Support to Border Areas Development Project (48189-002)

Initial Environmental Examination (IEE)

UPGRADING PROVINCIAL ROAD 756, BINH PHUOC PROVINCE

Prepared for
THE ASIAN DEVELOPMENT BANK

July 2016

Prepared by CONTRANS AB, SWEDEN
In joint venture with Transport Engineering Consultant Joint Stock Company No.2 (TECCO2) (Vietnam) and
In association with ASEAN Development and Management Consulting Ltd (ASEC) (Vietnam)

CURRENCY EQUIVALENT
(As of 21st June 2016)

Currency unit: Viet Nam Dong (VND)
USD1 = VND 22300

WEIGHTS AND MEASURES
km^2 – square kilometer
m^3 cubic meter

NOTE
In this report "$" refers to US Dollars

Consultants Quality Assurance Protocol

Prepared By	**CONTRANS SWEDEN AB**		
Auditor/Reviewer	**David Lupton Team Leader (TL)**		
Place	**Buon Ma Thuot, Vietnam**	*Date*	**21-06-2016**
Approved By	**Ta Ngoc Quang, Asia Manager**		

ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
CLV-DTA	Cambodia – Lao PDR – Vietnam Development Triangle Area
CPC	Commune People's Committee
CSC	Construction Supervision Consultant
DARD	Department of Agriculture and Rural Development
DONRE	Department of Natural Resources and Environment
DOT	Department of Transportation
DPC	District People's Committee
DPI	Department of Planning and Investment
ESP	Environment Safeguard Specialist
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
ESO	Environmental Safeguards Staff
GMS	Greater Mekong Sub-region
IEE	Initial Environmental Examination
IPM	Integrated Pest Management
LEP	Law on Environmental Protection
LIC	Loan Implementation Consultants
MONRE	Ministry of Natural Resources and Environment
MMP	Materials Management Plan
MPI	Ministry of Planning and Investment
PPU	Project Preparation Unit
PPC	Provincial People's Committee
PPE	Personal Protective Equipment
PMU	Provincial Project Management Unit
PPTA	Project Preparatory Technical Assistant
ROW	Right of Way
SPS	Safeguard Policy Statement
SST	Subproject Support Teams
The PPTA	The Project Preparatory Technical Assistant Consultants
The Project	Support to Border Areas Development Project
The Subproject	Upgrade Minh Lap – Loc Hiep Road, Binh Phuoc Province

TTF	Trade and Transport Facilitation
UXO	Unexploded ordnance
WMSDP	Waste Management and Spoil Disposal Plan

CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. EXECUTIVE SUMMARY

1. The Central Highland of Vietnam has many natural resources with more than 2 million hectares of rich basalt soil; make up 60% of the basalt soils of Vietnam. The soil is suitable for a variety of commercial crops including coffee, cocoa, pepper, and tea. The coffee production area has reached more than 290000 ha, about 80% of the total coffee area of the country. On the global scale, Vietnam has radically changed global coffee supply chains since 1990, increasing from less than 3% to more than 17% of global production[1]. The Central Highlands including Binh Phuoc is also the second largest rubber plantation area in Vietnam, mainly in Dak Lak province. The first one is the South East area (46.4%) and Binh Phuoc is one of the provinces with highest rubber production of the country.

2. Despite of these advantages, socio-economic development of the Central Highlands, especially four border provinces of Kon Tum, Gia Lai, Dak Lak and Dak Nong are still facing many difficulties, with less developed infrastructure and low living standards with many different ethnic groups. Their poverty rate is the second highest in the country, standing at 20.3% compared to 12.6% for the whole country in 2011.

3. The Support to Border Areas Development Project (Project) will help the five participating provinces (the Provinces) of Kon Tum, Binh Phuoc, Dak Lak, Dak Nong, and Gia Lai to better realize their growth potential and become more closely integrated into sub-regional frameworks including the Greater Mekong Sub-region (GMS). The project will include three main outputs and activities: i) Output 1: Road infrastructure in five VDTA provinces rehabilitated; ii) Output 2: VDTA plans and facilities for transport and trade facilitation (TTF) with a focus on inclusive growth developed and iii) Output 3: Institutional capacity for VDTA investment planning, project design and implementation, and resource management strengthened

4. Following extensive data collection, a multi-criteria analysis was used to make the final selection of the roads to be included in the shortlist. Measures were used that reflected the likely impact of the roads including eight themes: (i) agricultural productivity; (ii) population served; (iii) rural population; (iv) traffic count; (v) poor households; (vi) ethnic minority population; (vii) safeguards compliance (environment and social safeguards); and (viii) access to National Road No.14

A. Subproject Summary

5. In Binh Phuoc, the provincial road No.756 Minh Lap – Loc Hiep in Chon Thanh; Hon Quan and Loc Ninh districts was the short-listed subproject. With total length of 50.3 km, the Subproject goes through agricultural areas of 7 communes under 3 districts of Binh Phuoc province. It connects National Road No.14 in Minh Lap commune – Chon Thanh district goes through Tan Hung, Tan Loi, Thanh An communes – Hon Quan district and Loc Quang, Loc Phu communes – Loc Ninh district to Provincial Road No. 759B at the centre of Loc Hiep commune, Loc Ninh district.

6. The subproject will upgrade 50.3 km provincial road No.756 to Road Grade III standard of mountainous area (TCVN 4054-2005). The road alignment will be kept unchanged and 50.3 km road surface will be upgraded with asphalt. 43.3 km of the pavement surface will be upgraded and 7 km of the pavement surface will be newly constructed with project support.

B. Environment impacts and mitigations

7. The Project has been ranked as B on environmental issues during the Project Concept note as it has few potential significantly adverse impacts and none of them are irreversible. There is no protection area, historical site or cultural heritage site located adjacent to the road or likely to be affected by the implementation of the subproject. This IEE has been prepared to screen impacts and formulate mitigation

[1] Coffee in the 21st Century – Timothy J Killeen, PhD & Grady Harper

measures in three phases of subproject implementation including pre-construction; construction and operation phases and institutional arrangement to ensure that subproject Environment Management Plan (EMP) will be implemented.

8. In preconstruction phase, potential impacts have been identified relating to land acquisition and resettlement. To minimize the impact on income and disturbance of local people's lives, PMU will check and review the Land acquisition and resettlement process before the construction starts to ensure that all affected households have received compensation adequately in accordance with the current provincial market and ADB safeguard Policy be implemented.

9. Potential negative impacts in the construction phase have been identified as (i) the operation of construction machines and material transportation could damage local facilities such as low-voltage electricity lines, communication cables, existing drainage system and other roads in the subproject area. They will also impact on local traffic; increase the risk of work accident and traffic accident especially in the sensitive area such as commune administration centre, medical centre, school, kindergarten, pagoda and church. Dust, noise and vibration from construction machines such as concrete mixing plants or transportation truck could disturb local people, damage their houses, increase risk of respiratory and skin diseases. To minimize the impact, the contractor will collaborate with relevant authorities to set up detail plan for machines and workers mobilization as well as material transportation plan; inform in advance that plan to local authorities and local people; in accordance to that plan, PMU, Construction Supervision Consultant (CSC) and relevant authorities will monitor the compliance of the contractor in applying designated mitigation measures. If any buildings, structures in the subproject area are damaged by the construction activities, the contractor should compensate adequately with their own expense.

10. (ii) Material exploitation activities at the quarry, borrow pits and temporary storage areas along the subproject road may cause sediment runoff, sedimentation. Construction material may have fallen into the stream at seven stream crossing positions and lead to surface water pollution. To minimize the impact, the contractor with the support of Environment Safeguard Specialist (ESP) under Loan Implementation Consultants (LIC) will prepare a Material Management Plan (MMP) detailing the list of authorized quarry; borrow pit and other mines that will provide construction material for the subproject construction works and a timetable for material exploitation. The plan will also determine areas for temporary material stockpile along the subproject road; avoid sensitive area like schools, kindergartens, markets, commune centres, medical centres, pagodas and church.

11. (iii) Workers cause social disruption or transmit disease and construction activities caused risk to health and safety to local people or construction workers. In order to minimize this negative impact, contractor must ensure that all workers have medical certificate suitable for working and register them with local police for temporary stay. Contractor will arrange suitable and hygiene living condition at the worker camps, provide workers full protective gears and train them how to use. With the support of ESP, contractor will orient workers for environmental protection as well as custom of local people.

12. In the operation phase, the potential negative impact has identified relating to dust and noise arising from increasing of traffic density and higher risk of traffic accident as better driving conditions. To minimize the negative impacts, Binh Phuoc Department of Transportation (DOT), the responsible agency for subproject management in the operation phase will periodically maintain the road, install speed limit, warning sign or road hump (if applicable) at the sensitive points along the road such as school, kindergarten, market, medical centre, pagoda, church etc.

13. Beside the potential negative impact from the implementation of the subproject, the IEE also consider the impact of climate change on the road quality and service. There are 7 bridges along the subproject road and all of them are in good condition and could be utilized in accordance to the result of an investigation by PPTA Design Consultants. However, the result also pointed out that water level at the peak of 25 years in 2005 is lower than the elevation of 6 bridges, except Bu Linh Bridge (Km46+12.38) with part of the access road is 30 cm lower than the peak water level in 2005. Follow the climate change adaptation plan of Viet Nam – updated 2015, with A2 – highest emission scenario, annual precipitation of

the Central Highlands and Binh Phuoc until the end of the century will increase 15% in compare with current precipitation. From this point of view, access road to Bu Linh Bridge should be level up in order to reduce the cost for operation and maintenance.

14. The PPTA Consultant has also identified key stakeholders and conducted public consultations from provincial to commune level with a focus on the affected people views. The main concerns are collaboration between contractors and local authorities in construction and workers management, road safety issue, and the difficulty in movement and access properties in the construction phase. The representative of Thanh An CPC, Hon Quan district has expressed his concern on the design of the drainage system that need to be improved to ensure the for households at the section near Ba Ut Nhi Bridge (Km28+868) lower roadside would not be suffered from runoff water and inundation when raining as they experience. All of these concerns are addressed in the environmental management plan (EMP) (See Table 11 – 12 for more details).

15. An Environmental Management Plan (EMP) has been prepared under this IEE to detail responsibilities of relevant stakeholders on mitigation measures to be implemented during construction and operation phases of the subproject.

C. Institutional arrangement

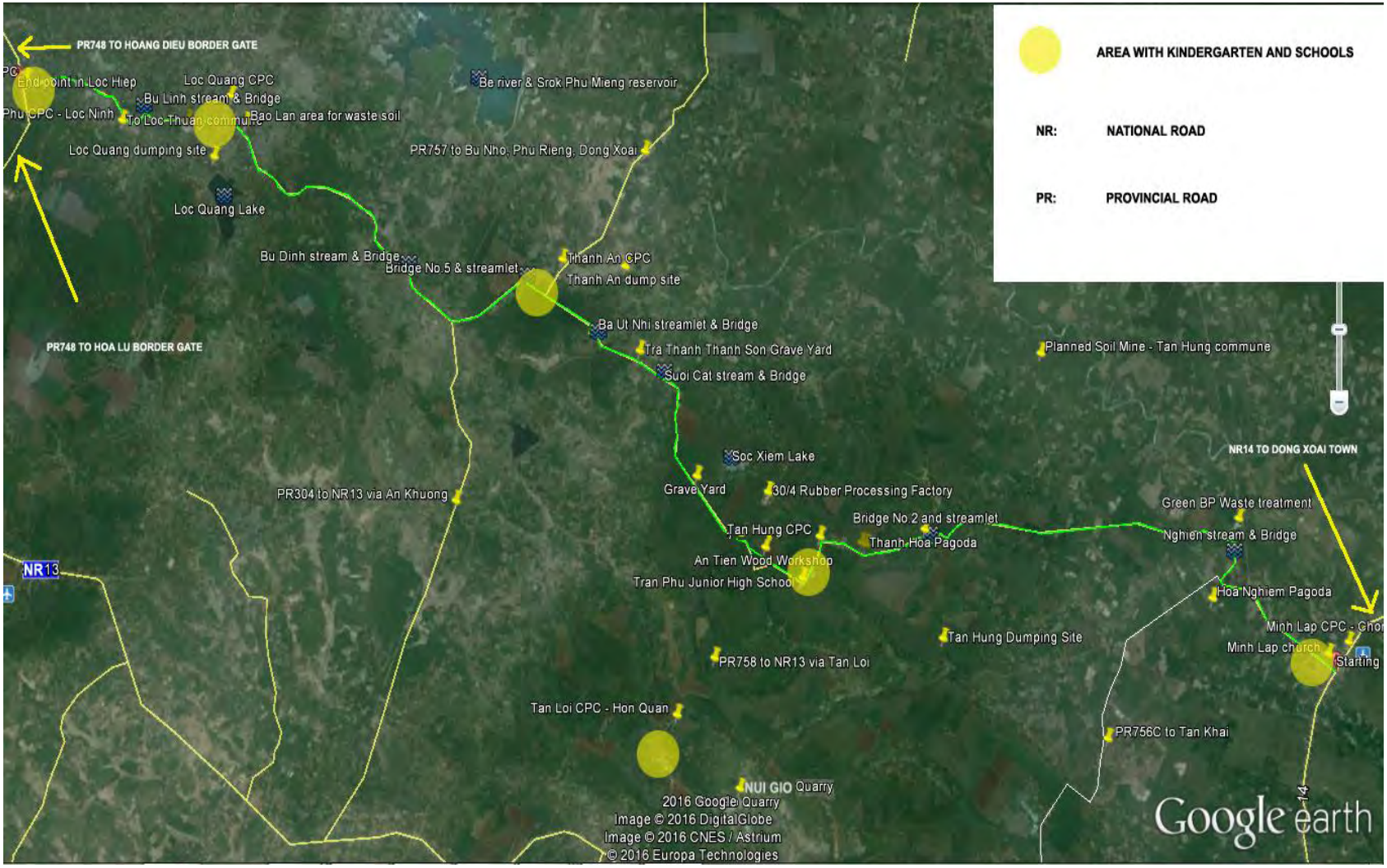
16. Binh Phuoc Provincial People Committee (PPC) has established a Project Preparation Unit (PPU) to support the preparation of the subproject in the PPTA period. One staff of Binh Phuoc Department of Natural Resources and Environment (DONRE) has been assigned as Environmental Safeguards Officer (ESO) of PPU. Ideally, the ESO will become ESO of Binh Phuoc PMU in the construction phase. Environment Safeguard Specialist (ESP) will organize a formal training course and on-the-job training for relevant PMU staff, Construction Supervision Consultant (CSC), communities, contractors and support for establishment and operation of the subproject environment management system in construction phase. ESP will also support PMU's capacity building by reviewing and evaluating the capacity on environmental protection of the PMU and Binh Phuoc Department of Transportation (DOT) – subproject management organization in the operation phase.

17. To fully reflect the environmental protection cost of the civil works and engage the environmental responsibilities of civil contractors, environmental requirements will be included in biding documents and civil work contracts. Any omission of environmental management costs will create high risks for implementing mitigation measures during the construction phase due to lack of resources and capacity, thus the environmental protection cost and responsibilities need to be involved from the beginning. Bid document will also specify that contractors shall engage capable and trained staff to take responsibility for the environmental management and safety issues at the working level and to monitor the effectiveness and review mitigation measures as the subproject proceeds.

D. Conclusion

18. The IEE concludes that the feasibility study of the subproject combined with available information is sufficient to identify the scope of potential environmental impacts and formulate mitigation measures for the subproject. Providing that significant changes to the subproject description do not occur at the detailed design phase, and that new sensitive environmental, or cultural resources are not determined, further detailed environmental impact assessment (EIA) is not required. The ESP, before finalization of the detail design, will update the EMP.

Figure 1 – General Map of Binh Phuoc and Subproject Area



II. BACKGROUND

19. The Support to Border Areas Development Project (Project) will help the five participating provinces (the Provinces) of Kon Tum, Binh Phuoc, Dak Lak, Dak Nong, and Gia Lai to better realize their growth potential and become more closely integrated into sub-regional frameworks including the Greater Mekong Sub-region (GMS), the Cambodia – Lao PDR – Viet Nam Development Triangle Area (CLV-DTA), and the ASEAN Economic Community. It will improve the project area's connectivity by developing critical transport infrastructure, leading to increased movement of people, agricultural produce, and other goods. Moreover, it will facilitate logistics and trade, and help develop the Provinces' capacity for investment planning from a regional integration perspective. As the Provinces are at the joint borders of the CLV-DTA, the Project will enable them to serve as an engine and gateway to wider markets for this sub-regional initiative. The Project will be implemented in 5 provinces in the CLV-DTA of Vietnam including Kon Tum, Binh Phuoc, Dak Lak, Dak Nong and Gia Lai.

20. The proposed Project will include 3 outputs and activities:

- ***Output 1: Road infrastructure in five VDTA provinces rehabilitated*.** The Project will improve transport infrastructure of the DTA area, including selected sections of provincial roads and roads that are important for filling the missing links for accessing national and international wider markets, tourism, healthcare facilities, and heritage and conservation areas. The project will provide the critical road infrastructure in service of selected value chains to ensure the smooth flow of products along the value chain to the market.
- ***Output 2: VDTA plans and facilities for transport and trade facilitation (TTF) with a focus on inclusive growth developed.*** This output will stimulate inclusive economic activity by (i) improving TTF within the VDTA leading to easier movement of goods and people across the borders, which in turn will stimulate the formation of strong value chains to support trade and tourism; and (ii) expanding the tourism industry which will involve the local population, with a special emphasis on the inclusion of ethnic minorities. Moreover, tourism also leads to demand for high quality local agricultural produce and rural products such as traditional handicrafts.
- ***Output 3: Institutional capacity for VDTA investment planning, project design and implementation, and resource management strengthened***. This output will consolidate the long-term development program for the VDTA. The indicators for achieving this output are: (i) VDTA master plan updated and implementation action plan prepared with ecosystem services, gender and EM considerations; and (ii) Officials nominated by the PPC trained to implement the updated master and action plans.

21. The Government of Vietnam has assigned Ministry of Planning and Investment (MPI) as the line agency for the preparation phase of the Project. Department of Planning and Investment (DPI) of the five provinces are responsible for the Project preparation phase in their provinces. DPIs have prepared a long list of the proposed roads in their provinces based on the Provincial Transportation Master Plans and the demand for road upgrade at the moment. The long list subprojects have been detailed feasibility and preliminary designs have been undertaken by the PPTA. A multi-criteria system with weight has been developed to screen and short-listed these subproject roads. The parameters have been listed in the Paragraph 4 above.

III. POLICY AND LEGAL FRAMEWORK

13. The subproject shall comply with requirements of ADB SPS 2009 and the GOV's Guidelines on Implementation of Law on Environmental Protection 2014. Decree No. 18/2015/ND-CP has detailed information on environmental protection assessment, environmental impact assessment and environmental protection plans. However certain activities commonly associated with infrastructure subproject such as quarry operations, extraction of gravel, etc., will also require permission from the relevant provincial level authorities. Depend on the scale, some constructions on the proposed road such as bridge or spillway shall require separated environmental impact assessment.

A. Asian Development Bank SPS requirement

ADB safeguard policy statement (SPS) 2009 imposes safeguard requirements for all its funded projects. The SPS 2009 clarifies reason, scope and contents of the environmental assessment. Safeguard policy statement emphasizes on environmental and social sustainability in progress of economic growth and poverty reduction in Asia and the Pacific, therefore the objectives of SPS focus on:

- Avoid adverse impacts of projects on the environment and affected people, where possible;
- Minimize/mitigate and/or compensate for adverse impacts on environment and affected people when avoidance is not possible; and
- Help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks

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

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

For environmental safeguards, the Project is initially categorized as 'B' for environmental safeguards. Environmental criteria for the long list multi-criteria system has been developed and contributed for the evaluation and short-listed subproject roads. Detail of the environmental criteria could be found in Appendix 02. The subproject has been classified as category A on environmental safeguards will not be short-listed as it will rescale the whole Project to category A on environment

B. Legal and Administrative Framework for Environmental Protection in Vietnam

2. The subproject has to comply with the environmental legal framework of Vietnam which is outlined in this section. The main components of the framework, if not, the more applicable ones are shown here.

3. Laws:

- Law No. 55/2014/QH13 of 23 June 2014 by the National Assembly on environment protection
- Law No. 17/2012/QH13 of 21 June 2012 by the National Assembly on water resources
- Law No. 20/2008/QH12 of 13 November 2008 by the National Assembly on biodiversity
- Law No. 68/2006/QH11 of 29 June 2006 by the National Assembly on standards and technical regulations
- Law No. 29/2004/QH11 of 03 December 2004 by the National Assembly on forest protection and development

4. Others

- Decree No. 18/2015/ND-CP dated February 14, 2015 on environmental protection planning, strategic environmental assessment, environmental impact assessment and environmental protection plans.
- Circular No. 27/2015/TT-BTNMT dated May 29, 2015 on strategic environmental assessment, environmental impact assessment and environmental protection plans.
- National Technical Regulations on air and noise quality
    - QCVN 05: 2013/BTNMT on ambient air quality
    - QCVN 26: 2010/BTNMT on noise
    - QCVN 27: 2010/BTNMT on vibration
- National Technical Regulations on water quality
    - QCVN 01: 2009/BYT on drinking water quality
    - QCVN 02: 2009/BYT on domestic water quality
    - QCVN 08: 2008/BTNMT on surface water quality
    - QCVN 09: 2008/BTNMT on underground water quality
    - QCVN 14: 2008/BTNMT on domestic wastewater

5. Other legislations applicable to the Project are the following:

- Law No. 27/2001/QH10 of 29 June 2001 by the National Assembly on fire prevention and fighting
- Law No. 40/2013/QH13 of 22 November 2013 by the National Assembly on amending and adding a number of articles of the Law No. 27/2001/QH10 of 29 June 2001 on fire prevention and fighting
- Decision No. 3733/2002/QD-BYT of 10 October 2002 by the Ministry of Health promulgating 21 labor hygiene standards, 5 principles and 7 labor hygiene measurements
- Law No. 50/2014/QH13 of 18 June 2014 by the National Assembly on construction
- Circular No. 22/2010/TT-BXD of 03 December 2010 by the Ministry of Construction on labor safety in work construction
- Law No. 10/2012/QH13 of 18 June 2012 by the National Assembly on labor code
- Law No. 64/2006/QH11 of 29 June 2006 by the National Assembly on HIV/AIDS prevention and control

IV. DESCRIPTION OF THE SUBPROJECT

A. The need for subproject

6. Binh Phuoc is belonging to South East area of Vietnam; it is also one of the main economical areas of the country. It plays a connection role for Central Highland and Cambodia and the transportation hub for people and goods from Central Highland to Binh Duong, Dong Nai and Ho Chi Minh City via National Road No.14. Binh Phuoc has 240km borderline with 3 provinces of Cambodia including Tbong Khmum, Kratie, and Mondulkiri. Trading activities are mainly through 2 border gates of Hoa Lu and Hoang Dieu connect to Kratie and Mondulkiri respectively.

7. The provincial road No.756 Minh Lap – Loc Hiep in Chon Thanh; Hon Quan and Loc Ninh districts, Binh Phuoc province has been short-listed based on the multi-criteria system (paragraph 4). The Subproject goes through agricultural areas of 7 communes under 3 districts of Binh Phuoc province. It connects National Road No.14 in Minh Lap commune – Chon Thanh district goes through Tan Hung, Tan Loi, Thanh An communes – Hon Quan district and Loc Quang, Loc Phu communes – Loc Ninh district to Provincial Road No. 759B at the center of Loc Hiep commune, Loc Ninh district.

8. Along the subproject road are poor communes, some residential areas of ethnic minority people, large agricultural cultivation of rubber, pepper, cashew, fruit trees. The road has been paved with bitumen long time ago and it has been severely damaged, make difficulties for local people to travel and for transportation of goods.

9. The road after upgraded will work as a transportation backbone from National Road No.14 to Loc Ninh then Hoa Lu international border gate. The road is also a short route connects district center of Chon Thanh and Hon Quan to Loc Ninh and links the agricultural production areas with the two international border gates: Hoa Lu and Hoang Dieu. It will promote economic development along the subproject road and support trade exchange in the CLV area with Ho Chi Minh City, Dong Nai and Ba Ria – Vung Tau provinces.

B. Location and scope

10. The Subproject will upgrade 50.3 km of provincial road No.756 to Grade III – Mountain in accordance with TCVN 4054:2005. The start point is the Minh Lap junction with National Road No.14 in Chon Thanh district. It goes through Minh Lap commune – Chon Thanh district; Tan Hung, Tan Loi, Thanh An communes – Hon Quan district; Loc Quang, Loc Phu, Loc Hiep communes – Loc Ninh district. The end point is the junction with provincial road No. 759B at the center of Loc Hiep commune at a distance of 22 and 31 km to Hoa Lu and Hoang Dieu international border gates respectively.

11. The output after implementing this subproject is upgrading and improvement of road systems; connect intensive agricultural production areas of Loc Ninh, Chon Thanh and Hon Quan districts and the Central Highlands provinces through the National Road No.14, linked with Kratie province of Cambodia and other provinces in the CLV region of Cambodia and Southwest Asia via National Road No.13 and Hoa Lu International Border Gate and Hoang Dieu Border Gate; from which connected to the airports, the seaports of Dong Nai, Ho Chi Minh city and Vung Tau.

12. The total length of subproject road is 50.3 km, in which:
+ Use of existing roadbed: 28.3 km
+ Existing roadbed can not be reused (damaged): 9.0 km
+ Existing gravel pavement section: 8.0 km
+ Week roadbed need cement concrete structure treatment: 5.0 km

13. There are total 44 culverts along the subproject route. Some of them will be upgraded or reconstructed. There are also 7 bridges along the route. The subproject will upgrade the surface of the

bridge without changing any other structures. There are no large water bodies located near the subproject road. Loc Quang Irrigation Lake in Loc Quang commune, Loc Ninh district is about 1 km from the route. The water sources for all flows that crossing the subproject route are come from mountainous area in South West area of the province then discharge into Song Be River. Based on the investigation from the PPTA, the peak water level for 25 years is happened in 2005 and all bridges are still in good conditions and no need to change the structure. The peak water level in 2009 is 30 cm higher than the level of Bu Linh Bridge (Km46+12.38). Binh Phuoc PPU explained that the flood in 2009 is only local scale and the water has flooded the pathway to the bridge but not the bridge itself. The subproject will reconstruct the pathway to the bridge without changing the structure.

Table 1 - Number of bridges and designed elevation based on 2005 peak water level

No.	Location	Name	Width (m)	Length (m)	Elevation above the sea level (m)	Peak water level 2005 (25 years)	Capacity (T)	Condition
1	Km4+819.21	Suoi Nghien bridge	6	49.30	486.35	484.86	H30	Good
2	Km14+565.38	Bridge No.2	5.5	12.43	503.67	502.62	H30	Good
3	Km26+649.42	Suot Cat bridge	5.0	33.20	497.04	496.07	H30	Good
4	Km28+868.14	Ba Ut Nhi bridge	5.0	8.2	520.47	519.47	H30	Good
5	Km31+493.69	Bridge No.5	6.0	6.31	535.72	534.72	H30	Good
6	Km35+869.97	Bu Dinh bride	6.0	12.59	530.75	529.25	H30	Good
7	Km46+12.38	Bu Linh bridge	5.7	24.87	518.84 (access road)	519.15	H30	

14. The main stone sources for construction activities in the area come from Nui Gio quarry in Tan Loi commune, Hon Quan district which is about 9km to the West of the route. This quarry has received operation license from Binh Phuoc DONRE until 2020 with capacity of nearly 200.000m^3 per year. The demand of stones for the subproject is about 120000 m^3. Sand for construction will be bought from mines in Tay Ninh and Binh Duong provinces which is about 80-100km from the subproject route. There is no suitable mine for filling soil in 7 subproject communes.

15. Currently, there are 3 communes have their own temporary dumping sites: Thanh An, Tan Hung and Loc Quang. These CPCs have already planned for disposal site and assigned the location in the commune.

16. Land acquisition and resettlement: There is no major household affected by implementation of the subproject. The subproject will upgrade the road surface and make some bend corrections or reconstruct some culverts. There are only two temporary houses with total area of 10.6m^2 over existing 200m^2 in Loc Quang commune will be acquired by the subproject. The detail information on affected land; buildings on land; crop and tree are show in Table 2 below.

Table 2 – Land Acquisition Data

District/ Commune	Name of the Land owner	Total in-use area			Permanent affected			Land Use Certificate
		House and garden (m^2)	Agricultural (m^2)	Other (m^2)	House (m^2)	Annual crop land (m^2)	Perennial (m^2)	
Loc Ninh								
Loc Quang	Vo Khanh		100.0				5.0	Registered
	Tran Van Kiem	100.0			5.5			Registered
	Le Thi Huong	1000.0			5.5			Registered
	Le Van Oanh		10000				9.2	Registered
	Tran Thi Phung		3000				8.4	Registered
Loc Phu	Bui Minh Chinh		8000			130.0		Registered
Total		1100	21100	0.0	11.0	130.0	22.6	0

District/ Commune	Name of the Land owner	Rice (m^2)	Other crop (m^2)	Coffe (tree)	Rubber (tree)	Pepper (tre)	Other tree
Chon Thanh							
Minh Lap							
	Le Thi Lai						1 (Dita Bark 20 years)
Loc Ninh							
Loc Quang							
	Le Van Oanh					5 (3 years)	
	Tran Thi Phung						1 (Mango tree – 4 years)
Total		0	0	0	0	5	2

17. In the plan, the subproject will be constructed in 24 months with the estimated budget of 20,382,267 USD in equivalent with 453,607,362,980 VND (1 USD = 22255 VND). Detail are listed in Table 3 below

Table 3 – Estimated budget of the subproject

No.	Item	Total (VND)
A	**Main budget**	
1	Construction budget for Road No.756	352,512,382,809
2	Resettlement and compensation (estimated)	10,000,000,000
3	Subproject management cost	3,909,682,791
4	Construction Consultant	11,853,337,000
5	Other cost	16,430,579,000
	Subtotal (A)	***394,705,981,600***
B	**Contingency**	
	1. Generated construction volumes (10%)	39,470,598,160
	2. Drift of prices	19,430,783,220
	Subtotal (B)	***58,901,381,380***
	Total (A+B)	**453,607,362,980**

V. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

1. Topography, Geology, and Soils

18. Binh Phuoc is a mountainous area located to the West of South East Zone of Vietnam. The total natural area is 6847.62 km^2. Binh Phuoc topography is diversified and complicated with moutain and hilly area mixed with small, narrow terrain and low land area. The slope is going down gradually from East and North East to West and South West of the province with quite dense river and stream networks in tree branch shaped. The topography of Binh Phuoc is divided into some main types: (i) low mountains; (ii) low mountains and hills; (iii) low and flat terrain. The slope angle is less than 15^0 (Grade I, II and III), suitable for agricultural activities (make up 70% of the provincial land area). Grade IV and V area which are not suitable for farming, occupied only 16.4% of the total land area.

19. The geological base of Binh Phuoc is eruptive basalt in different period. Together with moisture and hot weather condition, the 100 cm layer of crust of weathering has been established over the basalt base. The main type of rock and soil in the area are basalt, granite, argillaceous shale and alluvium..

20. The topography of the subproject area is quite flat with elevation is going up from the start point to the end point. The basalt soil type along the subproject road is suitable for the cultivation of industrial trees, especially rubber and pepper.

2. Hydrology and Climate

21. Binh Phuoc is the upstream province of the South East Zone with large water system but the water supply capacity for agricultural culvationis limited. There are four main river system in the province including: Be River; Sai Gon River; Dong Nai and Mang River. Be River is the main water source in the subproject area. It flows in North-South direction through Bu Gia Map; Bu Dop; Loc Ninh; Binh Long; Chon Thanh; Dong Phu to Binh Duong province. There are 3 hydro power plants have been constructed along Be River: Thac Mo, Srok Phu Mieng and Can Don. The fourth one, Phuoc Hoa hydropower plant is now undercontruction in the downstream of Can Don.

22. Binh Phuoc has a tropical monsoon climate with two separated seasons: Rainy season start from May to November and dry season start from December to April next year. The avarage rainfall of the province varied from 2494 to 2794 mm. The precipitation of the rainy season make up 90% of the whole year. The rainy days are 142 and concentrate in July, August and September. Rain is rare in January, February and March.

23. Located in the inner equator zone, Binh Phuoc has a high and stable temperature with avarage temperature of 26 – 27^0C. The low average temperature is 24.5-25^0C and high average temperature of 28.5-29^0C. Sunny hour is 2479 – 2730 hours on average per year. Annual average humidity of the province varied from 76.08 to 79.50%. The wind flow in three main directions: East; North East and South West.

24. Be River system running along the subproject road in North-South direction. The average distance to the route is about 5 km. Srok Phu Mieng Hydro Power Reservoir – the largest reservoir along Be River system located 5 km away from the subproject route. The other large water bodies are Loc Quang irrigation lake, about 1 km from the road in Loc Quang commune and An Khuong lake, about 3 km from the road in Thanh An commune.

25. Recently, Binh Phuoc province facing with many type of natural disasters, caused serious assets and human loss. Hon Quan and Loc Ninh are two of the subproject districts suffer the most from natural disaster. For instance, in 05 October 2014, heavy rain together with tornado has destroyed 8 houses,

washed away 1300m roads, and drowned 20 ha of rice of 6 communes including Loc Dien, Loc Phu –Loc Ninh district and Minh Lap – Chon Thanh district. Binh Phuoc also suffered from a serious drought in 2012. The consequence of the longest dry season in 10 years is production lost of more than 20.000 ha cultivated land, nearly 16000 household lack of water. Other types of natural disaster in Binh Phuoc province are turbulence wind, thunderstorm, soil erosion, landslide.

26. Drought trend is increasing in the recent year. In 2016, Binh Phuoc has requested for a support from Central budget of 14.9 billion VND for domestic water supply in the province. This budget is applied for drilling well, clean and maintains the existing well and construction different lakes system in Loc Ninh district, the one is facing with many difficulties related to drought. Some section of the road also suffered from tornado but at a local scale only. The detail natural disaster information could be found out in the Table 4 below.

Table 4 - Type of natural disaster in the recent year

Year of occurance	Type of disaster	Affected area		Number of affected people	affected area	Estimated damage
		Name of district	Name of commune	(HH)	Ha	(Mil vnd)
2015	Tornado	Chon Thanh	Minh Lap	02		10
2015						
2015	Drought	Loc Ninh	Loc Quang	13	4.75	
2015	Tornado and extreme weather	Loc Ninh	Loc Phu		1.55	
2015	Tornado and extreme weather	Loc Ninh	Loc Phu	05	1,87	
2015	Drought	Hon Quan	Tan Hung	370	23.4	13.000
2015	Tornado and extreme weather	Hon Quan	Tan Loi	13 (damaged home)		
2015	Tornado and extreme weather	Hon Quan	Thanh An	02 (damaged home)		

3. Surface and ground water

Surface water resources

27. The monitoring program for surface water quality (Status of Environment Report 2011-2015) has been implemented with 34 sampling locations in Binh Phuoc province. The monitoring parameters are pH, COD, BOD5, DO, NH4+, NO3-, phosphate, chlorine, iron, copper, zinc, lead, cyanide, arsenic coliform, oil. The result has showed that bacteria do not contaminate Surface water in the project area. Coliform levels are around 2000 MPN/100ml, reaching QCVN 08:2008 / BTNMT on surface water quality (column A1) consequently surface water can be used for water supply activities. The value of DO (DO: 5 mg / l) reaches QCVN 08:2008 / BTNMT (A2 column) consequently surface water can be used for domestic purposes (but do need appropriate treatment). BOD_5 and COD in Binh Phuoc in general is low and meet QCVN 08:2008 / BTNMT (column A2) consequently surface water can be used for domestic

purposes. Only in town centre, market, these two parameters are beyond QCVN 08:2008/BTNMT. 34 sampling positions for surface water quality are mainly located in the town and district centres, of which 12 positions are located in 3 subproject districts. The nearest location to the subproject is in Loc Ninh town, about 10 km from the subproject road.

Underground water resources

28. There are total 36 monitoring locations for underground water with nearly the same parameters for surface water quality. The nearest sampling location is the household's well in Loc Ninh town, about 10 km from the subproject road. In general, ground water reserve of Binh Phuoc is limited and may use for domestic water supply only. The southwest side of the province are richer in term of ground water resource. Most water quality parameters are within the permitted limit under QCVN 09:2008/BTNMT on underground water quality. But concentration of total coliform and nitrite at some monitoring points (wells) exceeds the limits for QCVN 09:2008 / BTNMT. Some water samples have been taken from shallow wells not drill wells could be the reason for high concentration of total coliform and nitrite.

4. Air quality and noise

29. According to Status of Environment report (SOE) of Binh Phuoc province 2011 - 2015, the levels of CO, NO_2, and SO2 at subproject area are within allowable standards of QCVN 05-2013/BTNMT on ambient air quality. The dust level at some junctions, trade centres in Chon Thanh, Hon Quan and Loc Ninh districts is over allowable level (TSP: over 300 $\mu g/m^3$), according to QCVN 05-2013/BTNMT. The reason could come from high urbanization and industrialization speed in Binh Phuoc recent years.

30. Through observation, from the beginning point of the road at the junction with National Road No.14 to Loc Dien commune, Loc Ninh district, the road is mainly run through area far from residential area, surrounded by industrial cultivation area (mainly rubber tree) and fields. The last part of the road run through Loc Quang, Loc Phu and Loc Hiep commune, Loc Ninh district, households are located along the road. However, the noise and vibration in these communes are still in the allowable limit of QCVN 26:2010/BTNMT on noise (SOE of Binh Phuoc).

B. Biological Environment

31. The main ecosystem along the subproject route is rubber plantation forest interfere with some pepper and cashew cultivation area. There is no natural forest located along the subproject road

1. Agriculture

32. The irrigation water for agricultural production is limited and the province developed agricultural mechanism that increase crops with less water demand. The main agricultural crops of Binh Phuoc are rubber and pepper. Rubber planted along the subproject road in Hon Quan district while the area in Chon Thanh district is dominated with pepper plantation. Rubber plantation is mainly belonging to Agricultural Co-operative of the district and Binh Long Rubber Plantation Company under Vietnam Rubber Corporation. Main crop type of the subproject area could be found in the Table 5.

2. Forestry

33. According to Forest Land Statistic report, up to 31 December 2013, the total forest land of Binh Phuoc is 177.256 ha of which natural forest is 58.613 ha and artificial forest is 101.650 ha. Forest covers 21.6% total area of Binh Phuoc. However, forest are mainly appear in the North area of the province, closed to the border with Cambodia like Ta Thiet protection forest and especially Bu Gia Map National Park, closed to Dak Nong province. There is no natural forest in the subproject area.

3. Fauna and Flora

34. There are many varieties of plant species in the subproject area, but no rare or endemic species are recorded. Similarly, no rare animals were detected in the subproject area. Agricultural crops, vegetables, plants in residents' gardens, other wild brushwood are main type of terrestrial flora. No big or rare trees needing special protection are present in the subproject area. Main terrestrial fauna are domestic animals, such as cows, buffaloes, chicken, pigs etc... In the region, there are no rare or endangered species as recorded in the Vietnamese Red Book (of Forestry department).

Table 5 – Land use statistic of the subproject area in 2015

Types of Land	Unit	Chon Thanh District	Minh Lap Commune	Loc Ninh District	Loc Quang Commune	Loc Phu Commune	Loc Hiep Commune	Hon Quan District	Tan Hung Commune	Tan Loi Commune	Thanh An commune
Natural landing areas	*ha*	38,959.16	5,008.25	85,329.33	4,386.58	3,220.25	2,901.13	66,412.61	9,631.09	4,587.60	6,225.62
A Agriculture Land	*ha*										
I. Agricultural production land	*Ha*	33,296.81	4,534.67	78,911.54	3,814.1	2,769.02	2,659.13	59,839.20	9,126.56	3,816.42	5,452.46
Land for planting annual crops	*ha*	93.92	18.01	2,821.48	395.64	134.09	146.31	1,248.67	42.44	75.30	231.58
- Rice	*ha*	84.4	18.01	2,618.35	395.64	123.58	102.8	1,020.47	42.44	57.81	209.39
- Other	*ha*	9.52	8.75	203.13	0	10.51	43.51	228.20	0	17.49	22.19
Land for long term trees (timber, industrial trees)	*ha*	33,088.77	4,495.69	51,187.29	2,845.72	1,839	1,966.1	51,435.17	9,078.78	3,732.55	3,810.41
- Rubber	*ha*	26,931.5	3,956.5	32,199.0	1,410	482	847	1,813.70	2,818	629.2	1,873.6
- cashew		316.7		5,063.5	409	169	183	4,057.70	646.7	336.2	1,062.2
- Other	*ha*	5,840.57	539.19	13,924.79	1,026.72	1,188	936.1	45,563.77	5,614.08	2,767.15	874.61
Land for forest	*ha*			24,837.1				7,016.38			
Land for aquatic	*ha*	43.47	12.22	25.42	0.41	0.57	10.54	55.34	0.27	0.93	6.23
Land for other agriculture	*ha*	70.65	8.75	24,877.36	572.33	795.36	50.36	83.86	5.07	7.64	9.97
II. Non-agriculture land	*ha*	5,122.47	274.12	6,417.79	572.48	451.23	242.00	6,573.41	504.53	771.17	773.15
1. Land for housing (rural and urban)	*ha*	501.42	38. 76	1,039.38	24.99	46.18	54.64	660.15	57.43	108.44	33.50
2. Land for trading and services	*ha*	1,833.08	16.50	1,744.98	0.10	28.18	14.15	521.86	12.31	15.23	45.84
3. Specialised land	*ha*	2,787.97	218.86	3,633.34	547.39	376.87	173.2	5,389.08	434.79	647.5	693.55
III. Other land	*ha*	539.88	199.46					2.32			0.26
V. Percentage of households issued land use certificates	%	88,83	96,4	93	96.5	93	94.9	90.13	97.54	96.11	95.73

C. Socio-economical Condition and Infrastructure

1. Population and Ethnic

35. Up to December 2013, total population of Binh Phuoc province is 927.126 people and the population of Loc Ninh, Hon Quan and Chon Thanh districts are 118778, 100924 and 72382 people respectively. Ethnic minority people make up 19.7% of the population including (listed from large to small population): Stieng, Khmer, Hoa, Muong, Nung, Thai... Population of the subproject area is listed in the Table 6 below.

Table 6 – Population and ethnic groups in the subproject area

No		Total of population	Peoples clarification (number of people)							
			Kinh	STieng	Khmer	Muong	Hoa	Nung	Thai	Others
		Total	Total	Total	Total	Total	Total	Total	Total	Total
1.	**Chon Thanh District**	72,382	67,152	2.755	1.556	304	319	99	51	24
2.	Minh Lap Commune	7,910	6,743	1,049	7	31	47	18	0	15
3.	**Loc Ninh District**	118,778	97,277	9,949	9,127	334	621	383	371	716
4.	Loc Quang Commune	6,272	2,371	1,576	2,102	38	71	38	0	76
5.	Loc Phu Commune	7,001	4,662	401	626	4	20	180	0	1,108
6.	Loc Hiep Commune	8,312	7,666	16	226	49	130	0	203	22
7.	**Hon Quan District**	100,924	79,943	18,764	339	277	486	269	169	682
8.	Tan Hung Commune	12,675	10,170	2,307	01	65	43	01	85	0
9.	Tan Loi Commune	9,043	7,898	951	5	74	75	0	5	35
10.	Thanh An Commune	11,031	8,331	2,409	31	23	55	40	5	137

2. Living Standards and housing

36. The main incomes of people in the subproject area are still from agricultural production. Chon Thanh district has 53.5% of people at working age are now working in industrial and construction. However, they are mainly working in the industrial zones along National Road No.13. In subproject commune of Minh Lap, labour in agricultural sector is still dominated with 62.84%. It's could be seen that the subproject area are the main agricultural zone of the three districts as agricultural sector of the 7 communes are always much higher than the average ratio of the district while the ratio for industrial and construction as well as trading and services are usually lower. Table 7 below detail the information on labour distribution in the communes of the subproject area.

Table 7 – Labour distribution in the subproject area

STT	Name of district/ commune	Labour	Labour in sector (%)				Poor HH
		No. labour	Agricultural production	Industrial and construction	Trading and services	Other	
1.	**Chon Thanh Dist.**	46,730	26.4	53.5	20.1	0	307
2.	Minh Lap Com.	5,778	62.84	10.03	26.23	0.9	33
3.	**Loc Ninh Dist.**	61,928	68.86	15.13	16.01	0	1,326
4.	Loc Quang Com.	3,882	75	25		0	179
5.	Loc Phu Com.	3,055	86.72	13.28		0	97
6.	Loc Hiep Com.	5,263	69.85	6.37	23.093	0.9	51
7.	**Hon Quan Dist.**	63,1	63.05	17.65	17.8	1.5	478
8.	Tan Hung Com.	8,064	88.7	3.14	8.16	0	28
9.	Tan Loi Com.	6,812	71.25	12.05	16.7	0	43
10.	Thanh An Com.	6,783	78.54	9.87	9.63	1.96	53

3. Employment and income

37. From the investigation result of the Consultants, number of poor households in the subproject communes over the total number of poor household of the district is quite low. The main reasons that lead to poor household are lack of production land and budget or households of female headed.

Table 8 – Number of poor households in 2015 under new standards

	Poor Household			Poor Household					
	Total of HHs	**Total of EM HHs**	**Total of populations**	**Female household head**	**Lack of production land**	**Lack of production fund**	**Lack of production knowledge**	**Many children**	**Others**
Chon Thanh District	307	92	860	227	98	5	8	26	170
Minh Lap Commune	33	17	97	7	13	0	0	3	2
Loc Ninh District	1,326	657	4,510	0	190	251	227	81	722
Loc Quang Commune	179	75	803	25	34	76	17	2	50
Loc Phu Commune	97	51	361	33	16	15	14	2	29
Loc Hiep Commune	51	6	148	33	8	6	3	3	15
Hon Quan District	478	206	1,392		237	280	22	107	37
Tan Hung Commune	83	20	238	7	23	29	4	3	2
Tan Loi Commune	63	24	178	46	17	28	2	12	23
Thanh An Commune	71	29	228	45	30	39	9	10	15

4. Education and Public Health

38. Medical care system has been developed adequately in the recent year. Medical center with sufficient equipment has existed in all communes of the three subproject districts. National health programs and disease prevention implemented well. Only a few cases of poor food safety and hygiene as in Chon Thanh district, 186 cases of dengue fever have been detected in 2015 in comparison with 80 cases of 2014.

39. The school at different level has been well-developed in all three subproject districts. Kindergarten and Primary school have several branches in different residential areas of each commune to ensure all children will have easy access to the school system. The ratio of children at age of 6 joining primary school is 100% for Chon Thanh and Hon Quan district. In Loc Ninh, this ratio is 99% as the district has some mountainous area closed to the border with Cambodia.

Table 9 – Environmental sensitive point in the subproject area

No.	Name	Commune	District	Remark
1.	Loc Hiep Primary School	Loc Hiep	Loc Ninh	Road side
2.	Loc Hiep Secondary School	Loc Hiep	Loc Ninh	Road side
3.	Loc Hiep Medical Center	Loc Hiep	Loc Ninh	Road side
4.	Loc Quang Kindergarten	Loc Quang	Loc Ninh	Road side
5.	Loc Quang Primary School	Loc Quang	Loc Ninh	Road side
6.	Loc Quang Medical Center	Loc Quang	Loc Ninh	Road side
7.	VK98 Historic Fuel Storage Site	Loc Quang	Loc Ninh	3km to the East of the route
8.	Tra Thanh Primary School – Thuan An branch	Thanh An	Hon Quan	Road side
9.	Tra Thanh Primary School – An Hoa branch	Thanh An	Hon Quan	Road side
10.	Tan Loi Kindergarten	Tan Loi	Hon Quan	6km to the West of the route, on the way to Nui Gio quarry
11.	Tan Loi Primary School	Tan Loi	Hon Quan	
12.	Tan Loi Secondary School	Tan Loi	Hon Quan	
13.	Tran Phu Junior High School	Tan Loi	Hon Quan	Road side
14.	Tan Hung Medical Center	Tan Hung	Hon Quan	Road side
15.	Tan Hung Kindergarten	Tan Hung	Hon Quan	Road side
16.	Tan Hung A Primary School	Tan Hung	Hon Quan	Road side
17.	Tan Hung Secondary School	Tan Hung	Hon Quan	Road side
18.	Thanh Hoa Pagoda	Tan Hung	Hon Quan	45m to the East of the route
19.	Hoa Nghiem Pagoda	Minh Lap	Chon Thanh	800m to the West of the route
20.	Minh Lap church	Minh Lap	Chon Thanh	Road side
21.	Minh Lap Primary School – Hamlet No.5 branch	Minh Lap	Chon Thanh	Road side
22.	Minh Lap Secondary School	Minh Lap	Chon Thanh	Road side
23.	Minh Lap Kindergarten and branch of Primary School	Minh Lap	Chon Thanh	Road side

5. Water supply and electricity cover

40. Nearly all the households in the subproject areas using electricity from national electricity network. The percentage of households using clean water is also high with all communes have a ratio higher than 90%.

6. HIV and human trafficking

41. In 2015, even the number of HIV infected cases in Chon Thanh, Loc Ninh and Hon Quan districts are high with 182; 143 and 205 people respectively, the number of HIV infected cases in the subproject communes are low (5 people per commune). Loc Phu commune has no HIV infected cases while Tan Loi commune has the highest number (12 infected cases).

7. Infrastructure

42. ***Transportation***: The development of economic system has boosted huge transportation demand in Binh Phuoc province. It also located at a strategic position and work as a hub for agricultural production from Central Highlands to Ho Chi Minh City, Dong Nai and Binh Duong provinces as well as to Cambodia via Hoa Lu and Hoang Dieu Border Gates. As the result, large number of vehicles using the

road has led to road degradation and damaged road surface. In the Infrastructure Planning for 2016-2020 of the three subproject districts, there are 42 roads at provincial to lower level - with direct and indirect connection to subproject road – will be constructed or upgraded. Some of them are already in the 2011-2015 Plan but the district could not allocated suitable budget.

43. ***Industrial activities***: The processing industry is still contributing the largest part in the industrial sector of subproject area. Minh Lap commune has the highest ratio for Industry-construction sector with 15.13% while all other communes have the ratio of 10% or lowers.

44. ***Other public facilities***: With the development of the infrastructure system, local people in the subproject area could easily access to the market. The furthest distance from the commune center to the market is 8 km in Loc Hiep and Loc Quang communes, Loc Ninh district. There are three communes have a market in the commune area including Minh Lap, Thanh An and Tan Hung. The detail information of the infrastructure system could be found in the table below.

Table 10 – Infrastructure system in the subproject area

	Unit	**Chon Thanh District**	Minh Lap Commune	**Loc Ninh District**	Loc Quang Commune	Loc Phu Commune	Loc Hiep Commune	**Hon Quan District**	Tan Hung Commune	Tan Loi Commune	Thanh An commune
1. Roads	Km	473.2	51.5	178.9	68.4	28.7	77.9	449.55	195	92.19	80.264
- Earth road	km	415.1	50.5	66.6	65.7	28.7	77.9	285.05`	125	59.526	60.884
- Concrete / asphalt roads	km	58.1	1.0	112	2.7	0	0	164.5	70	32.664	19.38
2. Number of car	unit	1,569		1,055		4	54	375	75	62	1,935
3. Number of motorbike	unit	22,452		41,367		3,182	2,732	35,597	4,150	3,8973	1,702
4. Market in commune	unit	04	01	01	01	0	01	03	1	0	1
Distance for the center of commune	km		4						1		0.3
5. Market outside commune	unit	02		03	01	01	01	5	1	2	1
Distance to commune center	km		8		8	3	8		10	7	14
6. Percentage of hhs using national electricity	%	98.60	96.00	95	89.9	93.2	91.72	90	92.8	9.02	98.7
7. Percentage of HHs using clean water	%	99.97	99.3	93,5	90.5	94.4	97.1	91.34	91.8	96.9	98
8. Percentage of concrete houses with floors	%	9.05	1.2	12.5	2.18	3.05	0.8	11.05	0.01	1.25	2.15
9. Percentage of HHs with brick / wood, roof, 1 floor	%	87.7	96.55	82.75	94.95	5.2	99.2	86.7	99.99	98.5	96.35
10. Percentage of HHs with cottages, tent	%	3.25	2.25	4.75	2.87	1.75	0.00	2.18	0.00	0.05	1.5
11. Percentage of HHs using telephone and cell phone	%	100	100	98.4	99.7	96.3	99.9	100	96	100	98.2
12. Percentage of HHs having toilet	%	89.7	96.2	93.1	95.6	87.5	89.7	74.3	78	83.5	87.7

D. Archaeological, Historical and Cultural Treasures

45. There are several archaeological sites have been discovered in Binh Phuoc including Loc An commune, Loc Ninh district and Binh Long town, Loc Ninh and Phuoc Long. There are no archaeological, cultural sites in the subproject area but only a historic site of VK98 Fuel Storage during the war in 1960s is about 3km from the subproject road in Loc Quang commune.

E. Key Environmental Features

46. ***Physical environmental features:*** The subproject area is quite flat. The subproject road is going downward gradually from the end point to the start point in Minh Lap commune in North-South direction. Along the road is mainly pepper cultivation in Loc Ninh district and rubber plantation in Hon Quan and Chon Thanh districts. There is no natural forest located in the subproject area.

47. Song Be River running along the subproject road with the nearest point of 5 km at Srok Phu Mieng Reservoir. There are 7 streams crossing the route and they are mainly originated from the mountainous areas in the North West of the province flow cross the route before discharge in to Song Be River. Loc Quang Irrigation Lake located 1 km away from the route in Loc Quang commune.

48. ***Social environmental features:*** As the subproject goes through high density population area, there are 16 kindergartens, schools and medical centers located at the side the subproject road. There are also two pagodas, one church and one historic site located in the subproject road are

VI. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

49. This section discusses the potential environmental impacts of the subproject and identifies mitigation measures to minimize the impacts in all design, construction and operation phases of the subproject. There are not any protected areas in the vicinity of the subproject road will be adversely affected due to subproject implementation.

50. The constructions activities during the construction phase will be mainly upgrade the existing road. The main physical impacts are relating to the operation of construction machines and material transportation truck, construction material exploitation at quarry, borrow pit and temporary stockpile. The activities will create dust, noise and vibration that disturb local people and increase risk of respiratory and skin disease.

51. The subproject construction will also impact on local traffic making difficulties for people to access their properties, especially the ones who live along the subproject road. There are several CPCs, medical clinics, schools, pagodas and church located along the road. There are also 2 rubber processing factories: named Phuong Hau and 30-4 located in Loc Phu and Thanh An commune respectively. These impacts to social infrastructure will be in short duration of construction phase only and these have been subject to detailed assessment in the Resettlement Plan.

52. The potential environmental impacts as well as the mitigation measures in the design, construction and operational phases are assessed below. The criteria for assessment are in line with ADBs SPS as specified in ADB Safeguard Policy Statement 2009 and the GOV standards based on Environmental Protection Law 2014. Where GOV standards or guidelines have some kind of conflict with ADB SPS, ADB SPS will be applied as the policy for the subproject implementation. The EMP is presented below including mitigation measures and monitoring plan for the implementation of the subproject road.

A. Potential impacts and mitigation measures in the design phase

53. Description: The proposed subproject involves upgrading of a single carriageway existing road. The whole route surface will be upgraded to asphalt concrete to meet Grade 3 of Mountain Road in accordance with TCVN 4054 – 2005. As the existing alignment of the road will be followed and the whole road surface width will be 6m and foundation width will be 9m, there may be minor adjustment at the design for bend correction or drainage at roadside steep slope area.

54. Bridges and culverts have been designed to withstand a 25-year return and the subproject will not change the design of any bridges along the route. The drainage system at the area with slope roadside will be designed follow TCVN 4054-2205 to ensure sufficient drainage capacity and avoid flood and runoff water affect cultivation and living area of local people. In line with ADB policy on environmentally responsible procurement, a new environmental assessment report will be undertaken for submission to ADB if there are any changes to subproject design that would result to environmental impacts or risks that are not within the scope of the current IEE.

B. Potential impacts and mitigation measures in the preconstruction phase

1. Land acquisition and Resettlement

55. **Impacts**: The subproject will upgrade the road surface and made some bend correction or reconstruct some culverts. There will be 10 households being affected, 8 of them in Loc Ninh district with 5 households in Loc Quang and 3 households in Loc Phu commune. The implementation of the subproject will impact some area of garden and agricultural land of these households. However, none of these

households have lost more than 10% of total land holding. There are only two temporary houses with total affected area of 10.6m^2 over 200m^2 in Loc Quang commune.

56. **Mitigation measures**: Before the construction start, PMU will review the Land Acquisition and Resettlement report and check at the field to ensure that all 10 affected households have received compensation adequately in accordance with the current provincial market price.

2. Public facilities affected and relocation

57. ***Impacts:*** The road will mainly upgrade road surface without changing direction or the road foundation so it will not make relocation of the electricity cable system along the road. The drainage system along the subproject road is also severely damaged so it will be upgraded and repaired. No other public facilities will be affected or relocated due to the implementation of the subproject.

3. Disturbance of unexploded mine and bomb (UXO)

58. ***Impacts:*** The subproject will be upgraded based on the existing foundation. There is no risk of UXO during the implementation of the subproject.

C. Potential impacts and mitigation measures in the construction phase

1. Loss of trees and impact to fauna

59. ***Impacts:*** There is no natural forest along the subproject roads but only rubber plantation area under local agricultural co-operative and Binh Long Rubber Plantation Company. The rubber plantation area is mainly located in the middle part of the subproject road in Tan Hung, Tan Loi and Thanh An communes. Tree could be cutting down unplanned during the construction phase. Forest fire could be happened if the implementation of fire prevention measures are not monitoring well. Some kind of livestock and poultry along the road could also be affected by construction activities.

60. ***Mitigation measures:*** CSC and PMU safeguards staff will supervise closely the tree cut down process to ensure no tree out of the cut-down list will be affected. The Management Board of Binh Long Rubber Plantation Company will be informed about the construction time and schedule, scope of works as well as location of worker camps and material storage sites. On the other hand, no construction camps, concrete mixing plants, material storage sites are to be located in the rubber plantation area. The contractors will not use or permit the use of woods as fuel for construction activities or use for cooking and water heating in worker camp. The contractors should not buy or use wood from illegal sources. PMU, ESP and CSC will strictly supervise and monitor the construction activities to ensure they will be done properly on the existing road foundation.

2. Impact on local facilities

61. ***Impacts:*** As the subproject road goes through several residential areas of Minh Lap, Thanh An, Tan Hung, Loc Quang, Loc Hiep communes, the water supplies, electrical power supply, and telecommunications, drainage systems of these areas could be maintained during the works. It will affect local people in their daily activities. It is minor impact as the road will be upgraded based on the existing foundation and no current public infrastructures will be relocated. The impact will be happened in 24-month of construction and stop upon the construction complete.

62. ***Mitigation measures:*** to minimize the negative impact, the contractors will inform in advance the construction schedule, the affected electric and telecommunication cable system, irrigations system to CPCs of the seven subproject communes in advance. Construction schedule will be published at the CPC so local people could easy access these information. If any facilities are accidentally damaged during construction period, it should be reported to CSC and PMU as well as the owner to the facilities before repaired at the contractor's expenses.

3. Impact by material exploitation activities at the quarry, borrow pits and temporary storage areas

63. ***Impacts:*** In the work of excavating and material exploitation for the subproject construction activities if excavated soil is not collected then siltation will be occurred. It will be able to cause stuck in water flow closed to the mines and quarry area, create filling situation that affects cultivation areas of residents. Earthwork activities will also change soil structure and raise the amount of unconsolidated sediments at the borrow pits. Temporary storage areas located along the road. When it rains, runoff water will take away them into the surrounding water bodies such as 7 crossing streams, Loc Quang, Soc Xiem and An Khuong lakes, causing sedimentation and erosion. Runoff water could also take construction material such as sand, soil from material storage sites into the surrounding water bodies if material stored for a long duration at the construction site. This impact will happen in the area of quarries; borrow pits and temporary material storage along the subproject road. It will affect local people living in the subproject area and near the quarries; borrow pits. The impact is minor as the main work at is upgrading the road surface based on the existing road base so the required amount of construction material is not large, about 120000 m^3 of stone. On the other hand, the terrain of the subproject area is quite flat and not required large volume of filling soil. The estimated volume of filling soil is 273329 m^3 with about 73000 m^3 could be reused from excavated soil.

64. Nui Gio quarry located 9 km from the subproject road in Tan Loi commune. This is the stone sources for construction activities in Binh Phuoc province. The capacity of the quarry is over 200000 m^3/ year and sufficient for the subproject construction while stone demand for subproject construction is about 120000 m^3

65. ***Mitigation measures***: To minimize the impact, in the detail design period, ESP will provide a Material Management Plan (MMP) for implementation by contractors. The MMP will support to balance the excavation soil and the filling soil to utilize most of the excavation soil for filling purpose. MMP will also list the suitable quarry and mines for construction materials. These mines should own operation licenses from MONRE of Binh Phuoc to ensure material exploitation at the mines will not cause any uncontrolled negative environmental impacts.

4. Generation of excavated soil

66. ***Description:*** The excavated soil subproject construction activities that could not be reuse as filling soil may have significant impacts and environmental degradation due to the improper disposal of these materials. According to the survey result of the PPTA Design Consultant, the estimated volume of excavated soil is 97529 m^3 and the estimated volume for soil for embankment is 273329 m^3. Most of the excavated soil will be reused as filling soil for road embankment. About 45000 m^3 of excavated soil will be transferred to the temporary dumping site. People in the residential areas along the subproject road and near the temporary dumping sites could be affected by soil erosion from these temporary dumping areas. This is a minor impact as in the negative side, the subproject road will be upgraded base on the existing foundation so the levelling work is minimized and the volumes of spoil will be not much. On the other hand the flat terrain along the subproject route is also minimizing the filling soil volume. The vacant land areas along the road are still available for temporary dumping area of spoil. In the positive side: local people could use the spoil for their garden or house foundation.

67. ***Mitigation measures:*** To minimize the negative impacts during 24-month of construction, the contractors should evaluate and grade the excavated soil and the suitable soil will be used for filling purpose. This will reduce the need to extract soil for filling. The excavated soil could be stored at locations agreed with CPCs so local people could take soil to fertilize their land or house foundation.

5. Generation of construction waste and domestic waste from workers

68. ***Description:*** Solid waste that will be generated from construction mainly includes domestic waste of workers and scraps of transported soil and stone, debris, mud. Domestic waste is mainly generated

from construction workers at campsites. Uncontrolled waste disposal operations can cause significant impacts. It will impact firstly the workers in the campsite and areas surround the construction sites and local residential area along the subproject area. The result of local consultation found that the waste collection is carried out in all the communes of the subproject area. The domestic solid waste are transfer to the temporary dumping sites of Thanh An, Tan Hung, Loc Quang communes and Loc Ninh, Chon Thanh district. The construction sites will be scattered along 50.3 km of the subproject road going through some dense population areas. Uncontrolled waste disposal could reduce the water quality (example as: Loc Quang, An Khuong lakes or the crossing streams), soil quality and heavily impact on local people.

69. ***Mitigation measures:*** To minimize the impact during 24-month of construction time, ESP will assist PMU to monitor the contractor progress of WMSDP implementation, to ensure the contractors will place enough dustbins at the worker camps. Contractors will work with 3 DPCs of Chon Thanh, Hon Quan, Loc Ninh and 7 subproject CPCs to find out suitable place for construction and domestic waste disposal. CSC and PMU will supervise to ensure waste and unused construction material will be treated properly and transfer to designated location.

6. Impact from hazardous materials and hazadous waste disposal

70. ***Impacts:*** Use of hazardous substances such as oils and lubricants, bitumen can cause significant impacts if they are uncontrolled or not disposed correctly. The impact level is insignificant because the main construction activity in 50.3 km is paving the road surface and the construction machines are not large. The impacted areas could be surrounding water bodies such as Loc Quang, An Khuong lakes and crossing streams such as Bu Dinh, Bu Linh and Suoi Nghien and people in 6 communes along the subproject road.

71. ***Mitigation measures***: Binh Phuoc PMU, assisted by the ESP and CSC, will be responsible for monitoring the contractor's progress of implementing the WMSDP to avoid or minimize impacts from use of hazardous substances such as oils and lubricants. The contractors must ensure that safe storage of fuel; oils... are agreed by PMU/ESP. They must storage in the areas provide with roof and impervious floor.

7. Impact from the operation of concrete mixing plant

72. ***Impacts:*** The operation of concrete mixing plant will generate noise and dust, gas and odour. Although the emissions from the concrete mixing plant will be rapidly dispersed in the open terrain they will need to be sited carefully to avoid complaints. The impact will happen at the construction sites along the subproject road and affect on local people living in the surrounding areas. However, the affected level is minor because of the small construction activities. Even the construction sites will stretch in several residential areas of the 6 communes along the road, the main work is only upgrading the road surface will not cause any significant impact to the local people along the road

73. ***Mitigation measures***: to minimize the negative impact, the contractors will place concrete and asphalt mixing plants at least 500 m away from sensitive areas, such as kindergartens/ schools, medical centers, pagodas and Minh Lap church. Loud construction activities will also be prohibited to locate at the environmental sensitive areas. PMU and CSC will responsible to monitor this mitigation measure during 24-month of construction phase.

8. Impact from noise, dust and vibration generated during from the construction activities

74. ***Description*****:** Earthworks and rock crushing activities will be the main sources of dust. Construction machines will generate gaseous emissions (NOx SOx, CO, CO_2, etc.) when they are in operation. Transportation vehicles could also create dust along the transportation route. These gaseous and dust could cause health problems to the residents who living near the construction site and along the

transportation route, especially at the environmental sensitive area such as schools/ kindergartens, medical centres, pagodas and church in the subproject communes. This is an average impact due to the subproject route goes through dense population area with many schools/ kindergartens, medical centres, pagodas and church.

75. ***Mitigation measures***: Similarly to the mitigation measure for impact from the operation of concrete mixing plant, the contractors will not locate any noise machines near the environmental sensitive areas such as the schools/ kindergartens, medical centres, pagodas and church. The contractors also will not located large material storage sites near the residential areas. The large storage sites should be located at least 100m away from these sensitive sites. The contractors will work with CPCs of the seven communes, with the represent of ESP and PMU, to identify areas for large material storage site as well as material transportation plan. PMU and ESP will responsible to monitor these mitigation measures.

9. Landslide, soil erosion and runoff

76. ***Impacts:*** Roadside erosion and runoff could happen when its rain, especially at the slope roadside section and the borrow areas. Erosion and runoff could impact on the cultivation areas of local people. Landslide could happen in the section with high slope side like the area near Ba Ut Nhi stream. Landslide will damage the road and block movement. The impact could be considered as insignificant due to subproject flat area and no large water bodies located at the roadside. All the bridges will be paved the surface without changing the structure.

77. ***Mitigation measures***: The contractors should limit to store material near the area of rivers/ stream crossing point and Loc Quang Lake. The construction activities of culverts construction will be implemented in dry season. The contractors will also update weather forecast daily during construction time to avoid heavy rain day. PMU and CSC will responsible to monitor these mitigation measures.

10. Impact on crossing streams or bridge construction locations

78. ***Impacts:*** Careless construction and poor materials control can cause blockage to streams. Runoff water during its rain could bring waste and soil into the nearby water bodies. That could lead to siltation and reduce the water quality. The 7 crossing streams and Loc Quang, An Khuong lakes could be affected by the construction activities and it will lead to reduce water quality of waterbodies of the streams/ lakes. This is a minor impact as the 7 bridges are still in good condition and will be utilized for the new subproject road.

79. ***Mitigation measures***: the contractors should disposed soils, spoils and construction waste out of the bridges/ culverts construction immediately. They should also discuss with relevant authorities for MMP and WMSDP implementation. Silt fences and sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and drilling operation within streams. The steep slopes should be covered with vegetation to avoid landslide and siltation in the nearby rivers/ streams. PMU and CSC should work and collaborate closely with relevant authorities such as CPCs and DPCs to monitor the implementation of these mitigation measures.

11. Impact on water resources and quality

80. ***Impacts:*** The irrigation and domestic water resources on surrounding lands will be affected by construction activities as follows: a) local water supplies will need to be tapped to meet campsite and construction requirements, so bringing subproject based water use into competition with local use; b) surface and subsurface water resources near the subproject route like 7 stream crossing points, Loc Quang and Soc Xiem Lakes could be contaminated by fuel and chemical spills, or by solid waste and effluents generated by the kitchens and toilets at construction campsites; (c) natural streams may become silted by borrow material (earth) in the runoff from the construction area, workshops and equipment washing-yards. Waste and construction material could fall into the water bodies if the waste is not control carefully or material stockpiles area not be covered and well monitored. The impact will mainly on water

bodies along the subproject road such as crossing streams, Loc Quang Lake and worker camps area, especially at the streams crossing points. On the other hand, using water for construction activities could also conflict with the local irrigation purpose especially in the dry season. Irrigation water of Loc Quang, An Khuong and Soc Xiem Lakes could not meet the demand for construction activities.

81. ***Mitigation measures***: In order to minimize this negative impact, the contractors will store lubricants, oils in designated area with roof covered and impervious foundation at least 50m from streams/ lakes. Sediment ditches, silt fences should be installed in suitable location to avoid runoff, erosion and siltation in lakes/ streams. Material storage sites should also be covered carefully with canvas and located at least 50m away from water bodies. The contractors will work with irrigation staff of the 7 communes to find out the most suitable construction plan. PMU and CSC will responsible to monitor these mitigation measures.

12. Impact by the large influx of construction worker

82. ***Impacts:*** Large influx of construction worker will create a burden on local public services like electric and water supply. Construction workers from other area could bring outside disease to the subproject area. The concentration of workers in the work camps could also create a good environment for diseases such as sore eyes, cholera, flu and respiratory problems. Social aspect: concentration of a number of workers could lead to social problems such as gambling, drug addiction, prostitute, violence, conflict amongst workers, or between workers with local people. The impact will affect directly on workers and indirectly on the community near the construction sites in the residential area of 7 communes along the subproject road. This is an average impact due to high density of population in the subproject area.

