and when required.

The SES shall ensure compliance with the requirements of the health and safety clauses in the contract documents. This shall include, but not be limited to: (i) construction activities; (ii) HIV/AIDS education campaign; (iii) compliance with Vietnam's labor laws; and (iv) road traffic safety.

Some Instructions

Site Inspections: The ES shall closely audit the construction activities through regular site inspections accomplished through daily site visits, walks and visual inspections to identify areas of potential environmental problems and concerns. The area of inspection should cover both the construction areas and the environment outside the site area that could be affected, directly or indirectly, by the contractor's activities as noted in footnote under Task 4.

Inspections should be done independently from the Contractor's staff. It is expected that the ES shall have their own hand held and portable monitoring equipment such as cameras, transport and other resources. Where definitive monitoring is necessary to resolve contentious issues or to impose penalties, the ES may contract third parties to carry out specific monitoring at the locations under review.

Where there is infringement of technical specifications, or condition of contracts, or non compliance with the EMP, the ES shall be immediately inform Contractor's Chief Engineer, Supervision Chief Engineer and EO. The ES shall also report all infringements to the PMU as part of the monthly reporting.

Regular joint environmental site inspections (e.g. weekly) should be organized by the ES and CSC, with participation from the Contractor's Site Environmental Officer (SEO). These should be used as an opportunity for the ES to further train the CSC and Contractor's staff.

ES field engineer's log-book shall be kept readily available for inspection by all persons assisting in project management, including the Independent Monitoring consultant

The ES shall also regularly review the records of the contractors to ensure that they are up to date, factual and meet the ESMP reporting requirements (e.g. environmental complaint monitoring records).

Complaints: Complaints will be received by the Contractor's Site Office from local residents with regard to environmental infractions such as noise, dust, traffic safety, etc. The Contractor's Chief Engineer or his deputy, and the SEO shall be responsible for processing, addressing or reaching solutions for complaints brought to them. The ES shall be provided with a copy of these complaints and shall confirm that they are properly addressed by the Contractors in the same manner as incidents identified during site inspections.

Unforeseen Impacts: In the event that an incident arises which was not foreseen in the ESMP or ESIA, the SES shall work closely with the CSC, the Contractors, and the EO to confirm satisfactory resolution

to the incident. The ES shall then update the ESMP and the implementation guidelines, training the Contractors' staff accordingly.

Monthly Payments: The ES shall confirm the monthly payments for environmentally related activities as recommended by the ES to the client.

Site Restoration and Landscaping: The ES shall closely monitor all activities with regard to site restoration and landscaping in areas such as borrow pits, quarries, camps, crushing plants, etc. to ensure that the activities are done to an appropriate and acceptable standard. The ES will agree with the Contractor on a Site Decommissioning and Restoration plan to be implemented before the completion of the construction of the access road and bridges.

Project Initiation and Staffing: It is anticipated that the CSCs and the ESs will be mobilized one month before the start of the construction activities. The one month start up time will be utilized by the ES to review and familiarize itself with the project, the project design, the technical specifications, contract documents, the ESIA, ESMP, RAP and EMDP reports and other project relevant documents and reports. Following the review, the SES will prepare a brief report on the potential issues and challenges arising from the implementation of the ESMP and the condition of contracts and make recommendations to the PMU about how best to improve the implementation of the ESMP.

The ES is expected to be mobilized at the beginning of the contract, to prepare the necessary guidelines, documentation, training, *etc.*

Reporting: As a minimum the ES shall prepare the following written reports:

- Weekly report of non-compliance issues
- Summary monthly report covering key issues and findings from reviewing and supervision activities
- Consolidated summary report from contractor's monthly report
- Quarterly Environmental Monitoring and Supervision Report
- The ES shall also collect and report on data as requested by the TSPMU.

At the end of the project the SES shall prepare a final report summarizing the key findings from their work, the number of infringements, resolutions, *etc.* as well as advice and guidance for how such assignments should be conducted in the future.

During the course of the project the SES shall provide briefings as requested by the TSPMU, environmental agencies, the World Bank, MONRE/DONRE, and TSPMU on the project progress, incidents, and other issues associated with environmental management and supervision. As a minimum these are expected to be at six-monthly intervals