83. ***Mitigation measures:*** Worker camp location and facilities located at least 500m from residential areas as agreed by local communities and approved by ESP and PMU and managed to minimize impacts. All workers should register with local police for temporary residential certificate. The worker camp should be located in the area with sufficient drainage to avoid water logging and formation of breeding sites for mosquitoes and flies. Worker should have health check before start work in the subproject and should be trained for living and working behavior before joining the sites. On the other hand, Contractors will use local labours for simple works such as smooth the road, moving soil, give priority to poor families, female householders, woman if they need jobs. It aims to raise their income, create more jobs, contribute to poverty reduction for local community and also reduce the number of construction workers from outside. Local people in the residential area of 7 subproject communes will have benefits from the subproject construction. However, this is a small positive impact and it requires the coordination between the contractor and CPCs of subproject communes and nearby communes in recruiting local labours (contractors often prefer to engage their own trained workforces rather than training unskilled labourers). The duration of the impact is also short, only in 24 months construction time.

13. Risk to health and safety to local people or construction workers

84. ***Impacts:*** Dust, exhaust gas and noise generating from earthworks, transporting of material, construction activities and operation of machines, etc. These factors have direct affects on health of workers and local residents. Material transport and construction activities on the existing road may create the risk of traffic safety and houses structure on roadsides especially in the environmental sensitive areas. The excavation of the trenches for side drain construction can threaten public safety, particularly of pedestrians and children. Waste and wastewater from construction activities and worker camps could also create a favourable environment for the outbreak of some respiratory diseases of local people as well as workers. Accidents may occur if during the construction if workers are not provided with safety equipment and obey construction regulations. The objects of this impact are local people in the subproject area especially pupil in the subproject area and the workers working at the site. This is an average impact as the construction sites will stretch along 50.3 km of the subproject, in the residential areas of 6 communes of Chon Thanh, Hon Quan and Loc Ninh district.

85. ***Mitigation measures***: The contractors with the support from ESP will conduct training for workers on safety and environmental hygiene. The workers will be instructed construction camp rules and site arrangement and all of them will be equipped with appropriate PPE such as safety boots, helmets, protective clothes, gloves and ear protection for the one working with noisy equipment. All areas of excavation greater than 1m deep and insides of temporary works should be fenced with sign boards installed. The contractors in collaboration with ESP and PMU will also work with 6 CPCs of commune along the road for the construction plan and scope. The CSC and PMU will responsible for supervision activities during construction phase and response timely for any raised opinions/ comments from local people and authorities.

14. Impact on the local traffic

86. ***Impacts:*** Construction activities on the Subproject road are likely to cause hindrance in traffic flow if not mitigated properly especially at the start point (junction with NR14), end point (junction with PR748) and 4 junctions with PR756C, PR758, PR757 and PR 304 along the subproject road. Local people and people from other area who travel on the subproject road will be affected during 24 months construction period. However, this is a minor impact due to local people could have other options for travel and the subproject only paved the road surface in short construction time.

87. ***Mitigation measures:*** To minimize the disturbance to local people, the contractor will work with CPCs on construction plan and the construction schedule and scope will be published in all subproject communes and districts. The contractor will also construct temporary road and minimizing interference with traffic flows past the works site.

15. Environmental impacts due to inappropriate enivronmental recovery responsibility

Impacts: If after construction completed, the sites are not cleaned up and/or site restoration such as replanting trees; grass; filling up construction pit; removing camp site have not been implemented in accordance with environmental regulation, the environmental issues like erosion, sedimentation and/or accident may occur. Construction waste and waste soil could also impact on the soil quality of the temporary acquired land area.

88. ***Mitigation measures***: Site cleaning up must be performed right after the work completion. Pit and excavation areas must be filled up by the contractors when the construction complete. PMU and CSC will strictly monitor the site to ensure all construction sites will be fully recovered upon the construction finish.

D. Potential impacts and mitigation measures in the operation phase

1. Impact from dust and noise arising from increasing of traffic density

89. ***Impacts:*** Paved road surface condition will reduce the dust concentration but better road condition will also increase traffic density along the subproject road especially the road play an important role for goods transportation from National Road No.14 to Hoa Lu and Hoang Dieu International Border Gates. Noise, dust and vibration could have negative impact on the local people living along the subproject road, especially the environmental sensitive areas such as schools/ kindergartens, medical centres, pagodas and church.

90. ***Mitigation measures:*** Binh Phuoc Department of Transportation (DOT) will responsible for subproject management in the operation phase. Road hump, speed limit sign will be installed at the sensitive areas like schools/ kindergarten, medical centres. The use of air horn will be banned along the subproject road, especially in the sensitive area.

2. Favourable conditions for transportation of goods and people movement

91. ***Impacts:*** The upgraded road will favor the good transportation to Hoang Dieu and Hoa Lu Border Gates. Support movement of local people on the road in rainy condition. As it support better transportation of goods, especially agricultural product, the time for transportation will reduce and the profit will increase. The completion of the road will favour people in the 7 communes of Chon Thanh, Hon Quan and Loc Ninh districts and surrounding residential areas as well as people who doing business along the subproject road.

3. Driving conditions and community safety

92. ***Impacts:*** The upgrading and construction of the road is likely to increase the vehicle speed on the road. Increases in traffic flow indicate additional future traffic should be moderate and unlikely to create many community safety issues. On the other hand, the condition of the road facilities will be enhanced and driving conditions should improve. The beneficiaries of the subproject are local people in the two districts and people who travel on the subproject road.

4. Affects on employment or livelihood

93. ***Impacts:*** Increase incomes and living standards for people in the subproject area by means of increasing the profit as save time for transportation and merchant will access production area easier, thus the agricultural production price will be higher. Local people in the subproject area and people who cultivate in the subproject area as well as local people in Chon Thanh, Hon Quan and Loc Ninh districts will be benefited from the completion of the road. This is a permanent impact and has significant effects to local people's lives.

5. Impacts on ethnic groups

94. ***Impacts:*** The completion of the subproject road will support to increase incomes and living standards for ethnic minorities in the subproject area by means of increasing the profit. The completion of the road will support them to save time for travel and increase production prices as merchant could access the production area easier.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

95. The objectives of the stakeholder consultation process was to disseminate information on the subproject and its expected impact, long-term as well as short-term, among primary and secondary stakeholders, and to gather information on relevant issues so that the feedback received could be used to address these issues at early stages of subproject design. Another important objective was to determine the extent of the concerns amongst the community, to address these in the subproject implementation and to suggest appropriate mitigation measures.

A. Public consultation preparation

96. Stakeholders are people, groups, or institutions that may be affected by, can significantly influence, or are important to the achievement of the stated purpose of a proposed intervention. The stakeholders consulted for the construction of the road 756 included representatives from Binh Phuoc DPI, DONRE, and DARD. Consultation has also been implemented with representatives from 7 CPCs in Chon Thanh, Loc Ninh and Hon Quan district, Rubber Processing Factories. Several local people living along the subproject road have been consulted using questionnaire and concentrated on the inconvenient condition for local people during the construction phase of the subproject. There are 51 local people have been interviewed with 11 of them are women. Consultations took place in April 2016. The consultation for local authorities has been conducted in mutual information exchange to get information from relevant authorities as well as record their concerns on potential environmental impact of the subproject implementation

B. Information dissemination during public consultation

97. Providing information through local authority offices will provide a conduit for the improvement of the subproject implementation to better serve the stakeholders. Public consultation can also assist in:

i) harnessing cooperation from informed people to help local authorities reconfirm the extent of local permits and licenses that will be required at a later stage;

ii) obtaining cooperation from informed residents and groups which to avoid cost and time in dealing with complaints;

iii) identifying local infrastructure subprojects or other local initiatives that will interface with the subproject roads with assistance from informed local authorities;

iv) the collection of relevant information on the current condition of the local environment including aspects of natural disaster.

98. The information disseminated during public consultation is including: (i) background of the Project and subproject; (ii) basic information related to ADB and the Government requirement for environmental protection; (iii) potential impacts during subproject implementation and mitigation measures.

C. Obtained results and use of results from public consultation

99. The results of the public consultations are recorded in Table 11 and 12 below. In general, all the relevant stakeholders are support the implementation of the subproject. As the subproject road has been constructed for a long time and different parts have been severely damaged, especially about 10 km in Thanh An commune, Hon Quan district, upgrade road surface will support goods transportation from National Road No.14 to Hoang Dieu and Hoa Lu Border Gate. The main construction work will be upgrade

road surface based on the existing road foundation, no house must be relocated and no major land acquisition will be taken, the local people is totally support the subproject implementation.

100. There is a concern of Loc Quang CPC that the design of drainage system for the section closed to Bu Dinh stream need to be sufficient for water discharge during heavy rain condition. This section has a large variable elevation between two road sides causing runoff water during heavy rain could overwhelm the drainage system and damage the road surface. There is also a similar opinion of local people in Thanh An commune related to temporary flood at the crossing point with Ba Ut Nhi streamlet in Thanh An commune due to insufficient capacity of the drainage system.

Table 11 – Main issues and information from local authorities

Main issues	Information from relevant authorities
Suitable subproject design	Tan Loi CPC: Should work with CPC before finalize the detail design
Impact on cultivation area and local traffic	DPI: The environmental impacts are minor and could be easily mitigated. The construction progress must be short to reduce impact on local people and reduce the subproject cost. Loc Phu CPC: Construction schedule and scope must inform CPC in advance;
Noise, dust, vibration	Several CPCs: sufficient watering the road to reduce dust concentration
Impact on local facilities	Loc Phu, Thanh An CPCs: Support local people construct the temporary access to their house during construction phase.
Impact on road safety	Tan Hung CPC: Ensure safety for local people, minimize dust and gaseous from construction machines
Runoff, sedimentation	Loc Quang, Thanh An CPCs: The design of the drainage system along the road at section near Ba Ut Nhi and Bu Dinh Bridge need to consider be sufficient to avoid runoff, sedimentation impact on cultivation area of local people

Table 12 – Main environmental concerns from public consultation

Concerns expressed	How concerns are addressed in IEE
No compensation or inadequate compensation	Before the construction start, PMU will review the Land Acquisition and Resettlement report and check at the field to ensure that all affected households have received compensation adequately
Moderate material transportation speed, cover with canvas to avoid dust and fallen materials	Regulation for material transportation will be put as a part of an Appendix in the contract with contractor. (See Appendix 4 - Environmental Mitigation Measures to Include into Bidding Documents – for reference) CPCs in cooperation with PMU and CSC will monitor the compliance during construction phase.
Sufficient drainage capacity at large elevation different road sides	Design strictly follow TCVN 4054 – 2005 Vietnam Technical Standards - Road and Highways – Specifications for Design

101. The environmental assessment process under the SPS 2009 requires the disclosure of the IEE to the public during the completion of the IEE to be in strict adherence to the rules. This process will be concluded by displaying the IEE at the PPC Headquarters during the period when the IEE is disclosed on the ADB website. Binh Phuoc PMU will responsible for IEE translation to Vietnamese and disclose at 7 subproject communes of Loc Ninh, Chon Thanh and Hon Quan districts.

VIII. GRIEVANCE REDRESS MECHANISM

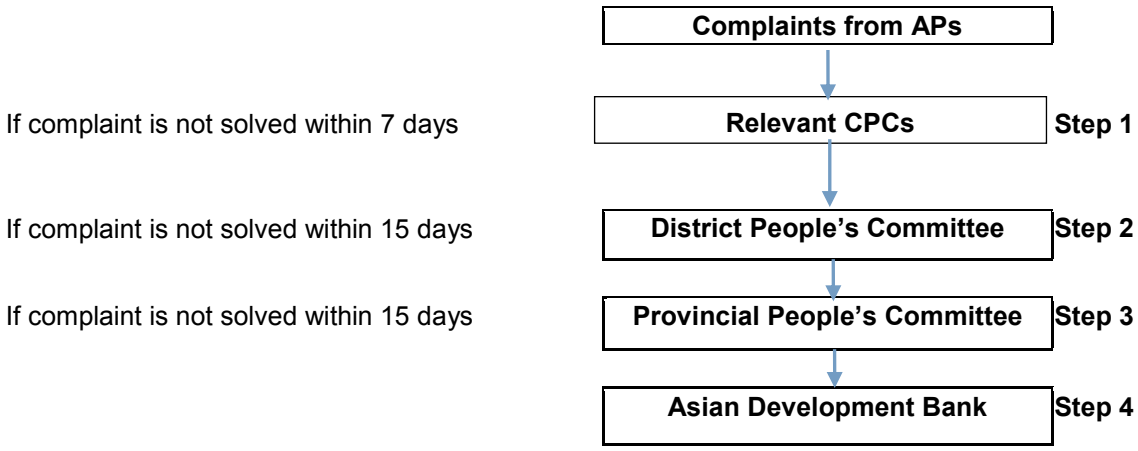
A. Purpose of the mechanism

102. During the deployment of the subproject, local people are disseminated environmental protection activities such as EMP. Negative impacts on the environment may occur during the construction and operational phases. Any comments/ suggestions of local people will be solved quickly, transparently and protected by law, particularly for affected people by the subproject. Complaint handling mechanism was classified by level and responsibilities of involved parties.

B. Grievance redress mechanism

103. The procedures for grievance redress is defined below and summarized in the figure below.The procedure described below should apply easily to environmental issues and be consistent with the legal process for resolution of disputes in Viet Nam:

- ***Step 1***: If a household has any complaint he/she can submit a complaint in the written or verbal forms to the representative of CPC-community monitoring board (usually the Deputy Chairman of the CPC). CPCs will work with ESP and CSC to solve complaints and representative of the CPCs will response in written form to the complainant
- ***Step 2***: If the complaint is not resolved with 7 days, the complainant will submit an application to the relevant DPCs to resolve the complaint.
- ***Step 3***: If more than 15 days but no official response in written form from DPCs, the complainant may submit a complaint in the written form to the Binh Phuoc PPC (through Binh Phuoc DONRE). Binh Phuoc PPC will require relevant DPC to solve the complaint. In case the complaint is still not resolved, Binh Phuoc PPC will require environmental police to investigate and requested stakeholders to resolve the complaint.
- ***Step 4***: If efforts to resolve disputes using the grievance procedures remain unresolved or unsatisfactory, APs have the right to directly discuss their concerns or problems with the ADB Southeast Asia Department through the ADB Viet Nam Resident Mission (VRM). If APs are still not satisfied with the responses of VRM, they can directly contact the ADB Office of the Special Project Facilitator (OSPF).



IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation arrangements

104. Binh Phuoc PMU – will recruit one Environment Safeguard Specialist (ESP) under Loan Implementation Consultants (LIC) to support subproject implementation in all five Project provinces. ESP will support PMUs updated EMP and as well as monitor the compliance of the contractors during construction phase.

105. PMU will engage Construction Supervision Consultant for the monitoring and supervision of the subproject in general and for environmental monitoring as well. CSC will ensure that the contractors implement the provisions of the subproject EMP.

Table 13 – Responsibilities for EMP implementation

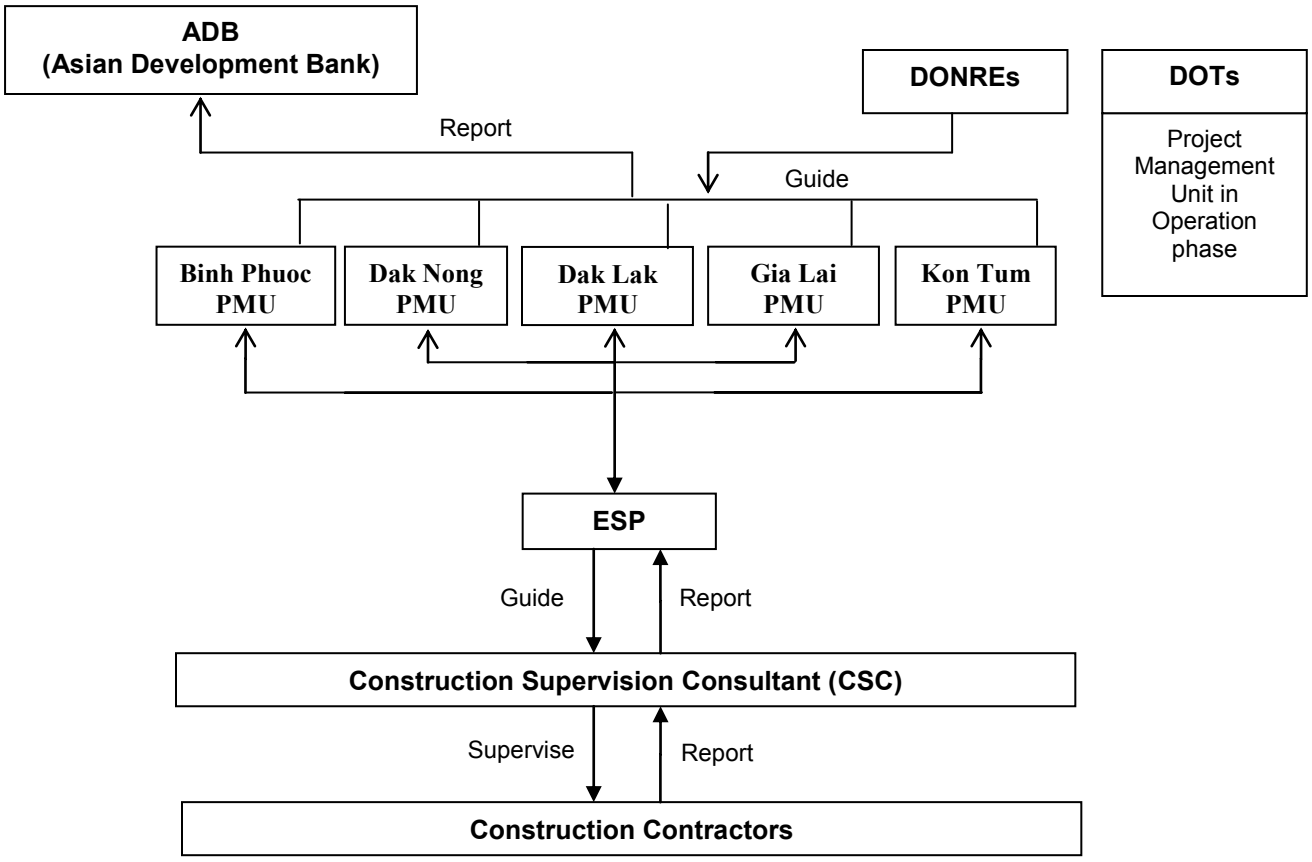
Agency	Responsibilities
Binh Phuoc Department of Planning and Investment	- Executing agency with overall responsibility for subproject construction and operation - Ensure that sufficient funds are available to properly implement the EMP Ensure that the Subproject, regardless of financing source, complies with the provisions of the EMP and ADB Safeguard Policy Statement 2009 (SPS) - Ensure that Subproject implementation complies with Government environmental policies and regulations - Ensure that tender and contract documents include the Subproject updated EMP - Submit semi-annual monitoring reports on EMP implementation to ADB
Provincial Project Management Unit under DPI (PMU)	- Ensure that EMP provisions are strictly implemented during various subproject phases (design/pre-construction, construction and operation) to mitigate environmental impacts to acceptable levels. - Undertake monitoring of the implementation of the EMP (mitigation and monitoring measures) with assistance from CSC and ESP. - Ensure that Subproject implementation complies with ADB's environmental policy and safeguards policy statement (SPS 2009) principles and requirements - For subproject duration, commit and retain a dedicated staff within PMU as environment and safeguards staff to oversee EMP implementation - Ensure that environmental protection and mitigation measures in the EMP are incorporated in the detailed design - With the support from ESP, updated EMP to suitable with any changing in subproject scope or any unanticipated impact rise. - Obtain necessary environmental approval(s) from DONRE prior to award of civil works contracts - Include the Subproject updated EMP in the bid and contract documents for civil works - Establish an environmental grievance redress mechanism, as described in the IEE, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the Subproject's environmental performance - With assistance from ESP, prepare semi-annual environmental monitoring reports for submission to ADB - Based on the results of EMP monitoring, identify environmental corrective actions and prepare a corrective action plan, as necessary, for submission to ADB.
Environment Safeguard	- Update EMP to make it suitable with the current condition or whenever

Specialist (ESP)	subproject scope change or any unanticipated impact rise. - Ensure that the environmental protection and mitigation measures identified in the EMP for the design stage has been incorporated in the detail design; - Assist PMU to ensure that all environmental requirements and mitigation measures from the IEE and EMP are incorporated in the bidding documents and contracts. - During detailed design phase carry out baseline data collection on air quality, noise and surface water quality (as specified in the EMP) - During detailed design phase, prepare method statement (Waste Management and Spoils Disposal Plan) described in the IEE/EMP. - Implement all mitigation and monitoring measures for various subproject phases specified as ESP's tasks in the EMP - Work with PMU to execute any additional environmental assessment prior to subproject construction as required in the EMP (e.g., preparation of new or supplementary environmental assessment in case of change in alignment that will result to adverse environmental impacts that are not within the scope of the IEE prepared during loan processing, etc.) - Undertake environmental management capacity building activities for PMU as described in the IEE and EMP. - Engage international and national environment specialists to ensure proper implementation of EMP provisions. Through these specialists, the ESP shall: (i) ensure proper and timely implementation of ESP's tasks specified in the EMP, (ii) conduct environmental training as specified in the IEE/EMP for PMU, (iii) conduct workers' orientation on EMP provisions, (iv) undertake regular monitoring of the contractor's environmental performance, as scheduled in the EMP (v) conduct field measurements for surface/ground water quality, dust and noise as required in the EMP, and (v) prepare environmental baseline report and environmental semi-annual environmental monitoring reports , as specified in the EMP, for submission to ADB.
Construction Supervison Consultant (CSC)	- Provide the ESP relevant information as well as full access to the subproject site and all project-related facilities (such as construction yards, workers' camps, borrow and quarry areas, crushing plants, concrete mixing plants, etc.) to monitor contractors' implementation of the subproject EMP, assess environmental impacts resulting from on-going site works and operation related facilities, undertake environmental effects monitoring and orientation of workers on EMP implementation. - Undertake day-to-day subproject supervision to ensure that the EMP is properly implemented by contractors. - Orient workers on EMP implementation, and health and safety procedures - Document and report to PMU on occupational accidents, diseases and incidents - As part of regular progress report submission to PMU, prepare reports on the status of the contractors' implementation of the EMP and health and safety issues - Engage an environmental staff to ensure proper implementation of the above tasks.
Contractors	- Recruit qualified environmental officer to ensure compliance with environmental statutory and contractual obligations and proper implementation of the Subproject EMP - Provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the EMP - Implement additional environmental mitigation measures, as necessary
Binh Phuoc Department of Transportation (DOT)	- Responsible for operation and maintenance of Subproject road - Implement EMP monitoring during operation
Binh Phuoc Department	Review and approve environmental assessment reports required by the

of Natural Resources and Environment (DONRE)	Government. - Undertake monitoring of the subproject's environmental performance based on their mandate

The organization structure of Environmental Management Plan is showed in the chart below:

Figure 2 – EMP Implementation Organization Chart



B. Environmental Management Plan

106. The anticipated environmental impacts and mitigation measures discussed in the previous section is presented in Table 13. The table also shows responsibilities and timeframe/schedule for implementation of mitigation measures and monitoring.

Table 13 shows that most mitigation activities during pre-construction are to be implemented by the ESP while during construction, measures shall be primarily implemented by the contractors. During operation stage, DOT shall undertake environmental mitigation and monitoring requirements specified in the EMP. To ensure implementation of mitigation measures during construction, the EMP shall be included in the tender and contract documents for civil works. Contractors' conformity with environmental contract procedures and specifications shall be regularly monitored by PMU with assistance from CSC and results shall be reported semi-annually to ADB.

C. Emergency Response Plan

Table 14 - Detail Environmental Management Plan

		Impact Mitigation				
Environmental Concern	Objective	Proposed Mitigation Measures	Responsible to Implement	Timing	Locations	Mitigation Cost
Design and Pre-construction Phase						
1. Sufficient drainage capacity in detail design	Design suitable drainage capacity at the large different elevation road sides	Design sufficient drainage capaity at the section with large different elevation road sides follow TCVN 4054 – 2005	Design Consultant	Before completion of detail design	N/A	
2. Land acquisition and resettlement	Control the impact of land acquisition and resettlement	Monitor the compensation process to ensure it is suitable with the Land Acquisition and Resettlement Report	ESP	Before construction	N/A	Included in the contract with ESP
3. Environmentally responsible procurement	EMP is properly implemented by selected contractors	1. EMP is included in tender documents to ensure that mitigation measures are budgeted and to prepare the contractors for environmental responsibilities. 2. Specify in bid document that Contractors shall engage capable and trained staff to take responsibility for the environmental management and safety issues at the working level and to monitor the effectiveness and review mitigation measures as the subproject proceeds. 3. Contractors recruit qualified staff to oversee implementation of environmental and safety measures specified in EMP.	ESP; PMU	Before bidding and before construction commencement	N/A	Included in the contract with ESP and PMU operation budget
4. Material Management Plan	Manage material storage area to avoid runoff and sedimentation	1. Designs to balance excavation and fill where possible. 2. Prepare the MMP. The plan shall detail the arrangements to be made to facilitate the timely production and supply of construction materials to avoid impacts due to unnecessary stockpiling outside the Subproject site. MMP shall consider the following: (i) Required materials, potential sources and estimated quantities available, (ii) Impacts to identified sources and availability (iii) Excavated slope material for reuse and recycling methods to be employed, (iv) Required endorsements from DONRE	ESP	Before bidding	N/A	Included in the contract with ESP

		and local groups for use of sources. (v) Methods of transportation to minimize interference with normal traffic. (vi) Constraints of regular delivery schedule to reduce stockpiling on site. vii) Measures to be employed to mitigate nuisances to local residents. (viii) Program for reuse of slope excavated material for reuse (ix) Program for delivery of quarry and borrow materials. (x) Discussion of the CSC, PMU/ ESP inspection/monitoring role. (xi) Agreement on publicity/public consultation requirements.				
5. Plan spoil and waste disposal	Minimize waste and pollution	1. Re-use of waste materials & spoil disposal locations included in bid and contract documents. 2. Prepare the WMSDP. The plan shall cover handling, storage, treatment, transport and disposal of solid and liquid wastes, hazardous materials, hazardous wastes and excavation spoils. 3. WMSDP will include consideration of all matters related to solid, liquid waste and spoil disposal including the following: i) Expected types of waste and quantities of waste arising. ii) Waste reduction, reuse and recycling methods to be employed iii) Agreed reuse and recycling options and locations for disposal / endorsement from DONRE and local groups. iv) Methods for treatment and disposal of all solid and liquid wastes. v) Methods of transportation to minimize interference with normal traffic. vi) Establishment of regular disposal schedule and constraints for hazardous waste. vii) Program for disposal of general waste / hazardous waste. viii) Discussion of the ESP, PMU/CSC inspection/ monitoring role.	ESP	Before bidding	N/A	Included in the contract with ESP

		ix) Establishment of complaints management system for duration of the works x) Agreement on publicity/ public consultation requirements. 4. The WMSDP shall include a section on Hazardous Materials and Waste section. This will detail the mitigation measures, organizational arrangements, resources, facilities, etc. to avoid environmental as well as health and safety impacts due to use and disposal of hazardous materials/substances.				
6. Environmental Capacity Development	Develop environmental management capacity of PMU to ensure proper EMP implementation and promote environmental awareness among workers.	1. PMU to commit and retain dedicated staff for subproject duration to oversee EMP implementation. 2. ESP to train PMU to build their capacity on EMP implementation, monitoring and reporting using workshops and on-the-job training techniques and case studies. 3. Conduct workers' orientation on EMP provisions. The ESP shall periodically conduct such orientation as every new contractor is engaged.	PMU; ESP	Through out the pre-construction and construction phase	N/A	Included in the contract with ESP and PMU operation budget
Construction Phase						
1. Loss of trees	Avoid and minimize impact to the plant in the subproject area	1. Minimized vegetation covers clearances. 3. Prohibit cutting of trees for firewood and for use in subproject. 4. During replanting/revegetation works, new alien plant species (i.e., species not currently established in the country or region of the subproject) shall not be used. Invasive species shall not be introduced into new environments. 5. The contractors will not use or permit the use of wood as a fuel for the execution of any part of the works, including but not limited to the heating of bitumen and bitumen mixtures, and to the extent practicable shall ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 6. Contractors shall not buy or use wood from the illegal sources (that come from the illegal logging)	7 CPCs; Contractors	Through out construction phase	Along the subproject road; worker camps area	Included in the contract with contractors

		7. No construction camps are to be rubber plantation area. 10. Contractors will take all precautions necessary to ensure that damage to vegetation is avoided due to fires resulting from execution of the works. The Contractors will immediately suppress the fire, if it occurs, and shall undertake replanting to replace damaged vegetation.				
2. Local facilities	Prevent interruption of services such as electricity and water supply during relocation of the local facilities. Repair damaged access roads.	1. Reconfirm power, water supply, and telecommunications likely to be interrupted by the works. 2. Contact all relevant local authorities for facilities and local people to plan reprovisioning of power, water supply, and telecommunication systems. 3. Facilities shall be relocated and reconnected well ahead of commencement of construction works and contractors shall coordinate with facility company for relocation and reconnection well before works commence. 4. Affected communities shall be properly informed in advance. 5. Reconnection of facilities shall be done at the shortest practicable time before construction commences. 6. Facilities damaged during construction shall be reported to the CSC, PMU and facility authority and repairs arranged immediately. 7. Access roads, agricultural land and other properties damaged during transport of construction materials and other project-related activities shall be reinstated upon completion of construction works at each section	Contractors	Before construction start and through out the construction phase	Along the subproject route; at the residential areas	Included in the contract with contractors
3. Materials exploitation and management of quarry, borrow pits and temporary storage area	Minimize impacts from materials extraction, transportation and storage.	1. Implement MMP prepared by ESP during detailed design phase. 2. Balance excavation and fill requirements to minimization negative impacts 3. Prioritize use of existing quarry sites with suitable materials and update the list of quarries and borrow pits monthly in MMP and report to PMU and minimize impacts on	Contractors	Though out construction phase	Subproject site, quarries and borrow pit areas	Included in the contract with contractors

		other local resources. 4. Procure materials only from Binh Phuoc DONRE authorized quarries and borrow sites. 5. Replant tree and vegetation cover of any vegetation clearance area in quarries and borrow pits 6. Stockpile topsoil for later use and fence and re-contour borrows pits after use. Topsoil, overburden, and low-quality materials shall be properly removed, stockpiled near the site, and preserved for rehabilitation. 7. Do not use quarries in areas of natural woodland or near rivers, which provide food and shelters for birds and other animals. 8. Borrow/quarry sites shall not be located in productive land and forested areas. 9. During quarry/borrow site operation; provide adequate drainage to avoid accumulation of stagnant water. 10. Ensure borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of water bodies favourable for mosquito breeding. 11. Upon completion of extraction activities, quarry and borrow pits shall be dewatered and fences shall be installed, as appropriate, to minimize health and safety risks. 12. To avoid drowning when pits become water filled, measures such as fencing, providing flotation devices such as a buoy tied to a rope, etc. shall be implemented.				
4. Waste and spoil disposal	Control spoils and waste disposal, lubricant and hazardous wastes.	1. Implement corresponding provisions of WMSDP prepared by the ESP. 2. Areas for disposal to be agreed with CPCs and Binh Phuoc DONRE checked and recorded by the CSC, ESP/PMU and monitored 3. Spoil and waste will not be disposed of in streams or other surrounding water bodies. 4. Spoils and waste shall only be disposed to areas approved by local authorities. 5. Spoil disposal shall not cause sedimentation and obstruction of flow of	Contractors	Through out construction phase	Through out construction site, material storage areas, machines and vehicles maintainance area	Included in the contract with contractors

		watercourses, damage to agricultural land and densely vegetated areas. 6. Under no circumstances will spoils be dumped into watercourses (rivers, streams, drainage, irrigation canals, etc.) 7. The spoils disposal site shall be located at least 50 m from surface water courses and shall be protected from erosion by avoiding formation of steep slopes and grassing.				
5. Operation of concrete mixing plant	Avoid air pollution, traffic obstacles and contamination	1. Locate mixing plant, bitumen heating, off road and (wherever practicable) at least 500 m from nearest sensitive receivers (residential areas, schools, clinics, etc.) and streams and install and maintain dust suppression equipment. 2. Concrete mixing areas shall be protected against spills and all contaminated soil must be properly handled according to applicable national and local laws and regulation. As a minimum, these areas must be contained, such that any spills can be immediately contained and cleaned up. 3. Prevent soil contamination requiring contractors to instruct and train their workers on storage and handling of materials and chemicals that can potentially cause soil contamination. 4. Recycle debris generated by dismantling of existing pavement subject to the suitability of the material.	Contractors	Through out construction phase	Through out construction site	Included in the contract with contractors
6. Noise, dust and vibration	To minimize negative impacts from noise, dust and vibration during construction period	1. Restrict works to daylight hours within 500 m of sensitive area. 3. Powered mechanical equipment and vehicle emissions to meet national TCVN/QCVN standards. All construction equipment and vehicles shall have valid certifications indicating compliance to vehicle emission and noise creation standards. 4. Monitor and investigate complaints; propose alternative mitigation measures. 5. Keep material storage site moist 6. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and	Contractors	Through out construction phase	Through out construction site especially at the sensitive areas such as schools/ kindergarten, medical centers, pagodas and church	Included in the contract with contractors

		dust emission. 7. On rainless day undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials storage sites, construction sites, access roads, quarry areas, borrow sites and other subproject areas where residential sites and other sensitive points such as schools, clinics… are located nearby. If works are within 15m of any sensitive points, the contractors shall install dust barrier between the works at the road edge and the sensitive points (e.g. 2.5 m high temporary walls, etc.) 8. Mixing, bitumen heating and crushing plants operations will be equipped with dust suppression devices such as water sprays. 9. Clean up road surfaces after work. 10. To protect buildings and structures from vibration, non-vibrating roller shall be used in construction sites near buildings and structures. 11. Structures, which are damaged due to vibration caused by the construction activities, shall be repaired immediately as directed by ESP/PMU. 12. Machinery shall be turned off when not in use. 13. Pile driving during to be schedule for daytime if construction site is near sensitive points or approved by DONRE, CPCs and ESP/PMU. 14. Impose speed limits on construction machines and transportation vehicles to minimize dust emission along areas where sensitive pints are located (houses, schools, clinics, pagodas, church etc.).				
7. Erosion control/ run off	Protect established facilities	1. Establish vegetation and erosion protection immediately after completion of works in each stretch / sector. 2. Check weather forecasts and minimize work in wet weather. 3. Stockpile topsoil for immediate replanting after cutting. 4. Minimize damage and excavation of surrounding vegetation during slope	Contractors	Through out construction phase	Through out construction site	Included in the contract with contractors

		formation. 5. Include and implement appropriate measures for slope protection, i.e. vegetation cover and stone pitching, as required in the detailed construction drawings. 6. Prevent erosion and protect the excavated slope with temporary or permanent drainage as soon as practicable after cutting. 7. If new erosion occurs accidentally, back fill immediately to restore original contours. 8. Low embankments will be protected from erosion by seeding and planting indigenous grasses that can flourish under local conditions. 9. Payments will be linked to the completion of the works as indicated by the installation of erosion control measures to protect the works to the satisfaction of ESP/PMU.				
8. Stream protection and bridge/culvert construction	Protect stream and maintain flows	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed not to block streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.	Contractors	Through out construction phase	7 streams/ flows crossing point	Included in the contract with contractors
9. Water resources and quality	To minimize impact from wastewater drainage and prevent potential impact on water quality due to subproject activities	1. Provide adequate drainage facilities at construction sites and worker camps to avoid stagnant water. 2. Implement agreed designs for bridges/ culverts sufficient to control flooding as designed. 3. Store lubricants, fuels and wastes in	Contractors	Through out construction phase	3 stream/ flow crossing positions, material storage sites, temporary waste disposal	Included in the contract with contractors

		dedicated enclosures at least 50 m from water bodies on high and impervious ground with top cover 4. Solid waste from construction activities and workers camps will not be thrown in streams and other water bodies (drainage, lake, pond, etc.) 5. Construction storage/stockpiles shall be provided with bunds to prevent silted run-off. 6. Stockpiled materials will be covered to reduce silted run-off. 7. No stockpiling or borrow sites at least 100m of water body. 8. Work in streams at bridge repair sites will be scheduled during dry season and work duration shall be as short as possible. 9. Washing of machinery and vehicles in surface waters shall be prohibited.			area	
10. Construction and worker camps	Construction camps and worker camps not to cause any negative impact to surrounding environment (forest area, water bodies)	1. Construction and worker camp location and facilities located at least 500m from settlements and agreed with local communities and facilities approved by ESP and managed to minimize impacts. 2. Hire and train as many local workers as possible. 3. Provide adequate housing for all workers at the construction camps and establish clean canteen/eating and cooking areas. 4. Mobile toilets (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and prevented by cleaning lavatories daily and by keeping toilets clean at all times. 5. Provide separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supply for male and female workers. 6. Borrow pits and natural depressions with prelaid impervious liners will be used to dispose of scarified/scraped asphalt, and then covered with soil. This will check potential groundwater contamination. 7. Camp site will be cleaned up to the satisfaction of and local community after use.	Contractors	Through out construction phase	Through out construction sites and worker camps	Included in the contract with contractors

		8. Solid and liquid waste will be managed in line with WMSDP. 9. All waste materials shall be removed and disposed to disposal sites approved by local authorities 10. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned.				
11. Sanitation and Diseases	Control of infectious diseases	1. Standing water will not be allowed to accumulate in the temporary drainage facilities or along the roadside to prevent proliferation of mosquitoes. 2. Temporary and permanent drainage facilities will be designed to facilitate the rapid removal of surface water from all areas and prevent the accumulation of surface water ponds. 3. Malaria controls (e.g., provision of insecticide treated mosquito nets to workers, installation of proper drainage to avoid formation of stagnant water, etc.) and HIV-AIDS education will be implemented in line with social plans for the subproject. 4. HIV/AIDS awareness and prevention program shall be implemented in line with social plans under the subproject.	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors
12. Safety precautions for workers	Ensure worker safety	1. Establish safety measures as required by law and by good engineering practice and provide first aid facilities that are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, ear plugs, gloves, etc. at no cost to the employee. 5. Where worker exposure to traffic cannot be completely eliminated, protective barriers	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors

		shall be provided to shield workers from traffic vehicles. 6. Workers shall be provided with reliable supply of potable water. 7. Construction camps shall be provided with adequate drainage to avoid accumulation of stagnant water. 8. Construction camps shall be provided with toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained to allow effective operation. 9. Ensure reversing signals are installed on all construction vehicles.				
13. Public safety	Prevent accident with local people	1. Install barriers (e.g., temporary fence) at construction areas to deter pedestrian access to the roadway except at designated crossing points. 2. The general public/local residents shall not be allowed in high-risk areas, e.g., excavation sites and areas where heavy equipment is in operation and such sites have a watchman to keep public out. 3. Speed restrictions shall be imposed on subproject vehicles and equipment when traveling through residential areas, especially through the sensitive points such as schools, local clinics, pagodas… 4. Upon completion of construction works, borrow areas will be backfilled (if suitable materials are available, e.g., excavation spoils) or fenced.	Contractors	Through out construction phase	Through out construction sites, quarries and borrow areas, material transportation roads, especially near schools/ kindergartens, medical centers, pagodas, church.	Included in the contract with contractors
14. Traffic Management	Minimize disturbance of traffic	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience due to subproject operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold ups and	Contractors	Through out construction phase	Through out construction sites; at start and end points of the road; 4 junctions with Provincial roads along the subproject route	Included in the contract with contractors

		congestion 3. In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up. 4. Provide safe vehicle and pedestrian access around construction areas. 5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. 6. Provide sufficient lighting at night within and in the vicinity of construction sites. 7. Designate traffic officers in construction sites.				
15. Environmental recovery	Provide environmental recovery of the subproject	Contractors to reconfirm and implement recovery (e.g., landscaping, tree replanting) identified at the detailed design stage	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors
Operation Phase						
1. Generate dust, noise, vibration	To minimize dust, noise and vibration	1. Install sign board, speed limit/ loading limit to prevent dust, noise and vibration from over speed vehicles 2. Install road humps at the residential area to reduce the impact from noise, dust and vibration.	Binh Phuoc Department of Transportation (DOT)	Through out operation phase	At the start and end point and 4 junctions along the subproject route. At the sensitive areas closed to schools/ kindergarten, medical centers, pagodas, church	Included in operation and maintenance cost
2. Traffic and road safety	Minimize road accident	1. Undertake road safety awareness campaigns for local residents and other road users of the subproject road. 2. Install and maintain road warning signs and markings. 3. Monitor road accidents and implement necessary preventive measures (awareness campaigns, provision of appropriate road furniture to enhance road safety and control traffic).	Binh Phuoc DOT	Through out operation phase	Along two sections subproject road	Included in operation and maintenance cost

D. Environmental mornitoring

1. Compliance Monitoring

107. Table 15 below shows the program for monitoring the compliance on various provisions of the EMP during pre-construction, construction and operation phases. ESP needs to implement a number of measures during detailed design phase (e.g., incorporation of environmental design measures into the detailed design, update EMP, etc.) and this will be confirmed by PMU to ADB. During construction, most of the mitigation measures will be implements by the contractors, CSC and ESP shall monitor their environmental performance, in terms of implementation of such measures. The timing or frequency of monitoring is also specified in Table 15. During operation EMP implementation shall be the responsibility of Binh Phuoc DOT.

108. At design phase, PMU shall ensure that EMP measures for the design stage are incorporated in the detailed design. The effective incorporation of the EMP in the civil works contracts shall also be ensured be by PMU with assistance from ESP and this, along with implementation of EMP provisions, shall be audited by ADB as part of the loan conditions.

109. Prior to implementation of the subproject the IEE and EMP will be updated and amended, as necessary, by ESP after the detailed designs are complete and contracting arrangements are known. Such updating shall be based on reconfirmation and any additional information on the assumptions made at this feasibility stage on location scale and expected conditions of the subproject.

110. At pre-construction phase, PMU with the support from ESP will prepare all environmental protection compliance certificates under Vietnam's regulations as guided through LEP 2014. IECM and ESP will also need to confirm that Contractors and their suppliers have complied with all statutory requirements for permits from DONRE and provincial authorities. IECM and ESP will check that Contractors have all the necessary valid licenses and permits for use of powered mechanical equipment if necessary and the use of local water supplies (and to construct or operate plant such as for cement batching or asphalt/bitumen (if required) in line with all environmental regulations and permit conditions from provincial authorities.

111. At construction phase, the ESP will undertake regular monitoring of the contractor's implementation of mitigation measures specified in the Subproject EMP if applicable. On the other hand, CSC will also monitor the construction activities on daily basis. They will ensure that the contractors comply with all environmental regulations as specify in subproject EMP if applicable.

112. Binh Phuoc Department of Transportation will be in charge of EMP implementation in the operation phase. The tasks are including monitoring of dust, noise and water quality... They also monitor the accidents along the subproject road as basis for implementation of mitigation measures to improve road safety.

2. Environmental Effects Monitoring

113. ESP undertake baseline environmental monitoring for air quality, noise and surface water quality. Sampling will be conducted prior to start of site works at the specified locations. During construction, ESP shall undertake quarterly monitoring of surface water quality and semi-annual monitoring of air quality and noise in the same locations sampled during pre-construction. Additional sampling occasions shall be carried out and additional parameters shall be analyzed (as necessary) to validate complaints and/or investigate pollution events caused by the subproject.

Table 15 - Environmental Monitoring Compliance

Performance and Impact Monitoring					
Environmental Concern	Parameter to monitor	Location	Frequency & Verification	Responsible to Monitor	Monitoring Cost
Design and Pre-construction Phase					
1. Land acquisition and resettlement	Compensation documents	N/A	Only one time before the construction commencement	Binh Phuoc DPI/ DONRE; PMU	Included in the operation budget of PMU
Construction Phase					
1. Loss of trees	Check of implementation	Along the subproject road, especially area goes through rubber plantation area; worker camps area	Before construction commencement and through out construction phase. Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
2. Local facilities	Check of implementation	Along the subproject road	Before construction commencement and through out construction phase. Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
3. Materials exploitation and management of quarry and borrow pits	Check of implementation	Subproject site, quarries and borrow pit areas	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
4. Waste and spoil disposal	Check of implementation	Through out construction site, material storage areas, machines and vehicles maintainance area	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
5. Concrete mixing plant, bitumen heating	Check of implementation	Through out construction site	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
6. Noise, dust and vibration	Check of implementation	Through out construction site	Bi-weekly and spot checks Part of daily construction supervision	ESP/ PMU	Included in the operation budget of PMU/ ESP CSC

	Ambient air quality (temperature, moisture, wind direction and speed, PM10, PM2.5, PB, NO_2, SO_2…); Noise level (average noise level, maximum noise level, vehicles frequency…)	11 monioring points: at start and end points the road. 4 junctions with PR756C, PR758, PR757, PR304; junction to Loc Phu CPC; junction to Loc Quang CPC; Ba Ut Nhi stream; Tan Hung CPC; Bridge No.2;	1 time before construction start and every quarter during 2 years construction time	ESP	3,600 USD[2]
7. Land slide, erosion control/ run off	Check of implementation	Through out construction site	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
8. Stream protection and bridge/culvert construction	Check of implementation	7 streams/ rivers crossing point	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
9. Water resources and quality	Check of implementation	Through out construction sites; 7 stream crossing positions, material storage sites, temporary waste disposal areas	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC

[2] Due to there is no cost norm for Binh Phuoc province, Figures has been estimated base on environmental monitoring cost norm of Dak Nong – Decision No. 17/2015/QD-UBND.

	Surface water quality	8 sampling points in total. 7 sampling points at 20m downstream of the crossing stream. 1 sampling point in Loc Quang lake	1 time before construction start and semi-annually during 2 years construction time	ESP	6,900 USD
10. Construction and worker camps	Check of implementation	Through out construction sites and worker camps	Before establishment of the facilities and through out the construction phase Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
11. Sanitation and Diseases	Check of implementation	Through out construction sites	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
12. Safety precautions for workers	Check of implementation. Check compliance to Labor Code of Vietnam and other relevant Decision, Decree and Circular under Government requirements	Through out construction sites	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
13. Public safety	Check of implementation	Through out subproject road, quarries and borrow areas, material transportation roads	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
14. Traffic Management	Check of implementation	Through out construction sites; at junctions 4 provincial roads; start and end points of the road; junctions to Loc Quang and Loc Phu CPCs.	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
15. Environmental recovery	Confirmed implementation of required enhancements	Through out construction sites	Before construction and bi-weekly check	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/

			Part of daily construction supervision		CSC
Operation Phase					
1. Dust, noise, vibration	Check of implementation; Ambient air environment, noise level at the road and in the areas which are adjacent to road	At the start and end point of the road. At the sensitive areas (schools/ kindergarten, medical centres, pagodas, Minh Lap Church	Semi-annual in the first two years	Binh Phuoc DOT	Included in operation and maintenance cost
2. Road safety	Check of implementation	Along the subproject road	Semi-annual	Binh Phuoc DOT	Included in the operation budget of DOT

E. Reporting

114. PMU will submit the following reports to ADB:

- *Monitoring report for baseline environment:* this report shows the result of baseline environment as implemented by ESP on ambient air quality, surface water quality... This report will be submitted to ADB before the construction start.
- *Environmental monitoring reports:* Environmental monitoring reports will cover the status of EMP implementation in terms of required mitigation measures for different phases of the subproject, results of environmental effects monitoring (air quality, noise and surface water quality), necessary remedial actions to effectively address negative environmental impacts due to subproject implementation, status of environmental capacity building activities as well as documentation of complaints received and corresponding action/resolution. The environmental monitoring reports will be submitted to ADB semi-annually during the construction phase and annually for two years after completion of construction.

Table 16 – Reporting procedures

Project Phase	Type Of Report	Frequency	Responsibility	Submitted To Whom
Construction	**Environmental Performance Report** indicating compliance with EMP and monitoring results at the contractor site	Monthly	Construction contractor	CSC
	Subproject EMP Compliance Report indicating compliance with subproject EMP and monitoring results	Quarterly	CSC	PMU
	EMP Compliance Report indicating compliance with subproject EMP and monitoring results	Semi-annually during construction phase	ESP/ PMU	ADB
Operation	**EMP Compliance Report: Operation** indicating compliance with subproject EMP commitments during operation	Annually in the first two years of operation. On-going frequency to be determined based on review after 2 years.	Binh Phuoc DOT	Binh Phuoc DONRE

Table 17 - Estimated cost for EMP Implementation (2-year construction/ 4-year in total)

Item	Estimated cost (USD)
1. Environmental specialist (ESP) – 1 National ESP	***76,910***
1 National Environmental Specialist - 14 man-months (intermittent in the first 2 years; 6 – 4 – 4) – 4000 usd/ man-month	56,000
Per diem for ESP: 48 usd x 30 days x 14 months	20,160
Air fare + taxi (to and from airports) for 3 round trips: 250 usd x 3 trips	750
2. Environmental effects monitoring - ESP	***10,500***
a) Ambient air quality	3,600
b) Surface water quality	6,900
3. Training/orientation, local transportation, supplies - ESP	***21,500***
a) Training/orientation: 1 formal training course for PMU, CSC, Contractors and Binh Phuoc DOT and other "on the job" training	1,500
b) Local transportation and supplies	20,000
4. Printing Environmental monitoring by ESP (8 reports)	***8,000***
Subtotal (1+2+3+4)	**116,910**
5. Contigency	**8090**
Total (1+2+3+4+5)	**125,000**

F. Capacity building

115. In Viet Nam, the environmental assessment process is established but environmental awareness and capability for implementation of EMP in infrastructure projects of both the executing agency and the implementation agency (PMU) are limited and in development. The safeguards staff of the PMU is usually responsible for many different task and do not have good background on safeguards issues. Usually, the engineer will also be in charge of the environmental monitoring and his/ her capacity is not suitable to check the adequacy of the subproject EMP. The IEEs and EMP are referred to the environmental department in DONRE for approval. During the Project PPTA phase, PPU has been established under Binh Phuoc DPI with one staff has been assigned as ESO.

116. The most significant challenge is the lack of human and financial resources and necessary infrastructure. To address this constraint, Binh Phuoc DPI/PMU will designate a full time staff as environmental safeguards officer (ESO) to handle the environmental aspects of the subproject during implementation stage. Ideally, ESO of the Project Preparation Unit (PPU) will be come ESO of the subproject PMU also. The ESO and other relevant staff of PMU will be trained by the environment specialists of the ESP during subproject implementation as "on the job" training or by formal training courses.

Table 18 – Detail capacity building program

Objective	1. Build capacity and procedures in undertaking systematic environmental assessments in accordance with Government regulations and ADB guidelines 2. Provide training on international best practice on environmental management, monitoring and reporting. 3. Provide guidance on how to effectively incorporate environmental measures into project design and how to incorporate EMP provisions into tender and contract documents.
Tasks/Scope of Work	1. Undertake training needs analyses and review prevailing government regulations and donor guidelines governing the assessment and management of environmental impacts for road development. 2. Review the skills of PMU and Binh Phuoc DOT staff to establish existing capacity on environmental assessments, environmental monitoring and implementation of mitigation measures for road development project. 3. Prepare the training plan and relevant training materials. 4. Deliver the training which may be through a combination of hands on assistance, on-the-job training, and training workshops. 5. Evaluate the effectiveness of the training measuring improvements in attitudes and skills achieved. 6. Modify the training documents/materials as necessary. 7. Hand-over the amended training documents/ material to the project manager for use in the delivery of the training. 8. Prepare report on result of training.
Time frame	Possible within 6 months after construction commencement
Target participant	Staff in PMU and Binh Phuoc DOT who responsible for environmental management
Staff resources	National environmental specialist with at least 15 years experience on environmental management of road projects and must possess relevant post-graduate degree in civil engineering, environmental management and other relevant courses. With working knowledge of safety issues and at least 3 years experience in conducting environmental management training.

X. CONCLUSIONS AND RECOMMENDATIONS

117. This IEE study was carried out in the Technical Assistant for Project Preparation (PPTA) phase. Primary and secondary data were used to assess potential environmental impacts in a comprehensive manner and public consultation and route reconnaissance were carried out in order complete the environmental assessments and recommend suitable mitigation measures. The IEE report provides a picture of potential environmental impacts associated with the upgrading of the subproject road and suitable mitigation measures have been recommended.

118. The implementation of the subproject "Upgrade Minh Lap – Loc Hiep road, Binh Phuoc province" will steadily improve the road quality; make it favourable for transportation to Hoa Lu and Hoang Dieu border gates. Several actions are required during the detailed design stage to minimize impacts to acceptable levels. The negative environmental impacts from the upgrading works will mostly take place during the construction stage. All of the impacts during construction phase should be very predictable and manageable and with appropriate mitigation and few residual impacts are likely. Additional human and financial resources will be required to improve environmental capability and to progress and achieve necessary statutory compliance and environmental clearance certification for the subproject or associated activities that also require environmental permits under the environmental laws of Viet Nam – LEP 2014.

119. No further or additional impact assessment is considered necessary at this stage. At the implementation stage, PMU through ESP will develop detail EMP to monitor the schedules of mitigation measures and conduct of environmental effects monitoring activities. EMP must be updated to ensure effective environmental monitoring and should be develop in accordance with the monitoring plan as specified in the EMP. With these measures in place, environmental impacts of the subproject should be manageable and will not result in any residual impact, which is above accepted environmental standards.

XI. APPENDIX 1

Appendix 1: Photos of the subproject road and the vicinity

Subproject road: Starting point

Subproject road: End point

Watering the road at section in Thanh An

Rubber plantation area in Tan Hung

Bu Linh Bridge

Section with concerns for efficient drainage design

Appendix 2: Environmental criteria for subproject selection

Province	Road	Environmental Criteria (100 points)				(Points remaining over 100 points) Environmental grading and remarks
		(deduction/40) National Park, Nature Reserve, Historical Site, Forest	(deduction/20) Flood prone, water bodies	(deduction/20) Land slide, soil erosion	(deduction/20) Alteration of surface water bodies	
Kon Tum	No. 675A	(-35) Some type of forest along the road	(-15) Sesan river, several large resevoirs	(-15) Some steep slopes on the road	(-15) 7 bridegs/ total 237 m of length	**Rank 1 – 10 points** Category B. Pay attention to land slide, soil erosion and flood. Wood logging activities still happen.
	No. 673A	(-40) Ngoc Linh Nature Reserve	N/A	(-10) Widing road with high moutains	(-5) 4/24	**Rank 3 – 30 points** Category A. The first 9km go through Ngoc Linh Nature Reserve. Pay attention to land slide also.
Gia Lai	No. 665	N/A	(-5) Some streams and river	N/A	(-20) 3/231	**Rank 4 – 40 points** Category B. Pay attention to flooding
	ChuTy– Ia Nan	N/A	N/A	N/A	(-5) 1/33	**Rank 5 – 50 points** Category B
	No. 670	N/A	(-10) Some rivers and streams	(-10) Some steep slopes on the road	(-5) 3/30	**Rank 4 – 40 points** Category B. Pay attention to land slide, soil erosion.
Daklak	No. 29	(-20) York Don National Park	N/A	N/A	N/A	**Rank 5 – 50 points** Category B. The part connect to Dak Rue Border Gate go near the buffer zone of York Don National Park.
	Cu Ne – Ea Sup	N/A	(-10) Ea Sup Lakes and some small streams and lakes	N/A	(-5) 2/20	**Rank 5 – 50 points** Category B. Pay attention to flooding
Daknong	Dak Buk So – Bu Prang	(-20) Border protection forest. Bu Gia Map National Park (in Binh Phuoc province)	(-5) Dak Buk So; Dak Blung lakes. Some small irrigation system	(-15) Some slopes along the route, hilly parts of the road	N/A	**Rank 3 – 30 points** Category B. Pay attention to forest protection and land slide
	No. 685	(-20)	(-5)	(-10)	N/A	**Rank 4 – 40 points**

		Cat Tien South Protection Forest	Some lakes and river	Mountainous area		Category B. Cat tien South Protection Forest is 7 km away from the road. Pay attention to forest protection and land slide
	Pr.Rd No. 6	N/A	(-5) Dak Buk So lake and other small lakes	(-15) Some land slide point	N/A	**Rank 4 – 40 points** Category B. Pay attention to land slide
	Gia Nghia Rd	N/A	N/A	N/A	N/A	**Rank 5 – 50 points** Category B
Binh Phuoc	Pr.Rd No.756	N/A	(-5) Some small lakes and streams	N/A	N/A	**Rank 5 – 50 points** Category B
	No. 754; 754A	(-30) Ta Thiet Protection Forest; Historical Site	(-5) Some small rivers and lakes	N/A	N/A	**Rank 4 – 40 points** Category B. The road goes along Ta Thiet Protection Forest for around 3.5 km. Historical Site of Southern Army General Staff is far from the road. Pay attention to forest protection.
	756B	N/A	(-5) Some small streams and lakes	N/A	(-5) 1/10	**Rank 5 – 50 points** Category B
	756C	N/A	N/A	N/A	N/A	**Rank 5 – 50 points** Category B

Appendix 3: Sources of reference information

1. *Statistics of poor households and marginal poor households of Chon Thanh District People's Committee in 2015*
2. *Statistics of poor households and marginal poor households of Hon Quan District People's Committee in 2015*
3. *Report on the 10 year of implementation of the decision No.24-NVTW date 12/03/2013 of the central executive committee of the 9th of Loc Ninh*
4. *Statistics of poor households of Labour Invalids and Social Affairs of Loc Ninh, Hon Quan and Chon Thanh District People's Committee in 2015*
5. *Statistics of poor households and marginal poor households of Tan Hung, Tan Loi, Loc Hiep, Loc Phu Communes People's Committee in 2015*
6. *Report on the Social and Environmental implementation of Chon Thanh District People's Committee*
7. *Statistics Division of Loc Ninh, Loc Hiep District people's committee in 2015*
8. *Statistics Division of Hon Quan District people's committee in 2015*
9. *Report on the socio-economic development and defense security of Thanh An, Tan Hung Tan Loi, Loc Quang, Loc Phu, Loc Hiep, Minh Lap Commune People's Committee in 2015*
10. *Statistic Division of area by administrative unit of Loc Ninh, Hon Quan and Chon Thanh in 2015*
11. *Healthcare Centre of Chon Thanh, Hon Quan and Loc Ninh Districts people's committee in 2015*

Appendix 4: Environmental Mitigation Measures to Include into Bidding Documents

1. Loss of trees and impact to fauna	1. Minimized vegetation covers clearances. 3. Prohibit cutting of trees for firewood and for use in subproject. 4. During replanting/revegetation works, new alien plant species (i.e., species not currently established in the country or region of the subproject) shall not be used. Invasive species shall not be introduced into new environments. 5. The contractors will not use or permit the use of wood as a fuel for the execution of any part of the works, including but not limited to the heating of bitumen and bitumen mixtures, and to the extent practicable shall ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 6. Contractors shall not buy or use wood from the illegal sources (that come from the illegal logging) 7. No construction camps are to be rubber plantation area. 10. Contractors will take all precautions necessary to ensure that damage to vegetation is avoided due to fires resulting from execution of the works. The Contractors will immediately suppress the fire, if it occurs, and shall undertake replanting to replace damaged vegetation.
2. Impact on local facilities	1. Reconfirm power, water supply, and telecommunications likely to be interrupted by the works. 2. Contact all relevant local authorities for facilities and local people to plan reprovisioning of power, water supply, and telecommunication systems. 3. Facilities shall be relocated and reconnected well ahead of commencement of construction works and contractors shall coordinate with facility company for relocation and reconnection well before works commence. 4. Affected communities shall be properly informed in advance. 5. Reconnection of facilities shall be done at the shortest practicable time before construction commences. 6. Facilities damaged during construction shall be reported to the CSC, PMU and facility authority and repairs arranged immediately. 7. Access roads, agricultural land and other properties damaged during transport of construction materials and other project-related activities shall be reinstated upon completion of construction works at each section
3. Materials exploitation and management of quarry, borrow pits and temporary storage area	1. Implement MMP prepared by ESP during detailed design phase. 2. Balance excavation and fill requirements to minimization negative impacts 3. Prioritize use of existing quarry sites with suitable materials and update the list of quarries and borrow pits monthly in MMP and report to PMU and minimize impacts on other local resources. 4. Procure materials only from Binh Phuoc DONRE authorized quarries and borrow sites. 5. Replant tree and vegetation cover of any vegetation clearance area in quarries and borrow pits 6. Stockpile topsoil for later use and fence and re-contour borrow pits after use. Topsoil, overburden, and low-quality materials shall be properly removed, stockpiled near the site, and preserved for rehabilitation. 7. Do not use quarries in areas of natural woodland or near rivers which provide food and shelters for birds and other animals. 8. Borrow/quarry sites shall not be located in productive land and forested areas. 9. During quarry/borrow site operation; provide adequate drainage to avoid accumulation of stagnant water. 10. Ensure borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of water bodies favorable for mosquito breeding. 11. Upon completion of extraction activities, quarry and borrow pits shall be dewatered and fences shall be installed, as appropriate, to minimize health and safety risks. 12. To avoid drowning when pits become waterfilled, measures such as fencing, providing flotation devices such as a buoy tied to a rope, etc. shall be implemented.

4. Waste and spoil disposal	1. Implement corresponding provisions of WMSDP prepared by the ESP. 2. Areas for disposal to be agreed with CPCs and Binh Phuoc DONRE checked and recorded by the CSC, ESP/PMU and monitored 3. Spoil and waste will not be disposed of in streams or other surrounding water bodies. 4. Spoils and waste shall only be disposed to areas approved by local authorities. 5. Spoil disposal shall not cause sedimentation and obstruction of flow of watercourses, damage to agricultural land and densely vegetated areas. 6. Under no circumstances will spoils be dumped into watercourses (rivers, streams, drainage, irrigation canals, etc.) 7. The spoils disposal site shall be located at least 50 m from surface water courses and shall be protected from erosion by avoiding formation of steep slopes and grassing.
5. Operation of concrete mixing plant	1. Locate mixing plant, bitumen heating, off road and (wherever practicable) at least 500 m from nearest sensitive receivers (residential areas, schools, clinics, etc.) and streams and install and maintain dust suppression equipment. 2. Concrete mixing areas shall be protected against spills and all contaminated soil must be properly handled according to applicable national and local laws and regulation. As a minimum, these areas must be contained, such that any spills can be immediately contained and cleaned up. 3. Prevent soil contamination requiring contractors to instruct and train their workers on storage and handling of materials and chemicals that can potentially cause soil contamination. 4. Recycle debris generated by dismantling of existing pavement subject to the suitability of the material.
6. Noise, dust and vibration	1. Restrict works to daylight hours within 500 m of sensitive area. 3. Powered mechanical equipment and vehicle emissions to meet national TCVN/QCVN standards. All construction equipment and vehicles shall have valid certifications indicating compliance to vehicle emission and noise creation standards. 4. Monitor and investigate complaints; propose alternative mitigation measures. 5. Keep material storage site moist 6. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emission. 7. On rainless day undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials storage sites, construction sites, access roads, quarry areas, borrow sites and other subproject areas where residential sites and other sensitive points such as schools, clinics… are located nearby. 8. Mixing, bitumen heating and crushing plants operations will be equipped with dust suppression devices such as water sprays. 9. Clean up road surfaces after work. 10. To protect buildings and structures from vibration, non-vibrating roller shall be used in construction sites near buildings and structures. 11. Structures which are damaged due to vibration caused by the construction activities shall be repaired immediately as directed by ESP/PMU. 12. Machinery shall be turned off when not in use. 13. Pile driving during to be schedule for day time if construction site is near sensitive points or approved by DONRE, CPCs and ESP/PMU. 14. Impose speed limits on construction machines and transportation vehicles to minimize dust emission along areas where sensitive pints are located (houses, schools, clinics, pagodas, church etc.).
7. Erosion control/ run off	1. Establish vegetation and erosion protection immediately after completion of works in each stretch / sector. 2. Check weather forecasts and minimize work in wet weather. 3. Stockpile topsoil for immediate replanting after cutting. 4. Minimize damage and excavation of surrounding vegetation during slope formation. 5. Include and implement appropriate measures for slope protection, i.e. vegetation cover and stone pitching, as required in the detailed construction drawings. 6. Prevent erosion and protect the excavated slope with temporary or permanent drainage as soon as practicable after cutting. 7. If new erosion occurs accidentally, back fill immediately to restore original contours. 8. Low embankments will be protected from erosion by seeding and planting indigenous

	grasses that can flourish under local conditions. 9. Payments will be linked to the completion of the works as indicated by the installation of erosion control measures to protect the works to the satisfaction of ESP/PMU.
8. Stream protection and bridge/culvert construction	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed not to block streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.
9. Water resources and quality	1. Provide adequate drainage facilities at construction sites and worker camps to avoid stagnant water. 2. Implement agreed designs for bridges/ culverts sufficient to control flooding as designed. 3. Store lubricants, fuels and wastes in dedicated enclosures at least 50 m from water bodies on high and impervious ground with top cover 4. Solid waste from construction activities and workers camps will not be thrown in streams and other water bodies (drainage, lake, pond, etc.) 5. Construction storage/stockpiles shall be provided with bunds to prevent silted run-off. 6. Stockpiled materials will be covered to reduce silted run-off. 7. No stockpiling or borrow sites at least 100m of water body. 8. Work in streams at bridge repair sites will be scheduled during dry season and work duration shall be as short as possible. 9. Washing of machinery and vehicles in surface waters shall be prohibited.
10. Construction and worker camps	1. Construction and worker camp location and facilities located at least 500m from settlements and agreed with local communities and facilities approved by ESP and managed to minimize impacts. 2. Hire and train as many local workers as possible. 3. Provide adequate housing for all workers at the construction camps and establish clean canteen/eating and cooking areas. 4. Mobile toilets (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and prevented by cleaning lavatories daily and by keeping toilets clean at all times. 5. Provide separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supply for male and female workers. 6. Borrow pits and natural depressions with prelaid impervious liners will be used to dispose of scarified/scraped asphalt, and then covered with soil. This will check potential groundwater contamination. 7. Camp site will be cleaned up to the satisfaction of and local community after use. 8. Solid and liquid waste will be managed in line with WMSDP. 9. All waste materials shall be removed and disposed to disposal sites approved by local authorities 10. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned.
11. Sanitation and Diseases	1. Standing water will not be allowed to accumulate in the temporary drainage facilities or along the roadside to prevent proliferation of mosquitoes. 2. Temporary and permanent drainage facilities will be designed to facilitate the rapid removal of surface water from all areas and prevent the accumulation of surface water ponds. 3. Malaria controls (e.g., provision of insecticide treated mosquito nets to workers, installation of proper drainage to avoid formation of stagnant water, etc.) and HIV-AIDS education will be implemented in line with social plans for the subproject. 4. HIV/AIDS awareness and prevention program shall be implemented in line with social plans under the subproject.

12. Safety precautions for workers	1. Establish safety measures as required by law and by good engineering practice and provide first aid facilities that are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, ear plugs, gloves, etc. at no cost to the employee. 5. Where worker exposure to traffic cannot be completely eliminated, protective barriers shall be provided to shield workers from traffic vehicles. 6. Workers shall be provided with reliable supply of potable water. 7. Construction camps shall be provided with adequate drainage to avoid accumulation of stagnant water. 8. Construction camps shall be provided with toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained to allow effective operation. 9. Ensure reversing signals are installed on all construction vehicles.
13. Public safety	1. Install barriers (e.g., temporary fence) at construction areas to deter pedestrian access to the roadway except at designated crossing points. 2. The general public/local residents shall not be allowed in high-risk areas, e.g., excavation sites and areas where heavy equipment is in operation and such sites have a watchman to keep public out. 3. Speed restrictions shall be imposed on subproject vehicles and equipment when traveling through residential areas, especially through the sensitive points such as schools, local clinics, pagodas… 4. Upon completion of construction works, borrow areas will be backfilled (if suitable materials are available, e.g., excavation spoils) or fenced.
14. Traffic Management	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience due to subproject operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold ups and congestion 3. In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up. 4. Provide safe vehicle and pedestrian access around construction areas. 5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. 6. Provide sufficient lighting at night within and in the vicinity of construction sites. 7. Designate traffic officers in construction sites.
15. Environmental recovery	Contractors to reconfirm and implement recovery (e.g., landscaping, tree replanting) identified at the detailed design stage

Appendix 5: National Technical Regulations of Vietnam

NATIONAL TECHNICAL REGULATION

ON SURFACE WATER QUALITY

1. GENERAL PROVISIONS

1.1. Scope of application

1.1.1. This regulation specifies the limit value of surface water quality parameters.

1.1.2. This regulation applies to assess and control the quality of surface water source, as a basis for the protection and use of water appropriately.

1.2. Explanation of terms

Surface water referred to in this Regulation is water flowing through or stagnate on the ground, streams, canals, ditches, gullies, arroyos, lakes, ponds, swamps, ...

2. TECHNICAL REGULATIONS

Limit values of the surface water quality parameters are specified in Table 1.

Table 1. Limit values of the surface water quality parameters

No.	Parameters	Unit	Limit values			
			A		B	
			A1	A2	B1	B2
1	pH		6-8,5	6-8,5	5,5-9	5,5-9
2	i. Dissolved oxygen (DO)	mg/l	≥ 6	≥ 5	≥ 4	≥ 2
3	Total suspended solidss (TSS)	mg/l	20	30	50	100
4	COD	mg/l	10	15	30	50
5	BOD_5 (20^0C)	mg/l	4	6	15	25
6	Ammonium (NH^+_4) (as N)	mg/l	0,1	0,2	0,5	1
7	Clorua Chloride (Cl^-)	mg/l	250	400	600	-
8	Florua Fluoride (F^-)	mg/l	1	1,5	1,5	2
9	Nitrite (NO^-_2) (as N)	mg/l	0,01	0,02	0,04	0,05
10	Nitrate (NO^-_3) (as N)	mg/l	2	5	10	15
11	Phosphate (PO_4^{3-}) (as P)	mg/l	0,1	0,2	0,3	0,5
12	Xianua Cyanide (CN-)	mg/l	0,005	0,01	0,02	0,02
13	Asen (As)	mg/l	0,01	0,02	0,05	0,1

14	Cadimi (Cd)	mg/l	0,005	0,005	0,01	0,01
15	Lead (Pb)	mg/l	0,02	0,02	0,05	0,05
16	Chrom III (Cr^{3+})	mg/l	0,05	0,1	0,5	1
17	Chrom VI (Cr^{6+})	mg/l	0,01	0,02	0,04	0,05
18	Copper (Cu)	mg/l	0,1	0,2	0,5	1
19	Zinc (Zn)	mg/l	0,5	1,0	1,5	2
20	Nickel (Ni)	mg/l	0,1	0,1	0,1	0,1
21	Iron (Fe)	mg/l	0,5	1	1,5	2
22	Mercury (Hg)	mg/l	0,001	0,001	0,001	0,002
23	Surface-active substances	mg/l	0,1	0,2	0,4	0,5
24	Total oil & grease	mg/l	0,01	0,02	0,1	0,3
25	Phenon (Total)	mg/l	0,005	0,005	0,01	0,02
26	Organic chlorine pesticide					
	Aldrin + Dieldrin	µg/l	0,002	0,004	0,008	0,01
	Endrin	µg/l	0,01	0,012	0,014	0,02
	BHC	µg/l	0,05	0,1	0,13	0,015
	DDT	µg/l	0,001	0,002	0,004	0,005
	Endosunfan(Thiodan)	µg/l	0,005	0,01	0,01	0,02
	Lindan	µg/l	0,3	0,35	0,38	0,4
	Chlordane	µg/l	0,01	0,02	0,02	0,03
	Heptachlor	µg/l	0,01	0,02	0,02	0,05
27	Organic phosphorus pesticide					
	Parathion	µg/l	0,1	0,2	0,4	0,5
	Malathion	µg/l	0,1	0,32	0,32	0,4
28	Herbicide					
	2,4D	µg/l	100	200	450	500
	2,4,5T	µg/l	80	100	160	200
	Paraquat	µg/l	900	1200	1800	2000
29	Total radioactivity α	Bq/l	0,1	0,1	0,1	0,1
30	Total radioactivity β	Bq/l	1,0	1,0	1,0	1,0
31	E.coli	MPN/ 100ml	20	50	100	200
32	Coliform	MPN/ 100ml	2500	5000	7500	10000

Note: The classification of surface water to assess and control the quality of water for various purposes of water use:

A1 - Good use for the purpose of domestic water supply and other purposes, such as type A2, B1 and B2.

A2 – Used for the purpose of domestic water supply but applying the appropriate treatment technology; aquatic plant and animal conservation, or purposes of use as type B1 and B2.

B1 - Use for irrigation and drainage purpose or other purposes with similar water quality requirements or other purposes of use such as type B2.

B2 – Water transportation and other purposes with low water quality requirements.

3. METHOD FOR DETERMINATION

3.1. Sampling for surface water quality monitoring conducted under the guidance of national standards:

- TCVN 5992:1995 (ISO 5667-2: 1991) - Water quality - Sampling. Guidance on sampling techniques.

- TCVN 5993:1995 (ISO 5667-3: 1985) - Water quality - Sampling. Guidance on storage and handling of samples.

- TCVN 5994:1995 (ISO 5667-4: 1987) - Water quality - Sampling. Guidance on sampling in natural and artificial lakes and ponds.

- TCVN 5996:1995 (ISO 5667-6: 1990) - Water quality - Sampling. Guidance on sampling in rivers and streams.

3.2. Analytical methods to determine the parameters of surface water quality shall comply with the guidance of the national standards or corresponding analytical standards of international organizations:

-TCVN 6492-1999 (ISO 10523-1994) - Water quality - Determination of pH.

-TCVN 5499-1995. Water quality - Determination of dissolved oxygen - Winkler method.

- TCVN 6625-2000 (ISO 11923-1997) - Determination of suspended solids by filtration through glass-fibre filters

B. - TCVN 6001-1995 (ISO 5815-1989) - Water quality - Determination of biochemical oxygen demand after 5 days (BOD 5) - Dilution and seeding method.

- TCVN 6491-1999 (ISO 6060-1989) - Water quality - Determination of the chemical oxygen demand.

- TCVN 6494-1999 - Water quality - Determination of ions of fluoride, chloride, nitrite, Orthophotphat, bromide, nitrate and soluble sulphate in liquid ion chromatography.

- TCVN 6194-1996 (ISO 9297-1989) - Water quality - Determination of chloride. The method of titration of nitrate silver with chromate indicator (MO method).

C. - TCVN 6195-1996 (ISO 10359-1-1992) - Water quality - Determination of fluoride - Electrochemical probe method for potable and lightly polluted water

- TCVN 6178-1996 (ISO 6777-1984) - Water quality - Determination of nitrite. Molecular absorption spectrometric method.

D. - TCVN 6180-1996 (ISO 7890-3-1988) - Water quality - Spectrometric method using sulfosalicylic acid

- TCVN 5988-1995 (ISO 5664-1984) - Water quality - Determination of ammonium - Distillation and titration method.

- TCVN 6181-1996 (ISO 6703-1-1984) - Water quality - Determination of total cyanide.

E. - TCVN 6336-1998 (ASTM D 2330-1988) - Test method for Methylene Blue Active Substances

F. - TCVN 5991-1995 (ISO 5666-3-1984) - Water quality - Determination of total mercury by flameless atomic absorption spectrometry - Method after digestion with bromine

- TCVN 6002-1995 (ISO 6333-1986) - Water quality - Determination of manganese - Formaldoxime spectrometric method

- TCVN 6053-1995 (ISO 9696-1992) - Water quality - Measurement of gross alpha activity in non-saline water - Thick source method

G. - TCVN 6177-1996 (ISO 6332-1988) - Water quality - Determination of iron - Spectrometric method using 1,10 - phenanthroline

- TCVN 6193-1996 (ISO 8288-1986) - Water quality - Determination of cobalt, nickel, copper, zinc, cadmium and lead - Flame atomic absorption spectrometric methods

- TCVN 6197-1996 (ISO 5961-1994) - Water quality - Determination of cadmium by atomic absorption spectrometry

- TCVN 6222-1996 (ISO 9174-1990) - Water quality. Methods for the determination of total chromium by atomic absorption spectrometry

H. - TCVN 6626-2000 (ISO 11969-1996) - Water quality - Determination of arsenic - Atomic absorption spectrometric method (hydride technique)

I. - TCVN 6216-1996 (ISO 6439-1990) - Water quality - Determination of phenol index - 4-Aminoantipyrine spectrometric methods after distillation

- TCVN 5070-1995 - Water quality - Weight method for determination of oil and oil products

J. - TCVN 6053-1995 (ISO 9696-1992) - Water quality - Measurement of gross alpha activity in non-saline water - Thick source method

K. - TCVN 6219-1995 (ISO 9697-1992) - Water quality - Measurement of gross beta activity.

L. - TCVN 6187-1-1996 (ISO 9308-1-1990) - Water quality - Detection and enumeration of coliform organisms, thermotolerant coliform organisms and presumptive Escherichia coli - Part 1: Membrane filtration method

The parameters specified in this Regulation not having national standards guiding the analytical method shall apply the corresponding analytical standards of the international organizations

4. IMPLEMENTATION ORGANIZATION

This Regulation shall apply in substitution for TCVN 5942:1995 - Water quality - surface water quality standards in the List of Vietnamese standards on environment which is mandatorily applied and issued together with Decision No. 35/2002/QD-BKHCNMT dated June 25, 2002 of the Minister of Science, Technology and Environment.

In case the national standards referred in this Regulation amended and supplemented or superseded shall be applied under new documents.

QCVN 09 : 2008/BTNMT

NATIONAL TECHNICAL REGULATION

ON UNDERGROUND WATER QUALITY

Introduction

QCVN 09:2008 / BTNMT was written by the Compilation Board of national technical regulations on water quality, submitted by the General Department of Environment and Legal Department for approval and issued under the Decision No. 16/2008/QD-BTNMT dated December 31, 2008 of the Minister of Natural resources and Environment.

NATIONAL TECHNICAL REGULATION

ON UNDERGROUND WATER QUALITY

1. GENERAL PROVISIONS

1.1. Scope of application

1.1.1. This regulation specifies the limit value of underground water quality parameters.

1.1.2. This regulation applies to assess and control the quality of underground water source, as a basis for the orientation of various purposes of use.

1.2. Explanation of terms

Underground water in this Regulation is the water in the soil and rocks underground.

2. TECHNICAL REGULATIONS

Limit values of the underground water quality parameters are specified in Table 1.

Table 1: Limit values of the underground water quality parameters

No.	Parameters	Unit	Limit values
1	pH	-	5,5 - 8,5
2	Hardness (as CaCO3)	mg/l	500
3	Total solids	mg/l	1500
4	COD ($KMnO_4$)	mg/l	4
5	Ammonium (as N)	mg/l	0,1
6	Chloride (Cl-)	mg/l	250
7	Fluoride (F-)	mg/l	1,0
8	Nitrite (NO^-_2) (as N)	mg/l	1,0
9	Nitrate (NO^-_3) (as N)	mg/l	15
10	Sulgreasee (SO_4^{2-})	mg/l	400
11	Cyanide (CN-)	mg/l	0,01
12	Phenol	mg/l	0,001

13	Asenic (As)	mg/l	0,05
14	Cadimi (Cd) Cadmium (Cd)	mg/l	0,005
15	Lead (Pb)	mg/l	0,01
16	Chromium VI (Cr6 +)	mg/l	0,05
17	Copper (Cu)	mg/l	1,0
18	Zinc (Zn)	mg/l	3,0
19	Manganese (Mn)	mg/l	0,5
20	Mercury (Hg)	mg/l	0,001
21	Iron (Fe)	mg/l	5
22	Selenium (Se)	mg/l	0,01
23	Total radioactivity α	Bq/l	0,1
24	Total radioactivity β	Bq/l	1,0
25	E.Coli	MPN/100ml	Not found
26	Coliform	MPN/100ml	3

3. METHOD FOR DETERMINATION

3.1. Sampling for underground water quality monitoring conducted under the guidance of national standards:

M. - TCVN 5992:1995 (ISO 5667-2: 1991) - Water quality - Sampling - Guidance on sampling techniques

N. - TCVN 5993:1995 (ISO 5667-3: 1985) - Water quality -sampling -Guidance on the preservation and handling of samples

- TCVN 6000:1995 (ISO 5667-11: 1992) - Water quality -sampling -Guidance on the sampling of groundwaters

3.2. Analytical methods to determine the parameters of underground water quality shall comply with the guidance of the national standards or corresponding analytical standards of international organizations:

O. - TCVN 6492-1999 (ISO 10523-1994) - Water quality - Determination of pH

- TCVN 2672-78 – Potable water – Method for determing the general hardness

P. - TCVN 6178-1996 (ISO 6777-1984) - Water quality -Determination of nitrite - Molecular absorption spectrometric method

Q. - TCVN 6180-1996 (ISO 7890-3-1988) - Water quality - Determination of nitrate - Spectrometric method using sulfosalicylic acid

R. - TCVN 6200-1996 (ISO 9280-1990) - Water quality - Determination of sulgreasee - Gravimetric method using barium chloride

S. - TCVN 6181-1996 (ISO 6703-1-1984) Water quality - Determination of total cyanide

T. - TCVN 5988-1995 (ISO 5664-1984) - Water quality - Determination of ammonium -Distillation and titration method

U. - TCVN 6194-1996 (ISO 9297-1989) Water quality -Determination of chloride - Silver nitrate titration with chromate indicator (Mohr's method)

V. - TCVN 6195-1996 (ISO 10359-1-1992) - Water quality - Determination of fluoride - Part 1: Electrochemical probe method for potable and lightly polluted water

W. - TCVN 6216-1996 (ISO 6439-1990) - Water quality - Determination of phenol index -4-Aminoantipyrine spectrometric methods after distillation

X. - TCVN 6626-2000 (ISO 11969-1996) - Water quality - Determination of arsenic - Atomic absorption spectrometric method (hydride technique)

Y. - TCVN 6193-1996 (ISO 8288-1986) - Water quality - Determination of cobalt, nickel, copper, zinc, cadmium and lead - Flame atomic absorption spectrometric methods

Z. - TCVN 6197-1996 (ISO 5961-1994) - Water quality - Determination of cadmium by atomic absorption spectrometry

AA. - TCVN 6002-1995 (ISO 6333-1986) - Water quality - Determination of manganese - Formaldoxime spectrometric method

BB. - TCVN 6177-1996 (ISO 6332-1988) - Water quality - Determination of iron - Spectrometric method using 1,10 - phenanthroline

CC. - TCVN 6183-1996 (ISO 9965-1993) -Water quality - Determination of selenium - Atomic absorption spectrometric method (hydride technique)

DD. - TCVN 59910-1995 (ISO 5666-3-1984) Water quality - Determination of total mercury by flameless atomic absorption spectrometry - Method after digestion with bromine

EE. - TCVN 6222-1996 (ISO 9174-1990) - Water quality -Determination of chromium - Atomic absorption spectrometric methods

FF. - TCVN 6187-1-1996 (ISO 9308-1-1990) - Water quality - Detection and enumeration of coliform organisms, thermotolerant coliform organisms and presumptive Escherichia coli - Part 1: Membrane filtration method

The parameters specified in this Regulation not having national standards guiding the analytical method shall apply the corresponding analytical standards of the international organizations

4. IMPLEMENTATION ORGANIZATION

This Regulation shall apply in substitution for TCVN 5944:1995- Water quality - underground water quality standards in the List of Vietnamese standards on environment which is mandatorily applied and issued together with Decision No. 35/2002/QD-BKHCNMT dated June 25, 2002 of the Minister of Science, Technology and Environment.

In case the national standards referred in this Regulation amended and supplemented or superseded shall be applied under new document

QCVN 05:2013/BTNMT

NATIONAL TECHNICAL REGULATIONS ON AMBIENT AIR QUALITY

Introduction

QCVN 05:2013/BTNMT was written by the Compilation Board of national technical regulations on ambient air quality, submitted by the General Department of Environment and Legal Department for approval and issued under the Circular No. 32/2013/TT-BTNMT dated October 25, 2013 of the Minister of Natural resources and Environment.

National Technical Regulation on Ambient Air Quality

1. GENERAL PROVISIONS

1.1. Scope of applications

1.1.1. This Regulation deals with limitations on values of basic factors including sulphur dioxide (SO2), carbon monoxide (CO), dioxide nitrogen (NO2), ozone (O3), total suspended particles (TSP), PM10, PM2.5, particles, and lead (Pb) in ambient air.

1.1.2. This Regulation applies to supervision and assessment of ambient air quality.

1.1.3. This Regulation does not apply to air within manufacturing facilities and indoor air.

1.2. Interpretation of terms

In this Regulation, the terms below are construed as follows:

1.2.1. Total suspended particles (TSP) is total particles with aerodynamic diameter less than or equal to 100 μm.

1.2.2. Particle PM_{10} is total suspended particles with aerodynamic diameter less than or equal to 10 μm.

1.2.3. Particle $PM_{2,5}$ is total suspended particles with aerodynamic diameter less than or equal to 2,5 μm.

1.2.4. Average 1 hour: The arithmetic average of the measured values over a period of 1 hour.

1.2.5. Average 8 hours: The arithmetic average of the measured values over a period of 8 consecutive hours.

1.2.6. Average 24 hours: The arithmetic average of the measured values over a period of 24 consecutive hours (a day).

1.2.7. Annual average: The arithmetic average of the 24-hour averate values measured over a period of one year.

2. Technical Reputation

Maximum value of basic parameters of ambient air is specified in Table 1.

Table 1: Maximum value of basic parameters of ambient aire

Unit: Micro gram over cubic meter ($\mu g/m^3$)

No.	Paramater	Average 1 hour	Average 8 hours	Average 24 hours	Annual average
1	SO_2	350	-	125	50
2	CO	30.000	10.000	-	-
3	NO_2	200	-	100	40

4	O_3	200	120	-	-
5	Tổng bụi lơ lửng (TSP)	300	-	200	100
6	Bụi PM_{10}	-	-	150	50
7	Bụi $PM_{2,5}$	-	-	50	25
8	Pb	-	-	1,5	0,5
Note: (-) unspecified					

Support to Border Areas Development Project (48189-002)

Initial Environmental Examination (IEE)

SUBPROJECT : UPGRADE AND REHABILITATE NATIONAL ROAD NO.29, DAK LAK PROVINCE

Prepared for
THE ASIAN DEVELOPMENT BANK

July 2016

Prepared by CONTRANS AB, SWEDEN
In joint venture with Transport Engineering Consultant Joint Stock Company No.2 (TECCO2) (Vietnam) and
In association with ASEAN Development and Management Consulting Ltd (ASEC) (Vietnam)

CURRENCY EQUIVALENT
(As of 27th May 2016)

Currency unit: Viet Nam Dong (VND)
USD1 = VND 22300

WEIGHTS AND MEASURES
km^2 – square kilometer
m^3 cubic meter

NOTE
In this report "$" refers to US Dollars

Consultants Quality Assurance Protocol

Prepared By	**CONTRANS SWEDEN AB**		
Auditor/Reviewer	**David Lupton Team Leader (TL)**		
Place	**Buon Ma Thuot, Vietnam**	*Date*	**21-06-2016**
Approved By	**Ta Ngoc Quang, Asia Manager**		

ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
BPMB	Buon Don Protection Forest Management Board
CLV-DTA	Cambodia – Lao PDR – Vietnam Development Triangle Area
CPC	Commune People's Committee
DARD	Department of Agriculture and Rural Development
DONRE	Department of Natural Resources and Environment
DOT	Department of Transportation
DPC	District People's Committee
DPI	Department of Planning and Investment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
ESP	Environment Safeguard Specialist
GMS	Greater Mekong Subregion
IEE	Initial Environmental Examination
IPM	Integrated Pest Management
MONRE	Ministry of Natural Resources and Environment
MPI	Ministry of Planning and Investment
PPU	Project Preparation Unit
PPC	Provincial People's Committee
PPE	Personal Protective Equipment
PMU	Provincial Project Management Unit
SST	Subproject Support Teams
The PPTA	The Project Preparatory Technical Assistant Consultants
The Project	Support to Border Areas Development Project
The Subproject	Upgrade and Rehabilitate National Road No.29, Dak Lak Province
UXO	Unexploded ordnance
WMSDP	Waste Management and Spoil Disposal Plan

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. EXECUTIVE SUMMARY

1. The Central Highland of Vietnam has many natural resources with more than 2 million hectares of rich basalt soil; make up 60% of the basalt soils of Vietnam. The soil is suitable for a variety of commercial crops including coffee, cocoa, pepper, and tea. The coffee production area has reached more than 290000 ha, about 80% of the total coffee area of the country. On the global scale, Vietnam has radically changed global coffee supply chains since 1990, increasing from less than 3% to more than 17% of global production[1]. Dak Lak, the fourth largest province of Vietnam with rich red basalt soil, mainly concentrate in Buon Ma Thuot plateau, suitable for coffee growth and it has been named the Coffee Capital. The Central Highlands is also the second largest rubber plantation area in Vietnam, mainly Dak Lak province.

2. Despite of these advantages, socio-economic development of the Central Highland, especially four border provinces of Kon Tum, Gia Lai, Dak Lak and Dak Nong are still facing many difficulties with less in small areas. Their poverty rate is the second highest in the country, standing at 20.3% compared to 12.6% for the average of whole country in 2011.

3. The Support to Border Areas Development Project (the Project) will help the five participating provinces (the Provinces) of Kon Tum, Binh Phuoc, Dak Lak, Dak Nong, and Gia Lai to better realize their growth potential and become more closely integrated into sub-regional frameworks including the Greater Mekong Sub-region (GMS). The project will include three main outputs and activities i) Output 1: Road infrastructure in five VDTA provinces rehabilitated; ii) Output 2: VDTA plans and facilities for transport and trade facilitation (TTF) with a focus on inclusive growth developed and iii) Output 3: Institutional capacity for VDTA investment planning, project design and implementation, and resource management strengthened.

4. Following extensive data collection, a multi-criteria analysis was used to make the final selection of the roads to be included in the shortlist. Measures were used that reflected the likely impact of the roads including eight themes: (i) agricultural productivity; (ii) population served; (iii) rural population; (iv) traffic count; (v) poor households; (vi) ethnic minority population; (vii) safeguards compliance (environment and social safeguards); and (viii) access to National Road No.14.

A. Subproject Summary

5. On 16 November 2014, Ministry of Transportation has issued Decision No.143/QD-BGTVT on the change of Provincial Road No.691 and 696 in Dak Lak area to the extension part of National Road No.29 in order to support the trade development between two provinces of Mondulkiri and Dak Lak. This is the blood line, the main East – West corridor, connect Vung Ro port in Phu Yen, crosses National Road No.1A and passes through many district centres, towns, and crowded residential areas of Phu Yen and Dak Lak provinces to Dak Rue – Chi Miet Border Gates and through other provinces of Cambodia and Lao to the North East area of Thailand.

6. The total length of National Road No.29 in Dak Lak province is 181km. The extension part is currently Grade IV Mountain road and has been degraded severely; make many difficulties for the movement and goods transportation of local people and socio-economical development of Dak Lak and Central Highlands in general.

[1] Coffee in the 21st Century – Timothy J Killeen, PhD & Grady Harper

7. The Subproject: Upgrade and Rehabilitate National Road No.29, Dak Lak Province (The Subproject) was the short-listed subproject in Dak Lak province. The Subproject will upgrade estimated 40 km road from Krong Buk Industrial Zone (Km186+126, NR29) to the Military fire practice field (Km226+00, NR29) in Krong Na commune, Buon Don District. The subproject will goes through Pong Drang, Ea Ngai, Cu Pong – Krong Buk district; Ea Tar, Cu Dlie Mnong, Ea Kueh and Ea Kiet – Cu M'gar district and Krong Na commune, Buon Don district.

B. Environment impacts and mitigations

8. The Project has been ranked as B on environmental issues during the Project Concept note as it has few potential significantly adverse impacts and none of them are irreversible. The initial environmental concern is the potential negative impact of the subproject implementation on Buon Don Protection Forest, locates along the last 5 km in Krong Na commune, Buon Don District. The completion of the road will provide access to the forest; potentially creating favorable conditions for wood logging and forestry product exploitation.

9. This IEE has been prepared to screen impacts and formulate mitigation measures in three phases of subproject implementation including design; pre-construction; construction and operation phases and institutional arrangement to ensure that subproject Environment Management Plan (EMP) will be implemented.

10. In the preconstruction phase, the potential impacts have been identified relating to land acquisition and resettlement. To minimize the impact on income and disturbance of local people's lives, PMU will check and review the Land acquisition and resettlement process before the construction start to ensure that all affected households have received compensation adequately in accordance with the current provincial market and ADB safeguard Policy be implemented.

11. Potential negative impacts in the construction phase have been identified as (i) forest encroachment in the 5 km goes through Buon Don Protection Forest. To minimize the impact, a closed collaboration between Dak Lak PMU, Environment Safeguard Specialist (ESP); Buon Don Protection Forest Management Board (BPMB), relevant Divisions of Buon Don district, Forest Ranger, Construction Supervision Consultant (CSC) and Contractors will be established to identify, manage and control the construction activities in the 5 km section goes through Buon Don Protection Forest, especially for tree cutting and vegetation clearance activities and to ensure construction activities will be done properly on the existing road foundation. Workers should be informed and prohibited from cutting trees for firewood and for use in the subproject activities before construction starts. (ii) The operation of construction machines and material transportation could damage local facilities such as low-voltage electricity lines, communication cables, existing drainage system and other roads in the subproject area. They will also impact on local traffic; increase the risk of work accidents and traffic accidents especially in the sensitive areas such as commune administration centres, medical centres, schools, kindergartens. Dust, noise and vibration from construction machines such as concrete mixing plants or transportation truck could disturb local people, damage their houses, increase risk of respiratory and skin diseases. To minimize the impact, the contractor will collaborate with relevant authorities to set up detail plan for machines and workers mobilization as well as material transportation plan; inform in advance that plan to local authorities and local people in accordance with that plan, while PMU, CSC and relevant authorities will monitor the compliance of the contractor in applying designated mitigation measures. If any buildings, structures in the subproject area are damaged by the construction activities, the contractor should compensate them adequately with their own expense.

12. (iii) Material exploitation activities at the quarry, borrow pits and temporary storage areas along the subproject road may cause sediment runoff, sedimentation. To minimize the impact, the contractor with the support of ESP under Loan Implementation Consultants (LIC) will prepare a Material Management Plan (MMP) detailing the list of authorized quarry; borrow pit and other mines that will provide construction material for the subproject construction works and a timetable for material exploitation. The plan will also determine areas for temporary material stockpile along the subproject road; avoid sensitive area like schools, kindergartens, markets, commune centres, and medical centres.

13. (iv) Workers cause social disruption or transmit disease and construction activities caused risk to health and safety to local people or construction workers. In order to minimize this negative impact, contractor must ensure that all workers have medical certificate suitable for working and register them with local police for temporary stay. Contractor will arrange suitable and hygiene living condition at the worker camps, provide workers full protective gears and train them how to use. With the support of ESP, contractor will orient workers for environmental protection as well as custom of local people.

14. In the operation phase, potential negative impacts have been identified as relating to dust and noise arising from increasing of traffic density and higher risk of traffic accident as better driving conditions. To minimize the negative impacts, Dak Lak Department of Transportation (DOT), the responsible agency for subproject management in the operation phase will periodically maintain the road, install speed limit, warning sign or road hump (if applicable) at the sensitive points along the road such as school, kindergarten, market, medical centre etc.

15. The PPTA Consultant has also identified key stakeholders and conducted public consultations from provincial to commune level with a focus on the affected people views. The main concerns are the difficulties in movement and access properties in the construction phase as well as wall cracking due to vibration from construction machines. The representative of Buon Don Protection Forest Management Board has expressed his concern on potential negative impacts to the forest. All of these concerns are addressed in the EMP (See Table 11 – 12 for more details).

16. An EMP has been prepared under this IEE to detail responsibilities of relevant stakeholders on mitigation measures to be implementated during construction and operation phases of the subproject.

C. Institutional arrangement

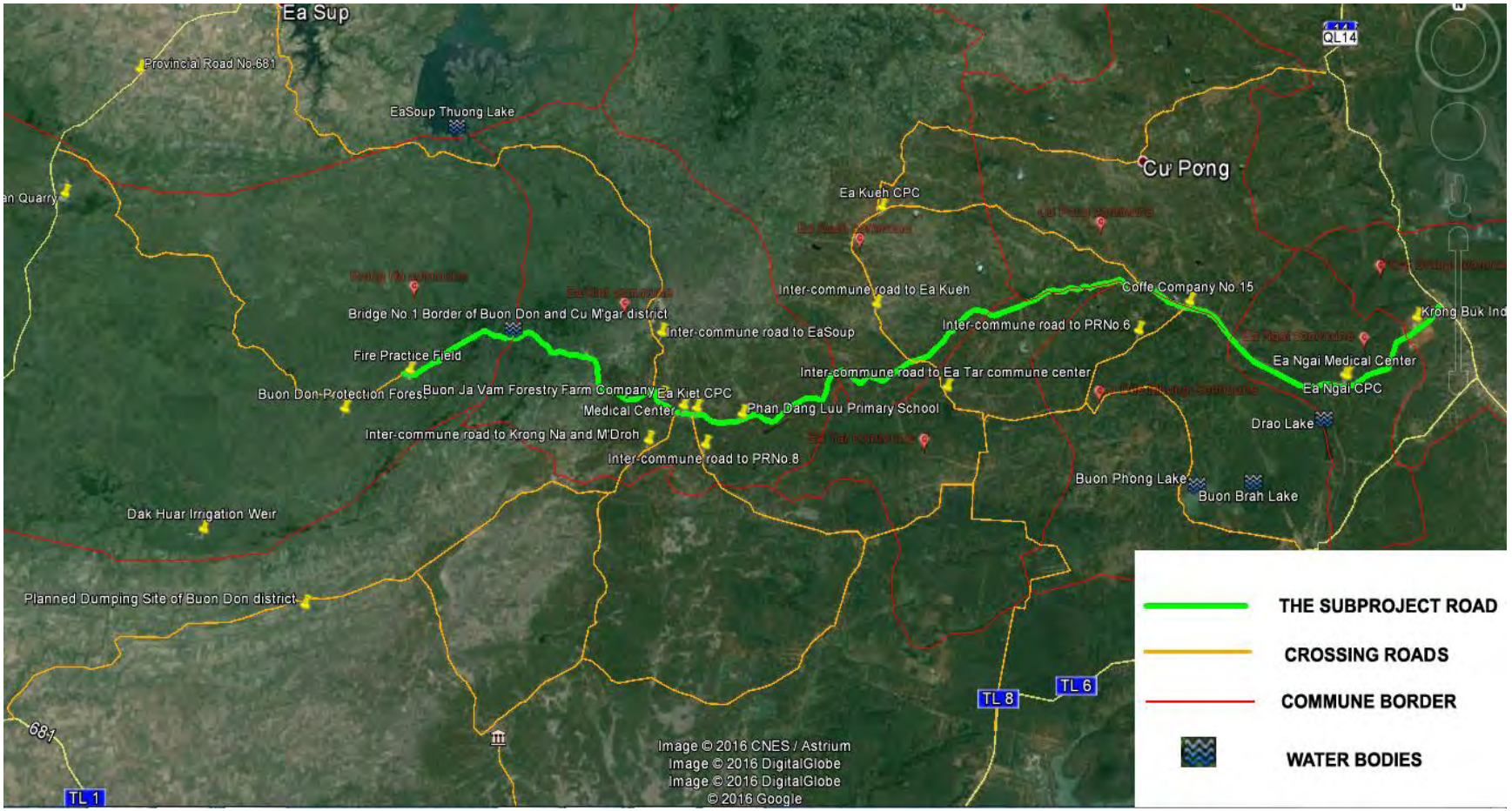
17. Dak Lak PPC has established a Project Preparation Unit (PPU) to support the preparation of the subproject in the PPTA period. One safeguard staff from other ODA Project has been assigned as Environmental Safeguards Officer (ESO) of PPU. Ideally, the ESO will become ESO of Dak Lak PMU in the construction phase. ESP will organize a formal training course and on-the-job training for relevant PMU staff, CSC, communities, contractors and support for establishment and operation of subproject environment management system in construction phase. ESP will also support PMU's capacity building by reviewing and evaluating the capacity for environmental protection of PMU and Dak Lak Department of Transportation (DOT) – subproject management organization in the operation phase.

18. To fully reflect the environmental protection cost of the civil works and engage the environmental responsibilities of civil contractors, environmental requirements will be included in biding documents and civil work contracts. Any omission of environmental management costs will create high risks for implementing mitigation measures during the construction phase due to lack of resources and capacity, thus the environmental protection cost and responsibilities need to be involved from the beginning. Bid document will also specify that contractors shall engage capable and trained staff to take responsibility for the environmental management and safety issues at the working level and to monitor the effectiveness and review mitigation measures as the subproject proceeds.

D. Conclusion

19. The IEE concludes that the feasibility study of the subproject combined with available information is sufficient to identify the scope of potential environmental impacts and formulate mitigation measures for the subproject. Providing that significant changes to the subproject description do not occur at the detailed design phase, and that new sensitive environmental, or cultural resources are not determined, further detailed environmental impact assessment (EIA) is not required. The ESP will update the EMP before finalization of the detail design.

Figure 1 – General Map of Dak Lak and Subproject Area



II. BACKGROUND

20. The Support to Border Areas Development Project (Project) will help the five participating provinces (the Provinces) of Kon Tum, Binh Phuoc, Dak Lak, Dak Nong, and Gia Lai to better realize their growth potential and become more closely integrated into sub-regional frameworks including the Greater Mekong Sub-region (GMS), the Cambodia – Lao PDR – Viet Nam Development Triangle Area (CLV-DTA), and the ASEAN Economic Community. It will improve the project area's connectivity by developing critical transport infrastructure, leading to increased movement of people, agricultural produce, and other goods. Moreover, it will facilitate logistics and trade, and help develop the Provinces' capacity for investment planning from a regional integration perspective. As the Provinces are at the joint borders of the CLV-DTA, the Project will enable them to serve as an engine and gateway to wider markets for this sub-regional initiative. The Project will be implemented in 5 provinces in the CLV-DTA of Vietnam including Kon Tum, Binh Phuoc, Dak Lak, Dak Nong and Gia Lai.

21. The proposed Project will include 3 outputs and activities:

- ***Output 1: Road infrastructure in five VDTA provinces rehabilitated*.** The Project will improve transport infrastructure of the DTA area, including selected sections of provincial roads and roads that are important for filling the missing links for accessing national and international wider markets, tourism, healthcare facilities, and heritage and conservation areas. The project will provide the critical road infrastructure in service of selected value chains to ensure the smooth flow of products along the value chain to the market.
- ***Output 2: VDTA plans and facilities for transport and trade facilitation (TTF) with a focus on inclusive growth developed.*** This output will stimulate inclusive economic activity by (i) improving TTF within the VDTA leading to easier movement of goods and people across the borders, which in turn will stimulate the formation of strong value chains to support trade and tourism; and (ii) expanding the tourism industry which will involve the local population, with a special emphasis on the inclusion of ethnic minorities. Moreover, tourism also leads to demand for high quality local agricultural produce and rural products such as traditional handicrafts.
- ***Output 3: Institutional capacity for VDTA investment planning, project design and implementation, and resource management strengthened***. This output will consolidate the long-term development program for the VDTA. The indicators for achieving this output are: (i) VDTA master plan updated and implementation action plan prepared with ecosystem services, gender and EM considerations; and (ii) Officials nominated by the PPC trained to implement the updated master and action plans.

22. The Government of Vietnam has assigned Ministry of Planning and Investment (MPI) as the line agency for the preparation phase of the Project. Department of Planning and Investment (DPI) of the five provinces are responsible for the Project preparation phase in their provinces. DPIs have prepared a long list of the proposed roads in their provinces based on the Provincial Transportation Master Plans and the demand for road upgrade at the moment. The long list subprojects have been detailed feasibility and preliminary designs have been undertaken by the PPTA. A multi-criteria system with weight has been developed to screen and short-listed these subproject roads. The parameters are (i) road condition; (ii) production areas; (iii) population served; (iv) poverty rate; (v) environmental safeguards; (vi) social safeguards (resettlement); (vii) ethnic minorities.

III. POLICY AND LEGAL FRAMEWORK

23. The subproject shall comply with requirements of ADB SPS 2009 and the GOV's Guidelines on Implementation of Law on Environmental Protection 2014. Decree No. 18/2015/ND-CP has detailed information on environmental protection assessment, environmental impact assessment and environmental protection plans. However certain activities commonly associated with infrastructure subproject such as quarry operations, extraction of gravel, etc., will also require permission from the relevant provincial level authorities. Depend on the scale; some constructions on the proposed road such as bridge or spillway shall require separated environmental impact assessment.

A. Asian Development Bank Requirements

24. ADB safeguard policy statement (SPS) 2009 imposes safeguard requirements for all its funded projects. The SPS 2009 clarifies reason, scope and contents of the environmental assessment. Safeguard policy statement emphasizes on environmental and social sustainability in progress of economic growth and poverty reduction in Asia and the Pacific, therefore the objectives of SPS focus on:

- Avoid adverse impacts of projects on the environment and affected people, where possible;
- Minimize/mitigate and/or compensate for adverse impacts on environment and affected people when avoidance is not possible; and
- Help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks

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

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

26. For environmental safeguards, the Project is initially categorized as 'B' for environmental safeguards. Environmental criteria for the long list multi-criteria system has been developed and contributed for the evaluation and short-listed subproject roads. Detail of the environmental criteria could be found in Appendix 02. The subproject has been classified as category A on environmental safeguards will not be short-listed as it will rescale the whole Project to category A on environment

B. Legal and Administrative Framework for Environmental Protection in Vietnam

27. The subproject has to comply with the environmental legal framework of Vietnam, which is outlined in this section. The main components of the framework, if not, the more applicable ones are shown here.

28. Laws:

- Law No. 55/2014/QH13 of 23 June 2014 by the National Assembly on environment protection
- Law No. 17/2012/QH13 of 21 June 2012 by the National Assembly on water resources
- Law No. 20/2008/QH12 of 13 November 2008 by the National Assembly on biodiversity
- Law No. 68/2006/QH11 of 29 June 2006 by the National Assembly on standards and technical regulations
- Law No. 29/2004/QH11 of 03 December 2004 by the National Assembly on forest protection and development

29. Others

- Decree No. 18/2015/ND-CP dated February 14, 2015 on environmental protection planning, strategic environmental assessment, environmental impact assessment and environmental protection plans.
- Circular No. 27/2015/TT-BTNMT dated May 29, 2015 on strategic environmental assessment, environmental impact assessment and environmental protection plans.
- Decision 186/2006/QD-TTg dated August 14, 2006 of the Prime Minister promulgating the Regulation on forest management
- Decree 09/2006/ND-CP dated 16th January, 2006 of the Government on forest fire prevention and control
- National Technical Regulations on air and noise quality
    - QCVN 05: 2013/BTNMT on ambient air quality
    - QCVN 26: 2010/BTNMT on noise
    - QCVN 27: 2010/BTNMT on vibration
- National Technical Regulations on water quality
    - QCVN 01: 2009/BYT on drinking water quality
    - QCVN 02: 2009/BYT on domestic water quality
    - QCVN 08: 2008/BTNMT on surface water quality
    - QCVN 09: 2008/BTNMT on underground water quality

- QCVN 14: 2008/BTNMT on domestic wastewater

30. Other legislations applicable to the Project are the following:

- Law No. 27/2001/QH10 of 29 June 2001 by the National Assembly on fire prevention and fighting
- Law No. 40/2013/QH13 of 22 November 2013 by the National Assembly on amending and adding a number of articles of the Law No. 27/2001/QH10 of 29 June 2001 on fire prevention and fighting
- Decision No. 3733/2002/QD-BYT of 10 October 2002 by the Ministry of Health promulgating 21 labor hygiene standards, 5 principles and 7 labor hygiene measurements
- Law No. 50/2014/QH13 of 18 June 2014 by the National Assembly on construction
- Circular No. 22/2010/TT-BXD of 03 December 2010 by the Ministry of Construction on labor safety in work construction
- Law No. 10/2012/QH13 of 18 June 2012 by the National Assembly on labor code
- Law No. 64/2006/QH11 of 29 June 2006 by the National Assembly on HIV/AIDS prevention and control
- Law No. 21-LCT/HDNN8 of 30 June 1989 by the National Assembly on people's health

IV. DESCRIPTION OF THE SUBPROJECT

A. The need for subproject

31. Dak Lak province is located at the centre of Central Highlands. It spreads out on an area of 13085 km^2, make up 3.9% of the country area and it is the fourth largest province of Vietnam. A part of the southwest slope of the Annamite Range, Dak Lak has a mostly mountainous topography (35% of its area are highlands and mountains). The average height is from 1000 to 1200 m; the highest peaks are Chu Yang Sin (2442m), Chu H'mu (2051m), Chu De (1793m), and Chu Yang Pel (1600m). In the middle of Dak Lak, one can find a flat stretch of highland that covers 53% of the natural area, with an average height of 450m. The rest of province is lower area. One more noticeable fact is that 1/3 of Dak Lak's area is Basalt, a precious soil type allowing the province to develop the coffee, rubber, pepper, etc. industries.

32. Dak Lak is one of the most potential provinces of Vietnam in term of tourism development. With the total population of only 1.833 million but Dak Lak is the home of forty-four ethnic groups. It has so many historical and natural sites, not to mention its diverse yet deeply rooted tradition and culture. With the basalt soil type, suitable for coffee production, Buon Ma Thuot city – the capital of Dak Lak is considered one of the "Capitals of Coffee" in the world. Some other attractive point like Ban Don (Don Hamlet) in Buon Don district, Dak Lak, a village which has been put on the world tourism map for its tradition of hunting and taming elephant.

33. Dak Lak has 70 km borderline with Cambodia, suitable for economical development integrated with security and defence. Buon Ma Thuot city is the centre of the province and it is also the meeting point of National Road No.14 – running along Central Highlands from North to South, National Road No.26 and No.27 connect to Nha Trang city - Khanh Hoa province, Da Lat city – Lam Dong province. From East to West, National Road No.29 starts from Phu Yen province, crosses National Road No.14 and reaches to Dak Rue Border Gate.

34. Despite the advantage, potential on agricultural and tourism development, the economical connection between Dak Lak and Cambodia is not met the demands. Dak Rue – Chi Miet Border Area has not been developed and the road connect to the border gate is still in bad condition.

35. The investment of the Subproject in order to connect National Road No.14 with Dak Rue – Chi Miet Border Gate as well as Vung Ro port in Phu Yen is necessary for the economical development of border districts in Vietnam and Cambodia, make an investment foundation for other projects in agricultural sectors, support to improve living standards of local people.

B. Location and scope

36. The Subproject will upgrade 40km of National road No.29 to Vietnamese Standard Road Grade IV – Mountainous (TCVN 4054-05) with the surface width of 8 m and base width of 9 m. The road surface material is asphalt concrete or cement concrete and the design speed is 40 km/h. The detail scale of a cross section as below:

+ Road base width: 9 m.

+ Road surface width: 8 m, slope angle of the road cross-section for straight section is 2%.

+ Improved roadside width (same material with road surface): 2x0.5m

+ Soil roadside width: 2x0.5m

+ Slope angle of the roadside cross-section is 4%.

+ Axle load for road surface: 100 KN

37. There are total 45 culverts along the subproject route. Some of them will be upgraded or reconstructed. There is only one stream cross the route at Km220+527.45. The current bridge has the total length of 31.6m and it is still in good condition and will be utilized. The subproject will only upgrade the surface of the bridge. Based on the investigation from the PPTA, the peak water level in Dak Lak for 25 years is happened in 2005 with 146.21m above the sea level at the bridge location.

38. The subproject will utilize all culverts are still in good conditions, ensure water drainage along the road and reconstruct or construct new culverts in case the old one is not function well.

39. The main filling soil and stone sources for the subproject could come from Phuc Thien borrow pit and quarry located in Km217+800 of the proposed subproject in subzones 550, Ea Kiet commune, Krong Buk district, Dak Lak. This borrow pit has been organized to provide filling soil for transportation construction in the area and it has the operation license from Dak Lak DONRE. The stone capacity of the borrow pit and quarry is over 8 million cubic meters while the estimated stone volume for subproject construction is about 110000 m^3. The management of Phuc Thien borrow pit and quarry is Phuc Thien One Member Construction Company.

40. Sand, steel, cement and other construction material could be bought in the shops system along the subproject road.

41. Currently, Ea Kiet and Ea Kueh communes of Cu M'gar district have set up temporary dumping sites for domestic wastes in the commune. The waste collection team is also established in these two communes to collect and transfer waste to the temporary dumping sites. Krong Buk district has assigned an area in hamlet No.11, Pong Drang commune that is about 5km from the subproject road for waste disposal. This area could also be used as temporary dumping site for excavated soil and other construction waste. For Buon Don, a dumping site of the district has been planned in Ea Huar commune. The contractor should work with CPCs for dumping site before construction start.

42. Land acquisition and resettlement: There is no major household affected by implementation of the subproject. The subproject will upgrade the road surface and make some bend corrections or reconstruct some culverts. The subproject will affect 479 HHs in 6 communes of two districts, of which 01 household will be affected the residential land but no relocation. 13 households will be affected their garden land but no one is severely affected due to loss of more than 10% their productive land holding; and remaining households are only affected to their auxiliary assets on land such as culvert, fence, gate… Out of 479 AHs, 19 HHs are EM belonging to Ede, Khmer, Dao, Nung groups. 20 affected households belong to vulnerable group of which 12 households are female headed with dependents, 03 are poor households, 02 households are elderly and 03 others are social preferred households.

43. Beside the impact to the households, the subproject also affected to some enterprises, communities and organizations as mentioned below:

(i) 04 enterprises: Buon Za Wam Forest Company, No.15 Coffee Company under Army Corps No.15, Cu M'Gar Electric Company, Krong Buk bus Transportation Company.

(ii) 05 schools: Phan Dang Luu primary school in Ea Kiet commune, Nguyen Cong Tru secondary school in Ea Ngai commune, Ngoc Lan Kindergarten in Cu Pong commune, Hoa Mai and Hoang Lan Kindergartens in Ea Kiet commune.

(iii) 02 Medical stations of Ea Ngai and Ea Kiet communes;

(iv) 02 Post office of Ea Ngai and Ea Kiet communes;

(v) 07 Organizations: Ea Ngai, Cu Pong, Ea Kueh, Cu Dlie Mnong and Ea Kiet CPCs, Assets management unit, Forest Management Station.

(vi) Communities: Villages #9, #10 in Ea Ngai commune, Thac Da village in Ea Kueh commune.

Table 1 - Impact on land of households, enterprises and organizations

No.	District/ Commune	Total affected area	Residential land (m2)	Garden land (m2)	Forest production land (m2)	Other Public land (m2)
A	**Krong Buk**	**645**	**35**	**610**	**0**	**0**
1	Cu Pong	645	35	610	0	0
B	**Cu M'Gar**	**611**	**10**	**601**	**0**	**0**
2	Ea Kueh	601	0	601	0	0
3	Cu Dlie Mnong	10	10	0	0	0
	Total	**1,256**	**45**	**1,211**	**0**	**0**

Source of data: IOL data provided by PMU of Dak Lak DPI

44. Impact on house and structures: subproject will affect partially a warehouse - Class 4 brick house of Coffee Company No.15 (10m^2). 472 households in 6 communes will be affected their gates, fences, culverts or yards. No household have to relocate. Impact on public assets: the subproject will affect to assets of several organizations, communities such as electric pole, transformer stations, bus station, bus signal panel, culverts and gates of villages.

Table 2 - Impacts on house and structures of households, enterprises and organizations

No.	District/ Commune	House (m^2)	Fence (m)	Steel roof (m^2)	Gate (m^2)	Concrete Yard (m^2)	Culvert (each)	Power transformer station (each)	Electric pole (each)	Biogas tank (m^3)
A	**Krong Buk**	**0**	**509**	**55**	**42**	**3,124.82**	**221**	**0**	**1**	**0**
1	Cu Pong	0	64	0	0	2,214.0	48	0	1	0
2	Ea Ngai	0	445	55	42	910.82	173	0	0	0
B	**Cu M'Gar**	**10**	**367**	**21**	**4.9**	**2,307.85**	**133**	**2**	**1**	**6**
3	Ea Kiet	0	96	21	4.9	994.85	37	1	1	6

4	Ea Tar	0	20	0	0	0	0	0	0	0
5	Ea Keuh	0	251	0	42	291.0	20	1	0	0
6	Cu Dlie Mnong	10	0	0	0	1,022.0	76	0	0	0
	Total	**10**	**876**	**76**	**88.9**	**5,432.67**	**381**	**2**	**2**	**6**

45. The subproject will also affect 606 various trees of 31 households planted along the road mainly curry, coffee, avocado, jackfruit…

46. In the plan, the subproject will be constructed in 24 months with the estimated budget of 22,386,712 USD in equivalent with 499,223,678,722 VND (1 USD equivalent with 22,300 VND).

Table 3 – Estimated budget of the subproject implementation

No	ITEMS COST	METHOLD	SUB COST PA1	USD	Notes
	Invesment Cost	**I+II+…+VI**	**499 223 678 722**	**22 386 712**	
I	**Construction cost**	**1+2**	**346 618 525 000**	**15 543 432**	
1	Embankment		38 224 535 633	1 714 105	
2	pavement		239 103 608 197	10 722 135	
3	Drainage; culverts		10 660 683 158	478 058	
4	Long drainage		47 104 873 473	2 112 326	
5	Embankment protection works		899 046 890	40 316	
6	Traffic safety		10 161 094 444	455 654	
7	Temporary works		464 683 513	20 838	
II	**SITE CLEARANCE COST**	separated	**4 149 865 722**	**186 093**	-
III	**MANAGEMENT COST**	1.274% *CPXDTT	**4 013 699 000**	**179 987**	
IV	**INVESTMENT ADVICE COST**		**17 544 574 000**	**786 752**	-
1	Report investment cost (*1,2 design improvement)	0.191%*CPXD*1,2	736 706 604	33 036	Decided 957/QD-BXD dated 29/9/2009
2	Survey cost (calculation temporary 100mil vnd /km)	Temporary	4 000 000 000	179 372	
3	Verification cost	0.028%*CPXD	85 889 930	3 852	Decided 957/QD-BXDdated 29/9/2009
4	Shop drawing cost (*1,2 design improvement)	0.909%*CPXD*1,2	3 587 277 645	160 864	Decided 957/QD-BXD dated

					29/9/2009
5	Survey cost for shop drawing (Calculation temporary 120 mil vnd/km)	Temporary	4 800 000 000	215 247	
6	Establish bidding document; Evaluation bidding document cost	0.2%*GGT	100 000 000	4 484	Decree 63/2014/ND-CP dated 26/6/2014
7	Supervision cost	0.97%*CPXD	2 170 906 293	97 350	Decided 957/QD-BXD dated 29/9/2009
8	Verification shop drawing cost	0.05%*CPXD	169 884 663	7 618	Decided 957/QD-BXD dated 29/9/2009
9	Verification estimates cost	0.05%*CPXD	160 816 056	7 211	Decided 957/QD-BXD dated 29/9/2009
10	Others cost for consultant (temporary)	0.50%*CPXD	1 733 092 625	77 717	
V	**OTHERS**		**27 882 252 000**	**1 250 325**	-
1	Clearance mine cost (calculation temporary:: 5000đ/m2)		**2 312 708 200**	**103 709**	
2	General cost		**19 364 018 875**	**868 342**	
2.1	Temporary housing cost	2.0%*CPXD	6 932 370 500	310 869	
2.2	Others undefined cost (2%)	2.0%*CPXD	6 932 370 500	310 869	
2.3	Mobilization and remobilization cost (calculation temporary)	0.5%*CPXD	1 733 092 625	77 717	
2.4	Ensuring transport cost (Calculation temporary)	1.0%*CPXD	3 466 185 250	155 434	
2.5	Setup Asphalt plant station	Temporary	300 000 000	13 453	
3	Insurance works cost (Temporary)	0.42%*CPXD	1 455 797 805	65 282	Decided 33/2004/QD-BTC dated 12/4/2004
4	Expertise fees (*TMDT)	0.009%*TMDT	34 439 250	1 544	
5	Verification fees for design document	0.01%*CPXD	37 021 765	1 660	Circulars 75/2014/TT-BTC dated 12/6/2014
6	Verification fees for estimate document	0.01%*CPXD	35 131 119	1 575	Circulars 75/2014/TT-BTC dated 12/6/2014
7	Expertise fees for Bidding document and result bidding	0.1%*GGT	100 000 000	4 484	Decree 63/2014/ND-CP dated

					26/6/2014
8	Approval settlement report fees	0.28%*TMDT	1 073 891 250	48 157	Circulars 09/2016/TT-BTC dated 18/01/2016
9	Audit cost (*TMĐT)	0.409%*TMDT*1, 1vat	1 736 150 625	77 854	Circulars 09/2016/TT-BTC dated 18/01/2016
10	Others (Temporary)	0.5%	1 733 092 625	77 717	
VI	**CONTIGENCY**		**99 014 763 000**	**4 440 124**	
	Variation works cost	10%	39 605 905 000	1 776 050	
	Inflation cost	15%	59 408 857 500	2 664 074	Indicator construction

V. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

1. Topography, Geology, and Soils

47. Dak Lak located to the West of Truong Son Ranch, the province topography gradually going down from South East to North West with hilly area and plateaus lying together. The main topographical types are: mountainous areas; plateaus; EaSoup peneplain; Krong Pach – Lak katabothron. The plateau occupied most of the land area in Dak Lak with two largest plateaus Buon Ma Thuot and M'Drak.

48. Buon Ma Thuot plateau is a large plateau lying more than 90km from North to South and 70km from East to West. This is a quite flat area with the average slope ratio of $3\text{-}8^0$ and 800m in the North to 300m in the West above the mean sea level (MSL). The soil type in the plateau is rich red basalt soil and most of the area have been used for cultivation.

49. EaSoup peneplain is a large area located in the West of the province, next to Buon Ma Thuot plateau. The surface has been flatted by weathering process with the average elevation of 180m above MSL with some mountain ranches like Yok Don and Chu M'Lanh. The main soil type in the peneplain is grey soil in thin layer with the typical vegetation cover of "Khop" forest – exfloliating trees in the summer.

50. The subproject road located mainly in Buon Ma Thuot plateau with rich red basalt soil and extensive agricultural cultivation area along the road. The last part of the road is running through EaSoup peneplain, mainly 4km in Buon Don district, is typical with grey soil and "Khop" forest along the road. The road is gradually going up from the start point in Krong Buk Industrial Zone to the end point in Krong Na commune (EaSoup peneplain).

2. Hydrology and Climate

51. Dak Lak located in the moonson area and it has been affected by two reverse moonson systems: tropic moonson and Northern Hemisphere trade winds. The climate of Dak Lak is also be affacted by its elevation and terrain to make a special climate type: Plateau tropical moonson or micro tropical plateau.

52. Total sunny hour of Dak Lak varied from 2200 to 2600 hour/year with average 6-7 hours per day in the rainy season. The annual average temperature is $22\text{-}24^0$C with low temperature fluctuation of a month ($4\text{-}5^0$C) but the daily temperature fluctuation is high, varied from $10\text{-}12^0$C upto $15\text{-}16^0$C sometimes in some places.

53. There are two clear seasons in Dak Lak. Rainy season usually starts from May to the end of November with 80-85% of the annual precipitation. The dry season starts from November to April next year with only 15-20% of the annual precipitation. However, the dry and rainy season is also different between areas in the province. Rainy season in the East area of the province usually come later (May and June) and ends in November and December. The average humidity of the year is 80-85% with lowest humidity sometimes only 40-45% in the dry season.

54. Dak Lak has a rich river and stream network with two main river systems: Serepok River system and Krong Nang and Hinh River system. The Serepok River system flow West – North West direction and discharge into Mekong River with the total water catchment of 14420 km^2.

The length of the River in Dak Lak province is about 300 km with the river width varied from 100 to 150m. Serepok River has two main branches is Krong Ana and Krong No Rivers. Krong Nang and Hinh River system is located in the North West of the province. The river catchment in Dak Lak is about 2880 km^2 with two main branches is Hinh River and Krong Nang River.

55. There is no large river or stream in the subproject area. 40 km of the subprojec road crosses only 1 small stream at Km220+527.45, the border of Krong Na commune, Buon Don district and Ea Kiet commune, Cu M'gar district. The stream originated from York Don Mountain area, flows North before discharge into EaSoup Thuong Lake – about 6 km from the subproject route.

3. Surface and ground water

Surface water resources and quality

56. There is no large water body located along the subproject route. The largest lake is EaSoup Thuong lake – about 6 km from the route in Buon Don district. There are also several small irrigation lakes along the subproject road with the distance varied from 200 m to 3 km. Due to the serious drought situation in the subproject area recent years, many irrigation lakes have dried up in the dry seasons like Buon Thai and Buon Vin lakes in Ea Kueh commune, Cu M'gar district. According to the result of surface water monitoring of Dak Lak[2] in 2015 by Center for Environmental Monitoring and Analysis, under Dak Lak DONRE, the surface water quality is still in good condition with most of the analyzed parameters are still under the QCVN 08:2008/BTNMT – National Technical Regulation on Surface Water Quality. The nearest sampling location for surface water quality to the subproject is EaSoup Thuong Lake – about 6 km from the subproject road. Only NO_2- parameter is higher than allowed level in most of the sampling locations.

Underground water resources and quality

57. According to the research on Underground Water in Central Highlands of Vietnam Federation of Geology and Mineral, the underground water resource in Dak Lak is mainly stored in basalt layer. The richest area for underground water is Ban Me Thuot plateau while EaSoup peneplain has limited underground water resources. Some area in Krong Buk district has drilled upto 20-30m underground but still could not get the water for domestic purpose.

58. The quality of underground water in Dak Lak according to the result of underground water monitoring of Dak Lak[3] in 2015 is still in good condition. All the parameters like hardness, COD, Fe, NO_2-, NO_3-, SO_4^{2-}, coliform, Mn, Pb, Cd, As are all under allowed level of QCVN 09:2008/BTNMT National Technical Regulation on Underground Water Quality. The nearest sampling location for underground water quality is in Krong Buk Industrial Zone – the start point of the subproject.

4. Natural Disaster

59. Based on the result of the PPTA investigation with local people along the subproject road, the main natural disasters in the recent years are drought and tornado. Tornados usually happen in local scale with unremarkable damage. Drought has a serious impact on the

[2] Dak Lak Environmental Status Report, 2015
[3] Dak Lak Environmental Status Report, 2015

agricultural production of subproject area and Dak Lak province in general. Local people in the subproject area has mentioned that the water demands for coffee cultivation is about 3 times higher than pepper with the same cultivation areas. Many interviewees have put new irrigation project as the highest priority and the subproject – upgrade road – could be start later. About half of the small irrigation lakes in the subproject area have dried up. In April 2016, the peak month of the dry season, domestic water supplies have ceased in most of the places in Dak Lak. Even in Buon Ma Thuot city, the domestic water has been supplied only 2 days per week.

60. Buon Don district located mainly on EaSoup peneplain with poor underground water resources, has suffered severely from the drought. According to representative of Buon Don Division of Agriculture and Rural Development, in the dry season of 2016, about one third of the coffee production area has been lost due to the drought.

5. Air quality and noise

61. In accordance to air quality monitoring program of Center for Environmental Monitoring and Analysis in 2015, the ambient air quality in Dak Lak province is still not polluted. All monitoring parameters are under QCVN 05:2013/BTNMT National Technical Regulation on Ambient Air Quality. Noise has also be measured and at all sampling location, it is reached the allowed level of QCVN 26:2010/BTNMT National Technical Regulation on Noise. It is reasonable as the sampling locations are all located at the junctions with high traffic density. The nearest monitoring point for air quality and noise is located at the junction of subproject road and National Road No.14 in Krong Buk Industrial Zone.

B. Biological Environment

1. Agriculture

62. Along the first 34 km of the subproject road in Krong Buk and Cu M'gar districts are agricultural cultivation of coffe, pepper and rubber. As the subproject located in Buon Ma Thuot plateau, the center for coffe production of Viet Nam, coffe is the main crops in the two districts are show in Table 4 below. The 5 km section along the subproject road in Krong Na commune, Buon Don district is mainly Dipterocarp forest of Buon Don protection forest with no cultivation area along the road.

Table 4 - Area and production of the main crop of the 3 districts in 2015

Type of Production	Unit	Krong Buk dist.	Cu M'Gar dist.	Buon Don dist.
1. Main crops				
a. Coffee				
- Area	Ha	21,068.63	35,831.00	3,673
- Productivity	Ton/ha	2.03	2	2.7
- Output	Ton/year	42.000	69,593.30	9,248
b. Rubber				
- Area	ha	2.237	8,740.50	937
- Productivity	Ton/ha	1.1	1.59	
- Output	Ton/year	2.200	12,490.40	10
c. Pepper				
- Area	ha	905	1,306	982

- Productivity	Ton/ha	2.2	2.97	2.6
- Output	Ton/year	1.011,3	2,336.40	1,274
d. Rice				
- Area	ha	387.5	2,725.44	2,653
- Productivity	Ton/ha	8.0	6.23	5.39
- Output	Ton/year	1,188.7	16,979.49	14,305
e. Cassava				
- Area	ha	890	785	1,840
- Productivity	Ton/ha	7.5	30	11.5
- Output	Ton/year	6,675.0	23,548	21,130
f. Corn				
- Area	ha	1.868	10,638	7,354
- Productivity	Ton/ha	11.2	6.43	5.13
- Output	Ton/year	10,495.6	68,430.5	37,695

2. Forestry

63. Krong Na commune, Buon Don district is one of the 7 communes of York Don National Park. The last 5 km of the subproject road in Krong Na commune running through subzone 454 and 436 of Buon Don Protection Forest. According to the Director of Buon Don Protection Forest Management Board, the forest has been established to reserve the specific dry Dipterocarp forest of Dak Lak with mainly Dipterocarpaceae family. Currently, there is no big tree in the forest and it is the poor forest under the recent forest investigation result. The subproject could upgrade the road surface based on the existing foundation but any other expansion to the area of the forest could be done only with the proper permission from Ministry of Natural Resources and Environment (MONRE).

3. Faunna and Flora

64. Dak Lak is one of the 12 center for biodiversity of Vietnam. The plantation cover of Dak Lak could be divide into 4 main types including (i) Tropical evergreen forest: developed on high mountainous area, thick soil layer with many precious trees like merawan, Burma padauk, aglaia, Fujian cypress, Pinus kesia... (ii) Mixed forest with timber and bamboo: the forest with main plant types are bamboo and Dipterocarpus obtusifolius. (iii) Replantation forest and shrubs and (iv) Natural grassland.

65. In accordance to a survey of Animal Resources Institute, there are 598 bird species under 46 families in Dak Lak; 228 mammal species in 26 families; 129 reptile species under 12 families; 79 amphibian species in 5 families; 96 fish species and other species... In particular there are rare species such as the elephant, tiger, leopard, gaur, bear, brow-antlered deer, Indian hog deer, flying squirrel...

In general, Dak Lak province has a rich forest resources high biodiversity with many rare plant and animal species. However, due to deforestation, along with indiscriminate hunting activities... has made this rich natural resources are at risk of depletion.

C. Socio-economical Condition and Infrastructure

1. Population and Ethnic

66. Up to 2015, total population of the 3 districtss is 316364 people with 178706 Kinh people, make up 56.54% of the total 3 district populations. Among ethnic minorities, Ede people have the largest population with 102207 people, make up 32.33% of the total population. Other ethnic groups' population area are Tay, Nung, Xe Dang...

Table 5 - Population and ethnic groups in the subproject area 2015

No		Total of population	Peoples clarification (number of people)							
			Kinh	Ede	Dao	Tay	Nung	Xe Dang	Thai	Others
I	**KrongBuk dist.**	66,295	45,282	19,591	13	247	138	24	20	980
1	Pong Drang Com.	18,914	15,212	3,439	3	93	58	0	11	106
2	Ea Ngai Com.	4,008	3,941	0	0	8	28	0	0	20
3	Cu Pong Com.	10,728	3,608	6,626	0	14	4	0	82	394
II	**Cu M'Gar Dist.**	183,424	98,266	67,049	1,433	590	661	331	224	14,870
1	Ea Tar Com.	8,351	3,156	4,330	539	33	9	0	0	284
2	Ea Kiet Com.	9,134	7,219	1,237	41	47	17	0	9	564
3	Ea Kueh Com.	6,944	2,163	2,910	511	11	8	143	741	457
4	Cu Dlie Mnong Com.	10,537	6,300	3,663	0	1	3	0	30	540
III	**Buon Don Dist.**	66,645	35,158	11,458	739	5,189	8,070	0	448	5,583
1	Krong Na Com.	5,166	1,187	1,526	84	10	20	0	10	2,329

Data sources:

1. *Statistics of the ethnic composition in Cu M'Gar District People's Committee in2015*
2. *Statistics of population and ethnic composition of KrongBukDistrict People's Committee in 2015*
3. *Statistics of poor households and marginal poor households under the new standards of Cu M'Gar District People's Committe in 2015*
4. *Statistics of poor households and marginal poor households under the new standards of Krong Buk District People's Committee in 2015*
5. *Statistics of peoples composition of Buon Don District Peoples' Committee in 2015*

2. Living Standards:

67. Along the NR29, the further to NR14, the poorer district. Buon Don is one of the poorest districts of Dak Lak with poor people make up more than 32% of the total population. 2/3 of the poor people is ethnic minorities.

Table 6 – Number of poor households and the reason in 2014

	Poor Household			
	Total of HHs	**Total of EM HHs**	**Total of populations**	**Total of EM populations**
KrongBuk District	3,096	1,731	12,734	7,060
Pong Drang Commune	478	187	1,969	938
EaNgai Commune	163	12	645	46
Cu Pong Commune	769	605	3,227	2,545
Cu M'Gar District	4,069	2,566	17,998	12,234
Ea Tar Commune	101	69	402	303
EaKiet Commune	244	124	1,106	512
EaKueh Commune	403	332	1,720	1,466
Cu DlieMnong Commune	171	104	725	461
Buon Don District	5,424	3,590	21,351	14,131
Krong Na Commune	756	640	2,406	2,036

Data sources:

1. *Statistics of poor households and marginal poor households under the new standards of Cu M'Gar District People's Committe in 2015*
2. *Statistics of poor households and marginal poor households under the new standards of Krong Buk District People's Committee in 2015*
3. *Statistics of poor households and marginal poor households under the new standards of Buon Don District People's Committee in 2015*

3. Employment and income

68. The table below shows the total of production value (count in million VND) of the 3 subproject districts in 2014 - 2015 as the investigation result of the PPTA Consultant.

Table 7 – Production of the 3 districts in 2014 - 2015

	Unit	Krong Buk District	Cu M'Gar District	Buon Don District
I. Total of production value (million dong)	**Mill. dong**	**3,497,653.15**	**8,854,039**	**2,108,000**
1. Agriculture, forestry, fisheries	Mill. dong	2,352,725.98	5,871,520	1,076,000
- Agriculture	Mill. dong	2,303,769.51	5,833,298	
+ Crop	Mill. dong	*2,078,191.42*	5,302,134	
+ livestock	Mill. dong	*112,463.01*	428,131	
- Fisheries	Mill. dong	*37,697.63*	29,217	
- Forestry	Mill. dong	*11,758.84*	9,005	
2. Industry- construction	Mill. dong	*259,648.17*	1,031,963	369,000
3. Business and services	Mill. dong	855,279.00	1,950,556	636,000
II. Production structure under sector (%)	%			
1. Agriculture, forestry, fisheries	%	67.26	66.31	51.56
2. Industry- construction	%	7.42	11.66	18.80
3. Business and services	%	23.04	21.05	30.36
4. Others	%	0	0.08	0
III. Total of food outputs (ton)		54.120		
- Average food per Capita	kg			796
IV. Per capita income / year (million)	Mill. dong		28	19,5

4. Education and Public Health

69. The school system has been well developed in all the three subproject districts. Each commune has their own primary and secondary school with possibly some branches for primary school in the remote hamlet. The percentage of drop out is low and nearly 100% students complete the primary school. The percentage of student complete secondary school is also high, over 99% for all subproject communes. However, the illiteracy rate is still high, especially it reached 25% in Buon Don district.

70. Each subproject commune has one medical clinic with some normal medicines and first aid kits for simple treatment. There is also one medical doctor assigned to work in every commune of the subproject districts. Pong Drang commune, Krong Buk district has two medical doctors working in the commune but it also has the highest number of drug users with 31 people over 87 people of Krong Buk district.

5. Water supply and electricity cover

71. Nearly all the households in the subproject communes using electricity from national electricity network (more than 95%). The percentage of people using clean water is not high, varied from 80 to 85% in the subproject communes. Krong Na commune, Buon Don district has only 51.3% of the household using clean water.

6. HIV and human trafficking

72. There is no human trafficking case has been recorded in the subproject communes.

7. Infrastructure

73. ***Transportation***: The subproject road is the main transportation route for goods from NR14 to NR14C and Dak Rue – Chi Miet Border Gates. There are 5 inter-commune roads cross the subproject roads. Two of them connect the subproject road with Provincial road No. 6 and No.8.

74. ***Industrial activities***: The construction industry of the subproject has a high development ratio. Krong Buk Industrial Zone is located at the beginning section of the subproject road. However, there are not so many company and processing factories are now in operation. Please see the Table 8 below for more details.

75. ***Other public facilities***: With the development of the infrastructure system, local people in the subproject area could easily access to the market. Please see the Table 8 below for more details.

Table 8 - Education and training in the subproject area in 2015

	Unit	**Krong Buk Dist.**	Pong Drang Com.	EaNgai Commune	Cu Pong Commune	**Cu M'Gar Dist.**	Ea Tar Commune	EaKiet Commune	EaKueh Commune	Cu Dlie Mnong Com.	**Buon Don District**	Krong Na Com.
No. of class												
Kindergarten	Class	112	46	15	11	262	18	18	13	17	127	12
Primary school	Class	438	66	26	47	673	38	48	36	36	279	29
Secondary School	Class	131	43	10	16	401	22	14	19	19	146	11
High school	Class	40	0	0	0	0	0	0	0	0	54	0
No. of students go to school												
Kindergarten	Student	3434	1,305	309	436	8,246	548	667	436	487	3,528	384
Of which female		1,906		87		4,139	208	332	456	221	1,714	180
Primary school	Student	6,614	1,635	644	1,164	15,934	883	1,253	776	887	5,862	549
Of which female		3,444.95				7,754	443	630	444	391	2885	275
Secondary School	Student	4.581	1,503	350	559	12,420	655	811	598	585	4,235	293
Of which female		2,305.09	649	176	265	5,995	273	376	284	242	2,114	157
High school	Student	1,835	1,284	0	0	5,850	0	0	0	0	2,060	41
Of which female		924.49				0	0	0	0	0	1,078	19
Percentage of dropout (%) in	%	1.76	1.2	1.2	2.82	0.93		0.75			1.12	12.45
Of which female		0.72						0.22				
Percentage of student finishing primary school	%	99	100	99.8	99.2	100	100	100	100	100	98	90

Of which female		52										40
Percentage of student finishing secondary school	%	96.7	97	100	95.5	99.7	99.3	99.6	99.5	99.6		100
Of which female		65.4	55	58.5	61.8							
Percentage of student finishing high school	%	80.42				86.71						
Of which female												
Percentage of illiterates	%	7.35				10.29	9.43	16.94	14.61	1.2	25	15
Of which female		5.5				4.72	3.4	7.78	5.46	0.53		10

Data sources: .....

1. Statistics Year Book 2014 of Cu M'Gar District people's committee
2. Statistics Year Book 2014 of Krong Buk district people's committee
3. Department of Education and Training of Cu M'Gar District people's committee
4. Report on the socio-ecomomic status in 2015 and orientations in 2016 of Krong Buk district people's committee
5. Report on the Kindergarten, Primary school, Second school of KrongBuk District people's committee
6. Department of Education and Training of Buon Don District people's committee

Table 9 – Health care in the subproject area in 2015

	Unit	**Krong Buk District**	Pong Drang Com.	EaNgai Com.	Cu Pong Com.	**Cu M'Gar District**	Ea Tar Commune	EaKiet Commune	EaKueh Com.	Cu Dlie Mnong Com.	**Buon Don District**	Krong Na Com.
Hospital/heathcare center	piece	7	1	01	1	17	1	1	1	1	9	1
Staff		75	10	7	8	139	8	8	9	9	167	7
- Doctor	persons	13	2	01	1	21	1	1	1	1	30	1
- Nurse, pharmacists	persons	53	6	05	6	113	6	6	7	7	120	5
- Orderlies	persons	9	2	01	1	15	1	1	1	1	17	1
Number of examed patients	persons	47,385	11,384	4,806	8,323	214,711		10,168			156,674	6,919
Number of drugusers in the commune	persons	87	31	6	16	36	2	4	13	1	10	0
Number of HIV infected people	persons	50	15	6	12	19			4		35	0
Number of malnourished children	persons	17.2	16.5	13.3	17.2	17.9			16,3		912	82

Data sources:

1. *Report on the socio-economic status in 2015 and orientations in 2016 of Cu M'Gardistrict people's committee*
2. *Report on the socio-economic status in 2015 and orientations in 2016 of Krong Buk district people's committee*
3. *Healthcare Centre of Cu M'Gar district people's committee*
4. *Healthcare Centre of Krong Buk District people's committee*
5. *Statisticis Year Book 2014 of Cu M'Gar District people's committee*
6. *Statisticis Year Book 2014 of Krong Buk district people's committee*
7. *Healthcare Centre of Buon Don District people's committee*

Table 10 – Infrastructure system in the subproject area

	Unit	**Krong Buk District**	Pong Drang Com.	EaNgai Commune	Cu Pong Com.	**Cu M'Gar District**	Ea Tar Commune	EaKiet Commune	EaKueh Commune	Cu Dlie Mnong Com.	**Buon Don District**	Krong Na Com.
1. Roads	Km	203.26	12.3	17.86	46.50	1,519.2	21.80	74.23	63.57	49.74		
- Earth road	km	91.9	2.8	2.0	25	1,222.0	17.30	38.33	33.29	37.69	266.85	61.16
- Concrete / asphalt roads	km	111.36	9.5	15.86	21,5	297.20	4.50	35.90	30.28	12.05	191.26	40.19
2. Number of car	unit				32						65	8
3. Number of motobike	unit				3,600	7,147					9,975	685
4. Market in commnue	unit	0	1	0	01	1	0	1	0	0	6	1
- Distance from the center of commune	km	0	3,5	0	01	1	0	0.5	0	0	1	0.5
5. Market outside commune	unit	1	0	0	01	8	1	1	1	1	5	0
Distance from the center of commune	km	11	0	0	20	25	5	7	6	12	7-20	1
6. Percentage of hhs using national electricity	%	93.63	96	98,0	95	99,5	99,5	98.32	99,2	99,5	98.6	98
7. Percentage of HHs using clean water	%	93.01	85,8	86,0	80	80	84.13	84.13	84.13	8412	70	51.3
8. Percentage of concrete hhs with floors	%	20	15	13,0	0	5	0	0	0	0	3	10
9. Percentage of HHs with brick	%	60	75	83,8	90	85	60	60	80	80	65	53

/ wood, roof, 1 floor												
10. Percent age of HHs with cottages, tent	%	20	10	3,2	10	10	40	40	20	20	32	27
11. Percent age of HHs using telephone and cellphone	%	100	100	90	100	100	100	100	100	100	98	90
12. Percent age of HHs having toilet	%	61.07	61.07	61.07	61.07	85	62.6	62.6	62.6	62.6	54	69

Data sources:

1.Division of Economic Infrastructure of Krong Buk District people's committee

2. Division of Economic Infrastructure of Cu M'Gar District people's committee

3. Statisticis Year Book 2014 of Cu M'Gar District people's committee

4. Statisticis Year Book 2014 of Krong Buk district people's committee

5. Division of Economic Infrastructure of Buon Don District people's committee

D. Archaeological, Historical and Cultural Treasures

76. There are several archaeological sites have been discovered in Dak Lak province. The main discovered archaeological site in Dak Lak is Buon Kieu, Yang Mao commune, Krong Bong district with the ages varied from 5200 – 5000 years ago. There are no archaeological, cultural sites in the subproject area.

E. Key Environmental Features

77. ***Physical environmental features:*** The last 5 km of the road located in Buon Don district is the protection forest under the management of Buon Don Protection Forest Management board. The forest is Dipterocarp forest, specific character for the Central Highlands of Viet Nam. Currently, there is no specific fauna species under the protection of the forest. The forest is one part of the Buon Don Ecological Tourism Area.

78. There are 7 main rivers in Dak Lak but none of them located in the subproject area. There are several small irrigation lake near the subproject road varied from 200m to 5km, many of them has no water for irrigation in the dry season, especially in Cu M'Gar district, Ea Kiet commune (Buon Vin and Buon Thai lakes have no water for irrigation).

79. ***Social environmental features:*** The subproject mainly goes through residential area and cultivation area (coffee, pepper, rubber) of Krong Buk and Cu M'Gar districts with several schools/ kindergarten with 3 main residential areas along the road in Ea Kiet – Cu M'Gar district and Cu Pong, Ea Ngai communes – Krong Buk district. Local people living close to the road at roadside so the impact during construction site must be consider seriously.

VI. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

80. This section discusses the potential environmental impacts of the subproject and identifies mitigation measures to minimize the impacts in all design, construction and operation phases of the subproject. Buon Don Protection Forest located at the end of the subproject road and could be adversely affected due to subproject implementation. York Don National Park – located along side of Nr14C to the border with Cambodia – is about 16km from the end point of the subproject.

81. The constructions activities during the construction phase will be mainly upgrade the existing road. The main physical impacts are relating to vegetation clearance for the site preparation, the operation of construction machines and material transportation truck, construction material exploitation at quarry, borrow pit and temporary stockpile. The activities will create dust, noise and vibration that disturb local people and increase risk of respiratory and skin disease.

82. The subproject construction will also impact on local traffic making difficulties for people to access their properties, especially the ones who live along the subproject road. There are several CPCs, medical clinics, schools located along the road. There is also Head Quarter of Military Coffee No.15 Company in Cu Dile Mnong commune, Krong Buk district and Buon Gia Wam Agricultural Farm Company in Ea Kiet commune, Cu M'Gar district. These impacts to social infrastructure will be in short duration of construction phase only and these have been subject to detailed assessment in the Resettlement Plan.

83. The potential environmental impacts as well as the mitigation measures in the pre-construction, construction and operational phases are assessed below. The criteria for assessment are in line with ADBs SPS as specified in ADB Safeguard Policy Statement 2009 and the GOV standards based on Environmental Protection Law 2014. Where GOV standards or guidelines have some kind of conflict with ADB SPS, ADB SPS will be applied as the policy for the subproject implementation. The EMP is presented below including mitigation measures and monitoring plan for the implementation of the subproject road.

A. Potential Impacts and Mitigation measures in the pre-construction phase

1. Improper subproject location and design

84. ***Impacts:*** The subproject will upgrade part of the NR49 in Dak Lak area. As some sections of NR49 goes through Buon Don protection forest, the improper selection of road sections for upgrade will posed negative impacts to the forest such as increase risk of forest fire in the construction period due to water heating and cooking at the worker camps or increase chances of access to the forest in better road conditions in the operation phase.

85. The improper road surface design could also posed negative impacts to Buon Don Protection Forest as well as local people along the subproject road. Bitumen road surface will cause air pollution and bitumen heating will increase the risk of forest fire during the construction period. Selection of cement concrete road surface will caused noise pollution during the construction time. If climate change considerations are not included in the subproject detail, such as consider the high emission scenario the quality and longevity of the road could also be impacted from the unwilling weather condition, which will lead to increase maintenance time consuming, and budget.

86. ***Mitigation Measures:*** The detail design of the road and culverts have been considered to withstand a 25-year return. The road section goes through Buon Don Protection Forest has been designed strictly follow the same alignment with the existing foundation under TCVN 4054 – 2005 Vietnam Technical Standards - Road and Highways – Specifications for Design. In line with ADB policy on environmentally responsible procurement, a new environmental assessment report will be undertaken for submission to ADB if there are any changes to subproject design that would result to environmental impacts or risks that are not within the scope of the current IEE.

2. Land acquisition and resettlement

87. **Impacts**: The subproject will upgrade the road surface based on the existing foundation and construct/ reconstruct 31 culverts in total. Some household will be affected by land lost and constructions on land (mainly culvert/ drain). Some agricultural tree and fruit trees will be cut down. If the compensation will not be paid correctly, it could impact on the incomes of the affected people. However, no households must relocate or loss of residential land in the subproject area and no household will be serious affected due to loss more than 10% of total land holding.

88. ***Mitigation measures****:* Before the construction start, PMU will review the Land Acquisition and Resettlement report and check at the field to ensure that all affected households have received compensation adequately in accordance with the current provincial market price. The Construction Supervision Consultant (CSC) will response for daily monitoring and record any complaints from these affected households and local people before submit to the Environment Safeguard Specialist (ESP) and PMU for resolution. A grievance redress mechanism will be established and inform to relevant stakeholders before construction start.

3. Public facilities affected and relocation

89. ***Impacts:*** The subproject road will mainly upgrade road surface without changing direction or the road foundation. The Right of Ways (ROW) of the road has been defined 8m from each side of the road so it will not make relocation of the electricity cable system along the road. The drainage system along the subproject road is also severely damaged so it will be upgraded and repaired. No other public facilities will be affected or relocated due to the implementation of the subproject.

4. Disturbance of unexploded mine and bomb (UXO)

90. ***Impacts:*** The subproject will be upgraded based on the existing foundation. There is no risk of UXO during the implementation of the subproject

B. Potential impacts and mitigation measures in the construction phase

1. Loss of trees and impact to faunna

91. ***Impacts:*** The last 5 km of the subproject road goes through Buon Don Protection Forest with two subzones of 454 and 436. The forest is now under the management of BPMB to protect the specific dry Dipterocarp forest of Central Highlands. The construction activities could have severely negative impact to the forest as trees could be cut down for construction activities and for using as fuel woods for bitumen or water heating. Forest fire could also be happened due to careless construction activities. Some kind of wild animals will be affected from the noise and vibration of construction activities or being hunted by the construction workers. However, as it is the poor forest with only few small trees and shrubs, no large wild animal has been found in recent years, the negative impacts could be minimized through suitable mitigation measures.

Mitigation measures: PMU, ESP work with BPMB, relevant Divisions of Buon Don district to identify suitable area for biodiversity offset of potential losses during construction period. PMU, ESP work with BPFMB, Buon Don district and Krong Na commune to identify current situation of the Dipterocarp Forest along the section in the forest (tree count, taking photos) before construction commence. No construction camps, concrete-mixing plants/ noise operation machines, large material storage sites are to be located in the forest area. A close collaboration between PMU, ESP, CSC, BPFMB, and Forest Ranger in construction monitoring and supervision at the forest section to ensure construction activities will be done properly on the existing road foundation. Any damage, loss of tree and impact to fauna of the forest will be recorded and compensated adequately (replanting to replace damaged vegetation). BPMB, Buon Don CPCs will be informed in advance for construction plan and scope, especially for tree cutting and vegetation clearance activities. CSC and PMU safeguards staff will supervise closely the tree cutting process to ensure no tree out of the cut-down list will be affected. Workers should be informed and prohibited from cutting trees for firewoods and for use in the subproject activities before construction start. The contractors will also not use wood as fuel to heating bitumen or any other activities. They also will not by fuel wood from illegal sources.

2. Impact on local facilities

92. ***Impacts:*** As the first 36 km of the subproject road goes through 3 main residential areas in Ea Kiet, Cu Pong and Ea Ngai commues, Cu M'Gar and Krong Buk district. The water supplies, electrical power supply, and telecommunications, drainage systems of these areas could be maintained during the works. It will affect local people in their daily activities. It is minor

impact as the road will be upgraded based on the existing foundation and no current public infrastructures will be relocated. The impact will be happened in 24-month of construction and stop upon the construction complete.

93. ***Mitigation measures:*** to minimize the negative impact, the contractors will inform in advance the construction schedule, the affected electric and telecommunication cable system, irrigations system to CPCs of the 8 subproject communes in advance. Construction schedule will be published at the CPC so local people could easy access these information. If any facilities are accidentally damaged during construction period, it should be reported to CSC and PMU as well as the owner to the facilities before repaired at the contractor's expenses.

3. Impact by material exploitation activities at the quarry, borrow pits and temporary storage areas

94. ***Impacts:*** In the work of excavating and material exploitation for the subproject construction activities if excavated soil is not collected then siltation will be occurred. It will be able to cause stuck in water flow closed to the mines and quarry area, create filling situation that affects cultivation areas of residents. Earthwork activities will also change soil structure and raise the amount of unconsolidated sediments at the borrow pits. Temporary storage areas located along the road. When it rains, runoff water will take away them into the surrounding water bodies such as the crossing stream at Km220+527.45 and several irrigation lakes like Drao Lake in Ea Ngai commune, Krong Buk district, causing sedimentation and erosion. Runoff water could also take construction material such as sand, soil from material storage sites into the surrounding water bodies if material stored for a long duration at the construction site. This impact will happen in the area of quarries; borrow pits and temporary material storage along the subproject road. It will affect local people living in the subproject area and near the quarries, borrow pits. The impact is minor as the main work at is upgrading the road surface based on the existing road base so the required amount of construction material is not large, about 110000 m^3 of stone. On the other hand, the terrain of the subproject area is quite flat and not required large volume of filling soil. The estimated volume of filling soil is 300954.21 m^3 with about 38497.87 m^3 could be reused from excavated soil.

95. ***Mitigation measures***: To minimize the impact, in the detail design period, ESP will provide a MMP for implementation by contractors. The MMP will support to balance the excavation soil and the filling soil to utilize most of the excavation soil for filling purpose. MMP will also listed the suitable quarry and mines for construction materials. These mines should own operation licenses from MONRE of Dak Lak to ensure material exploitation at the mines will not cause any uncontrolled negative environmental impacts. The temporary storage areas must be covered with canvas and fenced with sign board to avoid passing people. Replant tree and vegetation cover of any vegetation clearance area in the quarries and borrow pits.

4. Generation of excavated soil

96. ***Impacts:*** The excavated soil subproject construction activities that could not be reuse as filling soil may have significant impacts and environmental degradation due to the improper disposal of these materials. According to the survey result of the PPTA Design Consultant, the estimated volume of excavated soil is 111752.17 m^3, of which 73254.3 m^3 is organic soil, unsuitable for reuse as filling soil for road embankment. This amount of organic soil will be transferred to the temporary dumping site. People in the residential areas along the subproject road and near the temporary dumping sites could be affected by soil erosion from these temporary dumping areas. This is a minor impact as in the negative side, the subproject road will

be upgraded base on the existing foundation so the levelling work is minimized and the volumes of spoil will be not much. On the other hand the flat terrain along the subproject route is also minimizing the filling soil volume. The vacant land areas along the road are still available for temporary dumping area of spoil. In the positive side: local people could use the spoil for their garden or house foundation.

97. ***Mitigation measures:*** To minimize the negative impacts during 24-month of construction, the contractors should evaluate and grade the spoil and the suitable spoil will be used for filling purpose. This will reduce the need to extract soil for filling. Krong Buk DPC has assigned an area for temporary dumping site located roadside of NR14 in hamlet No.11, Pong Drang commune, about 5 km from Krong Buk Industrial Zone. Other areas for disposal should be agreed with CPCs. Dak Lak DONRE will check and ESP/CSC/PMU recorded and monitored for the disposal sites. The disposal site will be located at least 50m from water bodies and be protected from erosion and grassing.

5. Generation of construction waste and domestic waste from workers

98. ***Impacts:*** Construction waste is mainly come from the excavated bitumen from current road surface. Other kind of construction waste includes scraps of transported soil and stone, debris, mud. Domestic waste is mainly generated from construction workers at camp sites. Uncontrolled waste disposal operations can cause significant impacts. It will impact firstly the workers in the camp site and areas surround the construction sites and local residential areas of the 7 communes in Krong Buk and Cu M'Gar districts along the subproject road. Waste could also pollute water bodies of the lakes and stream. This will happen in 24 construction months and along 40km of the road.

99. ***Mitigation measures:*** To minimize the impact during 24-month of construction time, ESP will assist PMU to monitor the contractor progress of WMSDP implementation, to ensure the contractors will provide enough trashbins at the worker camps. Contractors need to work with 8 CPCs to find out suitable place for construction and domestic waste disposal. CSC and PMU will supervise to ensure waste and unused construction material will be treated properly and transfer to designated location. A regular check must be done by CSC at the sensitive area such as the stream crossing point, schools and medical centers to ensure no waste will be accumulated near the sensitive receivers.

6. Impact from hazardous materials and hazadous waste disposal

100. ***Impacts:*** Use of hazardous substances such as oils and lubricants, bitumen can cause significant impacts if uncontrolled or if waste is not disposed correctly. However, the affected level is insignificant because the main construction activity in 40 km is paving the road surface and the construction machines are not large. The impact areas could be surrounding water bodies such as Drao lake and stream. Local people in 8 communes along the subproject road could also be affected.

101. ***Mitigation measures***: Dak Lak PMU assisted by the ESP and CSC will be responsible to monitor the contractor's progress of implementing the WMSDP to avoid or minimize impacts from use of hazardous substances such as oils and lubricants. The contractors must ensure that safe storage of fuel; oils... are agreed by PMU/ESP. They must storage in the areas provide with roof, impervious floor.

7. Impact from noise, dust and vibration generated during from the construction activities

102. ***Description*****:** Earthworks and the operation of concrete mixing plant will be the main sources of dust. Concrete mixing plant will be located at Phuc Thien quarry (Km217+800) in Ea Kiet commune. Construction machines will generate gaseous emissions (NOx SOx, CO, CO_2, etc.) when they are in operation. Transportation vehicles could also create dust along the transportation route. These gaseous and dust could cause health problems to the residents who living near the construction site and along the transportation route, especially at the environmental sensitive area such as schools/ kindergartens, medical centers, subproject communes. This is an average impact due to the the first 34km of the subproject route goes through dense population area with many schools/ kindergartens, medical center.

103. ***Mitigation measures***: The contractors will not located any noisy machines near the environmental sensitive areas such as the schools/ kindergartens, medical center, CPCs especially in the 3 density residential areas along the road in Ea Ngai and Cu Pong communes, Krongbuk districts and Ea Kiet commune, Cu M'Gar district. The contractors also will not located large material storage sites in the residential areas. The large storage sites should be located at least 100m away from these sensitive areas. The contractors will work with CPCs of the 8 communes, with the representative of ESP and PMU, to identify areas for large material storage site as well as material transportation plan. PMU and CSC will responsible to monitor these mitigation measures.

8. Impact on crossing streams or bridge construction locations

104. ***Impacts:*** Careless construction and poor materials control can cause blockage to stream. Runoff water during its rain could bring waste and soil into the nearby water bodies. That could lead to siltation and reduce the water quality. The crossing stream could be affected by the construction activities and it will lead to reduce water quality of the stream.

105. ***Mitigation measures***: the contractors should disposed soils, spoils and construction waste out of the bridge/ culverts construction immediately. They should also discuss with relevant authorities for MMP and WMSDP implementation. Silt fences and sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and drilling operation within streams. The steep slopes should be covered with vegetation to avoid landslide and siltation in the nearby rivers/ streams. PMU and CSC should work and collaborate closely with relevant authorities such as CPCs and DPCs to monitor the implantation of these mitigation measures.

9. Employment or livelihood benefits from employment of local people

106. ***Impacts:*** Contractors will use local labour for simple works such as smooth the road, moving soil, give priority to poor families, female householders, woman if they need jobs. It aims to raise their income, create more jobs and contribute to poverty reduction for local community. Local people in the residential area of 8 subproject communes will have benefits from the subproject construction. However, this is a small positive impact and it requires the coordination between the contractor and CPCs of subproject communes and nearby communes in recruiting local labors (contractors often prefer to engage their own trained workforces rather than training unskilled laborers). The duration of the impact is also short, only in 24 months construction time.

10. Impact on water resources and quality

107. ***Impacts:*** The water resources on surrounding lands will be affected by construction activities as follows: a) local water supplies will need to be tapped to meet campsite and construction requirements, so bringing subproject based water use into competition with local use; b) surface and subsurface water resources near the subproject route like Drao Lake in Ea Ngai commune could be contaminated by fuel and chemical spills, or by solid waste and effluents generated by the kitchens and toilets at construction campsites; (c) natural stream may become silted by borrow material (earth) in the runoff from the construction area, workshops and equipment washing-yards. Construction activities could impact on the quality of the nearby water bodies. Waste and construction material could fall into the water bodies if the waste is not control carefully or material stockpiles area not be covered and well monitored. The impact will mainly on water bodies along the subproject road such as crossing streams and worker camps area.

108. ***Mitigation measures***: In order to minimize this negative impact, the contractors will store lubricants, oils in designated area with roof covered and impervious foundation at least 50m from streams/ lakes. Sediment ditches, silt fences should be installed in suitable location to avoid runoff, erosion and siltation in lakes/ streams. Material storage sites should also be covered carefully with canvas and located at least 50m away from water bodies. PMU and CSC will responsible to monitor these mitigation measures.

11. Impact by the large influx of construction worker

1. ***Impacts:*** Large influx of construction worker will create a burden on local public services like electric and water supply. Construction workers from other area could bring outside disease to the subproject area. The concentration of workers in the work camps could also create a good environment for diseases such as sore eyes, cholera, flu and respiratory problems. Social aspect: concentration of a number of workers could lead to social problems such as gambling, drug addiction, prostitute, violence, conflict amongst workers, or between workers with local people. The impact will affect directly on workers and indirectly on the community near the construction sites in the residential area of 8 communes along the subproject road. This is an average impact due to high density of population in the subproject area.

Mitigation measures: Worker camp location and facilities located at least 500m from residential areas as agreed by local communities and approved by ESP and PMU and managed to minimize impacts. All workers should register with local police for temporary residential certificate. The worker camp should be located in the area with sufficient drainage to avoid water logging and formation of breeding sites for mosquitoes and flies. Worker should have health check before start work in the subproject and should be trained for living and working behavior before joining the sites. On the other hand, Contractors will use local labours for simple works such as smooth the road, moving soil, give priority to poor families, female householders, woman if they need jobs. It aims to raise their income, create more jobs, contribute to poverty reduction for local community and also reduce the number of construction workers from outside. Local people in the residential area of 8 subproject communes will have benefits from the subproject construction. However, this is a small positive impact and it requires the coordination between the contractor and CPCs of subproject communes and nearby communes in recruiting local labours (contractors often prefer to engage their own trained workforces rather than training unskilled labourers). The duration of the impact is also short, only in 24 months construction time.

12. Risk to health and safety to local people or construction workers

109. ***Impacts:*** Dust, exhaust gas and noise generating from earthworks, transporting of material, construction activities and operation of machines, etc. These factors have direct affects on health of workers and local residents. Material transport and construction activities on the existing road may create the risk of affects on traffic safety and houses structure on road sides especially in the environmental sensitive areas. Public safety, particularly of pedestrians and children can be threatened by the excavation of the trenches for side drain construction .Waste and wastewater from construction activities and worker camps could also create a favorable environment for the outbreak of some respiratory diseases of local people as well as workers. Accidents may occur if during the construction if workers are not provided with safety equipment and obey construction regulations. The objects of this impact are local people in the subproject area especially pupil in the subproject area and the workers working at the site. This is an average impact as the construction sites will stretch along 40 km of the subproject, in the residential areas of 8 communes and 3 districts of Dak Lak.

110. ***Mitigation measures***: The contractors with the support from ESP will conduct training for workers on safety and environmental hygiene. The workers will be instructed construction camp rules and site arrangement and all of them will be equipped with appropriate PPE such as safety boots, helmets, protective clothes, gloves and ear protection for the one working with noisy equipment. All areas of excavation greater than 1m deep and insides of temporary works should be fenced with sign boards installed. The contractors in collaboration with ESP and PMU will also work with 8 CPCs of commune along the road for the construction plan and scope. The CSC and PMU will responsible for supervision activities during construction phase and response timely for any raised opinions/ comments from local people and authorities.

13. Impact on the local traffic

111. ***Impacts:*** Construction activities on the Subproject road are likely to cause hindrance in traffic flow if not mitigated properly especially at the junctions. Local people and people from other area who travel on the subproject road will be affected during 24 months construction period. However, this is a minor impact due to local people could have other options for travel and the subproject only paved the road surface in short construction time.

112. ***Mitigation measures:*** To minimize the disturbance to local people, the contractor will work with CPCs on construction plan and the construction schedule and scope will be published in all subproject communes and districts. The contractors need to coordinate with local traffic officials schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up. The contractor will also construct temporary road and minimizing interference with traffic flows past the works site.

14. Environmental impacts due to inappropriate enivronmental recovery responsibility

Impacts: If after construction work has been completed, the sites are not cleaned up, construction and domestic waste will pollute surrounding environment. If site restoration such as replanting trees; grass; filling up construction pit; removing camp site have not been implemented in accordance with environmental regulation then the environmental issues like erosion, sedimentation and accident may occur. Construction waste and waste soil could also impact on the soil quality of the temporary acquired land area.

113. ***Mitigation measures***: Site cleaning up must be performed right after the work completion. Pit and excavation areas must be filled up by the contractors when the construction complete. PMU and CSC will strictly monitor the site to ensure all construction sites will be fully recovered upon the construction finish.

C. Potential impacts and mitigation measures in the operation phase

1. Increase access to the forest

114. ***Impacts:*** The better road condition could increase the chance to access Buon Don Protection forest and make more convenience for wood logging or other illegal forest exploitation activities

115. ***Mitigation measures:*** Dak Lak Department of Transportation (DOT) the management organization of the subproject in the operation phase will coordinate with Buon Don Protection Forest Management Board, Krong Na CPC and Buon Don DPC to set up suitable control system. Establish checkpoints at the junction with NR14 and other junction with PRNo.6, No.8 and NR. 14C. On the other hand, better road condition will also support the management board of the forest in forest patrol and forest fire prevention.

2. Impact from dust and noise arising from increasing of traffic density

116. ***Impacts:*** Paved road surface condition will reduce the dust concentration but better road condition will also increase traffic density along the subproject road especially the road play an important role for goods transportation from National Road No.14 to Dak Rue border area. Noise, dust and vibration could have negative impact on the local people living along the subproject road, especially the environmental sensitive areas such as schools/ kindergartens, medical centers in the first 34km of the road.

117. ***Mitigation measures:*** Dak Lak Department of Transportation (DOT) will responsible for subproject management in the operation phase. Road hump, speed limit sign could be installed at the sensitive areas like schools/ kindergarten, medical centers. The use of air horn should be banned along the subproject road, especially in the sensitive area.

3. Favorable conditions for transportation of goods and people movement

118. ***Impacts:*** The upgraded road will favor the goods transportation from agricultural producion of Krong Buk and Cu M'Gar districts to Dak Peur Border Gate in Dak Nong, Le Thanh Border Gate in Gia Lai via NR14C and Dak Rue Border Gate. Support movement of local people on the road in rainy condition. As it support better transportation of goods, especially agricultural product, the time for transportation will reduce and the profit will increase. The completion of the road will favour people in the 8 communes of the 3 districtss and surrounding residential areas as well as people who doing business along the subproject road.

4. Driving conditions and community safety

119. ***Impacts:*** The upgrading and construction of the road is likely to increase the vehicle speed on the road. Increases in traffic flow indicate additional future traffic should be moderate and unlikely to create many community safety issues. On the other hand, the condition of the

road facilities will be enhanced and driving conditions should improve. The beneficiaries of the subproject are local people in the two districts and people who travel on the subproject road.

120. ***Mitigation measures:*** Dak Lak Department of Transportation (DOT) will responsible for subproject management in the operation phase. Road hump, speed limit sign could be installed at the road sections goes through residential areas of Ea Ngai, Cu Pong communes – Krong Buk district and Ea Kiet commune, Cu M'Gar district with kindergarten, school, medical centers.

5. Affects on employment or livelihood

121. ***Impacts:*** Increase incomes and living standards for people in the subproject area by means of increasing the profit as save time for transportation and merchant will access production area easier, thus the agricultural production price will be higher. Local people in the subproject area and people who cultivate in the subproject area as well as local people in the 8 subproject communes of the 3 districts will be benefited from the completion of the road. This is a permarnent impact and has significant effects to local people's lives.

6. Impacts on ethnic groups

122. ***Impacts:*** The completion of the subproject road will support to increase incomes and living standards for ethnic minorities in the subproject area by means of increasing the profit. The completion of the road will support them to save time for travel and increase production prices as merchant could access the production area easier.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

123. The objectives of the stakeholder consultation process was to disseminate information on the subproject and its expected impact, long-term as well as short-term, among primary and secondary stakeholders, and to gather information on relevant issues so that the feedback received could be used to address these issues at early stages of subproject design. Another important objective was to determine the extent of the concerns amongst the community, to address these in the subproject implementation and to suggest appropriate mitigation measures.

A. Public consultation preparation

124. Stakeholders are people, groups, or institutions that may be affected by, can significantly influence, or are important to the achievement of the stated purpose of a proposed intervention. The stakeholders consulted for the construction of the National Road No.29 included representatives from Dak Lak DPI, DONRE, DARD, DOT, relevant Divisions of Krong Buk, Cu M'Gar and Buon Don districts, York Don National Park Management Board, Buon Don Protection Forest Management Board. Consultation has also been implemented with representatives from 8 CPCs in the 3 districts. The consultation for local authorities has been conducted in mutual information exchange to get information from relevant authorities as well as record their concerns on potential environmental impact of the subproject implementation. Several local people living along the subproject road have been consulted using questionnaire. Consultations took place in April 2016.

B. Information dissemination during public consultation

125. Providing information through local authority offices will provide a conduit for the improvement of the subproject implementation to better serve the stakeholders. Public consultation can also assist in:

i) harnessing cooperation from informed people to help local authorities reconfirm the extent of local permits and licenses that will be required at a later stage;

ii) obtaining cooperation from informed residents and groups which to avoid cost and time in dealing with complaints;

iii) identifying local infrastructure subprojects or other local initiatives that will interface with the subproject roads with assistance from informed local authorities;

iv) the collection of relevant information on the current condition of the local environment including aspects of forest and wildlife and conservation.

126. The information disseminated during public consultation is including: (i) background of the Project and subproject; (ii) basic information related to ADB and the Government requirement for environmental protection; (iii) potential impacts during subproject implementation and mitigation measures.

C. Obtained results and use of results from public consultation

127. The results of the public consultations are recorded in Table 11 and 12 below. In general, all the relevant stakeholders are support the implementation of the subproject. As the subproject

road foundation has been constructed long time ago, the subproject will mainly upgrade the road surface based on the existing foundation, no house must be relocated and no major land acquisition will be taken, the local people is totally support the subproject implementation.

Table 11 – Main issues and information from local authorities

Main issues	Information from relevant authorities
Impact on Buon Don Protection Forest	Buon Don Protection Forest Management Board: the construction of the road section through Buon Don protection forest should not expanse out of the existing road foundation. No worker camps, machines, material stockpiles locate in the forest area. Any access to the forest must have approval from Ministry of Natural Resources and Environment.
Environmental recovery	DARD Division of Krong Buk district: Trees should be planting along the road to make a green belt protect local people and coffee production area along the road.
Drought prevention	Krong Buk, Buon Don DPCs: support local people prevent drought by invest more on the irrigation system.

Table 12 – Main environmental concerns from public consultation

Concerns expressed	How concerns are addressed in IEE
Vibration from construction machines could make wall cracking	Using suitable construction machines. Inform local authorities in advance for construction schedule and scale. Suitable compensation for any damaged or lost properties of local people due to construction activities
Difficult to access house	Inform local authorities and local people construction schedule and scale in advance. Construct temporary access road if applicable

128. The environmental assessment process under the SPS 2009 requires the disclosure of the IEE to the public during the completion of the IEE to be in strict adherence to the rules. This process will be concluded by displaying the IEE at the PPC Headquarters during the period when the IEE is disclosed on the ADB website.

VIII. GRIEVANCE REDRESS MECHANISM

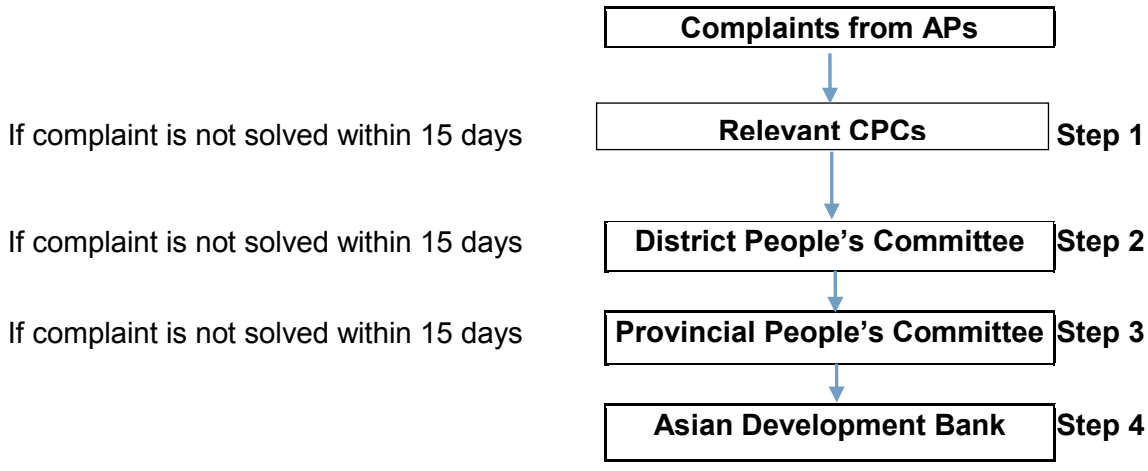
A. Purpose of the mechanism

129. During the deployment of the subproject, local people are disseminated environmental protection activities such as EMP. Negative impacts on the environment may occur during the construction and operational phases. Any comments/ suggestions of local people will be solved quickly, transparently and protected by law, particularly for affected people by the subproject. Complaint handling mechanism was classified by level and responsibilities of involved parties.

B. Grievance redress mechanism

130. Per the environmental management frame, there are 03 steps to redress complaint as below:

- ***Stage 1***: If a household has any complaint he/she can submit a complaint to the CPC-community monitoring board. CPCs will work with CSC and CSC to solve complaints.
- ***Stage 2***: If the complaint is not resolved, the complainant will submit an application to the relevant DPCs to resolve the complaint.
- ***Stage 3***: If more than 15 days but no response from the DPCs, the complainant may submit a complaint to the Dak Lak PPC (through Dak Lak DONRE). Dak Lak PPC will require relevant DPCs to solve the complaint. In case the complaint is still not resolved, Dak Lak PPC will require environmental police to investigate and requested stakeholders to resolve the complaint.
- If efforts to resolve disputes using the grievance procedures remain unresolved or unsatisfactory, APs have the right to directly discuss their concerns or problems with the ADB Southeast Asia Department through the ADB Viet Nam Resident Mission (VRM). If APs are still not satisfied with the responses of VRM, they can directly contact the ADB Office of the Special Project Facilitator (OSPF).
-



IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation arrangements

2. Dak Lak PMU will recruit Environment Safeguard Specialist (ESP) under Loan Implementation Consultants (LIC) to support subproject implementation in Dak Lak. ESP will support PMUs updated EMP and as well as monitor the compliance of the contractors during construction phase. ESP will also responsible for training and capacity building on the implementation of EMP.

3. PMU will engage Construction Supervision Consultant for the monitoring and supervision of the subproject in general and for environmental monitoring as well. CSC will ensure that the contractors implement the provisions of the subproject EMP.

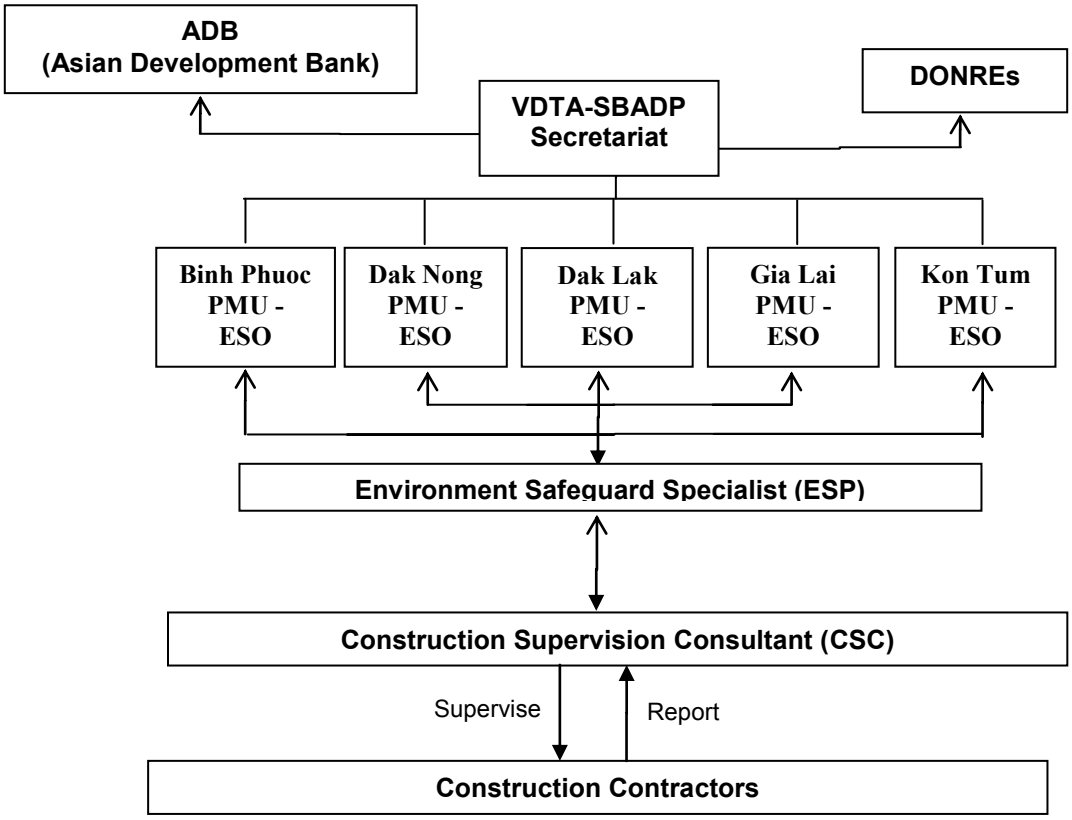
Table 13 – Responsibilities for EMP implementation

Agency	Responsibilities
Provincial Project Management Unit under DPI (PMU)	- Ensure that sufficient funds for EMP implementation. - Ensure that EMP provisions are strictly implemented during various subproject phases (design/pre-construction, construction and operation) to mitigate environmental impacts to acceptable levels. - Undertake monitoring of the implementation of the EMP (mitigation and monitoring measures) with assistance from CSC and ESP. - Ensure that Subproject implementation complies with ADB's environmental policy and safeguards policy statement (SPS 2009) principles and requirements - For subproject duration, commit and retain a dedicated staff within PMU as environment and safeguards staff to oversee EMP implementation - Ensure that environmental protection and mitigation measures in the EMP are incorporated in the detailed design - Obtain necessary environmental approval(s) from DONRE prior to award of civil works contracts - Include the Subproject updated EMP in the bid and contract documents for civil works - Establish an environmental grievance redress mechanism, as described in the IEE, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the Subproject's environmental performance - With assistance from ESP, prepare semi-annual environmental monitoring reports for submission to ADB - Based on the results of EMP monitoring, identify environmental corrective actions and prepare a corrective action plan, as necessary, for submission to ADB.
Environmental Safeguards Staff (ESO)	- PMU staff support for EMP implementation - Work closely with ESP of LIC to daily supervise of EMP implementation and preparation of EMP monitoring report
Environment Safeguard Specialist (ESP)	- Ensure that the environmental protection and mitigation measures identified in the EMP for the design stage has been incorporated in the detail design; - Assist PMU to ensure that all environmental requirements and mitigation measures from the IEE and EMP are incorporated in the bidding documents and contracts. - During detailed design phase carry out baseline data collection on air quality, noise and surface water quality (as specified in the EMP) - During detailed design phase, prepare method statement (Waste

	Management and Spoils Disposal Plan) described in the IEE/EMP. - Implement all mitigation and monitoring measures for various subproject phases specified as ESP's tasks in the EMP - Work with PMU to execute any additional environmental assessment prior to subproject construction as required in the EMP (e.g., preparation of new or supplementary environmental assessment in case of change in alignment that will result to adverse environmental impacts that are not within the scope of the IEE prepared during loan processing, etc.) - Undertake environmental management capacity building activities for PMU as described in the IEE and EMP. - Engage international and national environment specialists to ensure proper implementation of EMP provisions. Through these specialists, the ESP shall: (i) ensure proper and timely implementation of ESP's tasks specified in the EMP, (ii) conduct environmental training as specified in the IEE/EMP for PMU, (iii) conduct workers' orientation on EMP provisions, (iv) undertake regular monitoring of the contractor's environmental performance, as scheduled in the EMP (v) conduct field measurements for surface/ground water quality, dust and noise as required in the EMP, and (v) prepare environmental baseline report and environmental semi-annual environmental monitoring reports , as specified in the EMP, for submission to ADB.
Construction Supervision Consultant (CSC)	- Provide the ESP relevant information as well as full access to the subproject site and all project-related facilities (such as construction yards, workers' camps, borrow and quarry areas, crushing plants, concrete mixing plants, etc.) to monitor contractors' implementation of the subproject EMP, assess environmental impacts resulting from ongoing site works and operation related facilities, undertake environmental effects monitoring and orientation of workers on EMP implementation. - Undertake day to day subproject supervision to ensure that the EMP is properly implemented by contractors. - Orient workers on EMP implementation, and health and safety procedures - Document and report to PMU on occupational accidents, diseases and incidents - As part of regular progress report submission to PMU, prepare reports on the status of the contractors' implementation of the EMP and health and safety issues - Engage a national environment specialist to ensure proper implementation of the above tasks.
Contractors	- Recruit qualified environmental officer to ensure compliance with environmental statutory and contractual obligations and proper implementation of the Subproject EMP - Provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the EMP - Implement additional environmental mitigation measures, as necessary
Dak Lak Department of Transportation (DOT)	- Responsible for operation and maintenance of Subproject road - Implement EMP monitoring during operation
Dak Lak Department of Natural Resources and Environment (DONRE)	Review and approve environmental assessment reports required by the Government. - Undertake monitoring of the subproject's environmental performance based on their mandate

The organization structure of Environmental Management Plan is showed in the chart below:

Figure 2 – EMP Implementation Organization Chart



B. Environmental mitigation plan

131. The anticipated environmental impacts and mitigation measures discussed in the previous section is presented in Table 14. The table also shows responsibilities and timeframe/schedule for implementation of mitigation measures and monitoring.

132. Table 14 shows that most mitigation activities during pre-construction are to be implemented by the ESP while during construction, measures shall be primarily implemented by the contractors. During operation stage, DOT shall undertake environmental mitigation and monitoring requirements specified in the EMP. To ensure implementation of mitigation measures during construction, the EMP shall be included in the tender and contract documents for civil works. Contractors' conformity with environmental contract procedures and specifications shall be regularly monitored by PMU with assistance from CSC and results shall be reported semi-annually to ADB.

Table 14 - Detail Environmental Mitigation Plan

		Impact Mitigation				
Environmental Concern	Objective	Proposed Mitigation Measures	Responsible to Implement	Timing	Locations	Mitigation Cost
Design and Pre-construction Phase						
1. Environment and climate change in detail designs	Incorporation of environmental and climate change adaptation design measures into the detailed design	Check the detail design on the incorporation of environment and climate change adaptation, update base on the different scenarios of Dak Lak on climate change	ESP	Before construction	N/A	Included in the contract with ESP
	Incorporation of environmental and climate change adaptation design measures into the detailed design	Check the detail design on the incorporation of environment and climate change adaptation, update base on the different scenarios of Dak Lak on climate change	ESP	Before construction	N/A	Included in the contract with ESP
2. Land acquisition and resettlement	Control the impact of land acquisition and resettlement	Monitor the compensation process to ensure it is suitable with the Land Acquisition and Resettlement Report.	PMU; ESP	Before construction	N/A	Included in the contract with ESP and PMU operation budget
3. Environmentally responsible procurement	EMP is properly implemented by selected contractors	1. Update EMP 2. EMP is included in tender documents to ensure that mitigation measures are budgeted and to prepare the contractors for environmental responsibilities. 3. Specify in bid document that Contractors shall engage capable and trained staff to take responsibility for the environmental management and safety issues at the working level and to monitor the effectiveness and review mitigation measures as the subproject proceeds. 4. Contractors recruit qualified staff to oversee implementation of environmental and safety measures specified in EMP.	ESP; PMU; Contractors	Before bidding and before construction commence ment	N/A	Included in the contract with ESP and PMU operation budget
3. Material Management Plan	Manage material storage area to avoid runoff and sedimentation	1. Designs to balance excavation and fill where possible. 2. Prepare MMP. The plan shall detail the arrangements to be made to facilitate the timely production and supply of construction materials	ESP	Before bidding	N/A	Included in the contract with ESP

		to avoid impacts due to unnecessary stockpiling outside the Subproject site. MMP shall consider the following: (i) Required materials, potential sources and estimated quantities available, (ii) Impacts to identified sources and availability (iii) Excavated slope material for reuse and recycling methods to be employed, (iv) Required endorsements from DONRE and local groups for use of sources. (v) Methods of transportation to minimize interference with normal traffic. (vi) Constraints of regular delivery schedule to reduce stockpiling on site. vii) Measures to be employed to mitigate nuisances to local residents. (viii) Program for reuse of slope excavated material for reuse (ix) Program for delivery of quarry and borrow materials. (x) Discussion of the CSC, PMU/ ESP inspection/monitoring role. (xi) Agreement on publicity/public consultation requirements.				
5. Plan spoil and waste disposal	Minimize waste and pollution	1. Re-use of waste materials & spoil disposal locations included in bid and contract documents. 2. Prepare WMSDP. The plan shall cover handling, storage, treatment, transport and disposal of solid and liquid wastes, hazardous materials, hazardous wastes and excavation spoils. 3. WMSDP will include consideration of all matters related to solid, liquid waste and spoil disposal including the following: i) Expected types of waste and quantities of waste arising. ii) Waste reduction, reuse and recycling methods to be employed iii) Agreed reuse and recycling options and locations for disposal / endorsement from DONRE and local groups. iv) Methods for treatment and disposal of all solid and liquid wastes.	ESP	Before bidding	N/A	Included in the contract with ESP

		v) Methods of transportation to minimize interference with normal traffic. vi) Establishment of regular disposal schedule and constraints for hazardous waste. vii) Programme for disposal of general waste / hazardous waste. viii) Discussion of the ESP, PMU/CSC inspection/ monitoring role. ix) Establishment of complaints management system for duration of the works x) Agreement on publicity/ public consultation requirements. 4. The WMSDP shall include a section on Hazardous Materials and Waste section. This will detail the mitigation measures, organizational arrangements, resources, facilities, etc. to avoid environmental as well as health and safety impacts due to use and disposal of hazardous materials/substances.				
6. Environmental Capacity Development	Develop environmental management capacity of PMU to ensure proper EMP implementation and promote environmental awareness among workers.	1. PMU to commit and retain dedicated staff for subproject duration to oversee EMP implementation. 2. ESP to train PMU to build their capacity on EMP implementation, monitoring and reporting using workshops and on-the-job training techniques and case studies. 3. Conduct workers' orientation on EMP provisions. Such orientation shall be periodically conducted by the ESP as every new contractor is engaged.	PMU; ESP	Through out the pre-construction and construction phase	N/A	Included in the contract with ESP and PMU operation budget
Construction Phase						
1. Loss of trees and impact on fauna	Avoid and minimize impact to the plant and wild animal in the subproject area	1. Identify suitable area for biodiversity offset of potential losses. 2. Identify the status of the Dipterocarp forest along the last 5km of the route (tree count, take photo) before construction commencement 3. Monitor to ensure construction activities will be done properly on the existing road foundation. 4. Prohibit workers from using guns or any other kind of hunting tools at the subproject area. 5. Prohibit cutting of trees for firewood and for use in subproject.	PMU, ESP, BPMB, Buon Don DPC, Krong Na CPC; CSC; Contractors	Through out construction phase	Along the subproject road; worker camps area	Included in the contract with contractors and the operation budget of the Organizations

		6. During replanting/ recover vegetation works, new alien plant species (i.e., species not currently established in the country or region of the subproject) shall not be used. Invasive species shall not be introduced into new environments. 7. The contractors will not use or permit the use of wood as a fuel for the execution of any part of the works, including but not limited to the heating of bitumen and bitumen mixtures, and to the extent practicable shall ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 8. Contractors shall not buy or use wood from the illegal sources (that come from the illegal logging) 9. No construction camps, large material storage sites, noise operation machines are to be in the forest area. 10. Contractors will take all precautions necessary to ensure that damage to vegetation is avoided due to fires resulting from execution of the works. The Contractors will immediately suppress the fire, if it occurs, and shall undertake replanting to replace damaged vegetation.				
2. Local facilities	Prevent interruption of services such as electricity and water supply during relocation of the local facilities. Repair damaged access roads.	1. Reconfirm power, water supply, and telecommunications likely to be interrupted by the works. 2. Contact all relevant local authorities for facilities and local people to plan reprovisoning of power, water supply, and telecommunication systems. 3. Facilities shall be relocated and reconnected well ahead of commencement of construction works and contractors shall coordinate with factility company for relocation and reconnection well before works commence. 4. Affected communities shall be properly informed in advance. 5. Reconnection of facilities shall be done at the shortest practicable time before	Contractors	Before construction start and through out the construction phase	Along the subproject route; at the residential areas	Included in the contract with contractors

		construction commences. 6. Facilities damaged during construction shall be reported to the CSC, PMU and facility authority and repairs arranged immediately. 7. Access roads, agricultural land and other properties damaged during transport of construction materials and other project-related activities shall be reinstated upon completion of construction works at each section				
3. Materials exploitation and management of quarry, borrow pits and temporary storage area	Minimize impacts from materials extraction, transportation and storage.	1. Implement MMP prepared by ESP during detailed design phase. 2. Balance excavation and fill requirements to minimization negative impacts 3. Prioritize use of existing quarry sites with suitable materials and update the list of quarries and borrow pits monthly in MMP and report to PMU and minimize impacts on other local resources. 4. Procure materials only from Dak Lak DONRE authorized quarries and borrow sites. 5. Replant tree and vegatation cover of any vegatation clearance area in quarries and borrow pits 6. Stockpile topsoil for later use and fence and re-contour borrow pits after use. Topsoil, overburden, and low-quality materials shall be properly removed, stockpiled near the site, and preserved for rehabilitation. 7. During quarry/borrow site operation; provide adequate drainage to avoid accumulation of stagnant water. 8. Ensure borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of water bodies favorable for mosquito breeding. 9. Upon completion of extraction activities, quarry and borrow pits shall be dewatered and fences shall be installed, as appropriate, to minimize health and safety risks. 10. To avoid drowning when pits become	Contractors	Though out construction phase	Subproject site, quarries and borrow pit areas	Included in the contract with contractors

		waterfilled, measures such as fencing, providing flotation devices such as a buoy tied to a rope, etc. shall be implemented.				
4. Waste and spoil disposal	Control spoils and waste disposal, lubricant and hazardous wastes.	1. Implement corresponding provisions of WMSDP prepared by the ESP. (including hazardous wastes) 2. Areas for disposal to be agreed with CPCs and Dak Lak DONRE checked and recorded by the CSC, ESP/PMU and monitored (Dumping site in Hamlet No.11, Pong Drang – Krong Buk) 3. Spoil and waste will not be disposed of in streams or other surrounding water bodies. 4. Spoil disposal shall not cause sedimentationand obstruction of flow of watercourses, damage to agricultural land and densely vegetated areas. 5. Under no circumstances will spoils be dumped into watercourses (rivers, streams, drainage, irrigation canals, etc.) 7. The spoils disposal site shall be located at least 50 m from surface water courses and shall be protected from erosion by avoiding formation of steep slopes and grassing.	Contractors	Through out construction phase	Through out construction site, material storage areas, machines and vehicles maintainance area	Included in the contract with contractors
5. Noise, dust and vibration from construction activities	To minimize negative impacts from noise, dust and vibration during construction period	1. Restrict works to daylight hours within 500 m of sensitive area. 3. Powered mechanical equipment and vehicle emissions to meet national TCVN/QCVN standards. All construction equipment and vehicles shall have valid certifications indicating compliance to vehicle emission and noise creation standards. 4. Monitor and investigate complaints; propose alternative mitigation measures. 5. Keep material storage site moist 6. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emission. 7. On rainless day undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials storage sites, construction sites, access	Contractors	Through out construction phase	Through out construction site especially at the sensitive areas such as schools/ kindergarten, medical centers	Included in the contract with contractors

		roads, quarry areas, borrow sites and other subproject areas where residential sites and other sensitive points such as schools, clinics… are located nearby. 8. Mixing, bitumen heating and crushing plants operations will be equipped with dust suppression devices such as water sprays. 9. Clean up road surfaces after work. 10. To protect buildings and structures from vibration, non-vibrating roller shall be used in construction sites near buildings and structures. 11. Structures which are damaged due to vibration caused by the construction activities shall be repaired immediately as directed by ESP/PMU. 12. Machinery shall be turned off when not in use. 13. Impose speed limits on construction machines and transportation vehicles to minimize dust emission along areas where sensitive pints are located (houses, schools, clinics etc.).				
6. Stream protection and bridge/culvert construction	Protect stream and maintain flows	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed not to block streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.	Contractors	Through out construction phase	streams/ flows crossing point	Included in the contract with contractors
7. Impact on water resources and quality	To minimize impact from wastewater drainage and prevent potential	1. Province adequate drainage facilities at construction sites and worker camps to avoid stagnant water. 2. Implement agreed designs for bridges/	Contractors	Through out construction phase	stream/ flow crossing positions, material	Included in the contract with contractors

	impact on water quality due to subproject activities	culverts sufficient to control flooding as designed. 3. Store lubricants, fuels and wastes in dedicated enclosures at least 50 m from water bodies on high and impervious ground with top cover 4. Solid waste from construction activities and workers camps will not be thrown in streams and other water bodies (drainage, lake, pond, etc.) 5. Construction storage/stockpiles shall be provided with bunds to prevent silted run-off. 6. Stockpiled materials will be covered to reduce silted run-off. 7. No stockpiling or borrow sites at least 100m of water bodies. 8. Work in stream at bridge repair sites will be scheduled during dry season and work duration shall be as short as possible. 9. Washing of machinery and vehicles in surface waters shall be prohibited.			storage sites, temporary waste disposal area	
8. Construction and worker camps; Sanitation and Diseases	Construction camps and worker camps not to cause any negative impact to surrounding environment (forest area, water bodies); Control of infectious diseases	1. Construction and worker camp location and facilities located at least 500m from settlements and agreed with local communities and facilities approved by ESP and managed to minimize impacts. 2. Hire and train as many local workers as possible. 3. Provide adequate housing for all workers at the construction camps and establish clean canteen/eating and cooking areas. 4. Mobile toilets (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and prevented by cleaning lavatories daily and by keeping toilets clean at all times. 5. Provide separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supply for male and female workers. 6. Borrow pits and natural depressions with prelaid impervious liners will be used to dispose of scarified/scraped asphalt, and then covered with soil. This will check potential groundwater contamination.	Contractors	Through out construction phase	Through out construction sites and worker camps	Included in the contract with contractors

		7. Camp site will be cleaned up to the satisfaction of and local community after use. 8. Solid and liquid waste will be managed in line with WMSDP. 9. All waste materials shall be removed and disposed to disposal sites approved by local authorities 10. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned. 11. Standing water will not be allowed to accumulate in the temporary drainage facilities or along the roadside to prevent proliferation of mosquitoes. 12. Temporary and permanent drainage facilities will be designed to facilitate the rapid removal of surface water from all areas and prevent the accumulation of surface water ponds. 13. Malaria controls (e.g., provision of insecticide treated mosquito nets to workers, installation of proper drainage to avoid formation of stagnant water, etc.) and HIV-AIDS education will be implemented in line with social plans for the subproject. 14. HIV/AIDS awareness and prevention program shall be implemented in line with social plans under the subproject.				
9. Safety precautions for workers and public safety	Ensure worker safety; Prevent accident with local people	1. Establish safety measures as required by law and by good engineering practice and provide first aid facilities that are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, ear plugs, gloves,	Contractors	Through out construction phase	Through out construction sites, quarries and borrow areas, material transportation roads, especially near schools/ kindergartens, medical centers, commune	Included in the contract with contractors

		etc. at no cost to the employee. 5. Where worker exposure to traffic cannot be completely eliminated, protective barriers shall be provided to shield workers from traffic vehicles. 6. Ensure reversing signals are installed on all construction vehicles. 7. Install barriers (e.g., temporary fence) at construction areas to deter pedestrian access to the roadway except at designated crossing points. 8. The general public/local residents shall not be allowed in high-risk areas, e.g., excavation sites and areas where heavy equipment is in operation and such sites have a watchman to keep public out. 9. Speed restrictions shall be imposed on subproject vehicles and equipment when traveling through residential areas, especially through the sensitive points such as schools, local clinics, pagodas… 10. Upon completion of construction works, borrow areas will be backfilled (if suitable materials are available, e.g., excavation spoils) or fenced.			centers.	
10. Traffic Management	Minimize disturbance of traffic	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience due to subproject operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold ups and congestion 3. In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up. 4. Provide safe vehicle and pedestrian access around construction areas.	Contractors	Through out construction phase	Through out construction sites; at junctions to PR8 and PR6, junctions with inter-commune roads, junction with NR14.	Included in the contract with contractors

		5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. 6. Provide sufficient lighting at night within and in the vicinity of construction sites. 7. Designate traffic officers in construction sites.				
11. Environmental recovery	Provide environmental recovery of the subproject	Contractors to reconfirm and implement recovery (e.g., landscaping, tree replanting) identified at the detailed design stage	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors
Operation Phase						
1. Increase forest access	To minimize illegal wood logging and forest production gathering in Buon Don Protection Forest	1. Cooperate with Buon Don Protection Forest Management Board, Buon Don DPC and Krong Na CPC to setup a suitable O&M plan 2. Participate in the Forest Protection Campaign if applicable 3. Install sign board, propaganda board on forest protection along the section goes through Buon Don Protection Forest	Dak Lak Department of Transportation (DOT)	Through out operation phase	At the section goes through Buon Don Protection Forest	Included in operation and maintenance cost
2. Generate dust, noise, vibration	To minimize dust, noise and vibration	1. Install sign board, speed limit/ loading limit to prevent dust, noise and vibration from over speed vehicles 2. Install road humps at the residential area to reduce the impact from noise, dust and vibration.	Dak Lak Department of Transportation (DOT)	Through out operation phase	At the start and end point and main junctions along the subproject route. At the sensitive areas closed to schools/ kindergarten, medical centers…	Included in operation and maintenance cost
3. Traffic and road safety	Minimize road accident	1. Undertake road safety awareness campaigns for local residents and other road users of the subproject road. 2. Install and maintain road warning signs and markings. 3. Monitor road accidents and implement necessary preventive measures (awareness campaigns, provision of appropriate road furniture to enhance road safety and control traffic).	Dak Lak DOT	Through out operation phase	Along two sections subproject road	Included in operation and maintenance cost

C. Environmental monitoring

1. Compliance Monitoring

133. Table 15 below shows the program for monitoring the compliance on various provisions of the EMP during pre-construction, construction and operation phases. ESP needs to implement a number of measures during detailed design phase (e.g., incorporation of environmental design measures into the detailed design, update EMP, etc.) and this will be confirmed by PMU to ADB. During construction, most of the mitigation measures be implemented by the contractors and their environmental performance, in terms of implementation of such measures, shall be monitored by CSC and ESP. The timing or frequency of monitoring is also specified in Table 14. During operation EMP implementation shall be the responsibility of Dak Lak DOT.

134. At design phase, PMU shall ensure that EMP measures for the design stage are incorporated in the detailed design. The effective incorporation of the EMP in the civil works contracts shall also be ensured be by PMU with assistance from ESP and this, along with implementation of EMP provisions, shall be audited by ADB as part of the loan conditions.

135. Prior to implementation of the subproject the IEE and EMP will be updated and amended, as necessary, by ESP after the detailed designs are complete and contracting arrangements are known. Such updating shall be based on reconfirmation and any additional information on the assumptions made at this feasibility stage on location scale and expected conditions of the subproject.

136. At pre-construction phase, PMU with the support from ESP will prepare all environmental protection compliance certificates under Vietnam's regulations as guided through LEP 2014. CSC and ESP will also need to confirm that Contractors and their suppliers have complied with all statutory requirements for permits from DONRE and provincial authorities. CSC and ESP will check that Contractors have all the necessary valid licenses and permits for use of powered mechanical equipment if necessary and the use of local water supplies (and to construct or operate plant such as for cement batching or asphalt/bitumen (if required) in line with all environmental regulations and permit conditions from provincial authorities.

137. At construction phase, the ESP will undertake regular monitoring of the contractor's implementation of mitigation measures specified in the Subproject EMP if applicable. On the other hand, CSC will also monitor the construction activities on daily basis. They will ensure that the contractors comply with all environmental regulations as specify in subproject EMP if applicable.

138. Dak Lak Department of Transportation will be in charge of EMP implementation in the operation phase. The tasks are including monitoring of dust, noise and water quality... They also monitor the accidents along the subproject road as basis for implementation of mitigation measures to improve road safety.

2. Environmental Effects Monitoring

139. ESP undertake baseline environmental monitoring for air quality and noise. Sampling will be conducted prior to start of site works at the specified locations. During construction, ESP shall undertake quarterly monitoring of surface water quality and semi-annual monitoring of air quality

and noise in the same locations sampled during pre-construction. Additional sampling occasions shall be carried out and additional parameters will be analysed (as necessary) to validate complaints and/or investigate pollution events caused by the subproject.

Table 15 - Environmental Monitoring Compliance

Performance and Impact Monitoring					
Environmental Concern	Parameter to monitor	Location	Frequency & Verification	Responsible to Monitor	Monitoring Cost
Design and Pre-construction Phase					
1. Environment and climate change	Detail designs with environment and climate change cooperated	N/A	Only one time before the construction commence	PMU	Included in the operation budget of PMU
2. Land acquisition and resettlement	Compensation documents	N/A	Only one time before the construction commence	Dak Lak DPI/ DONRE; PMU	Included in the operation budget of PMU
3. Public facilities	Checking documents	N/A	Only one time before the construction commence	PMU	Included in the operation budget of PMU
4. Environmentally responsible procurement	Include in bidding documents. Check compliance	N/A	Bidding preparation period. Before start site works	PMU	Included in the operation budget of PMU
5. Material Management Plan	Require in contract with ESP. Check at Detailed Design.	N/A	Only one time in detailed design phase	PMU	Included in the operation budget of PMU
6. Plan spoil and waste disposal	Require in contract with ESP. Check at Detailed Design.	N/A	Only one time in detailed design phase	PMU	Included in the operation budget of PMU
7. Environmental Capacity Development	Require in contract with ESP. Check at Detailed Design. Complete training and check before and during the construction works.	N/A	Before construction commencement and at the beginning period of the construction phase	PMU	Included in the operation budget of PMU
Construction Phase					
1. Loss of trees	Check of implementation	Along the subproject road, especially area goes through Buon Don Protection forest; worker camps area	Before construction commencement and through out construction phase. Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
2. Local facilities	Check of implementation	Along the subproject road	Before construction commencement and through out construction phase. Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
3. Materials	Check of implementation	Subproject site,	Bi-weekly	ESP/ PMU	Included in the

exploitation and management of quarry and borrow pits		quarries and borrow pit areas	Part of daily construction supervision	CSC	operation budget of PMU/ ESP/ CSC
4. Waste and spoil disposal	Check of implementation	Through out construction site, material storage areas, machines and vehicles maintenance area	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
5. Noise, dust and vibration	Check of implementation	Through out construction site	Bi-weekly and spot checks Part of daily construction supervision	ESP/ PMU	Included in the operation budget of PMU/ ESP CSC
	Ambient air quality (temperature, moisture, wind direction and speed, PM10, NO_2, SO_2…); Noise level (average noise level, maximum noise level, vehicles frequency…)	9 monitoring points: 2 point at start and end points the road. 5 point at junctions: to PR8 and Pr6 and CPCs; 2 points in front of Ea Kiet; Ea Ngai CPCs.	1 time before construction start and semi-annually during 2 years construction time (5 times in total)	ESP	2,700 USD[4]
6. Stream protection and bridge/culvert construction	Check of implementation	Streams/ flows crossing point	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
7. Water resources and quality	Check of implementation	Through out construction sites; stream crossing position, material storage sites, temporary waste disposal areas	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
8. Construction and worker camps, sanitation and	Check of implementation	Through out construction sites and worker camps	Before establishment of the facilities and through out the construction phase	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/

[4] Due to there is no cost norm for Dak Lak province, Figures has been estimated base on environmental monitoring cost norm of Dak Nong – Decision No. 17/2015/QD-UBND.

Diseases			Part of daily construction supervision		CSC
9. Safety precautions for workers and pulic safety	Check of implementation. Check compliance to Labor Code of Vietnam and other relevant Decision, Decree and Circular under Government requirements	Through out construction sites, subproject roads, quarries and borrow areas, transportation road	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
10. Traffic Management	Check of implementation	Through out construction sites; at junction with inter-commune roads; NR14	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
11. Environmental recovery	Confirmed implementation of required enhancements	Through out construction sites	Before construction and bi-weekly check Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
Operation Phase					
1. Increase access to forest	Check of implementation	At the section passing Buon Don Protection Forest	Semi-annual in the first two years	Dak Lak PPC	Included in operation budget of Dak Lak PPC
2. Dust, noise, vibration	Check of implementation; Ambient air environment, noise level at the road and in the areas which are adjacent to road	At the start and end point of the road. At the sensitive areas (schools/ kindergarten, medical centers)	Semi-annual in the first two years	Dak Lak PPC	Included in operation and maintenance cost
3. Road safety	Check of implementation	Along the subproject road	Semi-annual	Dak Lak PPC	Included in the operation budget of PPC

D. Reporting

140. PMU will submit the following reports to ADB:

- *Monitoring report for baseline environment:* this report shows the result of baseline environment as implemented by ESP on ambient air quality, surface water quality... This report will be submitted to ADB before the construction start.
- *Environmental monitoring reports:* Environmental monitoring reports will cover the status of EMP implementation in terms of required mitigation measures for different phases of the subproject, results of environmental effects monitoring (air quality, noise and surface water quality), necessary remedial actions to effectively address negative environmental impacts due to subproject implementation, status of environmental capacity building activities as well as documentation of complaints received and corresponding action/resolution. The environmental monitoring reports will be submitted to ADB semi-annually during the construction phase and annually for two years after completion of construction.

Table 16 – Reporting procedures

Project Phase	Type Of Report	Frequency	Responsibility	Submitted To Whom
Construction	**Environmental Performance Report** indicating compliance with EMP and monitoring results at the contractor site	Monthly	Construction contractor	CSC
	Subproject EMP Compliance Report indicating compliance with subproject EMP and monitoring results	Quarterly	CSC	PMU
	EMP Compliance Report indicating compliance with subproject EMP and monitoring results	Semi-annually during construction phase	ESP/ PMU	ADB
Operation	**EMP Compliance Report: Operation** indicating compliance with subproject EMP commitments during operation	Annually in the first two years of operation. Ongoing frequency to be determined based on review after 2 years.	Dak Lak DOT	Dak Lak DONRE

Table 17 - Estimated cost for EMP Monitoring (2-year construction/ 4-year in total)

Item	Estimated cost (USD)
1. Environmental specialist of ESP – 1 National ESP	***76,910***
1 National Environmental Specialist - 14 man-months (intermittent in the first 2 years; 6 – 4 – 4) – 4000 usd/ man-month	56,000
Per diem for ESP: 48 usd x 30 days x 14 months	20,160
Air fare + taxi (to and from airports) for 3 round trips: 250 usd x 3 trips	750
2. Environmental effects monitoring - ESP	***2,700***
Ambient air quality: 9 monitoring locations x 5 times x 60 usd/sample[5]	2,700
3. Training/orientation, local transportation, supplies - ESP	***21,500***
a) Training/orientation: 1 formal training course for PMU, CSC, Contractors and Dak Lak DOT and other "on the job" training	1,500
b) Local transportation and supplies	20,000
4. Printing Environmental monitoring report by ESP (8 reports)	***8,000***
Subtotal (1+2+3+4)	**109,110**
5. Contigency	**10,890**
Total (1+2+3+4+5)	**120,000**

E. Capacity building

141. In Viet Nam, the environmental assessment process is established but environmental awareness and capability for implementation of EMP in infrastructure projects of both the executing agency and the implementation agency (PMU) are limited and in development. The safeguards staff of the PMU is usually responsible for many different task and capacity building will be implemented more to have sufficient EMP implementation. Usually, the engineer will also be in charge of the environmental monitoring and his/ her capacity is not suitable to check the adequacy of the subproject EMP. The IEEs and EMP are referred to the environmental department in DONRE for approval. During the Project PPTA phase, PPU has been established under Dak Lak DPI with one staff has been assigned as ESO.

142. The most significant challenge is the lack of human and financial resources and necessary infrastructure. To address this constraint, Dak Lak DPI/PMU will designate a full time staff as environmental safeguards officer (ESO) to handle the environmental aspects of the subproject during implementation stage. Ideally, ESO of the Project Preparation Unit (PPU) will be come ESO of the subproject PMU also. The ESO and other relevant staff of PMU will be trained by the environment specialists of the ESP during subproject implementation as "on the job" training or by formal training courses.

[5] Due to there is no cost norm for Dak Lak province, figures has been estimated base on environmental monitoring cost norm of Dak Nong – Decision No. 17/2015/QD-UBND.

Table 18 – Detail capacity building program

Objective	1. Build capacity and procedures in undertaking systematic environmental assessments in accordance with Government regulations and ADB guidelines 2. Provide training on international best practice on environmental management, monitoring and reporting. 3. Provide guidance on how to effectively incorporate environmental measures into project design and how to incorporate EMP provisions into tender and contract documents.
Tasks/Scope of Work	1. Undertake training needs analyses and review prevailing government regulations and donor guidelines governing the assessment and management of environmental impacts for road development. 2. Review the skills of PMU and Dak Lak DOT staff to establish existing capacity on environmental assessments, environmental monitoring and implementation of mitigation measures for road development project. 3. Prepare the training plan and relevant training materials. 4. Deliver the training which may be through a combination of hands on assistance, on-the-job training, and training workshops. 5. Evaluate the effectiveness of the training measuring improvements in attitudes and skills achieved. 6. Modify the training documents/materials as necessary. 7. Hand-over the amended training documents/ material to the project manager for use in the delivery of the training. 8. Prepare report on result of training.
Time frame	Possible within 3 months after construction commencement
Target participant	Staff in PMU and Dak Lak DOT who responsible for environmental management
Staff resources	International and national environmental specialist with at least 15 years experience on environmental management of road projects and must possess relevant post-graduate degree in civil engineering, environmental management and other relevant courses. With working knowledge of safety issues and at least 3 years experience in conducting environmental management training.

X. CONCLUSIONS AND RECOMMENDATIONS

143. This IEE study was carried out in the Technical Assistant for Project Preparation (PPTA) phase. Primary and secondary data were used to assess potential environmental impacts in a comprehensive manner and public consultation and route reconnaissance were carried out in order complete the environmental assessments and recommend suitable mitigation measures. The IEE report provides a picture of potential environmental impacts associated with the upgrading of the subproject road and suitable mitigation measures have been recommended.

144. The implementation of the subproject "Upgrade and Rehabilitate National Road No.29, Dak Lak Province" will steadily improve the road quality; make it favourable for transportation in both dry and rainy season, support stable goods transportation from agricultural production area of Krong Buk and Cu M'Gar districts to National Road 14C and Dak Rue Border Gate. Several actions are required during the detailed design stage to minimize impacts to acceptable levels. The negative environmental impacts from the upgrading works will mostly take place during the construction stage. All of the impacts during construction phase should be very predictable and manageable and with appropriate mitigation and few residual impacts are likely. Additional human and financial resources will be required to improve environmental capability and to progress and achieve necessary statutory compliance and environmental clearance certification for the subproject or associated activities that also require environmental permits under the environmental laws of Viet Nam – LEP 2014.

145. No further or additional impact assessment is considered necessary at this stage. At the implementation stage, PMU through ESP will develop detail EMP to monitor the schedules of mitigation measures and conduct of environmental effects monitoring activities. EMP must be updated to ensure effective environmental monitoring and should be developed follow monitoring plan as specified in the EMP. With these measures in place, environmental impacts of the subproject should be manageable and will not result in any residual impact which is above accepted environmental standards.

XI. APPENDIXES

A. Appendix 1: Photos of the subproject road and the vicinity

Starting point in Krong Buk Industrial Zone

Existing bridge at Km220+527.45

Current condition of Buon Don Protection Forest

Coffe cultivation area in Ea Kueh commune

Temporary dumping site in hamlet No.11
Pong Drang commune, 5km from subproject route

Through residential area - Ea Kiet commune

B. Appendix 2: Environmental criteria for subproject selection

Province	Road	Environmental Criteria (100 points)				(Points remaining over 100 points) Environmental grading and remarks
		(deduction/40) National Park, Nature Reserve, Historical Site, Forest	(deduction/20) Flood prone, water bodies	(deduction/20) Land slide, soil erosion	(deduction/20) Alteration of surface water bodies	
Kon Tum	No. 675A	(-35) Some type of forest along the road	(-15) Sesan river, several large resevoirs	(-15) Some steep slopes on the road	(-15) 7 bridegs/ total 237 m of length	**Rank 1 – 10 points** Category B. Pay attention to land slide, soil erosion and flood. Wood logging activities still happen.
	No. 673A	(-40) Ngoc Linh Nature Reserve	N/A	(-10) Widing road with high moutains	(-5) 4/24	**Rank 3 – 30 points** Category A. The first 9km go through Ngoc Linh Nature Reserve. Pay attention to land slide also.
Gia Lai	No. 665	N/A	(-5) Some streams and river	N/A	(-20) 3/231	**Rank 4 – 40 points** Category B. Pay attention to flooding
	ChuTy– Ia Nan	N/A	N/A	N/A	(-5) 1/33	**Rank 5 – 50 points** Category B
	No. 670	N/A	(-10) Some rivers and streams	(-10) Some steep slopes on the road	(-5) 3/30	**Rank 4 – 40 points** Category B. Pay attention to land slide, soil erosion.
Daklak	No. 29	(-20) York Don National Park	N/A	N/A	N/A	**Rank 5 – 50 points** Category B. The part connect to Dak Rue Border Gate go near the buffer zone of York Don National Park.
	Cu Ne – Ea Sup	N/A	(-10) Ea Sup Lakes and some small streams and lakes	N/A	(-5) 2/20	**Rank 5 – 50 points** Category B. Pay attention to flooding
Daknong	Dak Buk So – Bu Prang	(-20) Border protection forest. Bu Gia Map National Park (in Binh Phuoc province)	(-5) Dak Buk So; Dak Blung lakes. Some small irrigation system	(-15) Some slopes along the route, hilly parts of the road	N/A	**Rank 3 – 30 points** Category B. Pay attention to forest protection and land slide

	No. 685	(-20) Cat Tien South Protection Forest	(-5) Some lakes and river	(-10) Mountainous area	N/A	**Rank 4 – 40 points** Category B. Cat tien South Protection Forest is 7 km away from the road. Pay attention to forest protection and land slide
	Pr.Rd No. 6	N/A	(-5) Dak Buk So lake and other small lakes	(-15) Some land slide point	N/A	**Rank 4 – 40 points** Category B. Pay attention to land slide
	Gia Nghia Rd	N/A	N/A	N/A	N/A	**Rank 5 – 50 points** Category B
Binh Phuoc	Pr.Rd No.756	N/A	(-5) Some small lakes and streams	N/A	N/A	**Rank 5 – 50 points** Category B
	No. 754; 754A	(-30) Ta Thiet Protection Forest; Historical Site	(-5) Some small rivers and lakes	N/A	N/A	**Rank 4 – 40 points** Category B. The road goes along Ta Thiet Protection Forest for around 3.5 km. Historical Site of Southern Army General Staff is far from the road. Pay attention to forest protection.
	756B	N/A	(-5) Some small streams and lakes	N/A	(-5) 1/10	**Rank 5 – 50 points** Category B
	756C	N/A	N/A	N/A	N/A	**Rank 5 – 50 points** Category B

C. Appendix 3: Sources of reference information

1. *Dak Lak 5 years Environmental Status Report 2010*
2. *Dak Lak Environmental Monitoring Report 2015*
3. *Statistics of poor households and marginal poor households of Krong Buk, Cu M'Gar and Buon Don District People's Committes in 2015*
4. *Statistics of poor households of Labour Invalids and Social Affairs of Krong Buk, Cu M'Gar and Buon Don District People's Committees in 2015*
5. *Statistics Division of Krong Buk, Cu M'Gar and Buon Don District people's committees in 2015*
6. *Statistic Division of area by administrative unit of Krong Buk, Cu M'Gar and Buon Don districts in 2015*
7. *Healthcare Centre of Krong Buk, Cu M'Gar and Buon Don Districts people's committee in 2015*

D. Appendix 4: Environmental Mitigation Measures to Include into Bidding Documents

1. Loss of trees	1. Identify suitable area for biodiversity offset of potential losses. 2. Identify the status of the Dipterocarp forest along the last 5km of the route (tree count, take photo) before construction commencement 3. Monitor to ensure construction activities will be done properly on the existing road foundation. 4. Prohibit workers from using guns or any other kind of hunting tools at the subproject area. 5. Prohibit cutting of trees for firewood and for use in subproject. 6. During replanting/ recover vegetation works, new alien plant species (i.e., species not currently established in the country or region of the subproject) shall not be used. Invasive species shall not be introduced into new environments. 7. The contractors will not use or permit the use of wood as a fuel for the execution of any part of the works, including but not limited to the heating of bitumen and bitumen mixtures, and to the extent practicable shall ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 8. Contractors shall not buy or use wood from the illegal sources (that come from the illegal logging) 9. No construction camps, large material storage sites, noise operation machines are to be in the forest area. 10. Contractors will take all precautions necessary to ensure that damage to vegetation is avoided due to fires resulting from execution of the works. The Contractors will immediately suppress the fire, if it occurs, and shall undertake replanting to replace damaged vegetation.
2. Local facilities	1. Reconfirm power, water supply, and telecommunications likely to be interrupted by the works. 2. Contact all relevant local authorities for facilities and local people to plan reprovisoning of power, water supply, and telecommunication systems. 3. Facilities shall be relocated and reconnected well ahead of commencement of construction works and contractors shall coordinate with factility company for relocation and reconnection well before works commence. 4. Affected communities shall be properly informed in advance. 5. Reconnection of facilities shall be done at the shortest practicable time before construction commences. 6. Facilities damaged during construction shall be reported to the CSC, PMU and facility authority and repairs arranged immediately. 7. Access roads, agricultural land and other properties damaged during transport of construction materials and other project-related activities shall be reinstated upon completion of construction works at each section
3. Materials exploitation and management of quarry, borrow pits and temporary storage area	1. Implement MMP prepared by ESP during detailed design phase. 2. Balance excavation and fill requirements to minimization negative impacts 3. Prioritize use of existing quarry sites with suitable materials and update the list of quarries and borrow pits monthly in MMP and report to PMU and minimize impacts on other local resources. 4. Procure materials only from Dak Lak DONRE authorized quarries and borrow sites. 5. Replant tree and vegatation cover of any vegatation clearance area in quarries and borrow pits 6. Stockpile topsoil for later use and fence and re-contour borrow pits after use. Topsoil, overburden, and low-quality materials shall be properly removed, stockpiled near the site, and preserved for rehabilitation. 7. Do not use quarries in areas of natural woodland or near rivers which provide food and shelters for birds and other animals. 8. Borrow/quarry sites shall not be located in productive land and forested areas. 9. During quarry/borrow site operation; provide adequate drainage to avoid accumulation of stagnant water. 10. Ensure borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of water bodies favorable for mosquito breeding. 11. Upon completion of extraction activities, quarry and borrow pits shall be dewatered and fences shall be installed, as appropriate, to minimize health and safety risks. 12. To avoid drowning when pits become waterfilled, measures such as fencing, providing

	flotation devices such as a buoy tied to a rope, etc. shall be implemented.
4. Waste and spoil disposal	1. Implement corresponding provisions of WMSDP prepared by the ESP. (including hazardous wastes) 2. Areas for disposal to be agreed with CPCs and Dak Lak DONRE checked and recorded by the CSC, ESP/PMU and monitored 3. Spoil and waste will not be disposed of in streams or other surrounding water bodies. 4. Spoils and waste shall only be disposed to areas approved by local authorities. 5. Spoil disposal shall not cause sedimentationand obstruction of flow of watercourses, damage to agricultural land and densely vegetated areas. 6. Under no circumstances will spoils be dumped into watercourses (rivers, streams, drainage, irrigation canals, etc.) 7. The spoils disposal site shall be located at least 50 m from surface water courses and shall be protected from erosion by avoiding formation of steep slopes and grassing.
5. Noise, dust and vibration	1. Restrict works to daylight hours within 500 m of sensitive area. 3. Powered mechanical equipment and vehicle emissions to meet national TCVN/QCVN standards. All construction equipment and vehicles shall have valid certifications indicating compliance to vehicle emission and noise creation standards. 4. Monitor and investigate complaints; propose alternative mitigation measures. 5. Keep material storage site moist 6. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emission. 7. On rainless day undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials storage sites, construction sites, access roads, quarry areas, borrow sites and other subproject areas where residential sites and other sensitive points such as schools, clinics… are located nearby. 8. Mixing, bitumen heating and crushing plants operations will be equipped with dust suppression devices such as water sprays. 9. Clean up road surfaces after work. 10. To protect buildings and structures from vibration, non-vibrating roller shall be used in construction sites near buildings and structures. 11. Structures which are damaged due to vibration caused by the construction activities shall be repaired immediately as directed by ESP/PMU. 12. Machinery shall be turned off when not in use. 13. Pile driving during to be schedule for day time if construction site is near sensitive points or approved by DONRE, CPCs and ESP/PMU. 14. Impose speed limits on construction machines and transportation vehicles to minimize dust emission along areas where sensitive pints are located (houses, schools, clinics etc.).
6. Stream protection and bridge/culvert construction	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed not to block streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.
7. Impact on water resources and quality	1. Province adequate drainage facilities at construction sites and worker camps to avoid stagnant water. 2. Implement agreed designs for bridges/ culverts sufficient to control flooding as designed. 3. Store lubricants, fuels and wastes in dedicated enclosures at least 50 m from water bodies on high and impervious ground with top cover 4. Solid waste from construction activities and workers camps will not be thrown in streams and other water bodies (drainage, lake, pond, etc.) 5. Construction storage/stockpiles shall be provided with bunds to prevent silted run-off. 6. Stockpiled materials will be covered to reduce silted run-off. 7. No stockpiling or borrow sites at least 100m of water body. 8. Work in streams at bridge repair sites will be scheduled during dry season and work duration shall be as short as possible. 9. Washing of machinery and vehicles in surface waters shall be prohibited.
8. Construction and	1. Construction and worker camp location and facilities located at least 500m from settlements

worker camps; Sanitation and Diseases	and agreed with local communities and facilities approved by ESP and managed to minimize impacts. 2. Hire and train as many local workers as possible. 3. Provide adequate housing for all workers at the construction camps and establish clean canteen/eating and cooking areas. 4. Mobile toilets (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and prevented by cleaning lavatories daily and by keeping toilets clean at all times. 5. Provide separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supply for male and female workers. 6. Borrow pits and natural depressions with prelaid impervious liners will be used to dispose of scarified/scraped asphalt, and then covered with soil. This will check potential groundwater contamination. 7. Camp site will be cleaned up to the satisfaction of and local community after use. 8. Solid and liquid waste will be managed in line with WMSDP. 9. All waste materials shall be removed and disposed to disposal sites approved by local authorities 10. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned. 11. Standing water will not be allowed to accumulate in the temporary drainage facilities or along the roadside to prevent proliferation of mosquitoes. 12. Temporary and permanent drainage facilities will be designed to facilitate the rapid removal of surface water from all areas and prevent the accumulation of surface water ponds. 13. Malaria controls (e.g., provision of insecticide treated mosquito nets to workers, installation of proper drainage to avoid formation of stagnant water, etc.) and HIV-AIDS education will be implemented in line with social plans for the subproject. 14. HIV/AIDS awareness and prevention program shall be implemented in line with social plans under the subproject.
9. Safety precautions for workers and public safety	1. Establish safety measures as required by law and by good engineering practice and provide first aid facilities that are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, ear plugs, gloves, etc. at no cost to the employee. 5. Where worker exposure to traffic cannot be completely eliminated, protective barriers shall be provided to shield workers from traffic vehicles. 6. Workers shall be provided with reliable supply of potable water. 7. Construction camps shall be provided with adequate drainage to avoid accumulation of stagnant water. 8. Construction camps shall be provided with toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained to allow effective operation. 9. Ensure reversing signals are installed on all construction vehicles. 10. Install barriers (e.g., temporary fence) at construction areas to deter pedestrian access to the roadway except at designated crossing points. 11. The general public/local residents shall not be allowed in high-risk areas, e.g., excavation sites and areas where heavy equipment is in operation and such sites have a watchman to keep public out. 12. Speed restrictions shall be imposed on subproject vehicles and equipment when traveling through residential areas, especially through the sensitive points such as schools, local clinics, pagodas… 13. Upon completion of construction works, borrow areas will be backfilled (if suitable materials are available, e.g., excavation spoils) or fenced.
10. Traffic Management	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access

	restrictions. 2. In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience due to subproject operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold ups and congestion 3. In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up. 4. Provide safe vehicle and pedestrian access around construction areas. 5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. 6. Provide sufficient lighting at night within and in the vicinity of construction sites. 7. Designate traffic officers in construction sites.
11. Environmental recovery	Contractors to reconfirm and implement recovery (e.g., landscaping, tree replanting) identified at the detailed design stage

Support to Border Areas Development Project (48189-002)

Initial Environmental Examination (IEE)

PR-686 & PR-681 Dak Nong Subproject

Prepared for
THE ASIAN DEVELOPMENT BANK

July 2016

Prepared by CONTRANS AB, SWEDEN
In joint venture with Transport Engineering Consultant Joint Stock Company No.2 (TECCO2) (Vietnam) and
In association with ASEAN Development and Management Consulting Ltd (ASEC) (Vietnam)

CURRENCY EQUIVALENT
(As of 21st June 2016)

Currency unit: Viet Nam Dong (VND)
USD1 = VND 22300

WEIGHTS AND MEASURES
km^2 – square kilometer
m^3 cubic meter

NOTE
In this report "$" refers to US Dollars

Consultants Quality Assurance Protocol

Prepared By	**CONTRANS SWEDEN AB**		
Auditor/Reviewer	**David Lupton Team Leader (TL)**		
Place	**Buon Ma Thuot, Vietnam**	*Date*	**27-05-2016**
Approved By	**Ta Ngoc Quang, Asia Manager**		

ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
CLV-DTA	Cambodia – Lao PDR – Vietnam Development Triangle Area
CPC	Commune People's Committee
CSC	Construction Supervision Consultant
DONRE	Department of Natural Resources and Environment
DOT	Department of Transportation
DPC	District People's Committee
DPI	Department of Planning and Investment
ESP	Environment Safeguard Specialist
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
ESO	Environmental Safeguards Staff
GMS	Greater Mekong Sub-region
IEE	Initial Environmental Examination
IPM	Integrated Pest Management
LEP	Law on Environmental Protection
MONRE	Ministry of Natural Resources and Environment
MMP	Materials Management Plan
MPI	Ministry of Planning and Investment
PPU	Project Preparation Unit
PPC	Provincial People's Committee
PPE	Personal Protective Equipment
PMU	Project Management Unit
PPTA	Project Preparatory Technical Assistant
ROW	Right of Way
SPS	Safeguard Policy Statement
ESO	Environmental Safeguards Staff
SST	Subproject Support Teams
The PPTA	The Project Preparatory Technical Assistant Consultants
The Project	Support to Border Areas Development Project
The Subproject	PR-686 & PR-681 Dak Nong Subproject
TTF	Trade and Transport Facilitation

UXO	Unexploded ordnance
WMSDP	Waste Management and Spoil Disposal Plan

CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. EXECUTIVE SUMMARY

1. The Central Highland of Vietnam has many natural resources with more than 2 million hectares of rich basalt soil; make up 60% of the basalt soils of Vietnam. The soil is suitable for a variety of commercial crops including coffee, cocoa, pepper, and tea. The coffee production area has reached more than 290000 ha, about 80% of the total coffee area of the country. On the global scale, Vietnam has radically changed global coffee supply chains since 1990, increasing from less than 3% to more than 17% of global production[1]. The Central Highlands is also the second largest rubber plantation area in Vietnam, mainly in Dak Lak province.

2. Despite of these advantages, socio-economical development of the Central Highland, especially four border provinces of Kon Tum, Gia Lai, Dak Lak and Dak Nong are still facing many difficulties with less developed infrastructure and low living standards with many different ethnic groups. Their poverty rate is the second highest in the country, standing at 20.3% compared to 12.6% for the whole country in 2011.

3. The Support to Border Areas Development Project (Project) will help the five participating provinces (the Provinces) of Kon Tum, Binh Phuoc, Dak Lak, Dak Nong, and Gia Lai to better realize their growth potential and become more closely integrated into sub-regional frameworks including the Greater Mekong Sub-region (GMS). The project will include three main outputs and activities: i) Output 1: Road infrastructure in five VDTA provinces rehabilitated; ii) Output 2: VDTA plans and facilities for transport and trade facilitation (TTF) with a focus on inclusive growth developed and iii) Output 3: Institutional capacity for VDTA investment planning, project design and implementation, and resource management strengthened

4. Following extensive data collection, a multi-criteria analysis was used to make the final selection of the roads to be included in the shortlist. Measures were used that reflected the likely impact of the roads including eight themes: (i) agricultural productivity; (ii) population served; (iii) rural population; (iv) traffic count; (v) poor households; (vi) ethnic minority population; (vii) safeguards compliance (environment and social safeguards); and (viii) access to National Road No.14.

A. Subproject Summary

5. "PR-686 & PR-681 Dak Nong" subproject was the short-listed subproject in Dak Nong province. The subproject will upgrade two sections with asphalt concrete with detail information as follow:

(i) Section 1 – 14km from Km17+00 of Provincial Road No.686 to Km3+00 at the entrance of Dak Buk So town, Tuy Duc district centre. This section locates in Nam N'Jang and Dak N'Drung communes, Dak Song district.

(ii) Section 2 – about 23 km, starts from Km31+550.67 – Km35+409.15 of Provincial Road No.681 and Km139+00 – Km157+736.65 of old National Road No.14C. It locates in Dak Buk So and Quang Truc communes, Tuy Duc district. The end point of the Section 2 is Dak Huyt Bridge, 6 km away from Bu Prang Border Gate.

[1] Coffee in the 21st Century – Timothy J Killeen, PhD & Grady Harper

6. Section 1 of the subproject goes through centre of Dak N'Drung commune with residential area and cultivation area of pepper and coffee. Section 2 goes through coffee and pepper cultivation area of Quang Truc and Dak Buk So communes, Tuy Duc district. Section 2 has about 6 km running in the same alignment with border patrol road of which 2 km goes through watershed protection forest under the management of Border Protection Forest Management Board. Some kind of pine forest is also located along this 6 km section.

7. Section 1 will be upgraded to Vietnamese Standard Road Grade IV – Mountain with the surface width of 5.5 m, foundation width of 7.5 m while Section 2 will be upgraded to Vietnamese Standard Road Grade III – Mountain with the surface width 6 m, foundation width of 9 m. Both sections will have roadside width of 2x1 m and road surface material is asphalt concrete.

8. Currently, there are 3 bridges located in Section 1 of the subproject. General information and the peak water above Mean Sea Level (MSL) based on the investigation of PPTA Design Consultant have been listed in Table 1 below. Bridge over stream No.1 and No.2 will be upgraded and constructed as 2 two culverts. Bridge over Ba stream will be reconstructed with the total length of 34.1 m and width of 8 m.

Table 1 – Number of bridges and designed elevation based on 2005 peak water level

No.	Location	Name (river/ stream)	Section	Current Length (m)	Peak water level 2005 above MSL (m)
1	Km6+750	Ba stream	1	21	303.54
2	Km10+850	Stream No.2	1	6.5	288.10
3	Km12+100	Stream No.1	1	5	N/A

B. Environment impacts and mitigations

9. The Project has been ranked as B on environmental issues during the Project Concept note as it has few potential significantly adverse impacts and none of them are irreversible. The initial environmental concern is the potential negative impact of the subproject implementation on Border Watershed Protection Forest. The completion of the road will provide access to the forest; potentially creating favourable condition for wood logging and forestry product exploitation.

10. This IEE has been prepared to screen impacts and formulate mitigation measures in three phases of subproject implementation including design; pre-construction; construction and operation phases and institutional arrangement to ensure that subproject Environment Management Plan (EMP) will be implemented.

11. In the design, preconstruction phase, the potential impacts have been identified relating to land acquisition and resettlement. To minimize the impact on income and disturbance of local people's lives, PMU will check and review the Land acquisition and resettlement process before the construction start to ensure that all affected households have received compensation adequately in accordance with the current provincial market and ADB safeguard Policy be implemented.

12. The potential negative impact in the construction phase has been identified as (i) forest encroachment in the 2 km section goes through Border Watershed Protection Forest. To

minimize the impact, a closed collaboration between Dak Nong Project Management Unit (PMU), Environment Safeguard Specialist (ESP); Dak Nong Border Forest Management Board, relevant Divisions of Tuy Duc district, Forest Ranger, Military Border Soldier, Construction Supervision Consultant (CSC) and Contractors will be established to identify, manage and control the construction activities along the road section along old NR14C, especially for tree cutting and vegetation clearance activities and to ensure construction activities will be done properly on the existing road foundation. Workers should be informed and prohibited from cutting trees for firewood and for use in the subproject activities before construction starts.

13. (ii) Careless construction and poor materials control can cause blockage to Ba stream. Runoff water during its rain could bring waste and soil into the nearby water bodies like Ba stream or Dak N'Drung and Dak Buk So lakes that could lead to siltation and reduce the water quality. Ba stream could be affected by the construction activities, as a bridge will be constructed to replace the current bridge. The proposed mitigation measures are store lubricants, oils and other construction material stockpiles on impervious ground with covers or roof and at least 100m away from water bodies; install sediment ditches, silt fences at the area near Ba stream and Dak N'Drung, Dak Buk So Lake with high potential of runoff, erosion and sedimentation.

14. (iii) The operation of construction machines and material transportation could damage local facilities such as low-voltage electricity lines, communication cables, existing drainage system and other roads in the subproject area. They will also impact on local traffic; increase the risk of work accident and traffic accident especially in the sensitive area such as commune administration centres, medical centres, schools, kindergartens. Dust, noise and vibration from construction machines such as concrete mixing plants or trucks could disturb local people, damage their houses, increase risk of respiratory and skin diseases. To minimize the impact, the contractor will cooperate with relevant authorities to set up detail plan for machines and workers mobilization as well as material transportation plan; inform in advance that plan to local authorities and local people; in accordance to that plan, PMU, CSC and relevant authorities will monitor the compliance of the contractor in applying designated mitigation measures. If any buildings, structures in the subproject area are damaged by construction activities, the contractor should compensate them adequately at their own expense.

15. In the operation phase, the potential negative impact has been identified as relating to increase chance of access to Border Protection Forest; dust and noise arising from increasing of traffic density and higher risk of traffic accidents as a result of better driving conditions. To minimize the negative impacts, Dak Nong Department of Transportation (DOT), the responsible agency for subproject management in the operation phase will cooperate with Border Protection Forest Management Board, Tuy Duc DPC and Dak Buk So CPC in forest management, will periodically maintain the road, and will install speed limit, warning signs or road humps (if applicable) at sensitive areas along the road such as schools, kindergartens, medical centres etc.

16. The PPTA Consultant has also identified key stakeholders and conducted public consultations from provincial to commune level with a focus on the affected people views. The main concerns are (i) drainage issue along the subproject road, domestic and construction waste accumulate along the roadside and high road elevation in compares with house along roadside. (ii) Deputy Chairman of Dak N'Drung CPC and some people in Dak N'Drung commune have expressed their concerns on the drainage issues as current road elevation is higher than local people's houses. When it rains, runoff water usually flows from the road to

their house, create temporary floods, and make difficulties for their daily activities. All of these concerns are addressed in the EMP (See Table 11 – 12 for more details).

17. An EMP has been prepared under this IEE to detail responsibilities of relevant stakeholders on mitigation measures to be implemented during construction and operation phases of the subproject.

C. Institutional arrangement

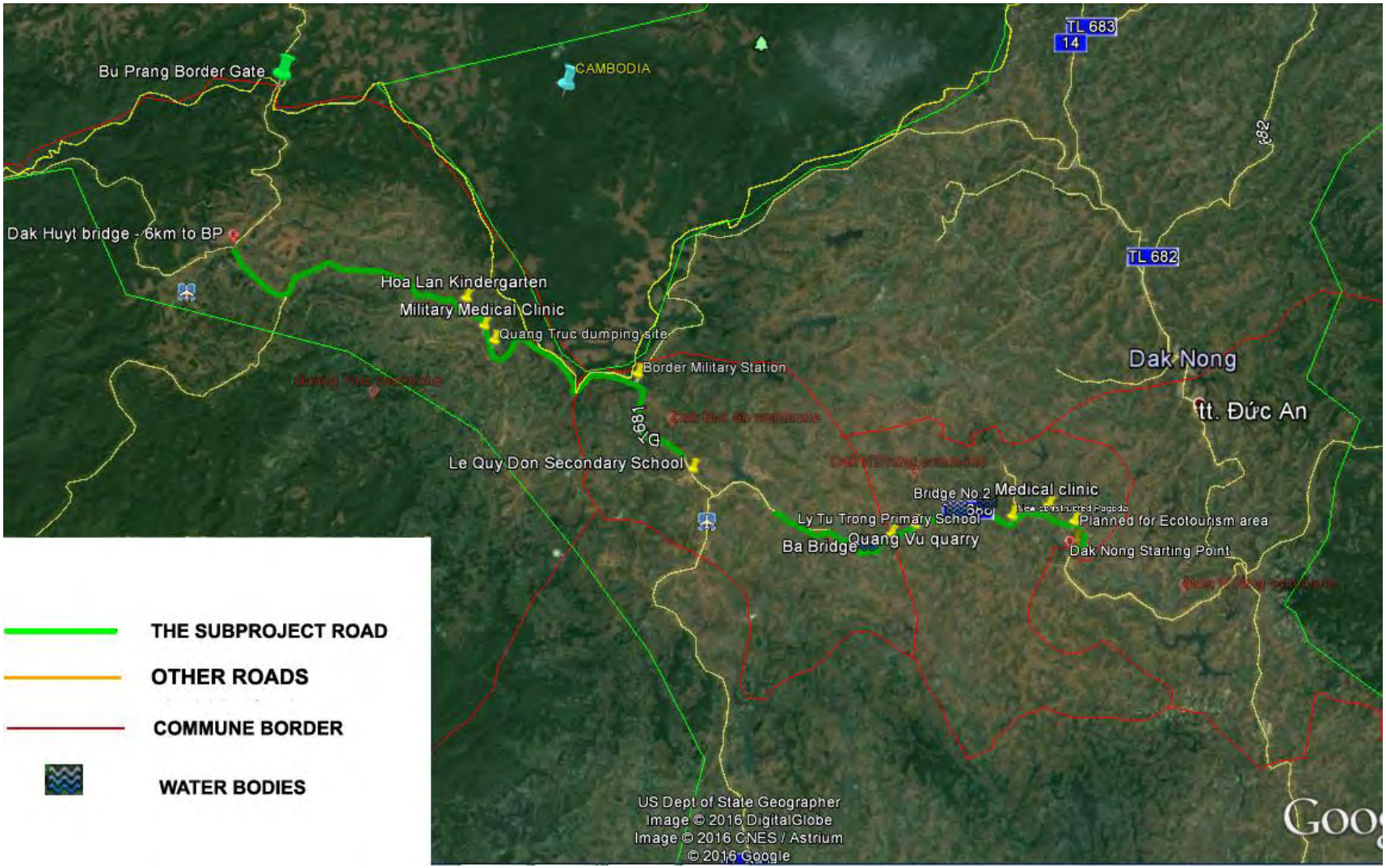
18. Dak Nong Provincial People Committee (CPC) has established a Project Preparation Unit (PPU) under Dak Nong Department of Planning and Investment (DPI) to support the preparation of the subproject in the PPTA period. One staff of the DPI has been assigned as Environmental Safeguards Officer (ESO) of PPU. Ideally, the ESO will become ESO of Dak Nong PMU in the construction phase. ESP will organize a formal training course and on-the-job training for relevant PMU staff, CSC, communities, contractors and support for establishment and operation of the subproject environment management system in construction phase. ESP will also support PMU's capacity building by reviewing and evaluating the capacity for environmental protection of the PMU and Dak Nong Department of Transportation (DOT) – subproject management organization in the operation phase.

19. To fully reflect the environmental protection cost of the civil works and engage the environmental responsibilities of civil contractors, environmental requirements will be included in biding documents and civil work contracts. Any omission of environmental management costs will create high risks for implementing mitigation measures during the construction phase due to lack of resources and capacity, thus the environmental protection cost and responsibilities need to be involved from the beginning. Bid document will also specify that contractors shall engage capable and trained staff to take responsibility for the environmental management and safety issues at the working level and to monitor the effectiveness and review mitigation measures as the subproject proceeds.

D. Conclusion

20. The IEE concludes that the feasibility study of the subproject combined with available information is sufficient to identify the scope of potential environmental impacts and formulate mitigation measures for the subproject. Providing that significant changes to the subproject description do not occur at the detailed design phase, and that new sensitive environmental, or cultural resources are not determined, further detailed environmental impact assessment (EIA) is not required. The ESP, before finalization of the detail design, will update the EMP.

Figure 1 – General Map of Dak Nong and Subproject Area



II. BACKGROUND

21. The Support to Border Areas Development Project (Project) will help the five participating provinces (the Provinces) of Kon Tum, Binh Phuoc, Dak Lak, Dak Nong, and Gia Lai to better realize their growth potential and become more closely integrated into subregional frameworks including the Greater Mekong Subregion (GMS), the Cambodia – Lao PDR – Viet Nam Development Triangle Area (CLV-DTA), and the ASEAN Economic Community. It will improve the project area's connectivity by developing critical transport infrastructure, leading to increased movement of people, agricultural produce, and other goods. Moreover, it will facilitate logistics and trade, and help develop the Provinces' capacity for investment planning from a regional integration perspective. As the Provinces are at the joint borders of the CLV-DTA, the Project will enable them to serve as an engine and gateway to wider markets for this subregional initiative. The Project will be implemented in 5 provinces in the CLV-DTA of Vietnam including Kon Tum, Binh Phuoc, Dak Lak, Dak Nong and Gia Lai.

22. The proposed Project will include 3 outputs and activities:

- ***Output 1: Road infrastructure in five VDTA provinces rehabilitated.*** The Project will improve transport infrastructure of the DTA area, including selected sections of provincial roads and roads that are important for filling the missing links for accessing national and international wider markets, tourism, healthcare facilities, and heritage and conservation areas. The project will provide the critical road infrastructure in service of selected value chains to ensure the smooth flow of products along the value chain to the market.
- ***Output 2: VDTA plans and facilities for transport and trade facilitation (TTF) with a focus on inclusive growth developed.*** This output will stimulate inclusive economic activity by (i) improving TTF within the VDTA leading to easier movement of goods and people across the borders, which in turn will stimulate the formation of strong value chains to support trade and tourism; and (ii) expanding the tourism industry which will involve the local population, with a special emphasis on the inclusion of ethnic minorities. Moreover, tourism also leads to demand for high quality local agricultural produce and rural products such as traditional handicrafts.
- ***Output 3: Institutional capacity for VDTA investment planning, project design and implementation, and resource management strengthened***. This output will consolidate the long-term development program for the VDTA. The indicators for achieving this output are: (i) VDTA master plan updated and implementation action plan prepared with ecosystem services, gender and EM considerations; and (ii) Officials nominated by the PPC trained to implement the updated master and action plans.

23. In order to reached these above outputs as well as avoid and minimize any possible negative impact of the Project implementation, the Project Preparatory Technical Assistant Consultants (the PPTA) has been recruited. The main tasks of the PPTA are (i) detail a project design that is economically, financially and technically feasible; (ii) provide advance drafts of the complete set of documentation necessary for the ADB to proceed with internal processing of the ensuing Project; (iii) prepare feasibility studies and comprehensive criteria for road sections, logistics and institutional arrangements to be improved under the Project; (iv) define the scope, cost, procedures for identifying subprojects, financing plan, implementation arrangements, procurement strategy, technology issues, capacity development needs and post-project operation and maintenance arrangements for the project (v) establish measures that will ensure adherence to the safeguard policies of both the ADB and the Government; (vi) provide guidance in actions to maximize the socioeconomic benefits such as impacts on poverty, gender and fair employment practices; (vii) provide project start up support to the government.

24. The Government of Vietnam has assigned Ministry of Planning and Investment (MPI) as the line agency for the preparation phase of the Project. Department of Planning and Investment (DPI) of the five provinces are responsible for the Project preparation phase in their provinces. DPIs have prepared a long list of the proposed roads in their provinces based on the Provincial Transportation Master Plans and the demand for road upgrade at the moment. The long list subprojects have been detailed feasibility and preliminary designs have been undertaken by the PPTA. A multi-criteria system with weight has been developed to screen and short-listed these subproject roads. The parameters have been listed in the Paragraph 4 above.

25. The Project is initially categorized as 'B' for environmental safeguards, and IEE is required to meet requirement of ADB SPS 2009. The objectives and scope of this IEE are to (i) assess the existing environmental conditions along and in the vicinity of the subproject road; (ii) identify potential environmental impacts from the proposed road improvement works; (iii) evaluate and determine the significance of the impacts; (iv) develop an environmental management plan (EMP) detailing mitigation measures, monitoring activities, reporting requirements, institutional responsibilities and cost estimates to address adverse environmental impacts; and (v) carryout public consultations to document any issues/ concerns that stakeholders may have on the subproject and to ensure that such concerns are addressed in the subproject design and mitigation measures.

III. POLICY AND LEGAL FRAMEWORK

26. The subproject shall comply with requirements of ADB SPS 2009 and the GOV's Guidelines on Implementation of Law on Environmental Protection 2014. Decree No. 18/2015/ND-CP has detailed information on environmental protection assessment, environmental impact assessment and environmental protection plans. However certain activities commonly associated with infrastructure subproject such as quarry operations, extraction of gravel, etc., will also require permission from the relevant provincial level authorities. Depend on the scale; some constructions on the proposed road such as bridge or spillway shall require separated environmental impact assessment.

A. ASIAN DEVELOPMENT BANK SPS requirement

27. ADB safeguard policy statement (SPS) 2009 imposes safeguard requirements for all its funded projects. The SPS 2009 clarifies reason, scope and contents of the environmental assessment. Safeguard policy statement emphasizes on environmental and social sustainability in progress of economic growth and poverty reduction in Asia and the Pacific, therefore the objectives of SPS focus on:

- Avoid adverse impacts of projects on the environment and affected people, where possible;
- Minimize/mitigate and/or compensate for adverse impacts on environment and affected people when avoidance is not possible; and
- Help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks

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

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

29. The Project is initially categorized as 'B' for environmental safeguards. Environmental criteria for the long list multi-criteria system has been developed and contributed for the evaluation and short-listed subproject roads. Detail of the environmental criteria could be found in Appendix 02. The subproject has been classified as category A on environmental safeguards will not be short-listed as it will rescale the whole Project to category A on environment

B. Legal and Administrative Framework for Environmental Protection in Vietnam

30. The subproject has to comply with the environmental legal framework of Vietnam which is outlined in this section. The main components of the framework, if not, the more applicable ones are shown here.

1. Laws:

- Law No. 55/2014/QH13 of 23 June 2014 by the National Assembly on environment protection
- Law No. 17/2012/QH13 of 21 June 2012 by the National Assembly on water resources
- Law No. 20/2008/QH12 of 13 November 2008 by the National Assembly on biodiversity
- Law No. 68/2006/QH11 of 29 June 2006 by the National Assembly on standards and technical regulations
- Law No. 29/2004/QH11 of 03 December 2004 by the National Assembly on forest protection and development

2. Others

- Decree No. 18/2015/ND-CP dated February 14, 2015 on environmental protection planning, strategic environmental assessment, environmental impact assessment and environmental protection plans.
- Circular No. 27/2015/TT-BTNMT dated May 29, 2015 on strategic environmental assessment, environmental impact assessment and environmental protection plans.
- Circular No. 36/2015/TT-BTNMT of 30 June 2015 by the Ministry of Natural Resources and Environment stipulating hazardous waste management
- Decision 07/2012/QD-TTg dated February 08, 2012 of the Prime Minister promulgating some regulations on intensified enforcement of forest protection
- Decision 186/2006/QD-TTg dated August 14, 2006 of the Prime Minister promulgating the Regulation on forest management
- Decree 09/2006/ND-CP dated 16th January, 2006 of the Government on forest fire prevention and control
- National Technical Regulations on air and noise quality
    - QCVN 05: 2013/BTNMT on ambient air quality
    - QCVN 26: 2010/BTNMT on noise
    - QCVN 27: 2010/BTNMT on vibration
- National Technical Regulations on water quality
    - QCVN 01: 2009/BYT on drinking water quality

- QCVN 02: 2009/BYT on domestic water quality
- QCVN 08: 2008/BTNMT on surface water quality
- QCVN 09: 2008/BTNMT on underground water quality
- QCVN 14: 2008/BTNMT on domestic wastewater

3. Other legislations applicable to the Project are the following:

- Law No. 27/2001/QH10 of 29 June 2001 by the National Assembly on fire prevention and fighting
- Law No. 40/2013/QH13 of 22 November 2013 by the National Assembly on amending and adding a number of articles of the Law No. 27/2001/QH10 of 29 June 2001 on fire prevention and fighting
- Decision No. 3733/2002/QD-BYT of 10 October 2002 by the Ministry of Health promulgating 21 labor hygiene standards, 5 principles and 7 labor hygiene measurements
- Law No. 50/2014/QH13 of 18 June 2014 by the National Assembly on construction
- Circular No. 22/2010/TT-BXD of 03 December 2010 by the Ministry of Construction on labor safety in work construction
- Law No. 10/2012/QH13 of 18 June 2012 by the National Assembly on labor code

IV. DESCRIPTION OF THE SUBPROJECT

A. The need for subproject

31. Dak Nong is located in the South West of Central Highlands area of Vietnam. It has 130km border line with Muldukirri province of Cambodia. Dak Nong located in a strategy position for socio-economical development and plays a connection role between Central Highlands and Southern Economical Zones as well as Central Coastal provinces and North East provinces of Cambodia. Dak Nong has potential and advantages for agricultural and ecotourism development.

32. There are two main legal documents related to the development of the subproject. The first one is Socio-economical Development Plan of Dak Nong has been approved by the Prime Minister at the Decision No. 1942/QD-TTg dated October 22, 2013 and the second is Transportation Development Plan 2020, up to 2030 approved by the Provincial People Committee at the Decision No. 255/QD-UBND dated February 19, 2013. These documents have stated that in 2016-2020 periods, the Province will focus on upgrade and expand road system to Bu Prang Border Gate in order to enhance cultural and economical exchange as well as bring more benefit on trade and economy for the people of two countries in the border areas.

33. The subproject road has been invested before the establishment of Dak Nong province. Currently, the road surface width is only 3-4m and has been damaged. It made many difficulties for the movement of people as well as goods transportation. Thus, the road need to be upgraded and expanded to improve transportation condition between two countries, connects with National Road No. 76 of Cambodia through Bu Prang Border Gate, support goods exchange between Dak Nong and Modukirri provinces. The upgraded subproject road will contribute to the general socio-economical development plan of Dak Nong until 2020 as approved by the Prime Minister and support to improve living standards of ethnic minority people in the subproject area. On the other hand, the completion of the subproject will also support the development of ecotourism in the province. There is a plan for an ecotourism in Dak N'Drung lake area near the starting point of the subproject.

B. Location and scope

34. The subproject route has the total length of 37 km with the starting point at Km17+00 of Provincial Road No.686 in Nam N'jang commune and end point at Km157+761 of National Road No.14C in Quang Truc commune. As the subproject route will not upgrade roads in Tuy Duc district center, it will divide into two sections:

- Section 1 – 14km from Km17+00 to Km3+00 of Provincial Road No.686. It located mainly in DakN'Drung commune; the section length in Nam N'jang commune is only 100m, will be designed in mountainous Grade IV (width: 7.5m, carriage way: 5.5m).
- Section 2 – about 23 km, start from Tuy Duc district center and ends at Dak Huyt Bridge, 6 km to Bu Prang Border Gate. The 6km from Dak Huyt Bridge to Bu Prang Border Gate has been constructed by Provincial budget by two lane of asphalt concrete follow Mountainous Grade III (width: 9m; carriage way: 6m)

35. The subproject goes through fourth communes of Dak Song district and Tuy Duc district namely Nam N'Jang, Dak N'Drung, Dak Buk So and Quang Truc with total length of 37.3 km.

These are poor communes of two districts with many ethnic minority groups living there and specializing in the growing of coffee, rubber, pepper, cashew and cassava in large area. The road after improvement will connect to the border with connectivity of road network in these districts and further contribute to achieve the objectives of project. The beneficiaries of the subproject will facilitate for transport, goods transport, commercial connectivity, promote socio--economic development for the areas along the road and create conditions for formation of Bu Prang border gate economic zone, as well as ensuring the security and defence of Dak Nong province and the Central Highlands.

36. The three bridges are all located in Section 1 of the subproject road with the information is listed in Table 1 above.

37. The stone source could be used for construction activities in the subproject area is come from a quarry of Quang Vu Trade and Service Company, located next to the Section 1 of the subproject (200m from the road) in Dak Tien hamlet, Dak N'Drung commune. The stone capacity of the quarry is about 1500000 m^3 and the exploitation time is 30 years and could be serving for the construction of the subproject, as the estimated stone volume for the subproject construction is about 11000 m^3. The estimated volume of excavated soil is 351904.61 m^3, of which 134450.09 m^3 is organic, unstable soil that could not be reused. Estimated volume of filling soil is 312531.46 m^3. About 120000 m excavated soil could be reused as filling soil for road embankment. There is no sand mine on the subproject area. The sand and filling soil sources are located near Serepok Bridge (Bridge No.14) – about 100km from the subproject area. Sand and filling soil could be purchased from the 3 main construction material shops along the subproject road in Dak N'Drung commune, Dak Song district and Quang Truc commune, Tuy Duc district. The detail information could be found in the Detail Design Report.

38. There are two temporary dumping sites existed in the two districts. The District Co-operative is responsible for waste collection in the district area. In the subproject area, there is a temporary dumping site located near the market in Quang Truc commune center, Tuy Duc district. The Contractor should discuss with CPCs and relevant authorities to find out suitable location for waste soil as well as domestic waste from worker before the construction start.

39. Land acquisition and resettlement: As the subproject will upgrade the road surface base on the existing foundation, there is no house will be relocated and no household will be major affected. The construction of the subproject will affect agricultural area, fruit trees and pepper, fence or gate of the local people; mainly concentrate in Dak N'Drung commune, Dak Song district. There are 32 household will be affected with 24 households in Dak Song district and the other 8 households in Tuy Duc district. The largest permanent affected land area of one household is 550 m^2 over 1648 m^2 in total of Dak Song district while only 182 m^2 in total of Tuy Duc district. The detail information could be find out in the land acquisition and resettlement report.

40. In the plan, the subproject will be constructed in 24 months with the estimated budget in Table 2 below

Table 2 – Estimated budget of the subproject

No	ITEMS COST	METHOLD	SUB COST PA1	USD	Notes

	Investment Cost		**514 479 977 465**	**23 070 851**	
I	**Construction cost**		**358 564 006 000**	**16 079 103**	**22 300**
	Route		**352 923 652 963**	**15 826 173**	**536 627 200 000**
1	Embankment		54 703 782 966	2 453 084	
2	pavement		233 740 305 306	10 481 628	
3	Drainage; culverts		7 433 427 430	333 338	
4	Long drainage		37 192 320 651	1 667 817	
5	Embankment protection works		6 804 358 717	305 128	
6	Traffic safety		12 582 005 934	564 216	
7	Temporary works		467 451 958	20 962	
	Bridge		**5 640 353 466**	252 931	
	Bridge Km6+798,51		5 640 353 466	252 931	
II	**SITE CLEARANCE COST**	Separated	**248 243 465**	**11 132**	
III	**MANAGEMENT COST**	1.217% *CPXDTT	**3 965 580 000**	**177 829**	
IV	**INVESTMENT ADVICE COST**		**18 474 970 000**	**828 474**	
1	Report investment cost (*1,2 design improvement)	0.176% *CPXD*1,2	755 242 502	33 867	Decided 957/QD-BXD dated 29/9/2009
2	Survey cost (calculation temporary 100mil vnd /km)	Temporary	3 730 000 000	167 265	
3	Verification cost	0.024%*CPXD	87 422 207	3 920	Decided 957/QD-BXD dated 29/9/2009
4	Shop drawing cost (*1,2 design improvement)	0.857%* CPXD*1,2	3 687 542 635	165 361	Decided 957/QD-BXD dated 29/9/2009
5	Survey cost for shop drawing (Calculation temporary 120mil vnd /km)	Temporary	4 476 000 000	200 717	
6	Establish bidding document; Evaluation bidding document cost	0.2%*GGT	200 000 000	8 969	Decree 63/2014/ND-CP dated 26/6/2014
7	Supervision cost	0.95%*CPXD	3 407 089 904	152 784	Decided 957/QD-BXD dated 29/9/2009
8	Verification shop drawing cost	0.05%*CPXD	174 052 053	7 805	Decided 957/QD-BXD dated 29/9/2009
9	Verification estimates cost	0.05%*CPXD	164 800 710	7 390	Decided 957/QD-BXD dated 29/9/2009
10	Others cost for consultant (temporary)	0.50%*CPXD	1 792 820 030	80 396	
V	**OTHERS**		**30 380 831 000**	**1 362 369**	

1	Clearance mine cost (calculation temporary: 5000đ/m^2)		**3 276 753 800**	**146 940**	
2	General cost		**20 521 020 330**	**920 225**	
2.1	Temporary housing cost	2.0%*CPXD	7 171 280 120	321 582	
2.2	Others undefined cost (2%)	2.0%*CPXD	7 171 280 120	321 582	
2.3	Mobilization and remobilization cost (calculation temporary)	0.5%*CPXD	1 792 820 030	80 396	
2.4	Ensuring transport cost (Calculation temporary)	1.0%*CPXD	3 585 640 060	160 791	
2.5	Setup Asphalt plant station	Temporary	800 000 000	35 874	
3	Insurance works cost (Temporary)				Decided 33/2004/QĐ-BTC dated 12/4/2004
	Insurance for Route cost (Temporary)	0.42%*CPXD	1 482 279 342	66 470	
	Insurance for Bridge cost (Temporary)	0.60%*CPXD	33 842 121	1 518	
4	Expertise fees (*TMDT)	0.007%*TMDT	38 101 536	1 709	Circulars 176/2011/TT-BTC dated 06/12/2011
5	Verification fees for design document	0.01%*CPXD	37 943 658	1 702	Circulars 75/2014/TT-BTC dated 12/6/2014
6	Verification fees for estimate document	0.01%*CPXD	35 987 854	1 614	Circulars 75/2014/TT-BTC dated 12/6/2014
7	Expertise fees for Bidding document and result bidding	0.1%*GGT	200 000 000	8 969	Decree 63/2014/NĐ-CP dated 26/6/2014
8	Approval settlement report fees	0.22%*TMĐT	1 144 246 500	51 312	Circulars 09/2016/TT-BTC dated 18/01/2016
9	Audit cost (*TMDT)	0.322%* TMDT*1,1vat	1 817 836 020	81 517	Circulars 09/2016/TT-BTC dated 18/01/2016
10	Others (Temporary)	0.5%	1 792 820 030	80 396	
VI	**CONTIGENCY**		**102 846 347 000**	**4 611 944**	-
	Variation works cost	10%	41 138 538 700	1 844 778	
	Inflation cost	15%	61 707 808 050	2 767 166	Indicator construction

V. DESCRIPTION OF THE ENVIRONMENT

A. Physical environment

1. Topography, Geology, and Soil

41. Dak Nong is located in the South West of Central Highlands, at the end of Truong Son range with the geographical coordination from $11^0$45' to $12^0$50' latitude and $107^0$13' to $108^0$10' longtitude. Dak Nong borders with Dak Lak province in the North and North East, Lam Dong province in the East and South East, Binh Phuoc province in the South and South West and Cambodia in the West. Dak Nong is one of the provinces in the CLV-DTA.

42. Dak Nong located in a highland area with the average elevation of 500m above Mean Sea Level. The topography of the province is quite flat with grasslands stretch to the East. The topography is lower to the West, toward Cambodia and the low lands are located in the South of the Province with different kind of lakes.

43. The hilly topography is typical for area of Dak Glong, Gia Nghia town, Dak Mil, Dak Song, Dak Rlap and Tuy Duc. The average height above Mean Sea Level is 800m with the slope angle over 30%, suitable for the development of perennial plants, industrial trees and cattle breeding.

44. The result of geological investigation has showed that the geology along the subproject route is quite homogenous with clayey basalt mixed with brownish red hard gravel. The whole route has a stable foundation. At some sections, the wall slope on both sides reached 2-7m with Grade IV Soil top roof. The top roof has been covered with vegetation so they are quite stable except section from Km34+700 – Km34+800 with a steep slope wall up to 7m heights, without vegetation cover and some evidences of landslide. However, it happened in separated positions and the volume is not large enough to block the road and affect the transportation activities.

2. Hydrology and Climate

45. Dak Nong is typical with tropical moisture highland climate and it also affected by hot and dry South West wind. The rainy season starts in April to the end of October with 90% precipitation of the year and the dry season start from November to April next year. The average temperature rank from 23 – 23.7^0C with the temperature peak in March to May and the lowest point in December.

46. The average precipitation is 1800-2600 mm. The highest precipitation is 3000 mm and concentrate in August and September. The driest months are January and February. The average humidity is 81-84%. In the rainy season, the main wind direction is South West and the main wind direction in the dry season is North East. Dak Nong rarely be affected by storm and it is suitable for the development of perennial tropical trees.

47. Dak Nong has a quite dense river and stream network distribute all over the province. National Road No.14 work as a watershed line, devide the province into two parts. Water accumulate to make flow in a short time with steep slope will flood residential area in the downstream. There are 3 main river systems including Serepok, Krong No and upstream of Dong Nai Rivers. In the subproject area, the main flow is Dak N'Drung tributary of Dong Nai Rivers. Dak N'Drung stream originated from the elevation of 800 m, including many streams and

streamlets in the area of Dak Mil, Dak Song, Tuy Duc, Dak R'Lap, Gia Nghia. The total water catchment is 912 km^2 and the average slope is 15-20%.

48. Information related to natural disaster in the subproject area could be found in Table 3 below

Table 3 - Type of natural disaster in the recent year

Year of occurrence	Type of disaster	Affected area		Number of affected people
		Name of district	Name of commune	(HH)
2015	Drought	Tuy Duc	Dak Buk So	01
2015	Drought	Dak Song	Dak N'Dung; Dak Mol; Dak Hoa	Several communes
2015	Drought	Dak Song	Nam Binh	02

3. Surface and ground water

49. Environment Monitoring Centre of Dak Nong has implemented the water-monitoring program for 2011-2015. In 2015, the monitoring program has been implemented in April with the samples from large water bodies of the province.

Surface water resources

50. The monitoring parameters are pH, COD, BOD5, DO, NH4+, NO3-, phosphate, chlorine, iron, copper, zinc, lead, cyanide, arsenic coliform, oil. The closest monitoring points are Dak Nong Bridge (Gia Nghia town) and Ho Tay (Dak Mil town) – 21 km and 26 km to the subproject area respectively. The monitoring has showed that surface water has been polluted by organic substance (BOD, COD); The average COD in Dak Nong bridge is 35 mg/l, 2.2 times over the allowed level (15 mg/l) and the average COD in Ho Tay is 1.5 times over the allowed level (QCVN 08:2008/BTNMT).

Underground water resources

51. Underground water is distributed in the entire province with large deposit from 40-90 m depth. Underground water deposit of the province is decreasing rapidly in the recent year as it has been used for irrigation purpose, mainly coffee in the dry season. The result from 37 sampling points has showed that, in general, the quality of underground water is still under the allowed level of A2 column, QCVN 09:2008/BTNMT. Only COD parameter at some points are higher than allowed level, especially in Hamlet No.2, Tuy Duc district (located in the middle of two subproject road sections) is 1 time higher than the allowed level.

4. Air quality and noise

52. According to Status of Environment report (SOE) of Dak Nong province 2011 - 2015, the level of CO, NO2, SO2 and TSP dust at subproject area is in the allowable limit of QCVN 05-2013/BTNMT. At only some monitoring points closed to the temporary dumping sites of the district or some processing factory, some parameters are higher than the allowed level. In the subproject area, the temporary dumping site in Quang Tam commune, Tuy Duc district has been listed as the environmental pollution point under the Report on 2014 Environmental Protection Program of Dak Nong DONRE.

B. Biological environment

53. The main ecosystem along the subproject route is coffe cultivation and rubber plantation area. Pepper and coffee cultivation is dominated along the Section 1 of the subproject road while rubber; coffee and pine plantation area is mainly located along Section 2. There is about 2 km closed to the border line with Cambodia is protection forest.

1. Agriculture

54. The main cultivation area of Tuy Duc and Dak Song are coffee and rubber. Coffee is the main agricultural production in the subproject area and contributes the large part for the economical development of the province. However, the natural disaster, especially drought has impact seriously on the development of the coffee growth. Groundwater has been used rapidly for irrigation purpose, mainly for coffee as it has high water demand. At some area, ground water level has going down deeper than 90m. Lack of water will be the main challenge for the development of coffee growth. Detail information related to agricultural sectors in 2014-2015 of the district is listed in Table 4 below.

Table 4 - Main agricultural production type of the district (2014-2015)

Production type	Unit	Tuy Duc district	Dak Buk So com.	Quang Truc com.	Dak Song district	Nam N'Jang com.	Dak N'Drung com.
1. Main crops							
a. Coffee							
Area	Ha	18,500	2,666	119.9	25,533		2,631
Productivity	Ton/ha		0.18	10.52	2.605		
Output	Ton/year	36,450	9,102	225.9	60,994	6,921	
b. Rubber							
Area	ha	8,010	824	100	1,469		15
Productivity	Ton/ha		0.12		1.65		
Output	Ton/year	1,920	240		880		
c. Pepper							
Area	ha	1,340	488	225.9	6,802		1,282
Productivity	Ton/ha		0.27	9.2	2.7		
Output	Ton/year	990	634.5	177.4	9,755	4,077	
d. Rice							
Area	ha	440	11.5	115	489		45

Productivity	Ton/ha		0.42	2.63	5.5		
Output	Ton/year	1,700	48.3	303.3	2,666		
e. Cassava							
Area	ha			517	810	191	
Productivity	Ton/ha			9.44	18.5		
Output	Ton/year			82.9	15.024		
f. Corn							
Area	ha			74.5	4,565	310	670
Productivity	Ton/ha			4.26	7.1		
Output	Ton/year			318	32.579		
f. Main livestock							
Buffalo	head	931	82	183	155	15	71
Cow	head	1862	165	1,037	2,382	122	287
Pigs	head	5,720	1,675	1,036	33,822	3,885	1,237
Poultry	head	128,590	35,000	6,817	295,160	32,960	29,389

2. Forestry

55. The total production forest of Tuy Duc district is 10,066 ha in 2014. The forest area is mainly located in Bu Gia Map National Park – South West of the district. The distance from the buffer zone of the National Park to the subproject route is about 5 km. A bunch of protection forest located 2 km along section 2 of the subproject – closed to the borderline with Cambodia. This is a separated forest with total natural area of 2 km^2, part of zone 1457 and located in Dak Buk So commune, Tuy Duc district. In accordance to Resolution No.31/NQ-HDND dated December 10, 2015 of Dak Nong People Council, this area has been planned to change to transportation land for road expand to Bu Prang border gate.

3. Fauna and Flora

56. Dak Nong has a diversified fauna and flora system with 1489 plant species and 273 animal species. The dominant families of plant species are Leguminosea; Magnoliaceae; Lauraceae; Fagaceae; Euphorbiaceae; Moraceae; Lythraceae; Dipterocarpaceae and Pinophyta. There is not so many specific plant species; only Da Lat Pinus (Pinus dalatensis) is specific for Central Area.

57. There are several specific animal species exist in Dak Nong province including black-leg langur (Pygathrix nigripes); golden cheek ribbon (Nomascus gabriellae); Truong Son Deer (Muntiacus truongsonensis)... Wild animal hunting and deforestation are still happen in the province. In two years of 2014 and 2015, Dak Nong Forest Protection Police has recorded 24 cases of forest protection violation. The forest coverage is still decreasing by 40000 ha per year and pose a great thread to the biodiversity conservation of the province

C. Socio-economical conditional and infrastructure

1. Population and Ethnic

58. The total population of Tuy Duc district is 52,731 people and Dak Song district is 75,907 people in accordance to *Statistics of* population *and ethnic composition of Tuy Duc and Dak Song District People's Committee in 2015.* Ethnic minorities make up nearly 50% of the total population of Tuy Duc district and only 18% of the Dak Song population is ethnic minorities. Detail information could be seen in Table 5.

Table 5 – Ethnic groups of Tuy Duc and Dak Song districts

No		Total of population	Peoples clarification (number of people)							
			Kinh	M'Nong	Thai	Muong	Tay	Nùng	Dao	Others
		Total	Total	Total	Total	Total	Total	Total	Total	Total
1	**Tuy Duc District**	**52,731**	**26,844**	**12,045**	**73**	**302**	**1,213**	**669**	**231**	**11,354**
	Percentage (%)	100	50.9	22.84	0.14	0.57	2.3	1.27	0.44	21.53
2	Dak Buk So commune	10,891	9,084	837	21	48	323	182	128	268
	Percentage (%)	100	83.4	7.68	0.19	0.44	2.97	1.67	1.18	2.46
3	Quang Truc commune	7,614	3,940	2,649	51	196	346	185	44	203
	Percentage (%)	100	51.8	34.8	0.67	2.57	4.54	2.43	0.58	2.67
4	**Dak Song District**	**75,907**	**62,427**	**7,164**	**335**	**208**	**1,412**	**799**	**1,602**	**1,960**
	Percentage (%)	100	82.24	9.44	0.46	0.27	1.86	1.05	2.11	2.58
5	Nam N'Jang commune	10,525	7,796	0	52	23	199	232	0	2,223
	Percentage (%)	100	74.07	0	0.49	0.21	1.89	2.2	0	21.12
6	Dak N'Drung commune	10,990	6,876	2,122	15	45	457	128	86	1,261
	Percentage (%)	100	62.56	19.3	0.13	0.4	4.15	1.16	0.78	11.48

2. Living Standards and housing

59. The numbers of poor households in Tuy Duc district is 6611 and in Dak Song district is 2806, make up more than 50% of the district total household. There are also 1154 households in Tuy Duc and 1391 households in Dak Song are close to the poverty line. The main reasons for this high number of poor household are mainly lack of budget for investment and lack of cultivation land. Detail information could be found in Table 6 below.

Table 6 – Number of poor households in the subproject area (2014-2015)

	Household		Poor Household					
	Total of HHs	Total of EM HHs	Lack of production facilities	Lack of landing production	Lack of production fund	Lack of production knowlege	Many childre n	Other s
Tuy Duc District	**12,871**	**4,823**	**847**	**1,590**	**5,511**	**574**	**412**	**1,019**
Dak Buk So Commune	2,900	2,479	347	248	751	306	222	770
Quang Truc Commune	1,962	922	277	111	542	83	61	138
Dak Song District	**2,806**	**941**	**412**	**1,291**	**2,139**	**90**	**221**	**723**
Nam N'Jang Commune	148	22	27	40	141	15	44	99
Dak N'Drung Commune	492	215	0	317	492	0	2	8

3. Employment and income

60. From the investigation result of the Consultants, local people in the subproject are mainly working in agriculture.

Table 7 – Production value of the district and three communes (2014-2015)

Types of Land	Unit	Tuy Duc District	Dak Buk So Commune	Quang Truc Commune	Dak Song District	Nam N'Jang Commune	Dak N'Drung commune
Natural land used areas	*ha*	111,924.94	8,348.94	55,908.96	80,646.24	16,478.67	6,757.38
Agriculture Land	*ha*	104,907.77	7,411.16	52,737.94	75,418.4	15,351.69	6,157.34
I. Agricultural production land	*ha*	57,167.63	7,079.98	12,512.32	52,608.34	7,062.22	6,083.99
1. Land for planting anual crops	*ha*	16,967.41	1,113.67	6,395.69	12,312.89	1,861.53	1,157.53
- Rice	*ha*	585.71	38.03	46.76	349.06	1.49	48.14
- Other	*ha*	16,381.70	1,075.64	6,348.93	11,963.82	1,860.04	1,109.19
2. Land for perennial trees (timber, industrial trees)	*ha*	40,200.22	5,966.31	6,116.63	40,295.47	5,200.69	4,926.66
- Rubber	*ha*	8010	824	100	1469	0	15

- Other	*ha*	32,190.22	5,142.31	6,016.63	38,826.47	5,200.69	4,911.66
1. Land for forest	*ha*	47,565.39	202.43	40,315.42	22,238.81	8,261.81	23.64
2. Land for aquatic	*ha*	174.75	128.75	10.2	570.57	27.66	49.7
3. Land for other agriculture	*ha*	0	0	0	0.65	0	0
II. Non-agriculture land	*ha*	4,714.61	918.67	900.14	4,938.76	974.63	599.34
1. Land for housing (rural and urban)	*ha*	335.60	86.22	31.67	825.57	213.62	74.42
2. Land for trading and services	*ha*						
3. Specialised land	*ha*	1,660.48	475.93	395.25	2,232.52	357.92	234.02
III. Non-usedland	*ha*	2,302.56	19.11	2,170.88	289.08	152.35	0.71

4. Education and Public Health

61. Each commune has a clinic to serve local people in the commune with some simple treatment. There are few HIV infected cases happen in the subproject area in accordance to statistic number of 2015. The information related to medical system of the district is showed in Table 8 below.

Table 8 – Medical care in the subproject area 2015

	Unit	**Tuy Duc District**	Dak Buk So Com.	Quang Truc Com.	**Dak Song District**	Nam N'Jang Com.	Dak N'Drung Com.
1. Hospital/ heathcare center	piece	**1**	1	1	**1/9**	1	1
2. Staff						8	7
- Doctor	persons	**3**	1		**27**	1	1
- Nurse, pharmacists	persons		2			2	5
- Elderlies	persons					5	1
In which: female staffs	persons	**14**	4	4		8	
3. Number of examed patients	persons	**11,265**	3,502	3,050	**92,118**	6,444	3,438
In which: female patients	persons		1,648	582			
4. Number of drug users in the commune	persons					15	24

In which: female	persons					0	0
5. Number of HIV infected people	persons	**36**	7	11	**87**	1	5
In which: female	persons	**15**	3	3		1	1
6. Number of malnourished children	persons	**1,498**	138	318	**20,9**	18.5	0
In which: female	persons	**734**	68	155			0

62. There are four kindergarten/ schools located in the subproject area of Dak Song district. Huong Duong Kindergarten located near the starting point of subproject section 1 in Nam N'Jang commune. Le Van Tam Primary School and Ly Thuong Kiet Secondary School located near Dak N'Drung CPC – about 100m from the subproject road. Ly Tu Trong Primary School for Dak Buk So commune is located at the roadside of the subproject road. There is only Hoa Lan kindergarten located at the road side of the subproject road in section 2 in Quang Truc commune. Detail information related to education and training is listed in Table 9 below.

Table 9 – Education and training in 2015

	Unit	**Tuy Duc District**	Dak Buk So Com.	Quang Truc Com.	**Dak Song District**	Nam N'Jang Com.	Dak N'Drung Com.
1. Number of class							
Kindergarten	Class	125	23	25	126	16	19
Primary School	Class	245	50	31	307	43	37
Secondary School	Class	75	23	8	134	15	17
High school	Class	1			1		
2. Number of students go to school							
a. Kindergarten	Student	3,433	709	500	3,988	583	556
b. Primary school	Student	6,476	1,353	714	8,650	1,145	1,072
c. Secondary School	Student	2,697	894	240	4,825	505	627
d. High school	Student						
3. Percentage of dropout (%) in	%	1,23	0	1	0.001	0.7	0
4. Percentage of student finishing primary school	%	100	100	95.4	99.92	100	99.36
5. Percentage of student finishing secondary school	%	100	100	100	98.7	99.17	99.27
6. Percentage of	%						

student finishing high school							
7. Percentage of illiterates	%				3.75	0	1.42

5. Water supply and electricity cover

63. Nearly all the households in the subproject areas using electricity from national electricity network. The percentage of households using clean water is also high, up to 100% in Dak Buk So and Quang Truc communes of Tuy Duc district. In Dak Song district, the percentage for Nam N'Jang and Dak N'Drung communes are 96% and 90% respectively.

6. HIV and human trafficking

64. There are total 24 HIV infected cases have been recognized in the 4 communes of the subproject. 18 infected cases have been recognized in 2 communes of Tuy Duc district. No human trafficking case has been recorded in the subproject area.

7. Infrastructure

65. ***Transportation***: The road network in Dak Nong has a total length of 3412km including 1501km of bitumen road, make up 44%, and 1911 km of earth and aggregate road make up 56% of the total road length. The backbones of the province are three national roads with the total length of 310 km. 6 provincial routes with the total length of 310 km; 125 km of town internal road; 798 km district road; 657 km communal road; 1172 km hamlet road and 40 km road of special purpose.

66. The road density of Dak Nong in km/km^2 area and km/1000 people is still low in comparison with average density of the Central Highlands and the whole country. The density in km/km^2 area of Dak Nong is 0.344 in comparison with 0.433 of Central Highlands and 0.799 of the whole country. In another term, Dak Nong has only 0.344 km/ 1000 people while this number of the Central Highlands is 4.624.

67. Tuy Duc district has total 187.73 km of asphalt/ concrete roads while Dak Song district has total 98.8 km. The subproject road is part of the road network connect to Bu Prang Border Gate with Cambodia. It play a backbone role, connects the agricultural areas in Central Highlands to the Border Gates through National Road No.14. Section 1 is already paved with asphalt while some parts of section 2 is still earth road. The road has been constructed before the establishment of Dak Nong province (separate from Dak Lak in 2004) and it has been damaged severely after more than 10 year in operation.

68. ***Industrial activities***: The processing industry is still contributing the largest part in the industrial sector of Dak Nong. According to statistic data of 2012, processing industry make up 91.68% of the industrial sector. The exploitation industry make up 1.59% and other sectors such as manufacturer, electricity and water supply make up only 6.72%. Dak Nong has a high industrial growth rate in comparison with other provinces in the Central Highlands. However industrial productivity is still low due to the slow development progress of some projects like Aluminium Processing Factory, high quality rubber production factory...

69. Industrial activities are not developed in the subproject area. The percentage of industry and construction sector in Dak Buk So and Quang Truc communes of Tuy Duc district is 0 while

this percentage in Nam N'Jang and Dak N'Drung communes of Dak Song district is only 12 and 1.6% respectively.

70. ***Other public facilities***: Detail information related to infrastructure system could be found in Table 10 below.

Table 10 – Infrastructure system in the subproject area

	Unit	Tuy Duc District	Dak Buk So Com.	Quang Truc Com.	Dak Song District	Nam N'Jang Com.	Dak N'Drung Com.
1. Roads	Km						
- Earth road	km	603.8	55	65	97.55	25	17
- Concrete / asphalt roads	km	187.73	39	56	98.8	46	19
2. Number of car	unit						
3. Number of motorbike	unit				4126	528	517
4. Market in commune	unit	1	1	1	*a.* *1*	1	1
- Distance for the centre of commune	km	1	0.5	0.5	0.5	0.5	0.05
5. Market outside commune	unit	2			5	1	1
- Distance to the centre of commune	km	15	25		15-23	15	15
6. Percentage of HHs using national electricity	%	90.64	94.33	95.51	96.95	98	85
7. Percentage of HHs using clean water	%	100	100	100	90	96	90
8. Percentage of concrete HHs with floors	%	6.1	11	4	5	2	10
9. Percentage of HHs with brick / wood, roof, 1 floor	%	93.5	89	95	92	97	80
10. Percentage of HHs with cottages, tent	%	0.4	0	1	3	1	10
11. Percentage of HHs using telephone and cell phone	%	100	100	100	100	100	100
12. Percentage of HHs having toilet	%	100	100	100	90	85	100

D. Archaeological, Historical and Cultural Treasures

71. There are several archaeological sites have been discovered in Dak Nong in the recent years. The objects are mainly come from Stone Age, New Stone Age and the Pre-Iron Age. In 2013, there are 35 sites have been discovered mainly concentrated in Cu Jut, Dak R'Lap and Dak Mil district. There are no archaeological or cultural sites in the subproject area. There is only a mark of Ho Chi Minh trail through Tuy Duc district area and provincial historical site of Henri

Maitre - a French official from the Colony period. These two marks are located at roadside in Dak Buk So commune, Tuy Duc district.

E. Key Environmental Features

72. ***Physical environmental features:*** The first half of section 1 of the subproject goes through residential area of Nam N'Jang (300 m) and Dak N'Drung communes. The second half of this section goes through cultivation area of Dak N'Drung commune – Dak Song district and Dak Buk So commune – Tuy Duc district. This is the cultivation area of coffee, pepper and rice with good irrigation system of Dak Buk So lake. The 3 bridges of the subproject route are all located in this part of section 1.

73. The first 3.5 km of the section 2 – from Tuy Duc district centre to the junction with old National Road No.14c – goes through coffee cultivation area of Dak Buk So commune. The next 2 km from the junction with Road No.14c goes through the area of protection forest along the borderline with Cambodia. This is planned to change to transportation land for the expanding of the subproject road. The second half of section 2 goes through Quang Truc commune centre and the cultivation area with mainly coffee and rubber. The end point is in a T-junction at Dak Huyt Bridge, 6 km to Bu Prang Border Gate and 25 km to the Gate of Bu Gia Map National Park in Binh Phuoc province.

74. The largest water body in the subproject area is Dak Buk So Lake, located in Tuy Duc district centre, about 1.2 km from the end point of section 1. Dak N'Drung Lake located at the roadside of the start point of section 1. Dak Nong province has planned for an eco-tourism site in the future.

75. ***Social environmental features:*** There are 3 schools and 1 kindergarten located along the section 1 of the subproject. Dak N'Drung CPC and medical centre is also located roadside at the centre of the commune. Le Quy Don Secondary School is located in Tuy Duc district centre, about 1 km from the start point of section 2. Section 2 goes through Quang Truc commune centre with Hoa Lan kindergarten and Quang Truc CPC. There is also one military medical centre of Military Unit No. 726 located about 50m from the subproject road.

VI. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

76. This section discusses the potential environmental impacts of the subproject and identifies mitigation measures to minimize the impacts in all design, construction and operation phases of the subproject. Border Watershed Protection Forest located along 2 km of the subproject road in Section 2 could be adversely affected due to subproject implementation.

77. The subproject construction will also impact on local traffic making difficulties for people to access their properties, especially the ones who live along the subproject road. There are several CPCs, medical clinics, schools, and kindergartens located along the road. These impacts to social infrastructure will be in short duration of construction phase only and these have been subject to detailed assessment in the Resettlement Plan.

78. The constructions activities during the construction phase will be mainly upgrade the existing road. The main physical issues relate to impacts such as vegetation clearance, earthworks, erosion control, obtaining rock based construction materials, noise, dust, spoil disposal, disposal of other waste, and water quality. The construction for the civil works will create dust; noise and vibration that could be affect local people during the construction side.

79. The potential environmental impacts as well as the mitigation measures in the pre-construction, construction and operational phases are assessed below. The criteria for assessment are in line with ADBs SPS as specified in ADB Safeguard Policy Statement 2009 and the GOV standards based on Environmental Protection Law 2014. Where GOV standards or guidelines have some kind of conflict with ADB SPS, ADB SPS will be applied as the policy for the subproject implementation. The EMP is presented below including mitigation measures and monitoring plan for the implementation of the subproject road.

A. Potential impacts and mitigation measures in the pre-construction phase

1. Improper subproject location and design

80. ***Impacts:*** If environmental and climate change considerations are not included in the subproject detail, the construction of the subproject road could pose severely negative impact to the sensitive receivers along the subproject road. The quality and longevity of the road could also be impacted from the unwilling weather conditions, which will lead to increase maintenance time consuming, and budget. Intensity of impact to Border Protection Forest will also change with different road surface material and construction technology. The construction of bitumen road will create a higher forest fire risk due to bitumen heating. Improper drainage design could impact on local people live along the subproject in Dak N'Drung commune – on the lower roadside as runoff water could flow to their house and create temporary inundation, make difficulties for their daily activities.

81. ***Mitigation Measures:*** The road surface of the Section 1 will be upgraded to asphalt concrete with the surface width of 5.5 m based on the existing road foundation width of 7.5 m. The roadsides will be improved 2x0.5m with the same road surface structure. To ensure the quality of the subproject road, 2-layer road surface of asphalt concrete (Eyc ≥ 130Mpa) has been considered in the subproject design. Culverts and small bridges (Bridge No.1 and No.2) have been designed to withstand a 25 year return and the medium bridge – Ba Bridge – has been designed to withstand a 100 year return. Contractor will work with Dak N'Drung CPC to support local people on levelling up their living area, using part of excavation soil. In line with ADB policy on environmentally responsible procurement, a new environmental assessment report will be undertaken for submission to ADB if there are any changes to subproject design that would result to environmental impacts or risks that are not within the scope of the current IEE.

2. Land acquisition and resettlement

82. **Impacts**: As the subproject will upgrade the road surface base on the existing foundation, there will be neither house relocated nor major affected household (lost more than 10% their land). The construction of the subproject will affect agricultural area, fruit trees and pepper, fence or gate of the local people; mainly concentrate in Dak N'Drung commune, Dak Song district. Households that lost their agricultural land will reduce the agricultural productivity and reduce their income. Households with area of yards and fence affected must repair their yards and fence.

83. **Mitigation measures:** Before the construction start, PMU will review the Land Acquisition and Resettlement report and check at the field to ensure that all 32 affected households have received compensation adequately in accordance with the current provincial market price.

3. Public relocation

84. **Description:** The implementation of the subproject road could involve in the relocation of some public infrastructure such as electricity poles or drainage system. It could lead to the interruption of the public services and impact on the local people. However, the road mainly upgrading the surface based on the existing foundation and the construction will not relocate any public infrastructure or buildings.

4. Disturbance of unexploded mine and bomb (UXO)

85. **Impacts:** Along the two sections of the subproject road, UXO can be left in some areas that have not been used for construction. Mine detector in subproject area may obstruct moving or agricultural works of local people. However, to help in securing safety for people UXO clearance team will be hire from professional UXO detector team. The clearance process could impact on local people living and cultivated activities, especially when the subproject route mainly goes through residential and cultivation area. However, the impact is minor due to most of the route will be constructed on the existing road base. This affect will be temporary and can be controlled by hiring mine detector team.

86. **Mitigation measures:** PMU will work with the Provincial Military Commands to check whether the area along the subproject route has been UXO cleared in the first phase or not. If it is not, Provincial Military Commands will be engaged in UXO clearing along the subproject road. The impact is only temporary in the pre-construction phase.

B. Potential impacts and mitigation measures in the construction phase

1. Loss of trees and impact to fauna

87. **Impacts:** The implementation of the subproject will involve in cut down some fruit trees and pepper in Dak Buk So communes. The construction activities will create noise, vibration that disturbs wild animals living in the forest area next to the road. Workers could hunt wild animals and cut down trees in the forest for fuel wood in cooking, water heating. Vegetation cover along the route could also get fires resulting from execution of the works. Invasive plant species could be introduced during roadside tree plantation or replant vegetation cover for high slope. The impact will be happened along the subproject route, worker camps area especially 2 km protection forest closed to the T-junction with National Road No.14C. This is a minor impact as there is small number of fruit trees and pepper will be cut down and the 2 km of protection forest along the borderline with Cambodia is only a separated forest and it also planned to change to transportation land for the expanding of the subproject.

88. **Mitigation measures:** CSC and PMU safeguards staff will supervise closely the tree cut down process to ensure no tree out of the cut-down list will be affected. The Border Watershed Management Board – the management unit of the protection forest area - will be informed about the construction time and schedule, scope of works as well as location of worker camps and material storage sites. On the other hand, no construction camps, concrete mixing plants, material storage sites are to be located in the forest areas. Avoid locate construction camps, concrete mixing plants or any machines that could create loud noise and vibration in the section of natural forest at the first half of section 2. The contractors will not use or permit the use of woods as fuel for construction activities or use for cooking and water heating in worker camp. The contractors should not buy or use wood from illegal sources. PMU, ESP and CSC will strictly supervise and monitor the construction activities to ensure they will be done properly on the existing road foundation.

2. Impact on local facilities

89. **Impacts:** Local water supplies, electrical power supply, and telecommunications must be maintained during the works. It will affect local people in their daily activities. Subproject construction could impact local facilities in the residential areas of Nam N'Jang; Dak N'Drung; Dak Buk So; Quang Truc communes and Tuy Duc district centre. It is minor impact as the road

will be upgraded based on the existing foundation and no current public infrastructures will be relocated. The impact will be happened in 24-month of construction and stop upon the construction complete.

90. **Mitigation measures:** to minimize the negative impact, the contractors will inform in advance the construction schedule, the affected electric and telecommunication cable system, irrigations system to CPCs of the four subproject communes in advance. Construction schedule will be published at the CPC so local people could easy access these information. If any facilities are accidentally damaged during construction period, it should be reported to CSC and PMU as well as the owner to the facilities before repaired at the contractor's expenses.

3. Impact by material exploitation activities at the quarry, borrow pits and temporary storage areas

91. **Impacts:** In the work of excavating and material exploitation for the subproject construction activities if excavated soil is not collected then siltation will be occurred. It will be able to cause stuck in water flow closed to the mines and quarry area, create filling situation that affects cultivation areas of residents. Earthwork activities will also change soil structure and raise the amount of unconsolidated sediments at the borrow pits. When it rains, runoff of rainwater will take away them into the surrounding water bodies causing sedimentation and erosion also. Runoff water could also take construction material such as sand, soil from material storage sites into the surrounding water bodies if material stored for a long duration at the construction site. This impact will happen in the area of quarries; borrow pits and temporary material storage along the subproject road. It will affect local people living in the subproject area and near the quarries, borrow pits. The impact is minor as the main work at is upgrading the road surface based on the existing road base so the required amount of construction material is not large. On the other hand, the terrain of the subproject area is quite flat and not required large volume of filling soil.

92. **Mitigation measures:** To minimize the impact, in the detail design period, ESP will provide a MMP for implementation by contractors. The MMP will support to balance the excavation soil and the filling soil to utilize most of the excavation soil for filling purpose. MMP will also list the suitable quarry and mines for construction materials. These mines should own operation licenses from MONRE of Dak Nong to ensure material exploitation at the mines will not cause any uncontrolled negative environmental impacts.

4. Generation of excess spoil

93. **Impacts:** The soil from cutting activities, which could not be reused as filling soil, could have significant impacts and environmental degradation due to the improper disposal of these materials. People in the residential areas along the subproject road and near the temporary dumping sites could be affected by soil erosion from these temporary dumping areas. This is a minor impact as in the negative side, the subproject road will be upgraded base on the existing foundation so the levelling work is minimized and the volumes of spoil will be not much. On the other hand the flat terrain along the subproject route is also minimizing the filling soil volume. The land resources along the road are still available for temporary dumping area of spoil. In the positive side: local people could use the spoil for their cultivation land, especially people in Dak N'Drung commune could use excavated soil to level up their living area, avoid inundation and temporary flood when its rain. The impact is minor due to the small quantity of spoil.

94. **Mitigation measures:** To minimize the negative impacts during 24-month of construction, the contractors should evaluate and grade the spoil and the suitable spoil will be

used for filling purpose. This will reduce the need to extract soil for filling. The spoil could be stored at locations agreed with CPCs; Dak Buk So and Quang Truc communes so local people could take soil to fertilize their land or level up their living area as in Dak N'Drung commune.

5. Generation of construction waste and domestic waste from workers

95. **Impacts:** Solid waste that will be generated from construction mainly includes domestic waste of workers and scraps of transported soil and stone, debris, mud. Domestic waste is mainly generated from construction workers at campsites. Uncontrolled waste disposal operations can cause significant impacts. It will impact firstly the workers in the campsite and areas surround the construction sites and local residential area along the subproject area. This is a minor impact as the construction sites will scattered along 34 km of the subproject road and there are two temporary dumping sites in Tuy Duc and Dak Song district.

96. **Mitigation measures:** To minimize the impact during 24-month of construction time, ESP will assist PMU to monitor the contractor progress of WMSDP implementation, to ensure the contractors will provide enough trash bins at the worker camps. Contractors need to work with 2 DPCs of Tuy Duc and Dak Song districts to find out suitable place for construction and domestic waste disposal. CSC and PMU will supervise to ensure waste and unused construction material will be treated properly and transfer to designated location.

6. Impact from hazardous materials and hazadous waste disposal

97. **Impacts:** Use of hazardous substances such as oils and lubricants can cause significant impacts at the construction sites along the subproject road if uncontrolled or if waste is not disposed correctly. It will affect surrounding environment and local residential area. However, this impact could be considered as insignificant because the main construction activity of the subproject road is upgrading road surface based on the existing foundation and the construction machines are not large.

98. **Mitigation measures:** Dak Nong PMU assisted by the ESP and CSC will be responsible to monitor the contractor's progress of implementing the WMSDP to avoid or minimize impacts from use of hazardous substances such as oils and lubricants. The contractors must ensure that safe storage of fuel; oils... are agreed by PMU/ESP. They must storage in the areas provide with roof, impervious floor.

7. Impact from noise, dust and vibration generated during from the construction activities

99. **Impacts:** Earthworks and the operation of concrete mixing plant will be the main sources of dust. Concrete mixing plant will be located at the quarry in Dak Tien village, Dak N'Drung commune. (20 m from roadside in the end of Section 1). Construction machines will generate gaseous emissions (NOx SOx, CO, CO_2, etc.) when they are in operation. Transportation vehicles could also create dust along the transportation route. These gaseous and dust could cause health problems to the residents who living near the construction site and along the transportation route, especially at the environmental sensitive area such as schools/ kindergartens, medical centres in the four communes. Wild animal in the protection forest area along the road could also be affected from noise, vibration and dust from construction activities. This is an average impact due to the subproject route goes through dense population area with several schools/ kindergartens and medical centres.

100. **Mitigation measures:** similar to the mitigation measure for impact from rock crushing and concrete mixing plant, the contractors should not located any noisy machines near the environmental sensitive areas such as the protection forest, schools/ kindergartens and medical centres. The large storage sites should be located at least 100m away from these sensitive points. The contractors will work with CPCs of Nam N'Jang; Dak N'Drung; Dak Buk So and Quang Truc communes, with the representative of ESP and PMU, to identify areas for large material storage site as well as material transportation plan. PMU and CSC will responsible to monitor these mitigation measures.

8. Landslide, soil erosion and runoff

101. **Impacts:** Roadside erosion and runoff could happen when its rain, especially at the roadside unlevelled section and the borrow areas. Erosion and runoff could impact on the cultivation areas of local people. Landslide could happen in the section with high slope side, for instance the area from Km34+700 to Km34+800 in Section 2 with steep slope along side and there is no vegetation cover. Landslide will damage the road and block movement. The impact could be considered as minor as based on the survey result of the PPTA, the scope of the landslide is not large and the amount of landslide will not block the road and impact on local transportation.

102. **Mitigation measures:** To minimize the negative impacts during 24-month of construction time, the contractors should limit to store material near the area of stream crossing points. The main construction activities such as bridges/ culverts construction should be implemented in dry season. The contractors will also update weather forecast daily during construction time to avoid heavy rain day. Work with relevant authorities for vegetation clearance in the area of stream crossing and Km34+700 to Km34+800. PMU and CSC will responsible to monitor these mitigation measures.

9. Impact on crossing streams or bridge construction locations

103. **Impacts:** Careless construction and poor materials control can cause blockage to streams. Runoff water during its rain could bring waste and soil into the nearby water bodies. That could lead to siltation and reduce the water quality. The 3 crossing streams, especially Ba stream and Dak Buk So lake, Dak N'Drung lake could be affected by the construction activities and it will lead to reduce water quality of waterbodies of the streams/ lakes.

104. **Mitigation measures:** the contractors should disposed soils, spoils and construction waste out of the bridges/ culverts construction immediately. They should also discuss with relevant authorities for MMP and WMSDP implementation. Silt fences and sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and drilling operation within streams. The steep slopes should be covered with vegetation to avoid landslide and siltation in the nearby rivers/ streams. PMU and CSC should work and collaborate closely with relevant authorities such as CPCs and DPCs to monitor the implantation of these mitigation measures.

10. Impact on water resources and quality

105. ***Impacts:*** The drainage system, irrigation and water resources on surrounding lands will be affected by construction activities as follows: a) local water supplies will need to be tapped to meet campsite and construction requirements, so bringing subproject based water use into competition with local use; b) surface and subsurface water resources near the subproject route

could be contaminated by fuel and chemical spills, or by solid waste and effluents generated by the kitchens and toilets at construction campsites; (c) natural streams may become silted by borrow material (earth) in the runoff from the construction area, workshops and equipment washing-yards. Construction activities could impact on the quality of the nearby water bodies. Waste and construction material could fall into the water bodies if the waste is not control carefully or material stockpiles area not be covered and well monitored. The impact will mainly on water bodies along the subproject road such as crossing streams and worker camps area, especially at the Ba stream crossing point. As Ba stream from Dak N'Drung Irrigation Lake, provide irrigation water for cultivation area of Dak N'Drung and Nam N'Jang communes, the subproject construction in 24 months could impact on the irrigation water resources for downstream users of these two communes.

106. ***Mitigation measures***: In order to minimize this negative impact, the contractors will work with Agricultural and Irrigation Staff of Dak Song district to set up a suitable construction schedule, avoid impact on the irrigation activities for Dak N'Drung and Nam N'Jang cultivation areas. The contractors will store lubricants, oils in designated area with roof covered and impervious foundation at least 50m from streams/ lakes. Sediment ditches, silt fences should be installed in suitable location to avoid runoff, erosion and siltation in lakes/ streams. Material storage sites should also be covered carefully with canvas and located at least 50m away from water bodies. PMU and CSC will responsible to monitor these mitigation measures.

11. Impact by the large influx of construction worker

107. ***Impacts:*** Large influx of construction worker will create a burden on local public services like electric and water supply. Construction workers from other area could bring outside disease to the subproject area. The concentration of workers in the work camps could also create a good environment for diseases such as sore eyes, cholera, flu and respiratory problems. Social aspect: concentration of a number of workers could lead to social problems such as gambling, drug addiction, prostitute, violence, conflict amongst workers, or between workers with local people. The impact will affect directly on workers and indirectly on the community near the construction sites in the residential area of 4 communes along the subproject road. This is an average impact due to high density of population in the subproject area, especially in Dak N'Drung and Quang Truc communes.

108. ***Mitigation measures:*** Worker camp location and facilities located at least 500m from residential areas as agreed by local communities and approved by ESP and PMU and managed to minimize impacts. All workers should register with local police for temporary residential certificate. The worker camp should be located in the area with sufficient drainage to avoid water logging and formation of breeding sites for mosquitoes and flies. Worker should have health check before start work in the subproject and should be trained for living and working behaviour before joining the sites. On the other hand, Contractors will use local labours for simple works such as smooth the road, moving soil, give priority to poor families, female householders, woman if they need jobs. It aims to raise their income, create more jobs, contribute to poverty reduction for local community and also reduce the number of construction workers from outside. Local people in the residential area of 4 subproject communes will have benefits from the subproject construction. However, this is a small positive impact and it requires the coordination between the contractor and CPCs of subproject communes and nearby communes in recruiting local labours (contractors often prefer to engage their own trained workforces rather than training unskilled labourers). The duration of the impact is also short, only in 24 months construction time.

12. Risk to health and safety to local people or construction workers

109. **Impacts:** Dust, exhaust gas and noise generating from earthworks, transporting of material, construction activities and operation of machines, etc. These factors have direct affects on health of workers and local residents. Material transport and construction activities on the existing road may create the risk of affects on traffic safety and houses structure on roadsides especially in the environmental sensitive areas. The excavation of the trenches for side drain construction can threaten public safety, particularly of pedestrians and children. Waste and wastewater from construction activities and worker camps could also create a favourable environment for the outbreak of some respiratory diseases of local people as well as workers. Accidents may occur if during the construction if workers are not provided with safety equipment and obey construction regulations. The objects of this impact are local people in the subproject area especially pupil in the subproject area and the workers working at the site. This is an average impact, as the construction sites will stretch along 34km of the subproject, in the residential areas of 4 communes of Tuy Duc and Dak Song district.

110. **Mitigation measures:** The contractors with the support from ESP will conduct training for workers on safety and environmental hygiene. The workers will be instructed construction camp rules and site arrangement and all of them will be equipped with appropriate PPE such as safety boots, helmets, protective clothes, gloves and ear protection for the one working with noisy equipment. All areas of excavation greater than 1m deep and insides of temporary works should be fenced with sign boards installed. The contractors in collaboration with ESP and PMU will also work with Nam N'Jang; Dak N'Drung; Dak Buk So and Tuy Duc CPCs for the construction plan and scope. The CSC and PMU will responsible for supervision activities during construction phase and response timely for any raised opinions/ comments from local people and authorities.

13. Impact on the local traffic

111. **Impacts:** Construction activities on the Subproject road are likely to cause hindrance in traffic flow if not mitigated properly especially in centre area of Quang Truc, Dak Buk So, Dak N'Drung communes and Tuy Duc district. Local people and people from other area who travel on the subproject road will be affected during 24 months construction period. However, this is a minor impact due to local people could have other options for travel through the town internal road networks.

112. **Mitigation measures:** To minimize the disturbance to local people, the contractor will work with CPCs on construction plan and the construction schedule and scope will be published in Nam N'Jang; Dak N'Drung; Dak Buk So and Tuy Duc. The contractor will also construct temporary road and minimizing interference with traffic flows past the works site.

14. Environmental impacts due to inappropriate environmental recovery responsibility

113. **Impacts:** If after construction work has been completed, the sites are not cleaned up, construction and domestic waste will pollute surrounding environment. If site restoration such as replanting trees; grass; filling up construction pit; removing camp site have not been implemented in accordance with environmental regulation then the environmental issues like erosion, sedimentation and accident may occur. Construction waste and waste soil could also impact on the soil quality of the temporary acquired land area.

114. **Mitigation measures:** Site cleaning up must be performed right after the work completion. Pit and excavation areas must be filled up by the contractors when the construction complete. PMU and CSC will strictly monitor the site to ensure all construction sites will be fully recovered upon the construction finish.

C. Potential impacts and mitigation measures in the construction phase

1. Impact from dust and noise arising from increasing of traffic density

115. **Impacts:** Paved road surface condition will reduce the dust concentration but better road condition will also increase traffic density along the subproject road especially the road play an important role for goods transportation from National Road No.14 to Bu Prang International Border Gate. Noise, dust and vibration could have negative impact on the local people living along the subproject road, especially the environmental sensitive areas such as schools/ kindergartens and medical centres.

116. **Mitigation measures:** Dak Nong Department of Transportation (DOT) will responsible for subproject management in the operation phase. Road hump, speed limit sign could be installed at the sensitive areas like schools/ kindergarten, medical centres. The use of air horn should be banned along the subproject road, especially in the sensitive area.

2. Favourable conditions for transportation of goods and people movement

117. **Description:** The upgraded road will favor the good transportation to Bu Prang Border Gate. Support movement of local people on the road in rainy condition. As it support better transportation of goods, especially agricultural product, the time for transportation will reduce and the profit will increase. The completion of the road will favour people in the 4 communes of Tuy Duc and Dak Song districts and surrounding residential areas as well as people who doing business along the subproject road.

3. Driving conditions and community safety

118. **Description:** The upgrading and construction of the road is likely to increase the vehicle speed on the road. Increases in traffic flow indicate additional future traffic should be moderate and unlikely to create many community safety issues. On the other hand, the condition of the road facilities will be enhanced and driving conditions should improve. The beneficiaries of the subproject are local people in the two districts and people who travel on the subproject road.

4. Affects on employment or livelihood

119. **Description:** Increase incomes and living standards for people in the subproject area by means of increasing the profit as save time for transportation and merchant will access production area easier, thus the agricultural production price will be higher. Local people in the subproject area and people who cultivate in the subproject area as well as local people in Tuy Duc and Dak Song districts will be benefited from the completion of the road. This is a permanent impact and has significant effects to local people's lives.

5. Impacts on ethnic groups

120. **Description:** The completion of the subproject road will support to increase incomes and living standards for ethnic minorities in the subproject area by means of increasing the profit. The completion of the road will support them to save time for travel and increase production prices as merchant could access the production area easier.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

121. The objectives of the stakeholder consultation process was to disseminate information on the subproject and its expected impact, long-term as well as short-term, among primary and secondary stakeholders, and to gather information on relevant issues so that the feedback received could be used to address these issues at early stages of subproject design. Another important objective was to determine the extent of the concerns amongst the community, to address these in the subproject implementation and to suggest appropriate mitigation measures.

A. Public consultation preparation

122. Stakeholders are people, groups, or institutions that may be affected by, can significantly influence, or are important to the achievement of the stated purpose of a proposed intervention. The stakeholders consulted for the construction of the subproject road included representatives from Dak Nong DPI, DONRE, DARD. Consultation has also been implemented with representatives from 4 CPCs in Tuy Duc and Dak Song districts, representative of Forest Management Board, Bu Prang Border Gate. Several local people living along the subproject road have been consulted using questionnaire and concentrated on the inconvenient condition for local people during the construction phase of the subproject. There are 37 local people have been interviewed with 16 of them are women. Consultations took place in September 2015 and April 2016.

B. Information dissemination during public consultation

123. Providing information through local authority offices will provide a conduit for the improvement of the subproject implementation to better serve the stakeholders. Public consultation can also assist in:

i) harnessing cooperation from informed people to help local authorities reconfirm the extent of local permits and licenses that will be required at a later stage;
ii) obtaining cooperation from informed residents and groups which to avoid cost and time in dealing with complaints;
iii) identifying local infrastructure subprojects or other local initiatives that will interface with the subproject roads with assistance from informed local authorities;
iv) the collection of relevant information on the current condition of the local environment including aspects of forest and wildlife and conservation.

124. The information disseminated during public consultation is including: (i) background of the Project and subproject; (ii) basic information related to ADB and the Government requirement for environmental protection; (iii) potential impacts during subproject implementation and mitigation measures; and (iv) grievance redress mechanism.

C. Obtained results and use of results from public consultation

125. The results of the public consultations are recorded in Table 11 and 12 below. In general, all the relevant stakeholders are support the implementation of the subproject. As the subproject road has been constructed more than 10 years ago and different parts have been severely damaged, upgrade road surface will support goods transportation from Dak Nong and other surrounding provinces to Bu Prang Border Gate. The main construction work will be upgrade

road surface based on the existing road foundation, no house must be relocated and no major land acquisition will be taken, the local people is totally support the subproject implementation.

Table 11 – Main issues and information from local authorities

Main issues	Information from relevant authorities
Forest protection at 2 km goes through Border Protection Forest.	DARD: This forest area is mainly located in Cambodia. The area managed by Vietnam is not large. DPI: This area has been planned to change to transportation land in accordance to Transportation Development Plan to 2020 of the province.
Soil erosion and drainage system of the subproject road	Dak N'Drung CPC: There is no drainage system along the route. The road level is high in compare with local people house along the route in Dak N'Drung commune. Good drainage system must be constructed to ensure runoff water will not flow over cultivation area of local people
Construction time	Tuy Duc district: The contractors should cooperate with local authorities to inform local people on construction schedule and scope.

Table 12 – Main environmental concerns from public consultation

Concerns expressed	How concerns are addressed in IEE
Forest protection at 2 km goes through Border Protection Forest.	CSC and PMU safeguards staff will supervise closely the tree cut down process to ensure no tree out of the cut-down list will be affected. The Border Watershed Management Board – the management unit of the protection forest area - will be informed about the construction time and schedule, scope of works as well as location of worker camps and material storage sites. No construction camps, large material storage sites are to be located in the forest areas. The contractors will not use or permit the use of woods as fuel for construction activities or use for cooking and water heating in worker camp. The contractors should not buy or use wood from illegal sources. PMU, ESP and CSC will strictly supervise and monitor the construction activities to ensure they will be done properly on the existing road foundation.
Suitable compensation	Before construction start, PMU will review the Land Acquisition and Resettlement Report and check at the site to ensure that all the affected households have received compensation adequately
Moderate material transportation speed, cover with canvas to avoid dust and fallen materials	Regulation for material transportation will be put as an appendix in the contract with contractor. CPCs in cooperation with PMU and CSC will monitor the compliance during construction phase.
Soil erosion and drainage system of the subproject road	The design of the road must follow the relevant regulations. Construction methods and schedule will be informed in advance to local people. CPCs in cooperation with PMU and CSC will monitor the compliance during construction phase. Contractor work with Dak N'Drung CPC to support local people using excavation soil to level up their living areas.
Clean waste on the road side	ESP will support PMU prepare WMSDP before the construction start. CSC and PMU will strictly supervise the contractors to ensure suitable mitigations measures will be applied as stated in WMSDP.

126. The environmental assessment process under the SPS 2009 requires the disclosure of the IEE to the public during the completion of the IEE to be in strict adherence to the rules. This process will be concluded by displaying the IEE at the PPC Headquarters during the period when the IEE is disclosed on the ADB website. Dak Nong PMU will responsible for IEE

translation to Vietnamese and disclose at 4 subproject communes of Dak Song and Tuy Duc districts.

VIII. GRIEVANCE REDRESS MECHANISM

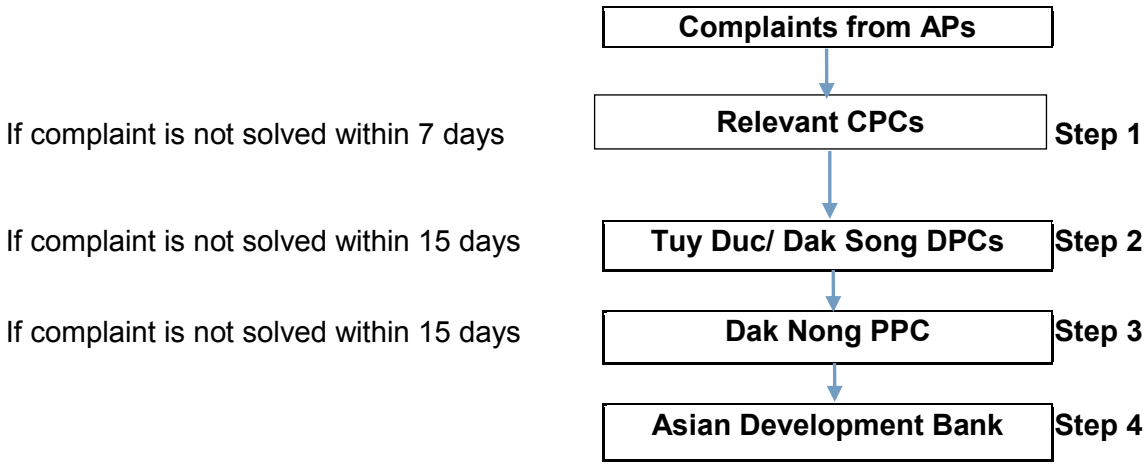
A. Purpose of the mechanism

127. During the deployment of the subproject, local people are disseminated environmental protection activities such as EMP. Negative impacts on the environment may occur during the construction and operational phases. Any comments/ suggestions of local people will be solved quickly, transparently and protected by law, particularly for affected people by the subproject. Complaint handling mechanism was classified by level and responsibilities of involved parties.

B. Grievance redress mechanism

128. Per the environmental management frame, there are 03 steps to redress complaint as below:

- ***Stage 1***: If a household has any complaint he/she can submit a complaint in the written or verbal forms to the representative of CPC-community monitoring board (usually the Deputy Chairman of the commune). CPC will work with ESP and CSC to solve complaints and representative of the CPCs will response in written form to the complainant.
- ***Stage 2***: If the complaint is not resolved within 7 days, the complainant will submit an application to the Tuy Duc/ Dak Song DPC to resolve the complaint.
- ***Stage 3***: If more than 15 days but no official response from Tuy Duc/ Dak Song DPCs, the complainant may submit a complaint in the written form to the Dak Nong PPC (through Dak Nong DONRE). Dak Nong PPC will require Tuy Duc/ Dak Song DPCs to solve the complaint. In case the complaint is still not resolved, Dak Nong PPC will require environmental police to investigate and requested stakeholders to resolve the complaint.
- If efforts to resolve disputes using the grievance procedures remain unresolved or unsatisfactory, APs have the right to directly discuss their concerns or problems with the ADB Southeast Asia Department through the ADB Viet Nam Resident Mission (VRM). If APs are still not satisfied with the responses of VRM, they can directly contact the ADB Office of the Special Project Facilitator (OSPF).



IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation arrangements

129. Dak Nong PMU will recruit one Environment Safeguard Specialist (ESP) under Loan Implementation Consultants (LIC) to support subproject implementation in Dak Nong. ESP will support PMU updated EMP and as well as monitor the compliance of the contractors during construction phase. ESP will also responsible for training and capacity building on the implementation of EMP.

130. PMU will engage Construction Supervision Consultant (CSC) for the monitoring and supervision of the subproject in general and for environmental monitoring as well. CSC will ensure that the contractors implement the provisions of the subproject EMP.

Table 13 – Responsibilities for EMP implementation

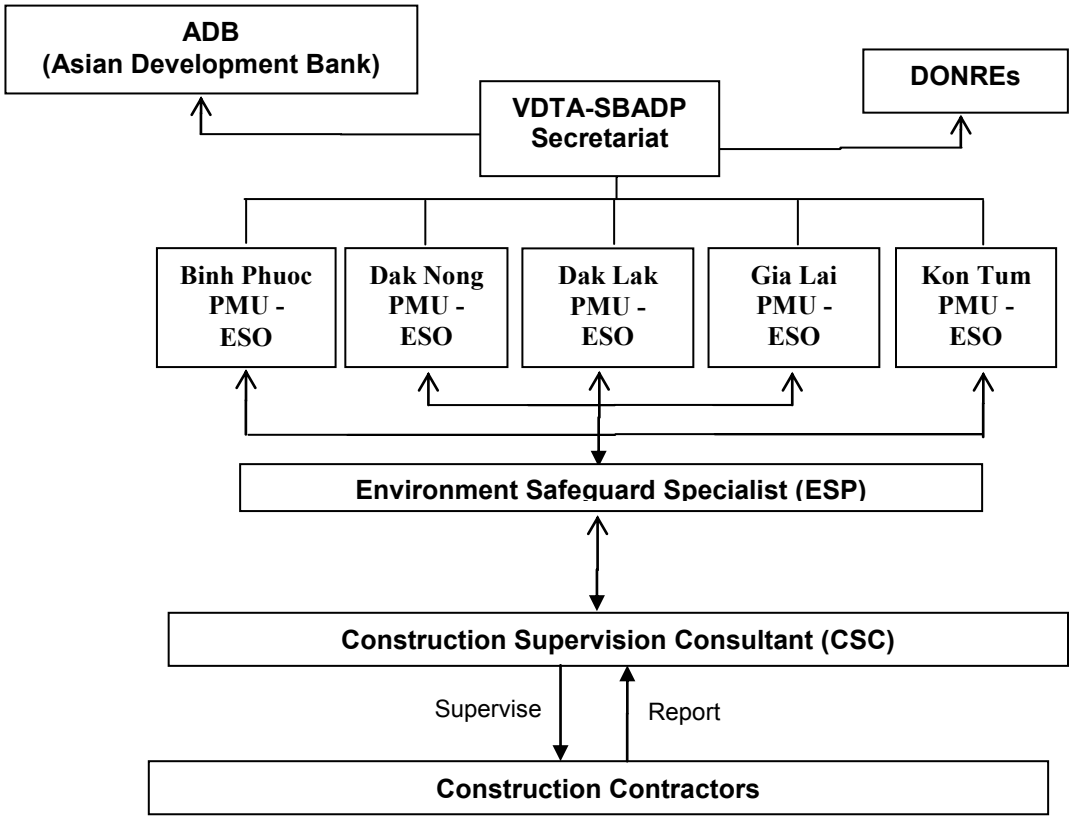
Agency	Responsibilities
Dak Nong Department of Planning and Investment	- Executing agency with overall responsibility for subproject construction and operation - Ensure that sufficient funds are available to properly implement the EMP Ensure that the Subproject, regardless of financing source, complies with the provisions of the EMP and ADB Safeguard Policy Statement 2009 (SPS) - Ensure that Subproject implementation complies with Government environmental policies and regulations - Ensure that tender and contract documents include the Subproject updated EMP - Submit semi-annual monitoring reports on EMP implementation to ADB
Provincial Project Management Unit under DPI (PMU)	- Ensure that EMP provisions are strictly implemented during various subproject phases (design/pre-construction, construction and operation) to mitigate environmental impacts to acceptable levels. - Undertake monitoring of the implementation of the EMP (mitigation and monitoring measures) with assistance from CSC and ESP. - Ensure that Subproject implementation complies with ADB's environmental policy and safeguards policy statement (SPS 2009) principles and requirements - For subproject duration, commit and retain a dedicated staff within PMU as environment and safeguards staff to oversee EMP implementation - Ensure that environmental protection and mitigation measures in the - EMP are incorporated in the detailed design With the support from ESP, updated EMP to suitable with any changing in subproject scope or any unanticipated impact rise - Obtain necessary environmental approval(s) from DONRE prior to award of civil works contracts - Include the Subproject updated EMP in the bid and contract documents for civil works - Establish an environmental grievance redress mechanism, as described in the IEE, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the Subproject's environmental performance - With assistance from ESP, prepare semi-annual environmental

	monitoring reports for submission to ADB - Based on the results of EMP monitoring, identify environmental corrective actions and prepare a corrective action plan, as necessary, for submission to ADB.
Environmental Safeguards Staff (ESO)	- PMU staff support for EMP implementation - Work closely with ESP of LIC to daily supervise of EMP implementation and preparation of EMP monitoring report
Environment Safeguard Specialist (ESP)	- - Update EMP to make it suitable with the current condition or whenever subproject scope change or any unanticipated impact rise. - Ensure that the environmental protection and mitigation measures identified in the EMP for the design stage has been incorporated in the detail design; - Assist PMU to ensure that all environmental requirements and mitigation measures from the IEE and EMP are incorporated in the bidding documents and contracts. - During detailed design phase carry out baseline data collection on air quality, noise and surface water quality (as specified in the EMP) - During detailed design phase, prepare method statement (Waste Management and Spoils Disposal Plan) described in the IEE/EMP. - Implement all mitigation and monitoring measures for various subproject phases specified as ESP's tasks in the EMP - Work with PMU to execute any additional environmental assessment prior to subproject construction as required in the EMP (e.g., preparation of new or supplementary environmental assessment in case of change in alignment that will result to adverse environmental impacts that are not within the scope of the IEE prepared during loan processing, etc.) - Undertake environmental management capacity building activities for PMU as described in the IEE and EMP. - Engage international and national environment specialists to ensure proper implementation of EMP provisions. Through these specialists, the ESP shall: (i) ensure proper and timely implementation of ESP's tasks specified in the EMP, (ii) conduct environmental training as specified in the IEE/EMP for PMU, (iii) conduct workers' orientation on EMP provisions, (iv) undertake regular monitoring of the contractor's environmental performance, as scheduled in the EMP (v) conduct field measurements for surface/ground water quality, dust and noise as required in the EMP, and (v) prepare environmental baseline report and environmental semi-annual environmental monitoring reports , as specified in the EMP, for submission to ADB.
Construction Supervision Consultant (CSC)	- Provide the ESP relevant information as well as full access to the subproject site and all project-related facilities (such as construction yards, workers' camps, borrow and quarry areas, crushing plants, concrete mixing plants, etc.) to monitor contractors' implementation of the subproject EMP, assess environmental impacts resulting from on-going site works and operation related facilities, undertake environmental effects monitoring and orientation of workers on EMP implementation. - Undertake day-to-day subproject supervision to ensure that the EMP is properly implemented by contractors. - Orient workers on EMP implementation, and health and safety procedures - Document and report to PMU on occupational accidents, diseases

	and incidents - As part of regular progress report submission to PMU, prepare reports on the status of the contractors' implementation of the EMP and health and safety issues - Engage an environmental staff to ensure proper implementation of the above tasks.
Contractors	- Recruit qualified environmental officer to ensure compliance with environmental statutory and contractual obligations and proper implementation of the Subproject EMP - Provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the EMP - Implement additional environmental mitigation measures, as necessary
Dak Nong Department of Transportation (DOT)	- Responsible for operation and maintenance of Subproject road - Implement EMP monitoring during operation
Dak Nong Department of Natural Resources and Environment (DONRE)	Review and approve environmental assessment reports required by the Government. - Undertake monitoring of the subproject's environmental performance based on their mandate

The organization structure of Environmental Management Plan is showed in the chart below:

Figure 2 – EMP Implementation Organization Chart



B. Environmental mitigation

131. The anticipated environmental impacts and mitigation measures discussed in the previous section is presented in Table 14. The table also shows responsibilities and timeframe/schedule for implementation of mitigation measures and monitoring.

132. Table 14 shows that most mitigation activities during pre-construction are to be implemented by the ESP while during construction, measures shall be primarily implemented by the contractors. During operation stage, DOT shall undertake environmental mitigation and monitoring requirements specified in the EMP. To ensure implementation of mitigation measures during construction, the EMP shall be included in the tender and contract documents for civil works. Contractors' conformity with environmental contract procedures and specifications shall be regularly monitored by PMU with assistance from CSC and results shall be reported semi-annually to ADB.

Table 14 - Detail Environmental Mitigation Plan

		Impact Mitigation				
Environmental Concern	Objective	Proposed Mitigation Measures	Responsible to Implement	Timing	Locations	Mitigation Cost
Design and Pre-construction Phase						
1. Environment and climate change in detail designs	Incorporation of environmental and climate change adaptation design measures into the detailed design	Check the detail design on the incorporation of environment and climate change adaptation, update base on the different scenarios of Dak Nong on climate change. Check the plan for using excavation soil for levelling up in Dak N'Drung commune	ESP	Before construction	N/A	Included in the contract with ESP
2. Land acquisition and resettlement	Control the impact of land acquisition and resettlement	Monitor the compensation process to ensure it is suitable with the Land Acquisition and Resettlement Report	ESP	Before construction	N/A	Included in the contract with ESP
3. Environmentally responsible procurement	EMP is properly implemented by selected contractors	1. EMP is included in tender documents to ensure that mitigation measures are budgeted and to prepare the contractors for environmental responsibilities. 2. Specify in bid document that Contractors shall engage capable and trained staff to take responsibility for the environmental management and safety issues at the working level and to monitor the effectiveness and review mitigation measures as the subproject proceeds. 3. Contractors recruit qualified staff to oversee implementation of environmental and safety measures specified in EMP.	ESP; PMU	Before bidding and before construction commencement	N/A	Included in the contract with ESP and PMU operation budget
4. Material Management Plan	Manage material storage area to avoid runoff and sedimentation	1. Designs to balance excavation and fill where possible. 2. Prepare MMP. The plan shall detail the arrangements to be made to facilitate the timely production and supply of construction materials to avoid impacts due to unnecessary stockpiling outside the Subproject site. MMP shall consider the following: (i) Required materials, potential sources and estimated quantities available, (ii) Impacts to identified sources and availability (iii) Excavated slope material for reuse and recycling methods to be employed,	ESP	Before bidding	N/A	Included in the contract with ESP

		(iv) Required endorsements from DONRE and local groups for use of sources. (v) Methods of transportation to minimize interference with normal traffic. (vi) Constraints of regular delivery schedule to reduce stockpiling on site. vii) Measures to be employed to mitigate nuisances to local residents. (viii) Program for reuse of slope excavated material for reuse (ix) Program for delivery of quarry and borrow materials. (x) Discussion of the CSC, PMU/ ESP inspection/monitoring role. (xi) Agreement on publicity/public consultation requirements.				
5. Plan spoil and waste disposal	Minimize waste and pollution	1. Re-use of waste materials & spoil disposal locations included in bid and contract documents. 2. Prepare WMSDP. The plan shall cover handling, storage, treatment, transport and disposal of solid and liquid wastes, hazardous materials, hazardous wastes and excavation spoils. 3. WMSDP will include consideration of all matters related to solid, liquid waste and spoil disposal including the following: i) Expected types of waste and quantities of waste arising. ii) Waste reduction, reuse and recycling methods to be employed iii) Agreed reuse and recycling options and locations for disposal / endorsement from DONRE and local groups. iv) Methods for treatment and disposal of all solid and liquid wastes. v) Methods of transportation to minimize interference with normal traffic. vi) Establishment of regular disposal schedule and constraints for hazardous waste. vii) Programme for disposal of general waste / hazardous waste. viii) Discussion of the ESP, PMU/CSC	ESP	Before bidding	N/A	Included in the contract with ESP

		inspection/ monitoring role. ix) Establishment of complaints management system for duration of the works x) Agreement on publicity/ public consultation requirements. 4. The WMSDP shall include a section on Hazardous Materials and Waste section. This will detail the mitigation measures, organizational arrangements, resources, facilities, etc. to avoid environmental as well as health and safety impacts due to use and disposal of hazardous materials/substances.				
6. Unexploded Ordnance	Avoid accidents due to any kind of UXO	1. Coordinate with appropriate agencies at the design stage to identify if UXO is a potential threat to works 2. Based on the findings, engage an authorized UXO clearing contractor (usually from Dak Nong Military Command, as necessary. 3. Ensure that the contractors shall only commence site works after the UXO clearing firm has certified that the subproject areas are already cleared.	ESP	Before bidding	N/A	Included in the contract with ESP
7. Environmental Capacity Development	Develop environmental management capacity of PMU to ensure proper EMP implementation and promote environmental awareness among workers.	1. PMU to commit and retain dedicated staff for subproject duration to oversee EMP implementation. 2. ESP to train PMU to build their capacity on EMP implementation, monitoring and reporting using workshops and on-the-job training techniques and case studies. 3. Conduct workers' orientation on EMP provisions. Such orientation shall be periodically conducted by the ESP as every new contractor is engaged.	PMU; ESP	Through out the pre-construction and construction phase	N/A	Included in the contract with ESP and PMU operation budget
Construction Phase						
1. Loss of trees and impacts to fauna	Avoid and minimize impact to flora and fauna in the subproject area	1. Minimized vegetation covers clearances. 3. Prohibit cutting of trees for firewood and for use in subproject. 4. During replanting works, new alien plant species (i.e., species not currently established in the country or region of the subproject) shall not be used. Invasive species shall not be introduced into new environments.	Nam N'Jang; Dak N'Drung; Dak Buk So; Quang Truc CPCs; Contractors	Through out construction phase	Along the subproject road, especially 2 km go through protection forest in Dak Buk So commune;	Included in the contract with contractors

		5. The contractors will not use or permit the use of wood as a fuel for the execution of any part of the works, including but not limited to the heating of bitumen and bitumen mixtures, and to the extent practicable shall ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 6. Contractors shall not buy or use wood from the illegal sources (that come from the illegal logging) 7. No construction camps, concrete mixing plants, material storage sites are to be located in the forest area. 10. Contractors will take all precautions necessary to ensure that damage to vegetation is avoided due to fires resulting from execution of the works. The Contractors will immediately suppress the fire, if it occurs, and shall undertake replanting to replace damaged vegetation.			worker camps area	
2. Local facilities	Prevent interruption of services such as electricity and water supply during relocation of the local facilities. Repair damaged access roads.	1. Reconfirm power, water supply, and telecommunications likely to be interrupted by the works. 2. Contact all relevant local authorities for facilities and local people to plan reprovisoning of power, water supply, and telecommunication systems. 3. Facilities shall be relocated and reconnected well ahead of commencement of construction works and contractors shall coordinate with facility company for relocation and reconnection well before works commence. 4. Affected communities shall be properly informed in advance. 5. Reconnection of facilities shall be done at the shortest practicable time before construction commences. 6. Facilities damaged during construction shall be reported to the CSC, PMU and facility authority and repairs arranged immediately. 7. Access roads, agricultural land and other	Contractors	Before construction start and through out the construction phase	Along the subproject route; at the residential areas	Included in the contract with contractors

		properties damaged during transport of construction materials and other project-related activities shall be reinstated upon completion of construction works at each section				
3. Materials exploitation and management of quarry, borrow pits and temporary storage area	Minimize impacts from materials extraction, transportation and storage.	1. Implement MMP prepared by ESP during detailed design phase. 2. Balance excavation and fill requirements to minimization negative impacts 3. Prioritize use of existing quarry sites with suitable materials and update the list of quarries and borrow pits monthly in MMP and report to PMU and minimize impacts on other local resources. 4. Procure materials only from Dak Nong DONRE authorized quarries and borrow sites. 5. Replant tree and vegetation cover of any vegetation clearance area in quarries and borrow pits 6. Stockpile topsoil for later use and fence and re-contour borrows pits after use. Topsoil, overburden, and low-quality materials shall be properly removed, stockpiled near the site, and preserved for rehabilitation. 7. Borrow/quarry sites shall not be located in productive land and forested areas. 8. During quarry/borrow site operation, provide adequate drainage to avoid accumulation of stagnant water. 9. Ensure borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of water bodies favourable for mosquito breeding. 10. Upon completion of extraction activities, quarry and borrow pits shall be dewatered and fences shall be installed, as appropriate, to minimize health and safety risks. 11. To avoid drowning when pits become water filled, measures such as fencing, providing flotation devices such as a buoy tied to a rope, etc. shall be implemented.	Contractors	Though out construction phase	Subproject site, quarries and borrow pit areas	Included in the contract with contractors
4. Waste and spoil disposal	Control spoils and waste disposal,	1. Implement corresponding provisions of WMSDP prepared by the ESP.	Contractors	Through out construction	Through out construction	Included in the contract

	lubricant and hazardous wastes.	2. Areas for disposal to be agreed with CPCs and Dak Nong DONRE checked and recorded by the CSC, ESP/PMU and monitored 3. Spoil and waste will not be disposed of in streams or other surrounding water bodies. 4. Spoils and waste shall only be disposed to areas approved by local authorities. 5. Spoil disposal shall not cause sedimentation and obstruction of flow of watercourses, damage to agricultural land and densely vegetated areas. 6. Under no circumstances will spoils be dumped into watercourses (rivers, streams, drainage, irrigation canals, etc.) 7. The spoils disposal site shall be located at least 50 m from surface watercourses and shall be protected from erosion by avoiding formation of steep slopes and grassing.		phase	site, material storage areas, machines and vehicles maintenance area	with contractors
5. Noise, dust and vibration	To minimize negative impacts from noise, dust and vibration during construction period	1. Restrict works to daylight hours within 500 m of sensitive area. 3. Powered mechanical equipment and vehicle emissions to meet national TCVN/QCVN standards. All construction equipment and vehicles shall have valid certifications indicating compliance to vehicle emission and noise creation standards. 4. Monitor and investigate complaints; propose alternative mitigation measures. 5. Keep material storage site moist 6. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emission. 7. On rainless day undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials storage sites, construction sites, access roads, quarry areas, borrow sites and other subproject areas where residential sites and other sensitive points such as schools, clinics… are located nearby. 8. Mixing, bitumen heating plants operations will be equipped with dust suppression	Contractors	Through out construction phase	Through out construction site especially at the sensitive areas such as schools/ kindergarten, medical centers…	Included in the contract with contractors

		devices such as water sprays. 9. Clean up road surfaces after work. 10. To protect buildings and structures from vibration, non-vibrating roller shall be used in construction sites near buildings and structures. 11. Structures, which are damaged due to vibration caused by the construction activities, shall be repaired immediately as directed by ESP/PMU. 12. Machinery shall be turned off when not in use. 13. Pile driving during to be schedule for daytime if construction site is near sensitive points or approved by DONRE, CPCs and ESP/PMU. 14. Impose speed limits on construction machines and transportation vehicles to minimize dust emission along areas where sensitive pints are located (houses, schools, clinics, pagodas etc.).				
6. Erosion control/ run off	Protect established facilities	1. Establish vegetation and erosion protection immediately after completion of works in each stretch / sector. 2. Check weather forecasts and minimize work in wet weather. 3. Stockpile topsoil for immediate replanting after cutting. 4. Minimize damage and excavation of surrounding vegetation during slope formation. 5. Protect the cut slope with planted vegetation, bioengineering or conventional civil engineering structures as soon as practicable after excavation. 6. Include and implement appropriate measures for slope protection, i.e. vegetation cover and stone pitching, as required in the detailed construction drawings. 7. Prevent erosion and protect the excavated slope with temporary or permanent drainage as soon as practicable after cutting. 8. If new erosion occurs accidentally, back	Contractors	Through out construction phase	Through out construction site and high risk slope as agreed with ESP/PMU (especially from Km34+700 to Km34+800)	Included in the contract with contractors

		fill immediately to restore original contours. 9. Low embankments will be protected from erosion by seeding and planting indigenous grasses that can flourish under local conditions. 10. Payments will be linked to the completion of the works as indicated by the installation of erosion control measures to protect the works to the satisfaction of ESP/PMU.				
7. Stream protection and bridge/culvert construction	Protect stream and maintain flows	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed not to block streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.	Contractors	Through out construction phase	3 streams/ flows crossing point	Included in the contract with contractors
8. Impact on water resources and quality	To minimize impact from wastewater drainage and prevent potential impact on water quality due to subproject activities	1. Province adequate drainage facilities at construction sites and worker camps to avoid stagnant water. 2. Implement agreed designs for bridges/ culverts sufficient to control flooding as designed. 3. Store lubricants, fuels and wastes in dedicated enclosures at least 50 m from water bodies on high and impervious ground with top cover 4. Solid waste from construction activities and workers camps will not be thrown in streams and other water bodies (drainage, lake, pond, etc.) 5. Construction storage/stockpiles shall be provided with bunds to prevent silted run-off. 6. Stockpiled materials will be covered to	Contractors	Through out construction phase	3 stream/ flow crossing positions, material storage sites, temporary waste disposal area	Included in the contract with contractors

		reduce silted run-off. 7. No stockpiling or borrow sites at least 100m of water body. 8. Work in streams at bridge repair sites will be scheduled during dry season and work duration shall be as short as possible. 9. Washing of machinery and vehicles in surface waters shall be prohibited.				
9. Large influx of construction workers	Construction camps and worker camps not to cause any negative impact to surrounding environment (forest area, water bodies, wild animal)	1. Construction and worker camp location and facilities located at least 500m from settlements and agreed with local communities and facilities approved by ESP and managed to minimize impacts. 2. Hire and train as many local workers as possible. 3. Provide adequate housing for all workers at the construction camps and establish clean canteen/eating and cooking areas. 4. Mobile toilets (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and prevented by cleaning lavatories daily and by keeping toilets clean at all times. 5. Provide separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supply for male and female workers. 6. Borrow pits and natural depressions with prelaid impervious liners will be used to dispose of scarified/scraped asphalt, and then covered with soil. This will check potential groundwater contamination. 7. As much as possible, food shall be provided from farms nearby and bush meat supplies will be banned to discourage poaching. 8. Camp site will be cleaned up to the satisfaction of and local community after use. 9. Solid and liquid waste will be managed in line with WMSDP. 10. All waste materials shall be removed and disposed to disposal sites approved by local authorities 11. Land used for campsites shall be	Contractors	Through out construction phase	Through out construction sites and worker camps	Included in the contract with contractors

		restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned.				
10. Safety precautions for workers	Ensure worker safety	1. Establish safety measures as required by law and by good engineering practice and provide first aid facilities that are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, earplugs, gloves, etc. at no cost to the employee. 5. Where worker exposure to traffic cannot be completely eliminated, protective barriers shall be provided to shield workers from traffic vehicles. 6. Workers shall be provided with reliable supply of potable water. 7. Construction camps shall be provided with adequate drainage to avoid accumulation of stagnant water. 8. Construction camps shall be provided with toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained to allow effective operation. 9. Ensure reversing signals are installed on all construction vehicles.	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors
11. Traffic Management	Minimize disturbance of traffic	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience	Contractors	Through out construction phase	Through out construction sites; at start and end points of Section 1; junctions with National Road No.14c.	Included in the contract with contractors

		due to subproject operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold ups and congestion 3. In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up. 4. Provide safe vehicle and pedestrian access around construction areas. 5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. 6. Provide sufficient lighting at night within and in the vicinity of construction sites. 7. Designate traffic officers in construction sites.				
12. Environmental recovery	Provide environmental recovery of the subproject	Contractors to reconfirm and implement recovery (e.g., landscaping, tree replanting) identified at the detailed design stage	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors
Operation Phase						
1. Generate dust, noise, vibration	To minimize dust, noise and vibration	1. Install sign board, speed limit/ loading limit to prevent dust, noise and vibration from over speed vehicles 2. Install road humps at the residential area to reduce the impact from noise, dust and vibration.	Dak Nong Department of Transportation (DOT)	Through out operation phase	At the start and end point of two sections. At the sensitive areas closed to schools/ kindergarten, medical centres	Included in operation and maintenance cost
2. Traffic and road safety	Minimize road accident	1. Undertake road safety awareness campaigns for local residents and other road users of the subproject road. 2. Install and maintain road warning signs and markings. 3. Monitor road accidents and implement necessary preventive measures (awareness campaigns, provision of appropriate road furniture to enhance road safety and control traffic).	Dak Nong DOT	Through out operation phase	Along two sections subproject road	Included in operation and maintenance cost

C. Environmental monitoring

1. Compliance Monitoring

133. Table 15 below shows the program for monitoring the compliance on various provisions of the EMP during pre-construction, construction and operation phases. ESP needs to implement a number of measures during detailed design phase (e.g., incorporation of environmental design measures into the detailed design, update EMP, etc.) and this will be confirmed by PMU to ADB. During construction, most of the mitigation the contractors shall implement measures and CSC shall monitor their environmental performance, in terms of implementation of such measures. The timing or frequency of monitoring is also specified in Table 15. During operation EMP implementation shall be the responsibility of Dak Nong DOT.

134. At design phase, PMU shall ensure that EMP measures for the design stage are incorporated in the detailed design. The effective incorporation of the EMP in the civil works contracts shall also be ensured be by PMU with assistance from ESP and this, along with implementation of EMP provisions, shall be audited by ADB as part of the loan conditions.

135. Prior to implementation of the subproject the IEE and EMP will be updated and amended, as necessary, by ESP after the detailed designs are complete and contracting arrangements are known. Such updating shall be based on reconfirmation and any additional information on the assumptions made at this feasibility stage on location scale and expected conditions of the subproject.

136. At pre-construction phase, PMU with the support from ESP will prepare all environmental protection compliance certificates under Vietnam's regulations as guided through LEP 2014. CSC and ESP will also need to confirm that Contractors and their suppliers have complied with all statutory requirements for permits from DONRE and provincial authorities. CSC and ESP will check that Contractors have all the necessary valid licenses and permits for use of powered mechanical equipment if necessary and the use of local water supplies (and to construct or operate plant such as for cement mixing (if required) in line with all environmental regulations and permit conditions from provincial authorities.

137. At construction phase, the Contractors need to implement environmental monitoring in a monthly basis in all their construction sites. ESP will undertake regular monitoring of the contractor's implementation of mitigation measures specified in the Subproject EMP if applicable. On the other hand, CSC will also monitor the construction activities on daily basis. They will ensure that the contractors comply with all environmental regulations as specify in subproject EMP if applicable.

138. Dak Nong Department of Transportation will be in charge of EMP implementation in the operation phase. The tasks are including monitoring of dust, noise and natural calamity mitigation measures... They also monitor the accidents along the subproject road as basis for implementation of mitigation measures to improve road safety.

2. Environmental Effects Monitoring

139. ESP undertake baseline environmental monitoring for air quality, noise and surface water quality. Sampling will be conducted prior to start of site works at the specified locations. During construction, ESP shall undertake quarterly monitoring of surface water quality and semi-annual monitoring of ground water quality; air quality and noise in the same locations sampled during

pre-construction. Additional sampling occasions shall be carried out and additional parameters shall be analysed (as necessary) to validate complaints and/or investigate pollution events caused by the subproject. Dak Nong DOT will responsible for ambient air quality monitoring in the first two years of the operation phase.

Table 15 - Environmental Monitoring Compliance

Performance and Impact Monitoring					
Environmental Concern	**Parameter to monitor**	**Location**	**Frequency & Verification**	**Responsible to Monitor**	**Monitoring Cost**
Design and Pre-construction Phase					
1. Environment and climate change	Detail designs with environment and climate change cooperated	N/A	Only one time before the construction commence	PMU	Included in the operation budget of PMU
2. Land acquisition and resettlement	Compensation documents	N/A	Only one time before the construction commencement	Dak Nong DPI/ DONRE; PMU	Included in the operation budget of PMU
3. Environmentally responsible procurement	Include in bidding documents. Check compliance	N/A	Bidding preparation period. Before start site works	PMU	Included in the operation budget of PMU
4. Material Management Plan	Require in contract with ESP. Check at Detailed Design.	N/A	Only one time in detailed design phase	PMU	Included in the operation budget of PMU
5. Plan spoil and waste disposal	Require in contract with ESP. Check at Detailed Design.	N/A	Only one time in detailed design phase	PMU	Included in the operation budget of PMU
6. Unexploded Ordnance	Checking documents/ certificates	N/A	Once, before construction start	PMU	Included in the operation budget of PMU
7. Environmental Capacity Development	Require in contract with ESP. Check at Detailed Design. Complete training and check before and during the construction works.	N/A	Before construction commencement and at the beginning period of the construction phase	PMU	Included in the operation budget of PMU
Construction Phase					
1. Loss of trees and impacts to fauna	Check of implementation	Along the subproject road, especially 2 km go through protection forest in Dak Buk So; worker camps area	Before construction commencement and through out construction phase. Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
2. Local facilities	Check of implementation	Along the subproject road	Before construction commencement and through out construction phase. Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
3. Materials exploitation and management of	Check of implementation	Subproject site, quarries and	Bi-weekly	ESP/ PMU	Included in the operation budget

quarry and borrow pits		borrow pit areas	Part of daily construction supervision	CSC	of PMU/ ESP/ CSC
4. Waste and spoil disposal	Check of implementation	Through out construction site, material storage areas, machines and vehicles maintenance area	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
5. Noise, dust and vibration	Check of implementation	Through out construction site	Bi-weekly and spot checks Part of daily construction supervision	ESP/ PMU	Included in the operation budget of PMU/ ESP CSC
	Ambient air quality (temperature, moisture, wind direction and speed, PM10, PM2.5, PB, NO_2, SO_2…); Noise level (average noise level, maximum noise level, vehicles frequency…)	11 monitoring points: at start and end points of 2 sections. T-Junction with the road to NR14; Near Dak N'Drung centre; near Quang Vu quarry; near Ba Bridge; T-junction with NR14C; in the protection forest area; near Quang Truc centre.	1 time before construction start and semi-annually during 2 years construction time	ESP	3,300 USD[2]
6. Land slide, erosion control/ run off	Check of implementation	Through out construction site and high risk slope as agreed with ESP/PMU (especially in Km34)	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
7. Stream protection and bridge/culvert construction	Check of implementation	3 streams/ rivers crossing point	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC

[2] Figures has been estimated base on environmental monitoring cost norm of Dak Nong – Decision No. 17/2015/QD-UBND.

8. Water resources and quality	Check of implementation	Through out construction sites; 3 stream crossing positions, material storage sites, temporary waste disposal areas	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
	Surface water quality	5 sampling points in total. 3 sampling points at 20m downstream of the crossing stream. 1 sampling point Dak N'Drung lake; 1 sampling point in Dak Huyt bridge area	1 time before construction start and every quarter during 2 years construction time	ESP	4,050 USD
9. Construction and worker camps, sanitation and diseases	Check of implementation	Through out construction sites and worker camps	Before establishment of the facilities and through out the construction phase Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
10. Safety precautions for workers and public safety	Check of implementation. Check compliance to Labor Code of Vietnam and other relevant Decision, Decree and Circular under Government requirements	Through out construction sites	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
11. Traffic Management	Check of implementation	Through out construction sites; at junctions with road to NR14; start and end points of 2 sections; T-junction with NR14c.	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
12. Environmental recovery	Confirmed implementation of required enhancements	Through out construction sites	Before construction and bi-weekly check	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/

			Part of daily construction supervision		CSC
Operation Phase					
1. Dust, noise, vibration	Check of implementation; Ambient air environment, noise level at the road and in the areas which are adjacent to road	At the start and end point of two sections. At the sensitive areas (schools/ kindergarten, medical centres/ area of protection forest	Semi-annual in the first two years	Dak Nong DOT	Included in operation and maintenance cost
2. Road safety	Check of implementation	Along two sections of the subproject road	Semi-annual	Dak Nong DOT	Included in the operation budget of DOT

D. Reporting

140. PMU will submit the following reports to ADB:

- *Monitoring report for baseline environment:* this report shows the result of baseline environment as implemented by ESP on ambient air quality, surface water quality... This report will be submitted to ADB before the construction start.
- *Environmental monitoring reports:* Environmental monitoring reports will cover the status of EMP implementation in terms of required mitigation measures for different phases of the subproject, results of environmental effects monitoring (air quality, noise and surface water quality), necessary remedial actions to effectively address negative environmental impacts due to subproject implementation, status of environmental capacity building activities as well as documentation of complaints received and corresponding action/resolution. The environmental monitoring reports will be submitted to ADB semi-annually during the construction phase and annually for two years after completion of construction.

Table 16 – Reporting procedures

Project Phase	Type Of Report	Frequency	Responsibility	Submitted To Whom
Construction	**Environmental Performance Report** indicating compliance with EMP and monitoring results at the contractor site	Monthly	Construction contractor	CSC
	Subproject EMP Compliance Report indicating compliance with subproject EMP and monitoring results	Quarterly	CSC	ESP
	EMP Compliance Report indicating compliance with subproject EMP and monitoring results	Semi-annually during construction phase	ESP/ PMU	ADB
Operation	**EMP Compliance Report: Operation** indicating compliance with subproject EMP commitments during operation	Annually in the first two years of operation. On-going frequency to be determined based on review after 2 years.	Dak Nong DOT	Dak Nong DONRE

Table 17 – Estimated cost for EMP Implementation (2-year construction/ 4-year in total)

Item	Estimated cost (US$)
1. Environment Safeguard Specialist (ESP)	***76,910***
1 National ESP - 14 man-months (intermittent in the first 2 years; 6 – 4 – 4) – 4000 US$/ man-month	56,000
Per diem for ESP: 48 US$ x 30 days x 14 months	20,160
Air fare + taxi (to and from airports) for 3 round trips: 250 US$ x 3 trips	750
2. Environmental effects monitoring (implemented by ESP)	***7,350***
Ambient air quality: 11 monitoring locations x 5 times x 60 US$/sample[3]	3,300
Surface water quality: 5 monitoring locations x 9 times x 90 US$/sample[4]	4,050
3. Training/orientation, local transportation, supplies (by ESP)	***21,500***
a) Training/orientation: 1 formal training course for PMU, CSC, Contractors and Dak Nong DOT and other "on the job" training	1,500
b) Local transportation and supplies	20,000
4. Printing Environmental monitoring report by ESP (8 reports)	***8,000***
Subtotal (1+2+3+4)	**113,760**
5. Contingency	**11,240**
Total (1+2+3+4+5)	**125,000**

E. Capacity building

141. In Viet Nam, the environmental assessment process is established but environmental awareness and capability for implementation of EMP in infrastructure projects of both the executing agency and the implementation agency (PMU) are limited and in development. The safeguards staff of the PMU is usually responsible for many different task and do not have good background on safeguards issues. Usually, the engineer will also be in charge of the environmental monitoring and his/ her capacity is not suitable to check the adequacy of the subproject EMP. The IEEs and EMP are referred to the environmental department in DONRE for approval. During the Project PPTA phase, PPU has been established under Dak Nong DPI with one staff has been assigned as ESO.

142. The most significant challenge is the lack of human and financial resources and necessary infrastructure. To address this constraint, Dak Nong DPI/PMU will designate a full time staff as environmental safeguards officer (ESO) to handle the environmental aspects of the subproject during implementation stage. Ideally, ESO of the Project Preparation Unit (PPU) will be come ESO of the subproject PMU also. The ESO and other relevant staff of PMU will be trained by the environment specialists of the ESP during subproject implementation as "on the job" training or by formal training courses.

[3] Due to there is no cost norm for Dak Lak province, figures has been estimated base on environmental monitoring cost norm of Dak Nong – Decision No. 17/2015/QD-UBND.
[4] Due to there is no cost norm for Dak Lak province, figures has been estimated base on environmental monitoring cost norm of Dak Nong – Decision No. 17/2015/QD-UBND.

Table 18 – Detail capacity building program

Objective	1. Build capacity and procedures in undertaking systematic environmental assessments in accordance with Government regulations and ADB guidelines 2. Provide training on international best practice on environmental management, monitoring and reporting. 3. Provide guidance on how to effectively incorporate environmental measures into project design and how to incorporate EMP provisions into tender and contract documents.
Tasks/Scope of Work	1. Undertake training needs analyses and review prevailing government regulations and donor guidelines governing the assessment and management of environmental impacts for road development. 2. Review the skills of PMU and Dak Nong DOT staff to establish existing capacity on environmental assessments, environmental monitoring and implementation of mitigation measures for road development project. 3. Prepare the training plan and relevant training materials. 4. Deliver the training, which may be through a combination of hands-on assistance, on-the-job training, and training workshops. 5. Evaluate the effectiveness of the training measuring improvements in attitudes and skills achieved. 6. Modify the training documents/materials as necessary. 7. Hand-over the amended training documents/ material to the project manager for use in the delivery of the training. 8. Prepare report on result of training.
Time frame	Possible within 3 months after construction commencement
Target participant	Staff in PMU and Dak Nong DOT who responsible for environmental management
Staff resources	International and national environmental specialist with at least 15 years experience on environmental management of road projects and must possess relevant post-graduate degree in civil engineering, environmental management and other relevant courses. With working knowledge of safety issues and at least 3 years experience in conducting environmental management training.

X. CONCLUSIONS AND RECOMMENDATIONS

143. This IEE study was carried out in the Technical Assistant for Project Preparation (PPTA) phase. Primary and secondary data were used to assess potential environmental impacts in a comprehensive manner and public consultation and route reconnaissance were carried out in order complete the environmental assessments and recommend suitable mitigation measures. The IEE report provides a picture of potential environmental impacts associated with the upgrading of the subproject road and suitable mitigation measures have been recommended.

144. The implementation of the subproject “Upgrade Road from NR No.14 to Bu Prang Border Gate (Section Km3-Km17 of PR No.686 and Section From Tuy Duc District Centre to Dak Huyt Bridge) – Dak Nong Province” will steadily improve the road quality; make it convenient for goods transportation to Bu Prang Border Gate. Several actions are required during the detailed design stage to minimize impacts to acceptable levels. The negative environmental impacts from the upgrading works will mostly take place during the construction stage. All of the impacts during construction phase should be very predictable and manageable and with appropriate mitigation and few residual impacts are likely. Additional human and financial resources will be required to improve environmental capability and to progress and achieve necessary statutory compliance and environmental clearance certification for the subproject or associated activities that also require environmental permits under the environmental laws of Viet Nam – LEP 2014.

145. No further or additional impact assessment is considered necessary at this stage. At the implementation stage, PMU through ESP will develop detail EMP to monitor the schedules of mitigation measures and conduct of environmental effects monitoring activities. EMP must be updated to ensure effective environmental monitoring and should be develop follow-monitoring plan as specified in the EMP. With these measures in place, environmental impacts of the subproject should be manageable and will not result in any residual impacts, which are above accepted environmental standards.

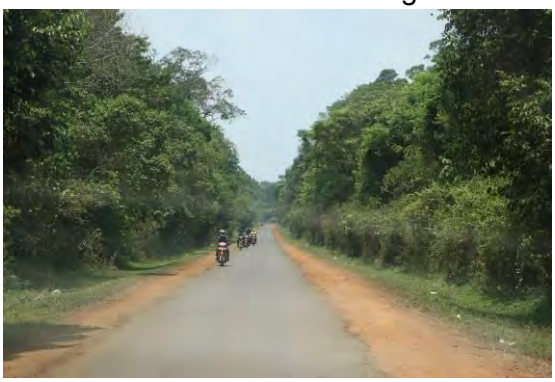
Appendix 1: Photos of the subproject road and the vicinity

S1 - Starting point in Nam N'Jang commune

Quang Vu quarry at the road side of the subproject

Low roadside in Dak N'Drung commune

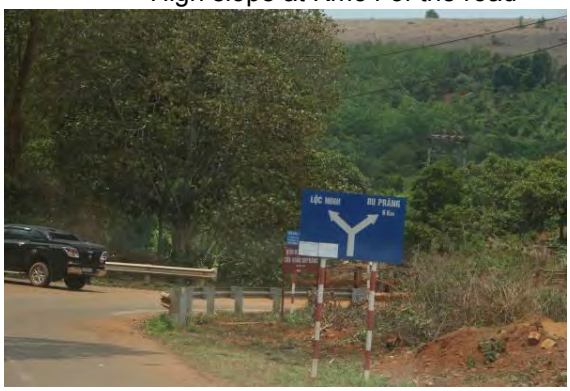
Dumping site in Quang Truc commune



Area goes through 2 km of protection forest

High slope at Km34 of the road

Military Base of Unit No.726 is under construction



End point at Dak Huyt Bridge

Appendix 2: Environmental criteria for subproject selection

Province	Road	Environmental Criteria (100 points)				(Points remaining over 100 points) Environmental grading and remarks
		(deduction/40) National Park, Nature Reserve, Historical Site, Forest	(deduction/20) Flood prone, water bodies	(deduction/20) Land slide, soil erosion	(deduction/20) Alteration of surface water bodies	
Kon Tum	No. 675A	(-35) Some type of forest along the road	(-15) Sesan river, several large resevoirs	(-15) Some steep slopes on the road	(-15) 7 bridegs/ total 237 m of length	**Rank 1 – 10 points** Category B. Pay attention to land slide, soil erosion and flood. Wood logging activities still happen.
	No. 673A	(-40) Ngoc Linh Nature Reserve	N/A	(-10) Widing road with high moutains	(-5) 4/24	**Rank 3 – 30 points** Category A. The first 9km go through Ngoc Linh Nature Reserve. Pay attention to land slide also.
Gia Lai	No. 665	N/A	(-5) Some streams and river	N/A	(-20) 3/231	**Rank 4 – 40 points** Category B. Pay attention to flooding
	ChuTy– Ia Nan	N/A	N/A	N/A	(-5) 1/33	**Rank 5 – 50 points** Category B
	No. 670	N/A	(-10) Some rivers and streams	(-10) Some steep slopes on the road	(-5) 3/30	**Rank 4 – 40 points** Category B. Pay attention to land slide, soil erosion.
Daklak	No. 29	(-20) York Don National Park	N/A	N/A	N/A	**Rank 5 – 50 points** Category B. The part connect to Dak Rue Border Gate go near the buffer zone of York Don National Park.
	Cu Ne – Ea Sup	N/A	(-10) Ea Sup Lakes and some small streams and lakes	N/A	(-5) 2/20	**Rank 5 – 50 points** Category B. Pay attention to flooding
Daknong	Dak Buk So – Bu Prang	(-20) Border protection forest. Bu Gia Map National Park (in Binh Phuoc	(-5) Dak Buk So; Dak Blung lakes. Some small irrigation system	(-15) Some slopes along the route, hilly parts of the road	N/A	**Rank 3 – 30 points** Category B. Pay attention to forest protection and land slide

		province)				
	No. 685	(-20) Cat Tien South Protection Forest	(-5) Some lakes and river	(-10) Mountainous area	N/A	**Rank 4 – 40 points** Category B. Cat tien South Protection Forest is 7 km away from the road. Pay attention to forest protection and land slide
	Pr.Rd No. 6	N/A	(-5) Dak Buk So lake and other small lakes	(-15) Some land slide point	N/A	**Rank 4 – 40 points** Category B. Pay attention to land slide
	Gia Nghia Rd	N/A	N/A	N/A	N/A	**Rank 5 – 50 points** Category B
Binh Phuoc	Pr.Rd No.756	N/A	(-5) Some small lakes and streams	N/A	N/A	**Rank 5 – 50 points** Category B
	No. 754; 754A	(-30) Ta Thiet Protection Forest; Historical Site	(-5) Some small rivers and lakes	N/A	N/A	**Rank 4 – 40 points** Category B. The road goes along Ta Thiet Protection Forest for around 3.5 km. Historical Site of Southern Army General Staff is far from the road. Pay attention to forest protection.
	756B	N/A	(-5) Some small streams and lakes	N/A	(-5) 1/10	**Rank 5 – 50 points** Category B
	756C	N/A	N/A	N/A	N/A	**Rank 5 – 50 points** Category B

Appendix 3: Sources of reference information

1. *Dak Nong Statistic Report 2014*
2. *Tuy Duc and Dak Song Statistic Report 2014*
3. *Statistics of poor households and marginal poor households of Dak Song and Tuy Duc District People's Committee in 2015*
4. *Statistics of poor households of Labour Invalids and Social Affairs of Dak Song and Tuy Duc District People's Committee in 2015*
5. *Statistics Division of Dak Song and Tuy Duc District people's committee in 2015*
6. *Statistic Division of area by administrative unit of Dak Song and Tuy Duc district in 2015*
7. *Healthcare Centre of Dak Song and Tuy Duc Districts people's committee in 2015*

Appendix 4: Environmental Mitigation Measures to Include into Bidding Documents

1. Loss of trees and impacts to fauna	1. Minimized vegetation covers clearances. 3. Prohibit cutting of trees for firewood and for use in subproject. 4. During replanting works, new alien plant species (i.e., species not currently established in the country or region of the subproject) shall not be used. Invasive species shall not be introduced into new environments. 5. Will not use or permit the use of wood as a fuel for the execution of any part of the works, including but not limited to the heating of bitumen and bitumen mixtures, and to the extent practicable shall ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 6. Shall not buy or use wood from the illegal sources (that come from the illegal logging) 7. No construction camps, concrete mixing plants, material storage sites are to be located in the forest area. 10. Take all precautions necessary to ensure that damage to vegetation is avoided due to fires resulting from execution of the works. Immediately suppress the fire, if it occurs, and shall undertake replanting to replace damaged vegetation.
2. Local facilities	1. Reconfirm power, water supply, and telecommunications likely to be interrupted by the works. 2. Contact all relevant local authorities for facilities and local people to plan reprovisoning of power, water supply, and telecommunication systems. 3. Facilities shall be relocated and reconnected well ahead of commencement of construction works and contractors shall coordinate with facility company for relocation and reconnection well before works commence. 4. Affected communities shall be properly informed in advance. 5. Reconnection of facilities shall be done at the shortest practicable time before construction commences. 6. Facilities damaged during construction shall be reported to the CSC, PMU and facility authority and repairs arranged immediately. 7. Access roads, agricultural land and other properties damaged during transport of construction materials and other project-related activities shall be reinstated upon completion of construction works at each section
3. Materials exploitation and management of quarry, borrow pits and temporary storage area	1. Implement MMP prepared by ESP during detailed design phase. 2. Balance excavation and fill requirements to minimization negative impacts 3. Prioritize use of existing quarry sites with suitable materials and update the list of quarries and borrow pits monthly in MMP and report to PMU and minimize impacts on other local resources. 4. Procure materials only from Dak Nong DONRE authorized quarries and borrow sites. 5. Replant tree and vegetation cover of any vegetation clearance area in quarries and borrow pits 6. Stockpile topsoil for later use and fence and re-contour borrows pits after use. Topsoil, overburden, and low-quality materials shall be properly removed, stockpiled near the site, and preserved for rehabilitation. 7. Borrow/quarry sites shall not be located in productive land and forested areas. 8. During quarry/borrow site operation, provide adequate drainage to avoid accumulation of stagnant water. 9. Ensure borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of water bodies favourable for mosquito breeding. 10. Upon completion of extraction activities, quarry and borrow pits shall be dewatered and fences shall be installed, as appropriate, to minimize health and safety risks. 11. To avoid drowning when pits become water filled, measures such as fencing, providing flotation devices such as a buoy tied to a rope, etc. shall be implemented.
4. Waste and spoil disposal	1. Implement corresponding provisions of WMSDP prepared by the ESP. 2. Areas for disposal to be agreed with CPCs and Dak Nong DONRE checked and recorded by the CSC, ESP/PMU and monitored 3. Spoil and waste will not be disposed of in streams or other surrounding water

	bodies. 4. Spoils and waste shall only be disposed to areas approved by local authorities. 5. Spoil disposals shall not cause sedimentation and obstruction of flow of watercourses, damage to agricultural land and densely vegetated areas. 6. Under no circumstances will spoils be dumped into watercourses (rivers, streams, drainage, irrigation canals, etc.) 7. The spoils disposal site shall be located at least 50 m from surface watercourses and shall be protected from erosion by avoiding formation of steep slopes and grassing.
5. Noise, dust and vibration	1. Restrict works to daylight hours within 500 m of sensitive area. 3. Powered mechanical equipment and vehicle emissions to meet national TCVN/QCVN standards. All construction equipment and vehicles shall have valid certifications indicating compliance to vehicle emission and noise creation standards. 4. Monitor and investigate complaints; propose alternative mitigation measures. 5. Keep material storage site moist 6. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emission. 7. On rainless day undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials storage sites, construction sites, access roads, quarry areas, borrow sites and other subproject areas where residential sites and other sensitive points such as schools, clinics… are located nearby. 8. Mixing, bitumen heating plants operations will be equipped with dust suppression devices such as water sprays. 9. Clean up road surfaces after work. 10. To protect buildings and structures from vibration, non-vibrating roller shall be used in construction sites near buildings and structures. 11. Structures, which are damaged due to vibration caused by the construction activities, shall be repaired immediately as directed by ESP/PMU. 12. Machinery shall be turned off when not in use. 13. Pile driving during to be schedule for daytime if construction site is near sensitive points or approved by DONRE, CPCs and ESP/PMU. 14. Impose speed limits on construction machines and transportation vehicles to minimize dust emission along areas where sensitive pints are located (houses, schools, clinics, pagodas etc.).
6. Erosion control/ run off	1. Establish vegetation and erosion protection immediately after completion of works in each stretch / sector. 2. Check weather forecasts and minimize work in wet weather. 3. Stockpile topsoil for immediate replanting after cutting. 4. Minimize damage and excavation of surrounding vegetation during slope formation. 5. Protect the cut slope with planted vegetation, bioengineering or conventional civil engineering structures as soon as practicable after excavation. 6. Include and implement appropriate measures for slope protection, i.e. vegetation cover and stone pitching, as required in the detailed construction drawings. 7. Prevent erosion and protect the excavated slope with temporary or permanent drainage as soon as practicable after cutting. 8. If new erosion occurs accidentally, back fill immediately to restore original contours. 9. Low embankments will be protected from erosion by seeding and planting indigenous grasses that can flourish under local conditions. 10. Payments will be linked to the completion of the works as indicated by the installation of erosion control measures to protect the works to the satisfaction of ESP/PMU.
7. Stream protection and bridge/culvert construction	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed not to block streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.
8. Impact on water	1. Province adequate drainage facilities at construction sites and worker camps to

resources and quality	avoid stagnant water. 2. Implement agreed designs for bridges/ culverts sufficient to control flooding as designed. 3. Store lubricants, fuels and wastes in dedicated enclosures at least 50 m from water bodies on high and impervious ground with top cover 4. Solid waste from construction activities and workers camps will not be thrown in streams and other water bodies (drainage, lake, pond, etc.) 5. Construction storage/stockpiles shall be provided with bunds to prevent silted run-off. 6. Stockpiled materials will be covered to reduce silted run-off. 7. No stockpiling or borrow sites at least 100m of water body. 8. Work in streams at bridge repair sites will be scheduled during dry season and work duration shall be as short as possible. 9. Washing of machinery and vehicles in surface waters shall be prohibited.
9. Large influx of construction workers	1. Construction and worker camp location and facilities located at least 500m from settlements and agreed with local communities and facilities approved by ESP and managed to minimize impacts. 2. Hire and train as many local workers as possible. 3. Provide adequate housing for all workers at the construction camps and establish clean canteen/eating and cooking areas. 4. Mobile toilets (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and prevented by cleaning lavatories daily and by keeping toilets clean at all times. 5. Provide separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supply for male and female workers. 6. As much as possible, food shall be provided from farms nearby and bush meat supplies will be banned to discourage poaching. 7. Camp site will be cleaned up to the satisfaction of and local community after use. 8. Solid and liquid waste will be managed in line with WMSDP. 9. All waste materials shall be removed and disposed to disposal sites approved by local authorities 10. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned.
10. Safety precautions for workers	1. Establish safety measures as required by law and by good engineering practice and provide first aid facilities that are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, earplugs, gloves, etc. at no cost to the employee. 5. Where worker exposure to traffic cannot be completely eliminated, protective barriers shall be provided to shield workers from traffic vehicles. 6. Workers shall be provided with reliable supply of potable water. 7. Construction camps shall be provided with adequate drainage to avoid accumulation of stagnant water. 8. Construction camps shall be provided with toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained to allow effective operation. 9. Ensure reversing signals are installed on all construction vehicles.
11. Traffic Management	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience due to subproject operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold ups and congestion 3. In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge

	construction sites to minimize traffic build-up. 4. Provide safe vehicle and pedestrian access around construction areas. 5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. 6. Provide sufficient lighting at night within and in the vicinity of construction sites. 7. Designate traffic officers in construction sites.
12. Environmental recovery	Reconfirm and implement recovery (e.g., landscaping, tree replanting) identified at the detailed design stage

Appendix 5: National Technical Regulations of Vietnam

NATIONAL TECHNICAL REGULATION

ON SURFACE WATER QUALITY

1. GENERAL PROVISIONS

1.1. Scope of application

1.1.1. This regulation specifies the limit value of surface water quality parameters.

1.1.2. This regulation applies to assess and control the quality of surface water source, as a basis for the protection and use of water appropriately.

1.2. Explanation of terms

Surface water referred to in this Regulation is water flowing through or stagnate on the ground, streams, canals, ditches, gullies, arroyos, lakes, ponds, swamps, ...

2. TECHNICAL REGULATIONS

Limit values of the surface water quality parameters are specified in Table 1.

Table 1. Limit values of the surface water quality parameters

No.	Parameters	Unit	Limit values			
			A		B	
			A1	A2	B1	B2
1	pH		6-8,5	6-8,5	5,5-9	5,5-9
2	i. Dissolved oxygen (DO)	mg/l	≥ 6	≥ 5	≥ 4	≥ 2
3	Total suspended solidss (TSS)	mg/l	20	30	50	100
4	COD	mg/l	10	15	30	50
5	BOD_5 (20^0C)	mg/l	4	6	15	25
6	Ammonium (NH^+_4) (as N)	mg/l	0,1	0,2	0,5	1
7	Clorua Chloride (Cl^-)	mg/l	250	400	600	-
8	Florua Fluoride (F^-)	mg/l	1	1,5	1,5	2
9	Nitrite (NO^-_2) (as N)	mg/l	0,01	0,02	0,04	0,05
10	Nitrate (NO^-_3) (as N)	mg/l	2	5	10	15
11	Phosphate (PO_4^{3-}) (as P)	mg/l	0,1	0,2	0,3	0,5
12	Xianua Cyanide (CN-)	mg/l	0,005	0,01	0,02	0,02
13	Asen (As)	mg/l	0,01	0,02	0,05	0,1
14	Cadimi (Cd)	mg/l	0,005	0,005	0,01	0,01
15	Lead (Pb)	mg/l	0,02	0,02	0,05	0,05
16	Chrom III (Cr^{3+})	mg/l	0,05	0,1	0,5	1

17	Chrom VI (Cr^{6+})	mg/l	0,01	0,02	0,04	0,05
18	Copper (Cu)	mg/l	0,1	0,2	0,5	1
19	Zinc (Zn)	mg/l	0,5	1,0	1,5	2
20	Nickel (Ni)	mg/l	0,1	0,1	0,1	0,1
21	Iron (Fe)	mg/l	0,5	1	1,5	2
22	Mercury (Hg)	mg/l	0,001	0,001	0,001	0,002
23	Surface-active substances	mg/l	0,1	0,2	0,4	0,5
24	Total oil & grease	mg/l	0,01	0,02	0,1	0,3
25	Phenon (Total)	mg/l	0,005	0,005	0,01	0,02
26	Organic chlorine pesticide					
	Aldrin + Dieldrin	µg/l	0,002	0,004	0,008	0,01
	Endrin	µg/l	0,01	0,012	0,014	0,02
	BHC	µg/l	0,05	0,1	0,13	0,015
	DDT	µg/l	0,001	0,002	0,004	0,005
	Endosunfan(Thiodan)	µg/l	0,005	0,01	0,01	0,02
	Lindan	µg/l	0,3	0,35	0,38	0,4
	Chlordane	µg/l	0,01	0,02	0,02	0,03
	Heptachlor	µg/l	0,01	0,02	0,02	0,05
27	Organic phosphorus pesticide					
	Parathion	µg/l	0,1	0,2	0,4	0,5
	Malathion	µg/l	0,1	0,32	0,32	0,4
28	Herbicide					
	2,4D	µg/l	100	200	450	500
	2,4,5T	µg/l	80	100	160	200
	Paraquat	µg/l	900	1200	1800	2000
29	Total radioactivity α	Bq/l	0,1	0,1	0,1	0,1
30	Total radioactivity β	Bq/l	1,0	1,0	1,0	1,0
31	E.coli	MPN/ 100ml	20	50	100	200
32	Coliform	MPN/ 100ml	2500	5000	7500	10000

Note: The classification of surface water to assess and control the quality of water for various purposes of water use:

A1 - Good use for the purpose of domestic water supply and other purposes, such as type A2, B1 and B2.

A2 – Used for the purpose of domestic water supply but applying the appropriate treatment technology; aquatic plant and animal conservation, or purposes of use as type B1 and B2.

B1 - Use for irrigation and drainage purpose or other purposes with similar water quality requirements or other purposes of use such as type B2.

B2 – Water transportation and other purposes with low water quality requirements.

3. METHOD FOR DETERMINATION

3.1. Sampling for surface water quality monitoring conducted under the guidance of national standards:

- TCVN 5992:1995 (ISO 5667-2: 1991) - Water quality - Sampling. Guidance on sampling techniques.

- TCVN 5993:1995 (ISO 5667-3: 1985) - Water quality - Sampling. Guidance on storage and handling of samples.

- TCVN 5994:1995 (ISO 5667-4: 1987) - Water quality - Sampling. Guidance on sampling in natural and artificial lakes and ponds.

- TCVN 5996:1995 (ISO 5667-6: 1990) - Water quality - Sampling. Guidance on sampling in rivers and streams.

3.2. Analytical methods to determine the parameters of surface water quality shall comply with the guidance of the national standards or corresponding analytical standards of international organizations:

-TCVN 6492-1999 (ISO 10523-1994) - Water quality - Determination of pH.

-TCVN 5499-1995. Water quality - Determination of dissolved oxygen - Winkler method.

- TCVN 6625-2000 (ISO 11923-1997) - Determination of suspended solids by filtration through glass-fibre filters

- TCVN 6001-1995 (ISO 5815-1989) - Water quality - Determination of biochemical oxygen demand after 5 days (BOD 5) - Dilution and seeding method.

- TCVN 6491-1999 (ISO 6060-1989) - Water quality - Determination of the chemical oxygen demand.

- TCVN 6494-1999 - Water quality - Determination of ions of fluoride, chloride, nitrite, Orthophotphat, bromide, nitrate and soluble sulphate in liquid ion chromatography.

- TCVN 6194-1996 (ISO 9297-1989) - Water quality - Determination of chloride. The method of titration of nitrate silver with chromate indicator (MO method).

- TCVN 6195-1996 (ISO 10359-1-1992) - Water quality - Determination of fluoride - Electrochemical probe method for potable and lightly polluted water

- TCVN 6178-1996 (ISO 6777-1984) - Water quality - Determination of nitrite. Molecular absorption spectrometric method.

- TCVN 6180-1996 (ISO 7890-3-1988) - Water quality - Spectrometric method using sulfosalicylic acid

- TCVN 5988-1995 (ISO 5664-1984) - Water quality - Determination of ammonium - Distillation and titration method.

- TCVN 6181-1996 (ISO 6703-1-1984) - Water quality - Determination of total cyanide.

- TCVN 6336-1998 (ASTM D 2330-1988) - Test method for Methylene Blue Active Substances

- TCVN 5991-1995 (ISO 5666-3-1984) - Water quality - Determination of total mercury by flameless atomic absorption spectrometry - Method after digestion with bromine

- TCVN 6002-1995 (ISO 6333-1986) - Water quality - Determination of manganese - Formaldoxime spectrometric method

- TCVN 6053-1995 (ISO 9696-1992) - Water quality - Measurement of gross alpha activity in non-saline water - Thick source method

- TCVN 6177-1996 (ISO 6332-1988) - Water quality - Determination of iron - Spectrometric method using 1,10 - phenanthroline

- TCVN 6193-1996 (ISO 8288-1986) - Water quality - Determination of cobalt, nickel, copper, zinc, cadmium and lead - Flame atomic absorption spectrometric methods

- TCVN 6197-1996 (ISO 5961-1994) - Water quality - Determination of cadmium by atomic absorption spectrometry

- TCVN 6222-1996 (ISO 9174-1990) - Water quality. Methods for the determination of total chromium by atomic absorption spectrometry

- TCVN 6626-2000 (ISO 11969-1996) - Water quality - Determination of arsenic - Atomic absorption spectrometric method (hydride technique)

- TCVN 6216-1996 (ISO 6439-1990) - Water quality - Determination of phenol index - 4-Aminoantipyrine spectrometric methods after distillation

- TCVN 5070-1995 - Water quality - Weight method for determination of oil and oil products

- TCVN 6053-1995 (ISO 9696-1992) - Water quality - Measurement of gross alpha activity in non-saline water - Thick source method

- TCVN 6219-1995 (ISO 9697-1992) - Water quality - Measurement of gross beta activity.

- TCVN 6187-1-1996 (ISO 9308-1-1990) - Water quality - Detection and enumeration of coliform organisms, thermotolerant coliform organisms and presumptive Escherichia coli - Part 1: Membrane filtration method

The parameters specified in this Regulation not having national standards guiding the analytical method shall apply the corresponding analytical standards of the international organizations

4. IMPLEMENTATION ORGANIZATION

This Regulation shall apply in substitution for TCVN 5942:1995 - Water quality - surface water quality standards in the List of Vietnamese standards on environment which is mandatorily applied and issued together with Decision No. 35/2002/QD-BKHCNMT dated June 25, 2002 of the Minister of Science, Technology and Environment.

In case the national standards referred in this Regulation amended and supplemented or superseded shall be applied under new documents.

QCVN 09 : 2008/BTNMT

NATIONAL TECHNICAL REGULATION

ON UNDERGROUND WATER QUALITY

Introduction

QCVN 09:2008 / BTNMT was written by the Compilation Board of national technical regulations on water quality, submitted by the General Department of Environment and Legal Department for approval and issued under the Decision No. 16/2008/QD-BTNMT dated December 31, 2008 of the Minister of Natural resources and Environment.

NATIONAL TECHNICAL REGULATION

ON UNDERGROUND WATER QUALITY

1. GENERAL PROVISIONS

1.1. Scope of application

1.1.1. This regulation specifies the limit value of underground water quality parameters.

1.1.2. This regulation applies to assess and control the quality of underground water source, as a basis for the orientation of various purposes of use.

1.2. Explanation of terms

Underground water in this Regulation is the water in the soil and rocks underground.

2. TECHNICAL REGULATIONS

Limit values of the underground water quality parameters are specified in Table 1.

Table 1: Limit values of the underground water quality parameters

No.	Parameters	Unit	Limit values
1	pH	-	5,5 - 8,5
2	Hardness (as CaCO3)	mg/l	500
3	Total solids	mg/l	1500
4	COD ($KMnO_4$)	mg/l	4
5	Ammonium (as N)	mg/l	0,1
6	Chloride (Cl-)	mg/l	250
7	Fluoride (F-)	mg/l	1,0
8	Nitrite (NO^-_2) (as N)	mg/l	1,0
9	Nitrate (NO^-_3) (as N)	mg/l	15
10	Sulgreasee (SO_4^{2-})	mg/l	400
11	Cyanide (CN-)	mg/l	0,01
12	Phenol	mg/l	0,001
13	Asenic (As)	mg/l	0,05

14	Cadimi (Cd) Cadmium (Cd)	mg/l	0,005
15	Lead (Pb)	mg/l	0,01
16	Chromium VI (Cr6 +)	mg/l	0,05
17	Copper (Cu)	mg/l	1,0
18	Zinc (Zn)	mg/l	3,0
19	Manganese (Mn)	mg/l	0,5
20	Mercury (Hg)	mg/l	0,001
21	Iron (Fe)	mg/l	5
22	Selenium (Se)	mg/l	0,01
23	Total radioactivity α	Bq/l	0,1
24	Total radioactivity β	Bq/l	1,0
25	E.Coli	MPN/100ml	Not found
26	Coliform	MPN/100ml	3

3. METHOD FOR DETERMINATION

3.1. Sampling for underground water quality monitoring conducted under the guidance of national standards:

- TCVN 5992:1995 (ISO 5667-2: 1991) - Water quality - Sampling - Guidance on sampling techniques

- TCVN 5993:1995 (ISO 5667-3: 1985) - Water quality -sampling -Guidance on the preservation and handling of samples

- TCVN 6000:1995 (ISO 5667-11: 1992) - Water quality -sampling -Guidance on the sampling of groundwaters

3.2. Analytical methods to determine the parameters of underground water quality shall comply with the guidance of the national standards or corresponding analytical standards of international organizations:

- TCVN 6492-1999 (ISO 10523-1994) - Water quality - Determination of pH

- TCVN 2672-78 – Potable water – Method for determing the general hardness

- TCVN 6178-1996 (ISO 6777-1984) - Water quality -Determination of nitrite - Molecular absorption spectrometric method

- TCVN 6180-1996 (ISO 7890-3-1988) - Water quality - Determination of nitrate - Spectrometric method using sulfosalicylic acid

- TCVN 6200-1996 (ISO 9280-1990) - Water quality - Determination of sulgreasee - Gravimetric method using barium chloride

- TCVN 6181-1996 (ISO 6703-1-1984) Water quality - Determination of total cyanide

- TCVN 5988-1995 (ISO 5664-1984) - Water quality - Determination of ammonium -Distillation and titration method

- TCVN 6194-1996 (ISO 9297-1989) Water quality -Determination of chloride - Silver nitrate titration with chromate indicator (Mohr's method)

- TCVN 6195-1996 (ISO 10359-1-1992) - Water quality - Determination of fluoride - Part 1: Electrochemical probe method for potable and lightly polluted water

- TCVN 6216-1996 (ISO 6439-1990) - Water quality - Determination of phenol index -4-Aminoantipyrine spectrometric methods after distillation

- TCVN 6626-2000 (ISO 11969-1996) - Water quality - Determination of arsenic - Atomic absorption spectrometric method (hydride technique)

- TCVN 6193-1996 (ISO 8288-1986) - Water quality - Determination of cobalt, nickel, copper, zinc, cadmium and lead - Flame atomic absorption spectrometric methods

- TCVN 6197-1996 (ISO 5961-1994) - Water quality - Determination of cadmium by atomic absorption spectrometry

- TCVN 6002-1995 (ISO 6333-1986) - Water quality - Determination of manganese - Formaldoxime spectrometric method

- TCVN 6177-1996 (ISO 6332-1988) - Water quality - Determination of iron - Spectrometric method using 1,10 - phenanthroline

- TCVN 6183-1996 (ISO 9965-1993) -Water quality - Determination of selenium - Atomic absorption spectrometric method (hydride technique)

- TCVN 59910-1995 (ISO 5666-3-1984) Water quality - Determination of total mercury by flameless atomic absorption spectrometry - Method after digestion with bromine

- TCVN 6222-1996 (ISO 9174-1990) - Water quality -Determination of chromium - Atomic absorption spectrometric methods

- TCVN 6187-1-1996 (ISO 9308-1-1990) - Water quality - Detection and enumeration of coliform organisms, thermotolerant coliform organisms and presumptive Escherichia coli - Part 1: Membrane filtration method

The parameters specified in this Regulation not having national standards guiding the analytical method shall apply the corresponding analytical standards of the international organizations

4. IMPLEMENTATION ORGANIZATION

This Regulation shall apply in substitution for TCVN 5944:1995- Water quality - underground water quality standards in the List of Vietnamese standards on environment which is mandatorily applied and issued together with Decision No. 35/2002/QD-BKHCNMT dated June 25, 2002 of the Minister of Science, Technology and Environment.

In case the national standards referred in this Regulation amended and supplemented or superseded shall be applied under new document

QCVN 05:2013/BTNMT

NATIONAL TECHNICAL REGULATIONS ON AMBIENT AIR QUALITY

Introduction

QCVN 05:2013/BTNMT was written by the Compilation Board of national technical regulations on ambient air quality, submitted by the General Department of Environment and Legal Department for approval and issued under the Circular No. 32/2013/TT-BTNMT dated October 25, 2013 of the Minister of Natural resources and Environment.

National Technical Regulation on Ambient Air Quality

1. GENERAL PROVISIONS

1.1. Scope of applications

1.1.1. This Regulation deals with limitations on values of basic factors including sulphur dioxide (SO2), carbon monoxide (CO), dioxide nitrogen (NO2), ozone (O3), total suspended particles (TSP), PM10, PM2.5, particles, and lead (Pb) in ambient air.

1.1.2. This Regulation applies to supervision and assessment of ambient air quality.

1.1.3. This Regulation does not apply to air within manufacturing facilities and indoor air.

1.2. Interpretation of terms

In this Regulation, the terms below are construed as follows:

1.2.1. Total suspended particles (TSP) is total particles with aerodynamic diameter less than or equal to 100 μm.

1.2.2. Particle PM_{10} is total suspended particles with aerodynamic diameter less than or equal to 10 μm.

1.2.3. Particle $PM_{2,5}$ is total suspended particles with aerodynamic diameter less than or equal to 2,5 μm.

1.2.4. Average 1 hour: The arithmetic average of the measured values over a period of 1 hour.

1.2.5. Average 8 hours: The arithmetic average of the measured values over a period of 8 consecutive hours.

1.2.6. Average 24 hours: The arithmetic average of the measured values over a period of 24 consecutive hours (a day).

1.2.7. Annual average: The arithmetic average of the 24-hour averate values measured over a period of one year.

2. Technical Reputation

Maximum value of basic parameters of ambient air is specified in Table 1.

Table 1: Maximum value of basic parameters of ambient aire

Unit: Micro gram over cubic meter ($\mu g/m^3$)

No.	Paramater	Average 1 hour	Average 8 hours	Average 24 hours	Annual average
1	SO_2	350	-	125	50
2	CO	30.000	10.000	-	-
3	NO_2	200	-	100	40
4	O_3	200	120	-	-
5	Total suspended particles (TSP)	300	-	200	100
6	Dust PM_{10}	-	-	150	50
7	Dust $PM_{2.5}$	-	-	50	25
8	Pb	-	-	1,5	0,5
Note: (-) unspecified					

Support to Border Areas Development Project (48189-002)

Initial Environmental Examination (IEE)

UPGRADE PROVINCIAL ROAD No.665 IA BANG-IA MOR, CHU PRONG DISTRICT, GIA LAI PROVINCE

Prepared for
THE ASIAN DEVELOPMENT BANK

July 2016

Prepared by CONTRANS AB, SWEDEN
In joint venture with Transport Engineering Consultant Joint Stock Company No.2 (TECCO2) (Vietnam) and
In association with ASEAN Development and Management Consulting Ltd (ASEC) (Vietnam)

CURRENCY EQUIVALENT
(As of 27th May 2016)

Currency unit: Viet Nam Dong (VND)
USD1 = VND 22300

WEIGHTS AND MEASURES
km^2 – square kilometre
m^3 cubic meter

NOTE
In this report "$" refers to US Dollars

Consultants Quality Assurance Protocol

Prepared By	**CONTRANS SWEDEN AB**		
Auditor/Reviewer	**David Lupton Team Leader (TL)**		
Place	**Buon Ma Thuat, Vietnam**	*Date*	**21-06-2016**
Approved By	**Ta Ngoc Quang, Asia Manager**		

ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
CLV-DTA	Cambodia – Lao PDR – Vietnam Development Triangle Area
CPC	Commune People's Committee
CSC	Construction Supervision Consultant
DARD	Department of Agriculture and Rural Development
DONRE	Department of Natural Resources and Environment
DOT	Department of Transportation
DPC	District People's Committee
DPI	Department of Planning and Investment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
ESP	Environmental Safeguard Specialist
ESO	Environmental Safeguards Staff
GMS	Greater Mekong Sub-region
IEE	Initial Environmental Examination
IPM	Integrated Pest Management
LEP	Law on Environmental Protection
MONRE	Ministry of Natural Resources and Environment
MMP	Materials Management Plan
MPI	Ministry of Planning and Investment
PPB	Project Preparation Board
PPC	Provincial People's Committee
PPE	Personal Protective Equipment
PMU	Provincial Project Management Unit
PPTA	Project Preparatory Technical Assistant
SPS	Safeguard Policy Statement
The PPTA	The Project Preparatory Technical Assistant Consultants
The Project	Support to Border Areas Development Project
The Subproject	Upgrade Provincial Road No.665 Ia Bang-Ia Mor, Chu Prong District, Gia Lai Province
TTF	Trade and Transport Facilitation
UXO	Unexploded ordnance
WMSDP	Waste Management and Spoil Disposal Plan

CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. EXECUTIVE SUMMARY

1. The Central Highland of Vietnam has many natural resources with more than 2 million hectares of rich basalt soil; make up 60% of the basalt soil of Vietnam. The soil is suitable for a variety of commercial crops including coffee, cocoa, pepper, and tea. The coffee production area has reached more than 290000 ha, about 80% of the total coffee area of the country. On the global scale, Vietnam has also radically changed global coffee supply chains since 1990, increasing from less than 3% to more than 17% of global production[1]. The Central Highlands is also the second largest rubber plantation area in Vietnam, mainly in Dak Lak province.

2. Despite of these advantages, socio-economical development of the Central Highland, especially four border provinces of Kon Tum, Gia Lai, Dak Lak and Dak Nong are still facing many difficulties, with less developed infrastructure and low living standards with many different ethnic groups. Their poverty rate is the second highest in the country, standing at 20.3% compared to 12.6% for the whole country in 2011.

1. The Support to Border Areas Development Project (Project) will help the five participating provinces (the Provinces) of Kon Tum, Gia Lai, Dak Lak, Dak Nong, and Binh Phuoc to better realize their growth potential and become more closely integrated into sub-regional frameworks including the Greater Mekong Sub-region (GMS). The project will include three main outputs and activities: i) Output 1: Road infrastructure in five VDTA provinces rehabilitated; ii) Output 2: VDTA plans and facilities for transport and trade facilitation (TTF) with a focus on inclusive growth developed and iii) Output 3: Institutional capacity for VDTA investment planning, project design and implementation, and resource management strengthened

2. Following extensive data collection, a multi-criteria analysis was used to make the final selection of the roads to be included in the shortlist. Measures were used that reflected the likely impact of the roads including eight themes: (i) agricultural productivity; (ii) population served; (iii) rural population; (iv) traffic count; (v) poor households; (vi) ethnic minority population; (vii) safeguards compliance (environment and social safeguards); and (viii) access to National Road No.14.

A. Subproject Summary

3. The provincial road No.665 in Chu Prong district, Gia Lai province has a total length of 65.87 km, connects NR14 with NR14C and ends at the junction with border patrol road in Ia Mor Border Area with Cambodia. It connects the residential in Chu Prong district centre to the border communes in the West, spreads over 6 communes of Ia Bang, Ia Tor, Ia Pia, Ia Me, Ia Ga and Ia Mor. Along the road from the start point at Phu My T-junction in Ia Bang commune to Km32.6 at Khoi village, Ia Ga commune is dense residential areas and some scattered areas of rubber, coffee and pepper cultivation. 100m corridors on both roadsides of the next section from Khoi village to the cross section with NR14C (Km57.9) is Ia Mor Protection Forest and out of this 100m corridor is vast rubber plantation area. Ia Mor Irrigation Project, locate roadside at Km48+200 is under construction. The proposed irrigation area of this project is 12,000 ha of Ia Mor and Ea Soup cultivation area of Dak Lak. Along the last 8km from cross section with NR14C to Border Patrol road is natural forest of Ia Mor Protection Forest. The whole route has been established before 1975 with the initial scale of 5m widths. Due to the economical

[1] Coffee in the 21st Century – Timothy J Killeen, PhD & Grady Harper

development demand, the road has been repaired and upgraded section by section. Some sections are already paved with asphalt concrete or bitumen to reach level IV – Mountainous from Government budget. Some other sections (mainly in Ia Mor and Ia Ga communes) are earth road with 6-7m foundation width.

4. The Subproject: Upgrade Provincial Road No.665 Ia Bang – Ia Mor, Chu Prong District, Gia Lai Province (the Subproject) was the short-listed subproject in Gia Lai province. The Subproject will upgrade 65.87km of provincial road No.665 to Vietnamese Standard Road Grade IV – Mountainous with the surface width of 5.5 m and base width of 7.5 m. The road surface material is asphalt concrete and the design speed is 40 km/h. The slope angle of the road cross-section for straight section is 2%. Roadside width: 2x1m, slope angle of the roadside cross-section are 4%. Road slope filling 1/1.5, road slope excavating 1/1.

5. There are total about 50 culverts along the subproject road. Some of them will be upgraded or reconstructed. There are five streams cross the subproject road with five bridges. Information relating to the existing bridges and planned bridge construction is listed below.

Table 1 – Number of bridges and designed elevation based on 2014 peak water level

No	Name	Location	Current condition	Beam/ L (m)/ B (m)	Notes
1	Suoi My bridge	Km39+189.38	Concrete slab	I33/ 43.1/ 8	New design, replacing the existing bridge
2	Ia Mor bridge	Km50+200.00	Suspension bridge	5I33/ 142.25/ 8	New design, replacing the existing bridge
3	Jo Stream bridge	Km56+550.56	Concrete slab	I33/ 43.1/ 8	New design, replacing the existing bridge
4	Pa stream bridge	Km60+742.75	Integration of low water crossing and culvert 2D750	I33/ 45.1/ 8	New design, replacing the existing drift
5	No. 5	Km61+331.83	Integration of low water crossing and culvert 2H1000	I24/ 35.1/ 8	New design, replacing the existing drift

B. Environment impacts and mitigations

6. The Project has been ranked as B on environmental issues during the Project Concept note as it has few potential significantly adverse impacts and none of them are irreversible. The initial environmental concern is the potential negative impact of the subproject implementation to Ia Mor Protection Forest. The completion of the road will provide access to the forest; potentially creating favourable condition for wood logging and forestry product exploitation.

7. This IEE has been prepared to screen impacts and formulate mitigation measures in three phases of subproject implementation including design; pre-construction; construction and operation phases and institutional arrangement to ensure that subproject Environment Management Plan (EMP) will be implemented.

8. In the preconstruction phase, the potential impacts have been identified relating to land acquisition and resettlement. To minimize the impact on income and disturbance of local people's lives, PMU will check and review the Land acquisition and resettlement process before the construction starts to ensure that all affected households have received compensation adequately in accordance with the current provincial market and ADB safeguard Policy be implemented.

9. The potential negative impacts in the construction phase have been identified as (i) forest encroachment in the section goes through Ia Mor Protection Forest. To minimize the impact, a closed collaboration between Gia Lai Project Management Unit (PMU), Environment Safeguard Specialist (ESP); Ia Mor Protection Forest Management Board (IPMB), relevant Divisions of Chu Prong district, Forest Ranger, Military Border Soldier, Construction Supervision Consultant (CSC) and Contractors will be established to identify, manage and control the construction activities along the road section from Khoi village, Ia Ga commune (Km32.6) to the end point of the road, especially for tree cutting and vegetation clearance activities and to ensure construction activities will be done properly on the existing road foundation. Workers should be informed and prohibited from cutting trees for firewood and for use in the subproject activities before construction start.

10. (ii) Careless construction and poor materials control can cause blockage to streams at five crossing locations. Runoff water during its rain could bring waste and soil into the nearby water bodies. That could lead to siltation and reduce the water quality. The five crossing streams, especially Ia Mor stream could be affected by the construction activities, as a bridge will be constructed to replace the existing suspension bridge. The proposed mitigation measures are store lubricants, oils and other construction material stockpiles on impervious ground with covers or roof and at least 100m away from water bodies; install sediment ditches, silt fences at the area with high potential of runoff, erosion and sedimentation.

11. (iii) The operation of construction machines and material transportation could damage local facilities such as low-voltage electricity lines, communication cables, existing drainage system and other roads in the subproject area. They will also impact on local traffic; increase the risk of work accidents and traffic accidents especially in the sensitive areas such as commune administration centres, medical centres, schools, kindergartens. Dust, noise and vibration from construction machines such as concrete mixing plants or transportation truck could disturb local people, damage their houses, increase risk of respiratory and skin diseases. To minimize the impact, the contractor will collaborate with relevant authorities to set up detail plan for machines and workers mobilization as well as material transportation plan; inform in advance that plan to local authorities and local people; in accordance to that plan, PMU, CSC and relevant authorities will monitor the compliance of the contractor in applying designated mitigation measures. If any buildings, structures in the subproject area are damaged by the construction activities, the contractor should compensate adequately with their own expense. (iv) Potential cumulative impact from the construction activities of the Sub-project and Ia Mor Irrigation Project. Large flux of construction workers, machines of two projects, especially for Ia Mor commune, will put a heavy burden to local infrastructure and service system. To avoid or minimize the impact, Gia Lai PMU, ESP, Contractor will work with Ia Mor CPC, Chu Prong DPC and contractor Ia Mor Irrigation Project to find out the suitable worker and machine mobilization schedules of the two projects, avoid concentration of machines and workers at the same time. The contractor will inform construction schedule and scope to local authorities in advance as well as investigate the capacity of mines, quarries and temporary dumping sites to see whether they are suitable for both projects.

12. In the operation phase, the potential negative impacts have been identified relating to increase chance of access to Ia Mor Protection Forest; dust and noise arising from increasing of traffic density and higher risk of traffic accident as better driving conditions. To minimize the negative impacts, Gia Lai Department of Transportation (DOT), the responsible agency for subproject management in the operation phase will cooperate with IMPB, Ia Mor CPC in forest management, periodically maintain the road, install speed limit, warning sign or road hump (if applicable) at the sensitive areas along the road such as schools, kindergartens, markets, medical centres etc.

13. The PPTA Consultant has also identified key stakeholders and conducted public consultations from provincial to commune level with a focus on the affected people views. The main concerns are (i) the road safety during construction time as various large construction machines are operated at the same time and falling material will create slippery condition and increase traffic accident risk. (ii) Village Head of Not village, Ia Me commune has expressed his concern on the drainage issue as the runoff water from PR.665 has created a deep ditch, divided Not village into two parts, make difficulties for the movement of the village people. (iii) The representative of Ia Mor Protection Forest Management Board has expressed his concern on potential negative impacts to the forest. All of these concerns are addressed in the EMP (See Table 11 – 12 for more details).

14. An EMP has been prepared under this IEE to detail responsibilities of relevant stakeholders on mitigation measures to be implemented during construction and operation phases of the subproject.

C. Institutional arrangement

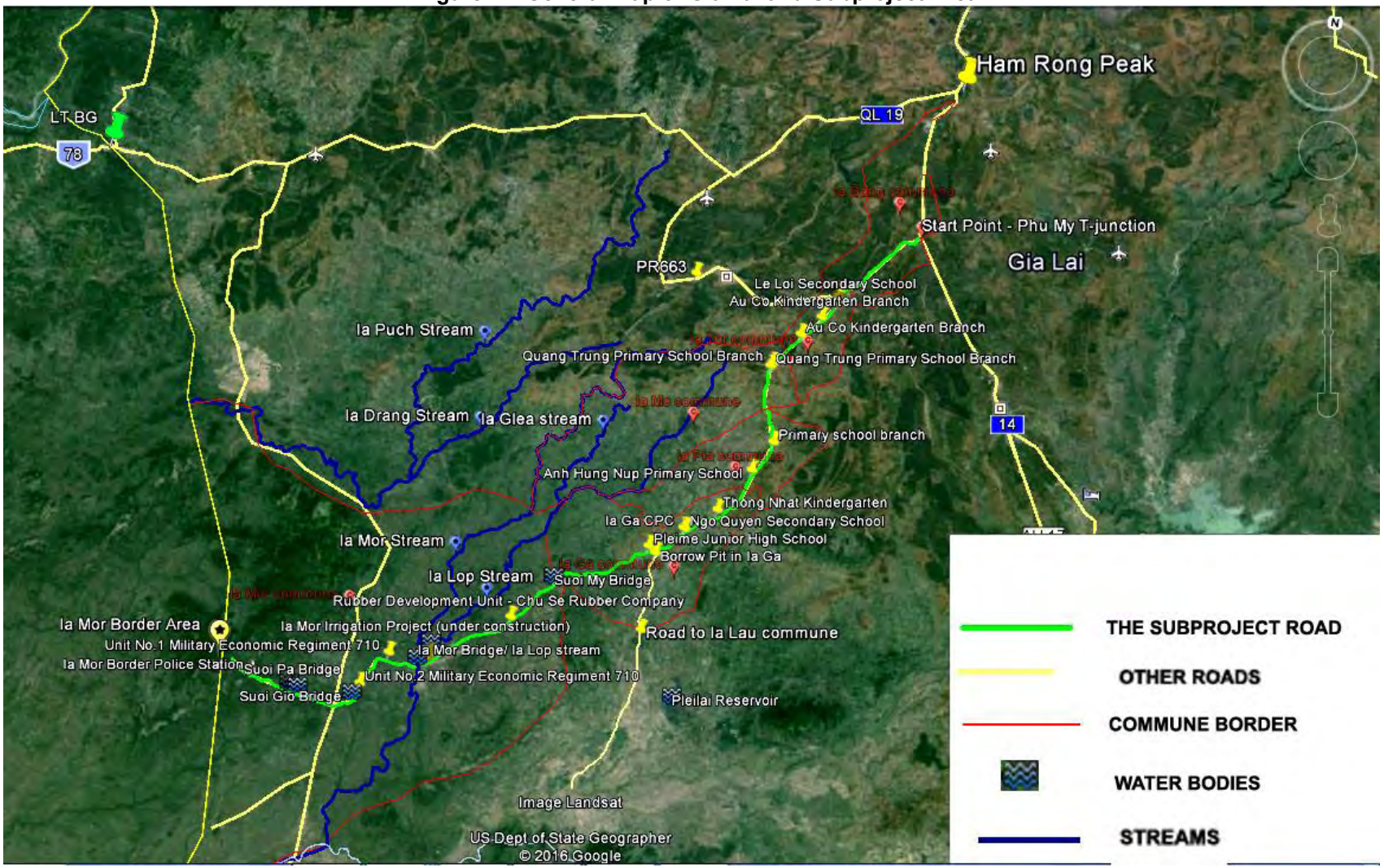
15. Gia Lai Provincial People Committee (CPC) has established a Project Preparation Unit (PPU) to support the preparation of the subproject in the PPTA period. One safeguard staff from other ODA Project has been assigned as Environmental Safeguards Officer (ESO) of PPU. Ideally, the ESO will become ESO of Gia Lai PMU in the construction phase. ESP will organize a formal training course and on-the-job training for relevant PMU staff, CSC, communities, contractors and support for establishment and operation of the subproject environment management system in construction phase. ESP will also support PMU's capacity building by reviewing and evaluating the capacity for environmental protection of the PMU and Gia Lai Department of Transportation (DOT) – subproject management organization in the operation phase.

16. To fully reflect the environmental protection cost of the civil works and engage the environmental responsibilities of civil contractors, environmental requirements will be included in biding documents and civil work contracts. Any omission of environmental management costs will create high risks for implementing mitigation measures during the construction phase due to lack of resources and capacity, thus the environmental protection cost and responsibilities need to be involved from the beginning. Bid document will also specify that contractors shall engage capable and trained staff to take responsibility for the environmental management and safety issues at the working level and to monitor the effectiveness and review mitigation measures as the subproject proceeds.

D. Conclusion

17. The IEE concludes that the feasibility study of the subproject combined with available information is sufficient to identify the scope of potential environmental impacts and formulate mitigation measures for the subproject. Providing that significant changes to the subproject description do not occur at the detailed design phase, and that new sensitive environmental, or cultural resources are not determined, further detailed environmental impact assessment (EIA) is not required. The ESP, before finalization of the detail design, will update the EMP.

Figure 1 – General Map of Gia Lai and Subproject Area



II. BACKGROUND

18. The Support to Border Areas Development Project (Project) will help the five participating provinces (the Provinces) of Kon Tum, Gia Lai, Dak Lak, Dak Nong, and Binh Phuoc to better realize their growth potential and become more closely integrated into sub-regional frameworks including the Greater Mekong Sub-region (GMS), the Cambodia – Lao PDR – Viet Nam Development Triangle Area (CLV-DTA), and the ASEAN Economic Community. It will improve the project area's connectivity by developing critical transport infrastructure, leading to increased movement of people, agricultural produce, and other goods. Moreover, it will facilitate logistics and trade, and help develop the Provinces' capacity for investment planning from a regional integration perspective. As the Provinces are at the joint borders of the CLV-DTA, the Project will enable them to serve as an engine and gateway to wider markets for this sub-regional initiative. The Project will be implemented in 5 provinces in the CLV-DTA of Vietnam including Kon Tum, Gia Lai, Dak Lak, Dak Nong and Binh Phuoc.

19. The proposed Project will include 3 outputs and activities:

- ***Output 1: Road infrastructure in five VDTA provinces rehabilitated.*** The Project will improve transport infrastructure of the DTA area, including selected sections of provincial roads and roads that are important for filling the missing links for accessing national and international wider markets, tourism, healthcare facilities, and heritage and conservation areas. The project will provide the critical road infrastructure in service of selected value chains to ensure the smooth flow of products along the value chain to the market.
- ***Output 2: VDTA plans and facilities for transport and trade facilitation (TTF) with a focus on inclusive growth developed.*** This output will stimulate inclusive economic activity by (i) improving TTF within the VDTA leading to easier movement of goods and people across the borders, which in turn will stimulate the formation of strong value chains to support trade and tourism; and (ii) expanding the tourism industry which will involve the local population, with a special emphasis on the inclusion of ethnic minorities. Moreover, tourism also leads to demand for high quality local agricultural produce and rural products such as traditional handicrafts.
- ***Output 3: Institutional capacity for VDTA investment planning, project design and implementation, and resource management strengthened***. This output will consolidate the long-term development program for the VDTA. The indicators for achieving this output are: (i) VDTA master plan updated and implementation action plan prepared with ecosystem services, gender and EM considerations; and (ii) Officials nominated by the PPC trained to implement the updated master and action plans.

20. In order to reached these above outputs as well as avoid and minimize any possible negative impact of the Project implementation, the Project Preparatory Technical Assistant Consultants (the PPTA) has been recruited. The main tasks of the PPTA are (i) detail a project design that is economically, financially and technically feasible; (ii) provide advance drafts of the complete set of documentation necessary for the ADB to proceed with internal processing of the ensuing Project; (iii) prepare feasibility studies and comprehensive criteria for road sections, logistics and institutional arrangements to be improved under the Project; (iv) define the scope, cost, procedures for identifying subprojects, financing plan, implementation

arrangements, procurement strategy, technology issues, capacity development needs and post-project operation and maintenance arrangements for the project (v) establish measures that will ensure adherence to the safeguard policies of both the ADB and the Government; (vi) provide guidance in actions to maximize the socioeconomic benefits such as impacts on poverty, gender and fair employment practices; (vii) provide project start up support to the government.

21. The Government of Vietnam has assigned Ministry of Planning and Investment (MPI) as the line agency for the preparation phase of the Project. Department of Planning and Investment (DPI) of the five provinces are responsible for the Project preparation phase in their provinces. DPIs have prepared a long list of the proposed roads in their provinces based on the Provincial Transportation Master Plans and the demand for road upgrade at the moment. The long list subprojects have been detailed feasibility and preliminary designs have been undertaken by the PPTA. A multi-criteria system with weight has been developed to screen and short-listed these subproject roads. The parameters have been listed in the Paragraph 4 above.

22. The Project is initially categorized as 'B' for environmental safeguards, and IEE is required to meet requirement of ADB SPS 2009. The objectives and scope of this IEE are to (i) assess the existing environmental conditions along and in the vicinity of the subproject road; (ii) identify potential environmental impacts from the proposed road improvement works; (iii) evaluate and determine the significance of the impacts; (iv) develop an environmental management plan (EMP) detailing mitigation measures, monitoring activities, reporting requirements, institutional responsibilities and cost estimates to address adverse environmental impacts; and (v) carryout public consultations to document any issues/ concerns that stakeholders may have on the subproject and to ensure that such concerns are addressed in the subproject design and mitigation measures.

III. POLICY AND LEGAL FRAMEWORK

23. The subproject shall comply with requirements of ADB SPS 2009 and the GOV's Guidelines on Implementation of Law on Environmental Protection 2014. Decree No. 18/2015/ND-CP has detailed information on environmental protection assessment, environmental impact assessment and environmental protection plans. However certain activities commonly associated with infrastructure subproject such as quarry operations, extraction of gravel, etc., will also require permission from the relevant provincial level authorities. Depend on the scale; some constructions on the proposed road such as bridge or spillway shall require separated environmental impact assessment.

A. ASIAN DEVELOPMENT BANK SPS requirement

- ADB safeguard policy statement (SPS) 2009 imposes safeguard requirements for all its funded projects. The SPS 2009 clarifies reason, scope and contents of the environmental assessment. Safeguard policy statement emphasizes on environmental and social sustainability in progress of economic growth and poverty reduction in Asia and the Pacific, therefore the objectives of SPS focus on:
- Avoid adverse impacts of projects on the environment and affected people, where possible;
- Minimize/mitigate and/or compensate for adverse impacts on environment and affected people when avoidance is not possible; and
- Help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks

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

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

- **Category FI.** A proposed project is classified as category FI if it involves investment of ADB funds to or through a FI.

25. For environmental safeguards, the Project is initially categorized as 'B'. Environmental criteria for the long list multi-criteria system has been developed and contributed for the evaluation and short-listed subproject roads. Detail of the environmental criteria could be found in Appendix 02. The subproject has been classified as category A on environmental safeguards will not be short-listed as it will rescale the whole Project to category A on environment

B. Legal and Administrative Framework for Environmental Protection in Vietnam

26. The subproject has to comply with the environmental legal framework of Vietnam that is outlined in this section. The main components of the framework, if not, the more applicable ones are shown here.

1. Laws:

- Law No. 55/2014/QH13 of 23 June 2014 by the National Assembly on environment protection
- Law No. 17/2012/QH13 of 21 June 2012 by the National Assembly on water resources
- Law No. 20/2008/QH12 of 13 November 2008 by the National Assembly on biodiversity
- Law No. 68/2006/QH11 of 29 June 2006 by the National Assembly on standards and technical regulations
- Law No. 29/2004/QH11 of 03 December 2004 by the National Assembly on forest protection and development

2. Others

- Decree No. 18/2015/ND-CP dated February 14, 2015 on environmental protection planning, strategic environmental assessment, environmental impact assessment and environmental protection plans.
- Circular No. 27/2015/TT-BTNMT dated May 29, 2015 on strategic environmental assessment, environmental impact assessment and environmental protection plans.
- Decision 07/2012/QD-TTg dated February 08, 2012 of the Prime Minister promulgating some regulations on intensified enforcement of forest protection
- Decision 186/2006/QD-TTg dated August 14, 2006 of the Prime Minister promulgating the Regulation on forest management
- Decree 09/2006/ND-CP dated 16th January, 2006 of the Government on forest fire prevention and control
- National Technical Regulations on air and noise quality
    - QCVN 05: 2013/BTNMT on ambient air quality
    - QCVN 26: 2010/BTNMT on noise
    - QCVN 27: 2010/BTNMT on vibration
- National Technical Regulations on water quality

- QCVN 01: 2009/BYT on drinking water quality
- QCVN 02: 2009/BYT on domestic water quality
- QCVN 08: 2008/BTNMT on surface water quality
- QCVN 09: 2008/BTNMT on underground water quality
- QCVN 14: 2008/BTNMT on domestic wastewater

3. Other legislations applicable to the Project are the following:

- Law No. 27/2001/QH10 of 29 June 2001 by the National Assembly on fire prevention and fighting
- Law No. 40/2013/QH13 of 22 November 2013 by the National Assembly on amending and adding a number of articles of the Law No. 27/2001/QH10 of 29 June 2001 on fire prevention and fighting
- Decision No. 3733/2002/QD-BYT of 10 October 2002 by the Ministry of Health promulgating 21 labour hygiene standards, 5 principles and 7 labour hygiene measurements
- Law No. 50/2014/QH13 of 18 June 2014 by the National Assembly on construction
- Circular No. 22/2010/TT-BXD of 03 December 2010 by the Ministry of Construction on labour safety in work construction
- Law No. 10/2012/QH13 of 18 June 2012 by the National Assembly on labour code

IV. DESCRIPTION OF THE SUBPROJECT

A. The need for subproject

27. The natural area of Gia Lai is 15.540 km^2 with the population in 2015 is approximately 1.377.800 people, including 01 city, 02 towns and 14 districts with 222 communes/ precincts in total. There are 34 ethnic groups living in Gia Lai with two local groups are Bahna and Jrai. The other ethnic people are migrants such as Tay and Thai ethnic people – mainly from the North. Gia Lai located in the GMS economical corridor and it has 90 km borderline with Cambodia. The position of Gia Lai make it works as a gateway to the border for all provinces in DTA area. National Road No. 14 connects Gia Lai to Ho Chi Minh City and other provinces in the Central Highlands. Gia Lai is also linked with the central coastal provinces through National Road No. 19 and 25. Thus, Gia Lai has an important position in national security and defence as well as economical development.

28. With the advantage and potential on agricultural development, up to now, in 2015 GDP contributions of Gia Lai, agriculture – forestry – aquaculture are still make up 40.04%. Industry and construction make up 26.77%; services are 33.19%. Agriculture is mainly long-term industrial plantation such as rubber, pepper, coffee and breeding. However, agricultural production processing is still weak and not met with the agricultural advantages and potential of the province.

29. One of the major reasons for the slow development of the agricultural sector in Gia Lai is the less development of the road network. Gia Lai has a total 10817 km road but mainly aggregated road and earth road. The 4 main roads are National Road No.14; 14C; 19 and 25 with the total length of 505km, make up only 4.67% of the province roads. Gia Lai also has 11 provincial roads with the total length of 537 km; make up 4.96% of the total road length.

30. In the rainy season, muddy condition of the road has blocked the movement of local people and goods transportation; make many difficulties for local people. In the dry season, air pollution by dust and other exhaust fumes could affect the health of local people.

31. In the General Socio-Economical Development Plan of Gia Lai to 2020, part of Chu Prong district will be separated to establish a new district in the area of Ia Ga commune. Thus, road No. 665 will be the main transportation route of the district and contribute to socio-economic in the area.

32. Upon the completion of the proposed road, it will become a bloodline link National Road No.14 to National Road No.14C as well as other roads in the province to make a transportation network and remove the geological barriers between regions, support goods exchanges, enlarge cultivation area of rubber, pepper and coffee.

B. Location and scope

33. The Subproject will upgrade 65.87km of provincial road No.665 to Vietnamese Standard Road Grade IV – Mountainous with the surface width of 5.5 m and base width of 7.5 m. The road surface material is asphalt concrete or cement concrete and the design speed is 40 km/h. The detail scale of a cross section as below:

+ Road base width: 7.5 m.

+ Road surface width: 5.5 m, slope angle of the road cross-section for straight section is 2%.
+ Roadside width: 2x1m, slope angle of the roadside cross-section are 4%.
+ Road slope filling: 1/1.5; road slope excavating: 1/1.

34. There are total nearly 50 culverts along the subproject route. Some of them will be upgraded or reconstructed. There are also stream cross the route with 5 bridges with Ia Mor stream is the largest, cross the road at Km50+133. All of them will be newly constructed to remove the existing one. Ia Mor Irrigation Project, which is locate at Km48+200, is under construction. This is an investment project from Ministry of Agriculture and Rural Development to irrigate for 12000 ha of different crops in Ia Mor and Ea Soup district of Dak Lak province. Pleilai Irrigation Lake in Ia Lau and Ia Pior communes, located about 10km from the subproject road.

35. Suoi My and Suoi Jo bridges are in good condition. However, the distance between spans of both bridges is not enough for water flow in the flood season and it blocks the traffic on the road in the flood season. On the other hand, the narrow width and the loading capacity of these bridge are not suitable it the design scale of the whole route. Ia Mor suspension bridge is serving for transportation of local people with only 2.5 m width. The bridge is degraded and loading capacity is only 2.5 tons. Suoi Pa Bridge and Bridge No.5 at Km61+331.83 are integrated drifts. The connection with Border Military Station No. 729 or border patrol road will be lost when it rain heavily or in the flooding time.

36. Current status of drainage and culvert system

+ Culvert: Some culverts have already constructed along the road. However, most of them have a small diameter, old and limited in the length make them unsuitable with the new design scale. There are total 50 culverts with total length of 480.87m, the round culvert has diameter from ∅75 to 4∅150cm, the tube culvert has the dimensions from H75x75cm to H100x100cm, the slab culvert has he dimensions from BxH50x50 to BxH4x3m.

+ Incline culvert: Several incline culverts have already located along the road to cross ditches in the residential area. All of them are still in good condition.

+ Drainage canal along the road: The drainage canal system has been constructed at some sections along the road especially in the residential areas. The budget has been extracted from annual operation and maintenance budget. These canal sections are still well functioned enough but some parts are already damaged. In accordance with the new design of the whole route, these canal sections must be reconstructed.

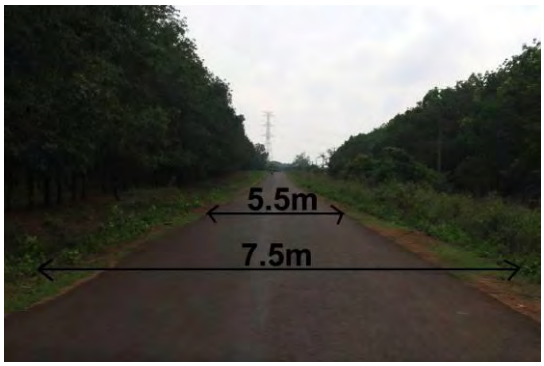
37. Utilized all culverts are still in good conditions, ensure water drainage along the road and reconstruct or construct new culverts in case the old one is not function well.

38. The drainage system along the road will be earth canal, designed in trapezium shape with size of (1.2+0.4) x 0.4m. The section with high slope angle (i>5%) and located outside of the residential area will be constructed by cut stone VXM M100 and 20cm in thickness.

39. Traffic safety system: Signal and sign are adequate at the section from Km0+0,00-:-Km32+6 and at section goes through Ia Mor commune centre. In the other sections, traffic signal and sign must be replace or newly install.

40. Traffic safety setup in the whole route: provide more traffic signals and signs at the road turning sections, high slope, culvert position... in accordance with Road signal QCVN 41: 2012/BGTVT

Bitumen section: 3.5m surface width



Bitumen section: 5.5m surface width – Rubber plantation area

Cement concrete: 5.5m surface width

Earth road section

Suoi My bridge: 4.5m width

Ia Mor suspension bridge: 2.5m width

41. The estimated volume of excavated soil of the subproject is about 134917.45 m^3, of which 96519.27 m^3 is unstable organic soil that is not suitable for embankment. Estimated required soil volume for embankment is 452436 m^3 and 25697.52 m^3 could be utilized from

excavated soil. Estimated volume of stone using for the subproject implementation is 145000 m^3. The main filling soil and stone sources for the subproject could come from Doc Trang borrow pit in Ia Ga commune, locate roadside to Ia Lau and Ia Piar communes, about 500m from Km31+500 of the subproject route. This borrow pit has been organized to provide filling soil for transportation construction of Gia Lai province and it has the operation license from Gia Lai DONRE. Part of the borrow pit could be used as temporary dumping site for the subproject. This borrow pit is under the management of Ia Ga CPC. There is another borrow pit at Km45 in Ia Mor commune. This borrow pit has been organized to provide filling soil for projects in Chu Prong district and under the management of Ia Mor CPC.

42. Sand, steel, cement and other construction material could be bought in the shops system along the subproject road.

43. Currently, all the communes have set up a temporary place for domestic waste. They have already planned for disposal site and assigned the location in the commune. The contractor should work with CPCs for quarries, mines and dumping site before construction start. This information will be integrated in the updated EMP by ESP.

44. Land acquisition and resettlement: There is no house will be relocated or major affected household. There are 56 affected households by the subproject construction activities. Only 2 households in Ia Mor is severely affected as they has lost more than 10% of the total natural land holding. The detail information on affected households is show in Table 2 below.

Table 2 – Affected households, enterprises and organizations

No.	District/ Commune	Number of AHs	Number of marginally AHs[1]	Number of severely affected HHs	Number of vulnerable AHs	Number of affected EM household	Number of affected organizations	Number of affected enterprises
A	**Chu Prong**	**56**	**54**	**2**	**8**	**14**	**9**	**4**
1	Ia Bang	3	3	0	1	0	0	0
2	Ia Tor	20	20	0	2	3	4	0
3	Ia Me	1	1	0	0	1	0	0
4	Ia Pia	20	20	0	2	0	3	3
5	Ia Ga	4	4	0	1	3	1	0
6	Ia Mor	8	6	2	2	7	1	1
Total		**56**	**54**	**2**	**8**	**14**	**9**	**4**

Note: Marginally affected household means the household who lose less than 10% of total productive land holding, partial loss of residential land without relocation/rebuilt the house on remaining land.
Source of data: IOL data provided by PMU of Gia Lai DPI

45. In the plan, the subproject will be constructed in 24 months with the estimated budget of 20,270,751 USD in equivalent with 452,037,736,494 VND). Detail are listed in Table 3 below

Table 3 – Estimated budget of the subproject

No	ITEMS COST	METHOD	Subtotal (Select) (VND)	USD	Notes
	Invesment Cost	**I+II+…+VI**	**452 037 736 494**	**20 270 751**	
I	**Construction cost**	**1+2**	**329 412 699 000**	**14 771 870**	**22 300**
	Route		**270 754 555 969**	**12 141 460**	
1	Embankment		40 706 826 892	1 825 418	
2	pavement		196 572 012 272	8 814 888	
3	Drainage; culverts		8 688 786 135	389 632	
4	Long drainage		17 746 516 453	795 808	
5	Embankment protection works		2 112 934 346	94 750	
6	Traffic safety		4 121 485 380	184 820	
7	Temporary works		805 994 492	36 143	
	Bridge		**58 658 142 612**	2 630 410	
	Suoi My bridge Km39+189,38		6 619 392 840	296 834	
	Iamơr Bridge Km50+209,69		32 351 081 673	1 450 721	
	Suoi Jo Bridge Km56+550,56		6 637 557 445	297 648	
	Suoi Pa Bridge Km60+742,45		7 199 764 166	322 859	
	Bridge Km61+331,83		5 850 346 489	262 347	
II	**SITE CLEARANCE COST**	Separated	**782 966 494**	**35 111**	
III	**MANAGEMENT COST**	1.192% *CPXDTT	**3 686 298 000**	**165 305**	
IV	**INVESTMENT ADVICE COST**		**23 792 890 000**	**1 066 946**	-
1	Report investment cost (*1,2 design improvement)	0.169%*CPXD*1,2	709 205 671	31 803	Decided 957/QD-BXD dated 29/9/2009
2	Survey cost (calculation temporary 100mil vnd /km)	Temporary	6 500 000 000	291 480	
3	Verification cost	0.023%*CPXD	83 515 705	3 745	Decided 957/QD-BXD dated 29/9/2009
4	Shop drawing cost (*1,2 design improvement)	0.834%*CPXD*1,2	3 440 123 838	154 266	Decided 957/QD-BXD dated 29/9/2009
5	Survey cost for shop drawing (Calculation temporary 120mil VND/km)	Temporary	7 800 000 000	349 776	

6	Establish bidding document; Evaluation bidding document cost	0.2%*GGT	100 000 000	4 484	Decree 63/2014/ND-CP dated 26/6/2014
7	Supervision cost	0.92%*CPXD	3 194 402 721	143 247	Decided 957/QD-BXD dated 29/9/2009
8	Verification shop drawing cost	0.05%*CPXD	163 684 520	7 340	
9	Verification estimates cost	0.04%*CPXD	154 894 319	6 946	
10	Others cost for consultant (temporary)	0.50%*CPXD	1 647 063 495	73 859	
V	**OTHERS**		**28 795 951 000**	**1 291 298**	
1	Clearance mine cost (calculation temporary: 5000vnd/m^2)		**3 557 211 650**	**159 516**	
2	General cost		**18 417 698 445**	**825 906**	
2.1	Temporary housing cost	2.0%*CPXD	6 588 253 980	295 437	
2.2	Others undefined cost (2%)	2.0%*CPXD	6 588 253 980	295 437	
2.3	Mobilization and remobilization cost (calculation temporary)	0.5%*CPXD	1 647 063 495	73 859	
2.4	Ensuring transport cost (Calculation temporary)	1.0%*CPXD	3 294 126 990	147 719	
2.5	Setup Asphalt plant station	Temporary	300 000 000	13 453	
3	Insurance works cost (Temporary)				Decided 33/2004/QD-BTC dated 12/4/2004
	Insurance for Route cost (Temporary)	0.42%*CPXD	1 137 169 135	50 994	
	Insurance for Bridge cost (Temporary)	0.60%*CPXD	351 948 856	15 782	
4	Expertise fees (*TMDT)	0.007%*TMDT	44 037 344	1 975	Circulars 176/2011/TT-BTC dated 06/12/2011
5	Verification fees for design document	0.01%*CPXD	35 652 454	1 599	Circulars 75/2014/TT-BTC dated 12/6/2014
6	Verification fees for estimate document	0.01%*CPXD	33 855 657	1 518	Circulars 75/2014/TT-BTC dated 12/6/2014
7	Expertise fees for Bidding document and result bidding	0.1%*GGT	100 000 000	4 484	Decree 63/2014/ND-CP dated 26/6/2014

8	Approval settlement report fees	0.20%*TMDT	1 342 536 000	60 203	Circulars 09/2016/TT-BTC dated 18/01/2016
9	Audit cost (*TMDT)	0.286%*TMDT*1.1vat	2 128 778 080	95 461	Circulars 09/2016/TT-BTC dated 18/01/2016
10	Others (Temporary)	0.5%	1 647 063 495	73 859	
VI	**CONTIGENCY**		**65 566 932 000**	**2 940 221**	-
	Variation works cost	10%	38 568 783 800	1 729 542	
	Inflation cost	15%	26 998 148 660	1 210 679	Indicator construction

V. DESCRIPTION OF THE ENVIRONMENT

A. Physical environment

1. Topography, Geology, and Soils

46. The topography of Gia Lai is in the central highland, divided into 4 regions: (i) high mountains and hills; (ii) highland area; (iii) midland region and plain (iv) low land. The peak of Gia Lai is 2023 m; and the lowest point is 200 m, the average level is 500 m to the mean sea level.

47. High mountain and hill occupy about 2/5 of the total area of the province, separated in sections with the total area of 6909 km^2, mainly concentrate in the North – East, East and South – East area of the province with some high peaks over 500m and higher than 15^0 angle. The highest peak is Kon Ka Kinh, over 1700m. Especially, the Mang Yan mountain range lay from Kon Ka Kinh peak to Krong Pa district, divide Gia Lai into 2 separated climate regions are East Truong Son and West Truong Son.

48. The highland region make up about 1/3 total natural area of the province (5800 km^2) with two red basaltic highland soil is Pleiku and Kon Ha Nung, suitable for industrial tree development. The area of Pleiku highland is 4550 km^2 with homogenous red basaltic soil in asymmetric qua-quaversal form, the average level is 750-800m, and the average slope is 3^0-5^0, light waving terrain. The main ridge between Mekong catchment and Ba river system at the city crossing section that lie North-South direction. It is nearly mix with national road No. 14. The terrain is quite suitable for building construction. Kon Ha Nung highland has the area of 1250 km^2, old basaltic soil with main type of soil is brown red ferralitic soil, average level is 800 – 900m, and the average slope is 10^0-18^0.

49. Midland and plain terrain make up 1/5 total natural land area of the province. The lowland terrain distributes along the river and stream, quite flat and is not separated. It is usually cover by a rich nutrition alluvial and suitable for industrial tree development. There are 2 main valleys are An Khe valley with about 1312 km^2 and Ayunpa – Krongpa, about 1474 km^2 natural area. The average level is from 200-300m.

50. Follow the Land investigation result of Institute of Agricultural Design and Planning – Central Region on the map scale 1/100000 of Gia Lai 2005; there are 6 soil groups with 16 soil types in Chu Prong district. The yellowish red soil makes up 44.17% of the total area and the grey soil make up 33.7% of the total area. The subproject area of Ia Mor, Ia Lau and Ia Pior are dominated with the yellowish red soil on acid magma and metamorphic rock. This type of soil has medium nutrient but the pH is low so it is suitable for bean, cereal crops or some kind of perennial tree such as rubber and cashews if the soil layer is over 70 cm in thickness.

2. Hydrology and Climate

51. Gia Lai is in the highland tropical monsoon climate with a dry and not so cold winter, wet and cool summer, the temperature variation between seasons in a year is from 9-10^0C. Gia Lai is a rich moisture area, high precipitation with higher rainfall in a year with high active frequency of storm and tropical depression. Gia Lai has two clear seasons are rainy season which start from May and end in October, the dry season start from November and end in April next year.

The average precipitation of West Truong Son region is 2200 to 2500 mm, and East Truong Son region is 1200 to 1750 mm. The average air temperature varied from 22^0C to 27^0C. The climate condition of Gia Lai is suitable for industrial tree development, forestry and agricultural as well as cattle breeding.

52. In Chu Prong district, the precipitation of the rainy season make up 80% of the year with the main wind direction is South - West why North – East is the main wind direction in the dry season. The average temperature is 23.5^0C and the average humidity of 81%.

53. The density of river and stream network in Chu Prong district is not so high but uniform distribute in the district from the North to South and from the East to West. The main streams are Ia Hlop stream, Ia Drang, Ia Mor, Ia Puch and Ia Glea. The water level is quite stable, suitable for the development of irrigation reservoir to serve for the cultivation of local people.

54. The Plateau at the South and West of Ham Rong Mountain is the sources of two main streams under Serepok River valley: Ia Drang and Ia Lop – the two main streams of Chu Prong district.

55. Ia Drang Stream, including two main branches: Ia Puch and Ia Drang. They originated from hilly area in Ham Rong Mountain, flow South West through the West area of the district, flow around the base of Chu Prong Mountain to Cambodia.

56. Ia Lop Stream including 3 main branches: Ia Lop, Ia Glae and Ia Mor. Ia Glae and Ia Mor start from the South of Ham Rong Mountain, flow through South West of the district to Ia Pior and South of Ia Mor commune then join Ia Lop, called Ia Mor cross the subproject road at Km50+133, then flow to Cambodia.

3. Surface and ground water

Surface water resources and quality

57. Total surface water deposit of Gia Lai is approximately 23 billion cubic meter, distribute in the main river systems are Ba river, Se San river system and the branch of Serepok river network.

58. Abundant of river and stream with their characteristics of short and high slope angle so Gia Lai has a great potential of hydropower. Se San River is one of the three rivers in Vietnam with highest hydropower potential, make up 11.3% hydropower potential of the country (stay behind 44% of Da river and Dong Nai river with 16,4%). Ba River and Serepok River also have a great potential for hydropower of 4.7 billion KWh, make up 6,64% ratio of the country.

59. The river/ stream system of Chu Prong district originated from South West of Pleiku Plateau, located in the high precipitation area of Gia Lai (>2000mm), so they have a quite abundant water resources. The annual flow module is about 30-40 l/s/km^2.

60. The area with high precipitation from 2000 – 2400mm per year as in Bien Ho Lake or Chu Prong... the minimum monthly flow rate reached to 8-10 l/s/km^2.

61. According to the result of surface water monitoring of Gia Lai in 2015, some areas of Gia Lai are already polluted with NH_4^+, NO_2^-, PO_4^{3-} and other organic pollution like BOD_5, COD

or micro-organism pollution with E.coli and coliform. The water quality in some areas is not suitable for drinking water or irrigation water. However, the water quality in Chu Prong district and the subproject area is still under the QCVN 08:2008/BTNMT. Table 4 below show the result of surface water quality monitoring in Chu Prong district in 2012.

Table 4 - Surface water quality in the subproject area

Water sampling in rainy season (09/2012)

Sample name	pH	BOD_5	TSS	COD	DO	Herbicide partition
	-	mg/l	mg/l	mg/l	mg/l	µg/l
NM3	6.28	19	24	32	1.92	0.16
NM4	6.49	15	19	24	3.05	KPH
NM5	6.57	12	20	17	3.76	0.05
QCVN 08:2008/BTNMT (Column B1)	5.5 – 9	15	50	30	≥ 4	0.4
QCVN 08:2008/BTNMT (Column B2)	5.5 – 9	25	100	50	≥ 2	0.5

Water sampling in dry season (12/2012)

Sample name	pH	BOD_5	TSS	COD	DO	Herbicide partition
	-	mg/l	mg/l	mg/l	mg/l	µg/l
NM3	6.35	21	26	39	3.2	0.14
NM4	6.73	12	16	21	4.7	KPH
NM5	6.62	10	14	18	5.3	KPH
QCVN 08:2008/BTNMT (Column B1)	5.5 – 9	15	50	30	≥ 4	0.4
QCVN 08:2008/BTNMT (Column B2)	5.5 – 9	25	100	50	≥ 2	0.5

NM3: Ia Bang stream - located in Ia Bang commune, Chu Prong district - at the wastewater point of Chu Se Rubber Factory.
NM4: Ia Lop stream - located in Yen Hung hamlet, Ia Pior commune, Chu Prong district.
NM5: Mo stream – located in Ia To commune, Chu Prong district.

Underground water resources and quality

62. According to an investigation of Southern Hydrological Geology Federation, underground water resources in the aquiferous complex are: Basalt igneous aquiferous complex Pliocene – Pleistocene with large distribution area, thick water holding layer. This is the most important water holding layer of Ia Mor – Ia Lop valley, could provide water for medium and large scale. The sustainable exploitation capacity is 1191675 m^3/day.

63. The quality of basalt igneous aquiferous complex is usually low mineral content, varied from 0.15 – 0.45 g/l. The main mineral agent are sodium bicarbonate-sodium chloride; calcium with low ion content. All the contamination parameters are under the allowed level of QCVN 09:2008/BTNMT – on underground water quality.

4. Natural Disaster

64. There is no hydrological monitoring station in the district area. However, based on an investigation with the local people, from August to October every year, especially year with a lot of tropical pressure and storm, the down stream area of Ia Lop and Ia Mor is usually flooded 2-3 days.

5. Air quality and noise

65. In accordance to air quality monitoring program of Gia Lai Department of Natural Resources and Environment (DONRE) in 2015, the ambient air quality in Gia Lai province is still not polluted. All monitoring parameters are under QCVN 05:2013/BTNMT on ambient air quality. Noise has also been measured and at all sampling location, it is still under QCVN 26:2010/BTNMT on noise. The nearest monitoring point for air quality and noise is in Chu Prong district centre – about 6 km from the subproject road. The monitoring program of Division of Natural Resources and Environment of Chu Prong district in 2012 has also showed no trace of air pollution in the district.

B. Biological environment

1. Agriculture

66. From the starting point at Phu My T-junction to the junction to Ia Lau and Ia Pior communes are the production areas of coffee, pepper and rubber. Local people grow these productions in their paddy fields. The latter part of the road in Ia Ga and Ia Mor communes is mainly production forest with the domination of rubber plantation. The protection forest is only existed on 100 m corridor from each side of the proposed road. In Ia Lau and Ia Pior commune is a large production area of cassava and sweet potato. The crop ratio of the district could be seen in Table 5 below

Table 5 - Area and production of the main crop of Chu Prong district in 2010

Name of the crop	Area (ha)	Production (ton)
Total Cultivation Area	57,831.6	
I. Annual crop	18,245.8	
1 – Food crop	9,218	36,643
a) Rice	3,718	11,453
b) Corn	5,500	25,190
2 – Other starch plant	4,400	
3 – Vegetables	4,104	
4 – Annual industrial plantation	576	
- Peanuts	200	184
- Cotton	300	480
II. Perennial plants	39,585.8	
1 – Industrial plants	39,303	
- Coffee	13,704	33,232
- Rubber	21,970	10,322
- Cashew	1,800	2,374
- Tea	529	1005
- Fruit plants	250	

Sources: Chu Prong Environment Report 2013

2. Forestry

67. Chu Prong has a rich forestry resources and it could become an advantage for economical development if the forest were well managed and well protected. The main forest type in the district is light forest with broad leaves. The dominant family is Dipterocarpaceae. This type of forest makes up 87.70% of the total forest area in the district. Evergreen broad leaves forest and plantation forest makes up only 12.30%. Currently, the name of Chu Prong does not listed in any plan for special forest system of Viet Nam. In 2000, Bird Life International and Forest Planning Institute of Vietnam have implemented an investigation in the Southwest area of the district and proposed plan to establish a Conservation area with total natural area of 50,104 ha in Ia Mor and Ia Lau communes. However, in accordance to Decision No. 53/2008/QD-UBND of Gia Lai PPC and the most recent forest investigation result in 2015, the forest subzones along the subproject road in Ia Ga and Ia Mor communes are mainly rubber plantation forest. The protection "forest" is only 100 m corridor from each side of the road and in some places; this corridor has also been occupied for living area of rubber plantation workers.

3. Fauna and Flora

68. The natural forest in Gia Lai makes up 78.3% of the total forest area. There is several kind of precious timber tree such as merawan, Burma padauk, aglaia,... The main family of the plantation cover in Gia Lai is Dipterocarpaceae, Fabaceae, Meliaceae, Fagaceae, Myrtaceae, Urticaceae and Chrysopogon... This kind of forest has been cleared in a large area due to changing in production method to industrial tree plantation.

69. In accordance to a survey of Animal Resources Institute, there are 375 bird species under 42 families in Gia Lai; 107 mammal species in 30 families; 94 reptile species under 16 families; 48 amphibian species in 6 families; 96 fish species and other species... In particular there are rare species such as the rhinoceros, gaur, tiger, leopard, bear, civet flying, flying squirrel, red wolves, pygmy loris, gibbon, spotted bat, birds such as white-collar cranes, peacock, reptiles such as geckos, worm lizard, spotted python...

70. In general, Gia Lai province has a rich forest resources high biodiversity with many rare plant and animal species. However, due to deforestation, along with indiscriminate hunting activities... has made this rich natural resources are at risk of depletion.

C. Socio-economical condition and infrastructure

1. Population and Ethnic

71. Up to December 2015, total population of Chu Prong district is 116,867 people with 61245 Kinh people; make up 52.4% of the total district population. Among ethnic minorities, Jrai people have the largest population with 38634, double of all other ethnic groups' population. The other ethnic groups are mainly people migrated from the Northern part of the countries including Muong, Nung, Dao, Tay, Thai...

72. The communes in the North of the district - including Ia Bang, Ia Tor, Ia Me and Ia Pia of the subproject – have a high population density of 104.2 – 415.8 people/km^2. The low population density communes are in the South and South West of the district, especially Ia

Puch and Ia Mor - two border communes. Ia Mor has the lowest population density of the district, only 3.6-people/ km^2.[2]

Table 6 – Population and ethnic groups in the subproject area

No		Total of population	Peoples clarification (number of people)							
			Kinh	Jrai	Thai	Muong	Tay	Nung	Dao	Others
		Total	Total	Total	Total	Total	Total	Total	Total	Total
1	**Chu Prong District**	116,867	61,245	38,634	724	4,441	2,255	4,695	3,251	1,613
2	Ia Tor commune	4,419	2,284	2,089	14	12	4	14		2
3	Ia Me commune	5,819	2,310	3,469			12	28		
4	Ia Pia commune	5,770	2,827	2,852		25		59		7
5	Ia Ga commune	4,212	1,627	1,173	12		202	809	374	15
6	Ia Mor commune	1,959	395	1,485	16	55	5	3		
7	Ia Bang commune	6,192	4,100	2,092						

Data sources: Summary of data of households, poor population, marginal households under the people's components in 2015 of Chu prong District

2. Living Standards

73. The poverty rate of the whole district is still more than 10% in 2014. Of which, Ia Bang commune has the lowest poverty rate of nearly 2.4% while Ia Mor has the highest rate of 22%. Follow the new poverty standards 2015, the poverty rate in the district even higher with more than 40% for Ia Mor commune. See Table 7 below for detail of poverty in the subproject area.

Table 7 – Number of poor households and the reason in 2014

	Poor Household		Poverty reasons					
	Total of poor HHs	Number of Poor people	Lack of production fund	Lack of production land	Lack of production facilities	Lack of labour	Unemployment	Others
Chu Prong District	3,273	13,656	55.30	14.7	12.56	4.83	2.29	10.32
Ia Tor Commune	187	867	69.52	24.6	6.95	0.04	0.05	24.06

[2] *Sources: Chu Prong Environment Report 2013*

	Poor Household		Poverty reasons					
	Total of poor HHs	**Number of Poor people**	**Lack of production fund**	**Lack of production land**	**Lack of production facilities**	**Lack of labour**	**Unemployment**	**Others**
Ia Me Commune	141	514	60.99	3.55	9.93	0	0	25.53
Ia Ga Commune	144	645	90.28	0	2.08	0	0	7.64
Ia Pia Commune	165	616	95.15	1.21	00	0	0	3.64
Ia Mor Commune	97	432	31.96	0	0	0.21	0	67.83
Ia Bang Commune	37	147	37.84	29.7	0	0.05	0	32.41

Sources: Results of census of poor households, marginal poor households in 2014 of the People's Committee of Chu Prong district

3. Employment and income

74. From the investigation result of the PPTA Consultant, in total 27421 households of the district, there are 25109 households working in agriculture, forestry and fisheries sectors. The number for industrial and construction is 345 households while 1967 households working in the business and trade. Table 8 below shows the production value of the district in 2015

Table 8 – Production of Chu Prong district 2015

	Unit	**Chu Prong District**
I. Total of production value (million dong)	**Mill. dong**	7,766.85
1. Agriculture, forestry, fisheries	Mill. dong	4,858.2
- Agriculture	Mill. dong	*4,843.6*
+ Crop	Mill. dong	*4,496.7*
+ livestock	Mill. dong	*334.1*
- Fisheries	Mill. dong	*9.62*
- Forestry	Mill. dong	*4.98*
2. Industry- construction	Mill. dong	*1,305.2*
3. Business and services	Mill. dong	1,603.5
II. Production structure under sector (%)	%	
1. Agriculture, forestry, fisheries	%	63.8
2. Industry- construction	%	16.4
3. Business and services	%	19.8

III. Total food production (ton)		40,441
- Average food production per person	Ton	0.357
IV. Average income	Million dong	28.2

4. Education and Public Health

75. The medical network of the district is including 01 District Medical Centre, 21 commune medical centres, 01 central medical in Ia Lau commune. The total medical staffs of the district are 211 people with 38 medial doctors. The status of medical system is summarized in Table 09 below.

Table 9 – Health care in the subproject area 2015

	Unit	Chu Prong District	Ia Tor Commune	Ia Me Commune	Ia Pia Commune	Ia Ga Commune	Ia Mor Commune	Ia Bang Commune
1. Hospital / healthcare centre	Piece	23	1	1	1	1	1	1
2. Staff		211	6	05		5		
- Doctor	Persons	38	0	1		1		
- Nurse, pharmacists	Persons	138	5	2	5	3		
- Orderlies	Persons	35	1	2	1	1		
In which: female staffs	Persons	161	3	5	3	1		
3. Number of examined patients	Persons	62,767	1,899	1,662	951	1,955		2,996
In which: female patients	persons		711	815		731		
4. Number of drug users in the commune	persons		0	10		1		
In which: female	persons					0		
5. Number of HIV infected people	persons	25	0	1	1	3		
In which:	persons	8		1		2		

female								
6. Number of malnourished children	persons	1,936	29	31		87	85	
In which: female	persons		11	17		42		

76. The Primary school and Secondary school system has been well developed and allocated all over the district area. Many branches of the Primary school have also opened to ensure all the children at the school age will go to school. Along the subproject road, there are 5 kindergartens/ branches; 10 primary schools/ branches; 4 secondary schools and 1 junior high school.

5. Water supply and electricity cover

77. Nearly all the households in the subproject areas using electricity from national electricity network. The lowest rate is 98% in Ia Tor and Ia Mor communes. The percentage of households using clean water is also high; all communes have a ratio higher than 90% except Ia Pia with 74.6% of the households have using clean water.[3]

6. HIV and human trafficking

78. There is no human trafficking case has been recorded in the subproject communes. For HIV infection, over 25 infectious cases in 2015, there are 3 cases in Ia Ga commune and Ia Pia, Ia Me have 1 case for each commune. [4]

7. Infrastructure

79. ***Transportation***: The transportation system of the district has developed in the recent years. The road distributed in a large network but many of them have already downgraded. There are 3 National Roads running through the district including: (i) NR19 connects Pleiku city with Le Thanh – Duc Co Border Gate through 3 communes of Bau Can, Thang Hung and Binh Giao – total 20km of bitumen in good condition; (ii) NR14 from Ham Rong T-junction goes through Ia Bang commune with total 10km in the district area, crosses the subproject road at Phu My T-junction – start point of the subproject; (iii) NR14C goes through 2 border communes of Ia Puch and Ia Mor with total 38km, mainly earth road with some sections are upgraded to cement concrete.

80. There are two provincial roads in the district. The first one is the subproject road – PR665 and the second one is PR663 starts from the junction with NR19, goes through Bau Can, Ia Phin, Chu Prong town, Ia Boong, Ia Puch communes then connects to NR14C with total 48km.

81. There are also 11 district roads with total over 200km and other commune roads, inner town roads... with total over 200 km.

[3] Data sources: *Department of Planning and Finance of Chu Prong district*
[4] *Data sources: Report of the medical work in 2015 orientations and tasks of DPC 2016 Chu Prong*

82. ***Industrial activities***: The construction industry of the district has a high development ratio. Industry-construction and business-trade have the ratio of one fifth over agriculture/ forestry/ fisheries in term of labour distribution but made up one third in term of production value for the year 2015. (See Table 8 above for more details).

83. ***Other public facilities***: With the development of the infrastructure system, local people in the subproject area could easily access to the market. There is no market located in the subproject communes and the farthest distance from the market to one commune centre is quite far, almost 70km in cases of Ia Mor commune. The detail information of the infrastructure system could be found in the table below.

Table 10 – Infrastructure system in the subproject area

	Unit	Chu Prong District	Ia Tor Commune	Ia Me Commune	Ia Pia Commune	Ia Ga Commune	Ia Mor Commune	Ia Bang Commune
1. Roads	Km							
- Soil road	km	757	45	2	19.08	6,9		
- Concrete / asphalt roads	km	263	15	4	14.72	29.07		
2. Number of car	piece		68	7				
3. Number of motorbike	piece	21,106	1,120	1500				
4. Market in commune	market	02						
- Distance for the centre of commune	km	0.3						
5. Market outside commune	market	1	1	1	1	1	1	1
- Distance for the centre of commune	km	4	8	10	30	50	70	5
6. Percentage of HHs using national electricity	%	100	98	100	99.9	100	98	100
7. Percentage of HHs using clean water	%	92	95	89.9	74.6	98	92	98
8. Percentage of concrete HHs with floors	%	5	13	20	9.3			
9. Percentage of HHs with brick / wood, roof, 1 floor	%	90	58	70				
10. Percentage of HHs with cottages, tent	%	5	15	10				
11. Percentage of HHs using telephone and cell phone	%	100	99	96	82	100	100	100
12. Percentage of HHs having toilet	%	90	82	70	72.3			

Data sources:

1. Department of Planning and finance of Chu Prong district

2. Office of people's committee of Ia Me commune

3. Office of people's committee of Ia Ga commune

D. Archaeological, Historical and Cultural Treasures

84. There are several archaeological sites have been discovered in Gia Lai province. The new discovered archaeological site in An Khe town (about 80km from the subproject) has been highly evaluated by the Institute of Archaeology of Viet Nam. There are no archaeological, cultural sites in the subproject area.

E. Key Environmental Features

85. ***Physical environmental features:*** The subproject area is quite flat and has a trend of going downward gradually from the start point to the end point in the border area with Cambodia in North East – South West direction. Along the first 30km goes through Ia Bang, Ia Tor, Ia Piar, Ia Me is mainly residential area with coffee cultivation of local people. There is no forest located in this section of the subproject area. The later part in Ia Ga and Ia Mor communes (mainly Ia Mor commune) is the forest area but mainly production forest of rubber plantation companies (Chu Se Rubber Company, Military Economic Regiment 710). There are 3 subzones (989, 991, 993) of Ia Mor Protection Forest located along the road. The 3 subzones have already changed to production forest with rubber plantation and only 100 m corridor from both sides of the road is remain protection forest with few trees under Dipterocarpaceae family – the local tree type.

86. Over 5 stream crossing points, Ia Mor is the largest stream, cross the road at Km 50+133. Pleilai Irrigation Lake in Ia Lau and Ia Piar communes, located about 10km from the subproject road. Ministry of Agriculture and Rural Development has invested Ia Mor irrigation system to irrigate for 12000 ha of different crops in Gia Lai and Dak Lak provinces. This system will also provide drinking water for 50000 people living in the border communes of Chu Prong district. This project is now under construction and locate at KM48+200 of the subproject route

87. ***Social environmental features:*** The first 32 km of the subproject goes through dense population area. There are 5 kindergartens/ branches; 10 primary schools/ branches; 4 secondary schools and 1 junior high school located at along the subproject road. Each commune has one medical clinic and there are two small churches located roadside of the subproject. Ia Mor residential area is also partly located along the road in Ia Mor commune. There is also An Phu Farm – Chu Se Rubber Company and Ia Mor Military Border Station located along the road at this section.

VI. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

88. This section discusses the potential environmental impacts of the subproject and identifies mitigation measures to minimize the impacts in all design, construction and operation phases of the subproject. Ia Mor Protection Forest located along the subproject road from KM32+6 to the end of the road could be adversely affected due to subproject implementation.

89. The constructions activities during the construction phase will be mainly upgrade the existing road. The main physical impacts are relating to vegetation clearance for the site preparation, the operation of construction machines and material transportation truck, construction material exploitation at quarry, borrow pit and temporary stockpile. The activities will create dust, noise and vibration that disturb local people and increase risk of respiratory and skin disease.

90. The subproject construction will also impact on local traffic making difficulties for people to access their properties, especially the ones who live along the subproject road. There are several CPCs, medical clinics, schools, and kindergartens located along the road. There is also Rubber Development Unit of Chu Se Rubber Company; Unit No.1 and No.2 of Military Economic Regiment 710 and Ia Mor Border Military Station locate along the road in Ia Mor commune. These impacts to social infrastructure will be in short duration of construction phase only and these have been subject to detailed assessment in the Resettlement Plan.

91. The potential environmental impacts as well as the mitigation measures in the pre-construction, construction and operational phases are assessed below. The criteria for assessment are in line with ADBs SPS as specified in ADB Safeguard Policy Statement 2009 and the GOV standards based on Environmental Protection Law 2014. Where GOV standards or guidelines have some kind of conflict with ADB SPS, ADB SPS will be applied as the policy for the subproject implementation. The EMP is presented below including mitigation measures and monitoring plan for the implementation of the subproject road.

A. Potential impacts and mitigation measures in the pre-construction phase

1. Improper subproject location and design

92. ***Description:*** If environmental and climate change considerations are not included in the subproject detail, the construction of the subproject road could pose severely negative impact to the sensitive receivers along the subproject road. The quality and longevity of the road could also be impacted from the unwilling weather conditions, which will lead to increase maintenance time consuming, and budget. Intensity of impact to Ia Mor Protection Forest will also change with different road surface material and construction technology. The construction of bitumen road will create a higher forest fire risk due to bitumen heating. Improper drainage design could impact on local people as the case in Not village, Ia Me commune. Runoff water has created a deep ditch, divided Not village into two parts, make many difficulties for the movement of village people.

93. ***Mitigation Measures:*** The detail design of the road and culverts/ bridges will consider the flood situation of the Ia Mor area, especially the bridges area over crossing streams and A2 scenario - the highest scenario for precipitation of Tay Nguyen area until 2100[5] with the precipitation will increase 1.9% in compare with the precipitation of 1980-1999 period (1721.5mm). Culverts have been designed to withstand a 25-year return and bridges have been designed to withstand a 100-year return. Asphalt concrete has been selected as road surface material for the whole route. A culvert or a drift will be constructed to support the movement between residential clusters in Not village, Ia Me commune. In line with ADB policy on environmentally responsible procurement, a new environmental assessment report will be undertaken for submission to ADB if there are any changes to subproject design that would result to environmental impacts or risks that are not within the scope of the current IEE.

2. Land acquisition and resettlement

94. **Impacts**: The subproject will upgrade the road surface based on the existing foundation and construct/ reconstruct 5 bridges in total. 56 households is affected by the implementation of the subproject of which 2 households in Ia Mor is severely affected as they has lost more than 10% of the total natural land holding. If the compensation will not be paid correctly, it could impact on the incomes of the affected people, especially in Ia Mor communes, the poorest commune of the district.

95. ***Mitigation measures:*** Before the construction start, PMU will review the Land Acquisition and Resettlement report and check at the field to ensure that all affected households have received compensation adequately in accordance with the current provincial market price. ESP wills response for quarterly monitoring and record any complaints from these affected households and local people before submit to PMU for resolution. A grievance redress mechanism will be established and inform to relevant stakeholders before construction start.

3. Public facilities affected and relocation

96. ***Impacts:*** Some public facilities such as electricity cables, drainage system, and telecommunication system could be affected or relocated for the implementation of the road. This will impact on the daily living of local people who using these facilities.

[5] Climate Change Adaptation Plan for Gia Lai in 2010-2020 period with view to 2030.

97. However, the subproject road will mainly upgrade road surface without changing direction or the road foundation. The Right of Ways (ROW) of the road has been defined 15 m from each side of the road so it will not make relocation of the electricity cable system along the road. The drainage system along the subproject road is also severely damaged so it will be upgraded and repaired. No other public facilities will be affected or relocated due to the implementation of the subproject.

4. Disturbance of unexploded mine and bomb (UXO)

98. ***Impacts:*** The subproject will be upgraded based on the existing foundation. There is no risk of UXO during the implementation of the subproject.

B. Potential impacts and mitigation measures in the construction phase

1. Loss of trees and impact to fauna

99. ***Impacts:*** 100 m corridor on both roadside from Suoi My Bridge to the junction with NR14C are 3 subzones – 989, 991 and 993 of Ia Mor Protection Forest under the management of Ia Mor Protection Forest Management Board. There are also 4 subzones of 995, 996, 999 and 1000 of Ia Mor Protection Forest locate along the subproject road from the junction with NR14C to the end point at the junction with border patrol road. These four subzones are under the management of Ia Mor CPC and Border Defence Soldier of Border Defence Post No. 729. The construction activities could have severely negative impact to the forest as trees could be cut down for construction activities and for using as fuel woods for bitumen or water heating. Forest fire could also be happened due to careless construction activities. Some kind of wild animals will be affected from the noise and vibration of construction activities or being hunted by the construction workers. However, as nearly all the area of subzones 989, 991, 993 – Ia Mor Protection Forest has now been changed to rubber plantation and the “real” protection forest are only 100 m corridors from each side of the road, the negative impacts could be minimized through suitable mitigation measures.

100. ***Mitigation measures:*** Ia Mor Protection Forest Management Board, Ia Mor Border Defence Post, Ia Mor and Ia Ga CPCs will be informed in advance for construction plan and scope, especially for tree cutting and vegetation clearance activities. ESP and PMU safeguards staff will supervise closely the tree cutting process to ensure no tree out of the cut-down list will be affected. Workers should be informed and prohibited from cutting trees for firewood and for use in the subproject activities before construction start. The contractors will also not use wood as fuel to heating bitumen or any other activities. They also will not by fuel wood from illegal sources. On the other hand, no construction camps, concrete mixing plants, large material storage sites are to be located in the forest area. The contractors will not use or permit the use of woods as fuel for construction activities or use for cooking and water heating in worker camp. Hunting is prohibited in all subproject area. PMU, ESP and CSC will strictly supervise and monitor the construction activities to ensure they will be done properly on the existing road foundation.

2. Impact on local facilities

101. ***Impacts:*** As the first 32.6 km of the subproject road goes through several residential areas, the water supplies, electrical power supply, and telecommunications, drainage systems of

these areas could be maintained during the works. It will affect local people in their daily activities. It is minor impact as the road will be upgraded based on the existing foundation and no current public infrastructures will be relocated. The impact will be happened in 24-month of construction and stop upon the construction complete.

102. ***Mitigation measures:*** to minimize the negative impact, the contractors will inform in advance the construction schedule, the affected electricity and telecommunication cable system, irrigations system to CPCs of the 6 subproject communes in advance. Construction schedule will be published at the CPC so local people could easy access these information. If any facilities are accidentally damaged during construction period, it should be reported to ESP and PMU as well as the owner to the facilities before repaired at the contractor's expenses.

3. Impact by material exploitation activities at the quarry, borrow pits and temporary storage areas

103. ***Impacts:*** In the work of excavating and material exploitation for the subproject construction activities if excavated soil is not collected then siltation will be occurred, especially at 5 stream crossing areas in Ia Ga and Ia Mor commune. It will be able to cause stuck in water flow closed to the mines and quarry area, create filling situation that affects cultivation areas of residents. Earthwork activities will also change soil structure and raise the amount of unconsolidated sediments at the borrow pits. When it rains, runoff of rainwater will take away them into the surrounding water bodies causing sedimentation and erosion also. Runoff water could also take construction material such as sand, soil from material storage sites into the surrounding water bodies if material stored for a long duration at the construction site. This impact will happen in the area of the two proposed borrow pits in Doc Trang, 500 m from subproject road and roadside at Km45, Ia Mor commune. The estimated volume for embankment soil is 452,436 m^3 and about 28,500 m^3 could be utilized from excavated soil. It will affect local people living in the subproject, quarry, and borrow pit areas. The temporary storage areas could also have some negative impacts on the surrounding environment such as soil runoff when its rain of dust arising in the dry conditions.

104. ***Mitigation measures***: To minimize the impact, in the detail design period, ESP will provide a MMP for implementation by contractors. The MMP will support to balance the excavation soil and the filling soil to utilize most of the excavation soil for filling purpose. MMP will also list the suitable quarry and mines for construction materials. These mines should own operation licenses from MONRE of Gia Lai to ensure material exploitation at the mines would not cause any uncontrolled negative environmental impacts. The temporary storage areas must be covered with canvas and fenced with signboard to avoid passing people. Replant tree and vegetation cover of any vegetation clearance area in the quarries and borrow pits.

4. Generation of excavated spoil

105. ***Impacts:*** The excavated soil subproject construction activities that could not be reuse as filling soil may have significant impacts and environmental degradation due to the improper disposal of these materials. According to the survey result of the PPTA Design Consultant, the estimated volume of excavated soil is 134,917.45 m^3, of which 96,519.66 m^3 is organic soil, unsuitable for reuse as filling soil for road embankment. This amount of organic soil will be transferred to the temporary dumping site. People in the residential areas along the subproject road and near the temporary dumping sites could be affected by soil erosion from these temporary dumping areas. This is a minor impact as in the negative side, the subproject road will

be upgraded base on the existing foundation so the levelling work is minimized and the volumes of spoil will be not much. On the other hand the flat terrain along the subproject route is also minimizing the filling soil volume. The vacant land areas along the road are still available for temporary dumping area of spoil. In the positive side: local people could use the spoil for their garden or house foundation.

106. ***Mitigation measures:*** To minimize the negative impacts during 24-month of construction, the contractors should evaluate and grade the spoil and the suitable spoil will be used for filling purpose. This will reduce the need to extract soil for filling. Part of the borrow pit in Doc Trang could be used as temporary dumping site. The areas for disposal should be agreed with CPCs. Dak Lak DONRE will check and ESP/CSC/PMU recorded and monitored for the disposal sites. The disposal site will be located at least 50m from water bodies and be protected from erosion and grassing.

5. Generation of construction waste and domestic waste from workers

107. ***Impacts:*** Solid waste that will be generated from construction mainly includes domestic waste of workers and scraps of transported soil and stone, debris, mud. Domestic waste is mainly generated from construction workers at campsites. Uncontrolled waste disposal operations can cause significant impacts. It will impact firstly the workers in the campsite and areas surround the construction sites and local residential areas of Ia Bang, Ia Tor, Ia Pia, Ia Me and Ia Mor along the subproject road. Waste could also pollute water bodies of the streams as the 5 crossing points with the subproject road. This will happen in 24 construction months and along 65.87km of the road.

108. ***Mitigation measures:*** To minimize the impact during 24-month of construction time, ESP will assist PMU to monitor the contractor progress of WMSDP implementation, to ensure the contractors will provide enough trash bins at the worker camps. Contractors need to work with 3 CPCs of 5 subproject CPCs to find out suitable place for construction and domestic waste disposal. CSC and PMU will supervise to ensure waste and unused construction material will be treated properly and transfer to designated location. A regular check must be done by ESP at the sensitive area such as the 5 stream crossing points, schools and medical centres to ensure no waste will be accumulated near the sensitive receivers.

6. Impact from hazardous materials and hazardous waste disposal

109. ***Impacts:*** Use of hazardous substances such as oils and lubricants, bitumen can cause significant impacts if uncontrolled or if waste is not disposed correctly. However, the affected level is insignificant because the main construction activity in 65.87 km is paving the road surface and the construction machines are not large. The impact areas could be surrounding water bodies, especially Ia Mor stream. Local people in 6 communes along the subproject road could also be affected.

110. ***Mitigation measures***: Gia Lai PMU assisted by the ESP and CSC will be responsible to monitor the contractor's progress of implementing the WMSDP to avoid or minimize impacts from use of hazardous substances such as oils and lubricants. The contractors must ensure that safe storage of fuel; oils... are agreed by PMU/ESP. They must storage in the areas provide with roof, impervious floor and at least 100 m from watercourse.

7. Impact from noise, dust and vibration generated during from the construction activities

111. ***Description*****:** Earthworks and the operation of concrete mixing plant will be the main sources of dust. Concrete mixing plant will be located at Doc Trang quarry (500 m from the junction to Ia Lau commune) in Ia Ga commune. Construction machines will generate gaseous emissions (NOx, SOx, CO, CO_2, etc.) when they are in operation. Transportation vehicles could also create dust along the transportation route. These gaseous and dust could cause health problems to the residents who living near the construction site and along the transportation route, especially at the environmental sensitive area such as schools/ kindergartens, medical centres, subproject communes. This is an average impact due to the first 30km of the subproject route goes through dense population area with many schools/ kindergartens, medical centres, in Ia Bang, Ia Pia, Ia Tor and Ia Me communes. The latter part is also passes through Ia Mor commune centre with the possible of cumulative impact in case Ia Mor Irrigation Project and the Subproject is implemented at the same time.

112. ***Mitigation measures***: The contractor will not locate any noisy machines near the environmental sensitive areas such as the schools/ kindergartens, medical centre, CPCs. The contractors also will not locate large material storage sites in the residential areas. The large storage sites should be located at least 100m away from these sensitive points. The contractors will work with CPCs of the 6 communes, with the representative of ESP and PMU, to identify areas for large material storage site as well as material transportation plan. PMU and CSC will responsible to monitor these mitigation measures.

8. Landslide, soil erosion and runoff

113. ***Impacts:*** Roadside erosion and runoff could happen when its rain, especially at the roadside unlevelled section, near the rivers/ streams and the borrow areas. Erosion and runoff could impact on the cultivation areas of local people, impact of the quality of water bodies. Landslide could happen in the section with high slope side, will damage the road and block movement. In general, the impact could be considered as insignificant due to subproject flat area and there is no large water bodies located at the road side but attention must be paid to the crossing point with Ia Mor stream as it is the largest stream of the district and play an important role for the irrigation and even domestic water of Chu Prong district.

114. ***Mitigation measures***: The contractors should limit to store material near the area of stream crossing point, especially Ia Mor stream. The construction activities of culverts/ bridges construction will be implemented in dry season. The contractors will also update weather forecast daily during construction time to avoid heavy rain day. PMU and CSC will responsible to monitor these mitigation measures.

9. Impact on crossing streams or bridge construction locations

115. ***Impacts:*** Careless construction and poor materials control can cause blockage to streams. Runoff water during its rain could bring waste and soil into the nearby water bodies. That could lead to siltation and reduce the water quality. The 5 crossing streams, especially Ia Mor stream could be affected by the construction activities and it will lead to reduce water quality of water bodies of the streams.

116. ***Mitigation measures***: the contractors should disposed soils, spoils and construction waste out of the bridges/ culverts construction immediately. They should also discuss with relevant authorities for MMP and WMSDP implementation. Silt fences and sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and drilling operation within streams. The steep slopes should be covered with vegetation to avoid landslide and siltation in the nearby rivers/ streams. PMU and CSC should work and collaborate closely with relevant authorities such as CPCs and Chu Prong DPC to monitor the implementation of these mitigation measures.

10. Impact on water resources and quality

117. ***Impacts:*** The drainage system, irrigation and water resources on surrounding lands will be affected by construction activities as follows: a) local water supplies will need to be tapped to meet campsite and construction requirements, so bringing subproject based water use into competition with local use; b) surface and subsurface water resources near the subproject route could be contaminated by fuel and chemical spills, or by solid waste and effluents generated by the kitchens and toilets at construction campsites; (c) natural streams may become silted by borrow material (earth) in the runoff from the construction area, workshops and equipment washing-yards. Construction activities could impact on the quality of the nearby water bodies. Waste and construction material could fall into the water bodies if the waste is not control carefully or material stockpiles area not be covered and well monitored. The impact will mainly on water bodies along the subproject road such as crossing streams and worker camps area, especially at the Ia Mor stream crossing point. As Ia Mor stream provide irrigation water for Ia Mor cultivation area and Ea Soup of Dak Lak, the subproject construction in 24 months could impact on the irrigation water resources for downstream users of Ia Mor and Ea Soup.

118. ***Mitigation measures***: In order to minimize this negative impact, the contractors will work with Agricultural and Irrigation Staff of Chu Prong and Ea Soup districts to set up a suitable construction schedule, avoid impact on the irrigation activities for Ia Mor and Ea Soup cultivation areas. The contractors will store lubricants, oils in designated area with roof covered and impervious foundation at least 50m from streams/ lakes. Sediment ditches, silt fences should be installed in suitable location to avoid runoff, erosion and siltation in lakes/ streams. Material storage sites should also be covered carefully with canvas and located at least 50m away from water bodies. PMU and CSC will responsible to monitor these mitigation measures.

11. Impact by the large influx of construction worker

119. ***Impacts:*** Large influx of construction worker will create a burden on local public services like electric and water supply. Construction workers from other area could bring outside disease to the subproject area. The concentration of workers in the work camps could also create a good environment for diseases such as sore eyes, cholera, flu and respiratory problems. Social aspect: concentration of a number of workers could lead to social problems such as gambling, drug addiction, prostitute, violence, conflict amongst workers, or between workers with local people. The impact will affect directly on workers and indirectly on the community near the construction sites in the residential area of 6 communes along the subproject road. This is an average impact due to high density of population in the subproject area.

120. ***Mitigation measures:*** Worker camp location and facilities located at least 500m from residential areas as agreed by local communities and approved by ESP and PMU and managed to minimize impacts. All workers should register with local police for temporary residential

certificate. The worker camp should be located in the area with sufficient drainage to avoid water logging and formation of breeding sites for mosquitoes and flies. Worker should have health check before start work in the subproject and should be trained for living and working behaviour before joining the sites. On the other hand, Contractors will use local labours for simple works such as smooth the road, moving soil, give priority to poor families, female householders, woman if they need jobs. It aims to raise their income, create more jobs, contribute to poverty reduction for local community and also reduce the number of construction workers from outside. Local people in the residential area of 8 subproject communes will have benefits from the subproject construction. However, this is a small positive impact and it requires the coordination between the contractor and CPCs of subproject communes and nearby communes in recruiting local labours (contractors often prefer to engage their own trained workforces rather than training unskilled labourers). The duration of the impact is also short, only in 24 months construction time.

12. Risk to health and safety to local people or construction workers

121. ***Impacts:*** Dust, exhaust gas and noise generating from earthworks, transporting of material, construction activities and operation of machines, etc. These factors cause direct affects on health of workers and local residents. Material transport and construction activities on the existing road may create the risk of affects on traffic safety and houses structure on roadsides especially in the environmental sensitive areas. The excavation of the trenches for side drain construction can threaten public safety, particularly of pedestrians and children. Waste and wastewater from construction activities and worker camps could also create a favourable environment for the outbreak of some respiratory diseases of local people as well as workers. Accidents may occur if during the construction if workers are not provided with safety equipment and obey construction regulations. The objects of this impact are local people in the subproject area especially pupil in the subproject area and the workers working at the site. This is an average impact, as the construction sites will stretch along 65.87 km of the subproject, in the residential areas of 6 communes of Chu Prong district.

122. ***Mitigation measures***: The contractors with the support from ESP will conduct training for workers on safety and environmental hygiene. The workers will be instructed construction camp rules and site arrangement and all of them will be equipped with appropriate PPE such as safety boots, helmets, protective clothes, gloves and ear protection for the one working with noisy equipment. All areas of excavation greater than 1m deep and insides of temporary works should be fenced with sign boards installed. The contractors in collaboration with ESP and PMU will also work with 6 CPCs of commune along the road for the construction plan and scope. The CSC and PMU will responsible for supervision activities during construction phase and response timely for any raised opinions/ comments from local people and authorities.

13. Impact on the local traffic

123. ***Impacts:*** Construction activities on the Subproject road are likely to cause hindrance in traffic flow if not mitigated properly especially at the start point (Phu My T-junction), junction with PR663, junction with the road to Ia Lau commune and junction with NR14C along the subproject road. Local people and people from other area who travel on the subproject road will be affected during 24 months construction period. However, this is a minor impact due to local people could have other options for travel and the subproject only paved the road surface in short construction time.

124. ***Mitigation measures:*** To minimize the disturbance to local people, the contractor will work with CPCs on construction plan and the construction schedule and scope will be published in all subproject communes and districts. The contractors need to coordinate with local traffic officials schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up. The contractor will also construct temporary road and minimizing interference with traffic flows past the works site.

14. Cumulative impact from the Subproject and Ia Mor Irrigation Project

125. ***Impacts:*** Ia Mor Irrigation Project is under construction at Km48+200 of the Subproject road. This project is a huge irrigation project, invested by Ministry of Agricultural and Rural Development to ensure irrigation water for 12,000 ha cultivation area of Ia Mor commune and Ea Soup district, Dak Lak province. The construction activities of the two projects at the same time will create a heavy burden to the local infrastructures and services like water supply, electricity, road network, and waste treatment system… The impact will mainly take place in Ia Mor commune and impact directly to commune's infrastructure and service and local people. However, the impact is not large as the main dam construction is nearly complete at the moment and the reservoir will store water in the middle of 2017.

126. ***Mitigation measures***: PMU and EPS will work with Ia Mor CPC and the contractor of Ia Mor Irrigation Project to find out a suitable construction schedule, machine and worker mobilization plan avoid concentrate construction works at the same time. The contractor will inform Ia Mor CPC the construction schedule and scope in advance. The selection of material mines, borrow pit and dumping site for the subproject will also consider the demands from Ia Mor Irrigation Project.

15. Environmental impacts due to inappropriate environmental recovery responsibility

127. ***Impacts:*** If after construction work has been completed, the sites are not cleaned up, construction and domestic waste will pollute surrounding environment. If site restoration such as replanting trees; grass; filling up construction pit; removing camp site have not been implemented in accordance with environmental regulation then the environmental issues like erosion, sedimentation and accident may occur. Construction waste and waste soil could also impact on the soil quality of the temporary acquired land area.

128. ***Mitigation measures***: Site cleaning up must be performed right after the work completion. Pit and excavation areas must be filled up by the contractors when the construction complete. PMU and CSC will strictly monitor the site to ensure all construction sites will be fully recovered upon the construction finish.

C. Potential impacts and mitigation measures in the operation phase

1. Increase access to the forest

129. ***Impacts:*** The better road condition could increase the chance to access Ia Mor Protection forest and make more convenience for wood logging or other illegal forest exploitation activities

130. ***Mitigation measures:*** Gia Lai Department of Transportation (DOT) the management organization of the subproject in the operation phase will coordinate with Ia Mor Protection Forest Management Board, Ia Mor CPC and Ia Mor Border Post No.729 to set up suitable control system. Establish checkpoints at the junction with NR14C and the border patrol road. On the other hand, better road condition will also support the management board of the forest in forest patrol and forest fire prevention.

2. Impact from dust and noise arising from increasing of traffic density

131. ***Impacts:*** Paved road surface condition will reduce the dust concentration but better road condition will also increase traffic density along the subproject road especially the road play an important role for goods transportation from National Road No.14 to NR14C and along the border area. Noise, dust and vibration could have negative impact on the local people living along the subproject road, especially the environmental sensitive areas such as schools/ kindergartens, medical centres in the first 30km of the road.

132. ***Mitigation measures:*** Gia Lai Department of Transportation (DOT) will responsible for subproject management in the operation phase. Road hump, speed limit sign could be installed at the sensitive areas like schools/ kindergarten, medical centres. The use of air horn should be banned along the subproject road, especial in the sensitive area.

3. Favourable conditions for transportation of goods and people movement

133. ***Impacts:*** The upgraded road will favor the goods transportation from agricultural production of Chu Prong district to Le Thanh Border Gate via NR14C. Support movement of local people on the road in rainy condition, especially local people in Ia Mor and Ia Ga commune. As it supports better transportation of goods, especially agricultural product, the time for transportation will reduce and the profit will increase. The completion of the road will favor people in the 6 communes of Chu Prong districts and surrounding residential areas as well as people who doing business along the subproject road.

4. Driving conditions and community safety

134. ***Impacts:*** The upgrading and construction of the road is likely to increase the vehicle speed on the road. Increases in traffic flow indicate additional future traffic should be moderate and unlikely to create many community safety issues. On the other hand, the condition of the road facilities will be enhanced and driving conditions should improve. The beneficiaries of the subproject are local people in the two districts and people who travel on the subproject road.

5. Affects on employment or livelihood

135. ***Impacts:*** Increase incomes and living standards for people in the subproject area by means of increasing the profit as save time for transportation and merchant will access production area easier, thus the agricultural production price will be higher. Local people in the subproject area and people who cultivate in the subproject area as well as local people in the 6 subproject communes of Chu Prong district will be benefited from the completion of the road. This is a permanent impact and has significant effects to local people's lives.

6. Impacts on ethnic groups

136. ***Impacts:*** The completion of the subproject road will support to increase incomes and living standards for ethnic minorities in the subproject area by means of increasing the profit. The completion of the road will support them to save time for travel and increase production prices as merchant could access the production area easier.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

137. The objectives of the stakeholder consultation process was to disseminate information on the subproject and its expected impact, long-term as well as short-term, among primary and secondary stakeholders, and to gather information on relevant issues so that the feedback received could be used to address these issues at early stages of subproject design. Another important objective was to determine the extent of the concerns amongst the community, to address these in the subproject implementation and to suggest appropriate mitigation measures.

A. Public consultation preparation

138. Stakeholders are people, groups, or institutions that may be affected by, can significantly influence, or are important to the achievement of the stated purpose of a proposed intervention. The stakeholders consulted for the construction of the provincial road No.665 included representatives from Gia Lai DPI, DONRE, DARD, DOT, Chu Prong Division of Natural Resources and Environment, Chu Prong Division of Agricultural and Rural Development. Consultation has also been implemented with representatives from 6 CPCs in Chu Prong district, Ia Mor Protection Forest Management Board, Ia Mor Military Border Station. Several local people living along the subproject road have been consulted using questionnaire. Consultations took place in March 2016.

B. Information dissemination during public consultation

139. Providing information through local authority offices will provide a conduit for the improvement of the subproject implementation to better serve the stakeholders. Public consultation can also assist in:

i) harnessing cooperation from informed people to help local authorities reconfirm the extent of local permits and licenses that will be required at a later stage;

ii) obtaining cooperation from informed residents and groups which to avoid cost and time in dealing with complaints;

iii) identifying local infrastructure subprojects or other local initiatives that will interface with the sub-project roads with assistance from informed local authorities;

iv) the collection of relevant information on the current condition of the local environment including aspects of forest and wildlife and conservation.

140. The information disseminated during public consultation is including: (i) background of the Project and subproject; (ii) basic information related to ADB and the Government requirement for environmental protection; (iii) potential impacts during subproject implementation and mitigation measures.

C. Obtained results and use of results from public consultation

141. The results of the public consultations are recorded in Table 11 and 12 below. In general, all the relevant stakeholders are support the implementation of the subproject. As the subproject road foundation has been constructed long time ago, the subproject will mainly upgrade the road surface based on the existing foundation with 15 m ROWs, no house must be relocated and no

major land acquisition will be taken, the local people is totally support the subproject implementation.

Table 11 – Main issues and information from local authorities

Main issues	Information from relevant authorities
Impact by runoff water	Lang Not village, Ia Me commune: accumulate water in the heavy rain has created flows, divided the village into two parts. Good drainage system should be consider to avoid it
Impact on Ia Mor protection forest	Ia Mor Protection Forest Management Board: Cooperate with the Management Board in Forest Protection. Inform construction schedule and scale in advance

Table 12 – Main environmental concerns from public consultation

Concerns expressed	How concerns are addressed in IEE
No compensation or inadequate compensation	Before the construction start, PMU will review the Land Acquisition and Resettlement report and check at the field to ensure that all affected households have received compensation adequately
Moderate material transportation speed, cover with canvas to avoid dust and fallen materials	Regulation for material transportation will be put as an appendix in the contract with contractor. CPCs in cooperation with PMU and CSC will monitor the compliance during construction phase.

142. The environmental assessment process under the SPS 2009 requires the disclosure of the IEE to the public during the completion of the IEE to be in strict adherence to the rules. This process will be concluded by displaying the IEE at the PPC Headquarters during the period when the IEE is disclosed on the ADB website.

VIII. GRIEVANCE REDRESS MECHANISM

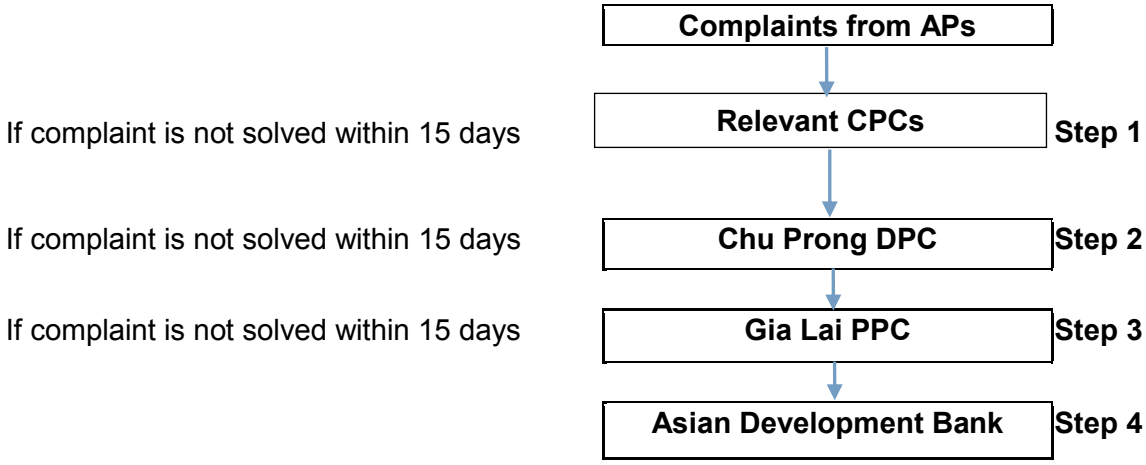
A. Purpose of the mechanism

143. During the deployment of the subproject, local people are disseminated environmental protection activities such as EMP. Negative impacts on the environment may occur during the construction and operational phases. Any comments/ suggestions of local people will be solved quickly, transparently and protected by law, particularly for affected people by the subproject. Complaint handling mechanism was classified by level and responsibilities of involved parties.

B. Grievance redress mechanism

144. Per the environmental management frame, there are 03 steps to redress complaint as below:

- ***Stage 1***: If a household has any complaint he/she can submit a complaint to the CPC-community monitoring board. CPCs will work with CSC and CSC to solve complaints.
- ***Stage 2***: If the complaint is not resolved, the complainant will submit an application to the Chu Prong DPC to resolve the complaint.
- ***Stage 3***: If more than 15 days but no response from the DPCs, the complainant may submit a complaint to the Gia Lai PPC (through Gia Lai DONRE). Gia Lai PPC will require Chu Prong DPC to solve the complaint. In case the complaint is still not resolved, Gia Lai PPC will require environmental police to investigate and requested stakeholders to resolve the complaint.
- If efforts to resolve disputes using the grievance procedures remain unresolved or unsatisfactory, APs have the right to directly discuss their concerns or problems with the ADB Southeast Asia Department through the ADB Viet Nam Resident Mission (VRM). If APs are still not satisfied with the responses of VRM, they can directly contact the ADB Office of the Special Project Facilitator (OSPF).



IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation arrangements

145. Gia Lai PMU will recruit Environment Safeguard Specialist (ESP) under Loan Implementation Consultants (LIC) to support subproject implementation in Gia Lai. ESP will support PMU updated EMP and as well as monitor the compliance of the contractors during construction phase. ESP will also responsible for training and capacity building on the implementation of EMP.

146. PMU will engage Construction Supervision Consultant (CSC) for the monitoring and supervision of the subproject in general and for environmental monitoring as well. CSC will ensure that the contractors implement the provisions of the subproject EMP.

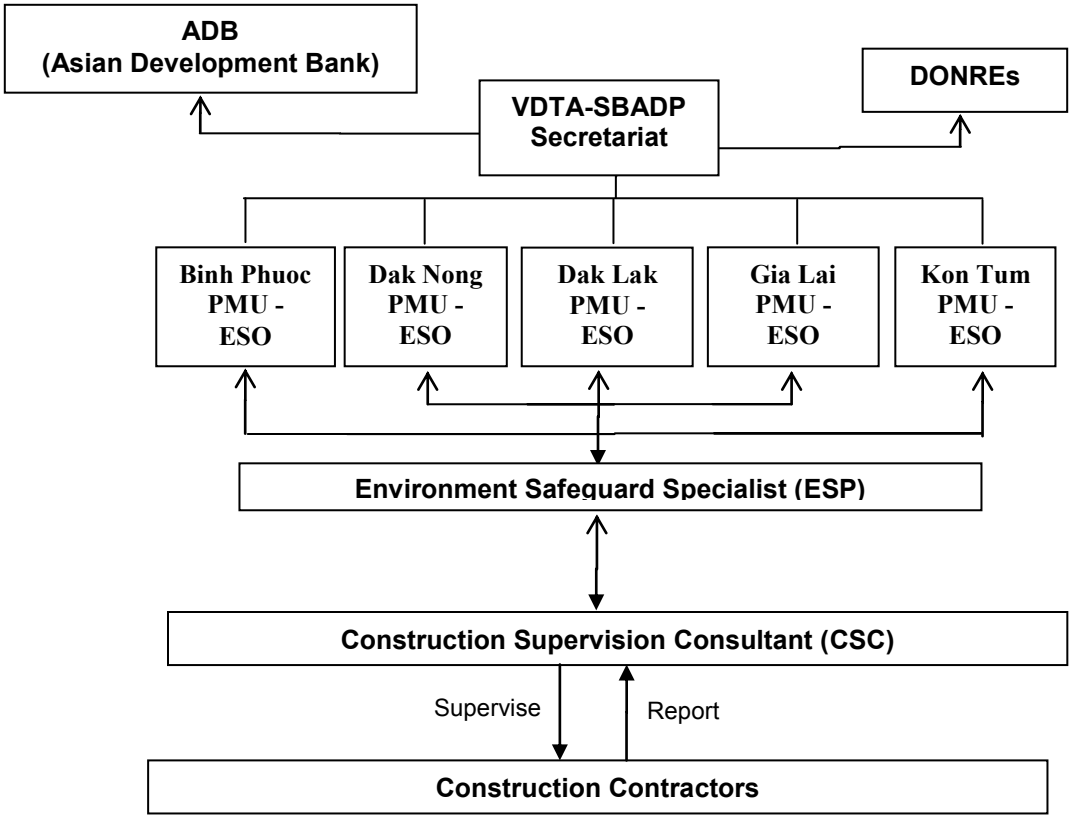
Table 13 – Responsibilities for EMP implementation

Agency	Responsibilities
Gia Lai Project Management Unit under DPI (PMU)	- Ensure that EMP provisions are strictly implemented during various subproject phases (design/pre-construction, construction and operation) to mitigate environmental impacts to acceptable levels. - Undertake monitoring of the implementation of the EMP (mitigation and monitoring measures) with assistance from ESP and CSC. - Ensure that Subproject implementation complies with ADB's environmental policy and safeguards policy statement (SPS 2009) principles and requirements - For subproject duration, commit and retain a dedicated staff within PMU as environment and safeguards staff to oversee EMP implementation - Ensure that environmental protection and mitigation measures in the EMP are incorporated in the detailed design - Obtain necessary environmental approval(s) from DONRE prior to award of civil works contracts - Include the Subproject updated EMP in the bid and contract documents for civil works - Establish an environmental grievance redress mechanism, as described in the IEE, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the Subproject's environmental performance - With assistance from ESP, prepare semi-annual environmental monitoring reports for submission to ADB - Based on the results of EMP monitoring, identify environmental corrective actions and prepare a corrective action plan, as necessary, for submission to ADB.
Environmental Safeguards Staff (ESO)	- PMU staff support for EMP implementation - Work closely with ESP of LIC to daily supervise of EMP implementation and preparation of EMP monitoring report
Environment Safeguard Specialist (ESP)	- Ensure that the environmental protection and mitigation measures identified in the EMP for the design stage has been incorporated in the detail design; - Assist PMU to ensure that all environmental requirements and mitigation measures from the IEE and EMP are incorporated in the bidding documents and contracts. - During detailed design phase carry out baseline data collection on air quality, noise and surface water quality (as specified in the EMP) - During detailed design phase, prepare method statement (Waste Management and Spoils Disposal Plan) described in the IEE/EMP.

	- Implement all mitigation and monitoring measures for various subproject phases specified as ESP's tasks in the EMP - Work with PMU to execute any additional environmental assessment prior to subproject construction as required in the EMP (e.g., preparation of new or supplementary environmental assessment in case of change in alignment that will result to adverse environmental impacts that are not within the scope of the IEE prepared during loan processing, etc.) - Undertake environmental management capacity building activities for PMU as described in the IEE and EMP. - Engage international and national environment specialists to ensure proper implementation of EMP provisions. Through these specialists, the ESP shall: (i) ensure proper and timely implementation of ESP's tasks specified in the EMP, (ii) conduct environmental training as specified in the IEE/EMP for PMU, (iii) conduct workers' orientation on EMP provisions, (iv) undertake regular monitoring of the contractor's environmental performance, as scheduled in the EMP (v) conduct field measurements for surface/ground water quality, dust and noise as required in the EMP, and (v) prepare environmental baseline report and environmental semi-annual environmental monitoring reports , as specified in the EMP, for submission to ADB.
Construction Supervision Consultant (CSC)	- Provide the ESP relevant information as well as full access to the subproject site and all project-related facilities (such as construction yards, workers' camps, borrow and quarry areas, crushing plants, concrete mixing plants, etc.) to monitor contractors' implementation of the subproject EMP, assess environmental impacts resulting from on-going site works and operation related facilities, undertake environmental effects monitoring and orientation of workers on EMP implementation. - Undertake day-to-day subproject supervision to ensure that contractors properly implement the EMP. - Orient workers on EMP implementation, and health and safety procedures - Document and report to PMU on occupational accidents, diseases and incidents - As part of regular progress report submission to PMU, prepare reports on the status of the contractors' implementation of the EMP and health and safety issues - Engage a national environment specialist to ensure proper implementation of the above tasks.
Contractors	- Recruit qualified environmental officer to ensure compliance with environmental statutory and contractual obligations and proper implementation of the Subproject EMP - Provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the EMP - Implement additional environmental mitigation measures, as necessary
Gia Lai Department of Transportation (DOT)	- Responsible for operation and maintenance of Subproject road - Implement EMP monitoring during operation
Gia Lai Department of Natural Resources and Environment (DONRE)	Review and approve environmental assessment reports required by the Government. - Undertake monitoring of the subproject's environmental performance based on their mandate

The organization structure of Environmental Management Plan is showed in the chart below:

Figure 2 – EMP Implementation Organization Chart



B. Environmental mitigation

147. The anticipated environmental impacts and mitigation measures discussed in the previous section is presented in Table 14. The table also shows responsibilities and timeframe/schedule for implementation of mitigation measures and monitoring.

148. Table 14 shows that most mitigation activities during pre-construction are to be implemented by the ESP while during construction, measures shall be primarily implemented by the contractors. During operation stage, Gia Lai DOT shall undertake environmental mitigation and monitoring requirements specified in the EMP. To ensure implementation of mitigation measures during construction, the EMP shall be included in the tender and contract documents for civil works. Contractors' conformity with environmental contract procedures and specifications shall be regularly monitored by PMU with assistance from CSC and results shall be reported semi-annually to ADB.

Table 14 - Detail Environmental Mitigation Plan

		Impact Mitigation				
Environmental Concern	Objective	Proposed Mitigation Measures	Responsible to Implement	Timing	Locations	Mitigation Cost
Design and Pre-construction Phase						
1. Environment and climate change in detail designs	Incorporation of environmental and climate change adaptation design measures into the detailed design	Check the detail design on the incorporation of environment and climate change adaptation, update base on the different scenarios of Gia Lai on climate change. Check the plan for drift construction in Not village, Ia Me commune	ESP	Before construction	N/A	Included in the contract with ESP
2. Land acquisition and resettlement	Control the impact of land acquisition and resettlement	Monitor the compensation process to ensure it is suitable with the Land Acquisition and Resettlement Report.	PMU; ESP	Before construction	N/A	Included in the contract with ESP and PMU operation budget
3. Impact on Public facilities	Minimize impact from the interruption of services such as electricity and water supply during relocation of the local facilities.	1. Review detail designs to identify potential affected public facilities 2. Working with the owner of the affected public facilities to minimize “service interruption” duration and suitable mitigation measures	CPCs, PMU, ESP	Before construction	Through out the subproject sites	Included in the contract with ESP and CPCs, PMU operation budget
4. Environmentally responsible procurement	EMP is properly implemented by selected contractors	1. Update EMP 2. EMP is included in tender documents to ensure that mitigation measures are budgeted and to prepare the contractors for environmental responsibilities. 3. Specify in bid document that Contractors shall engage capable and trained staff to take responsibility for the environmental management and safety issues at the working level and to monitor the effectiveness and review mitigation measures as the subproject proceeds. 4. Contractors recruit qualified staff to oversee implementation of environmental and safety measures specified in EMP.	ESP; PMU	Before bidding and before construction commencement	N/A	Included in the contract with ESP and PMU operation budget
5. Material Management Plan	Manage material storage area to avoid runoff and	1. Designs to balance excavation and fill where possible. 2. Prepare the MMP. The plan shall detail	ESP	Before bidding	N/A	Included in the contract with ESP

	sedimentation	the arrangements to be made to facilitate the timely production and supply of construction materials to avoid impacts due to unnecessary stockpiling outside the Subproject site. MMP shall consider the following: (i) Required materials, potential sources and estimated quantities available, (ii) Impacts to identified sources and availability (iii) Excavated slope material for reuse and recycling methods to be employed, (iv) Required endorsements from DONRE and local groups for use of sources. (v) Methods of transportation to minimize interference with normal traffic. (vi) Constraints of regular delivery schedule to reduce stockpiling on site. vii) Measures to be employed to mitigate nuisances to local residents. (viii) Program for reuse of slope excavated material for reuse (ix) Program for delivery of quarry and borrow materials. (x) Discussion of the CSC, PMU/ ESP inspection/monitoring role. (xi) Agreement on publicity/public consultation requirements.				
6. Plan spoil and waste disposal	Minimize waste and pollution	1. Re-use of waste materials & spoil disposal locations included in bid and contract documents. 2. Prepare the WMSDP. The plan shall cover handling, storage, treatment, transport and disposal of solid and liquid wastes, hazardous materials, hazardous wastes and excavation spoils. 3. WMSDP will include consideration of all matters related to solid, liquid waste and spoil disposal including the following: i) Expected types of waste and quantities of waste arising. ii) Waste reduction, reuse and recycling methods to be employed iii) Agreed reuse and recycling options and	ESP	Before bidding	N/A	Included in the contract with ESP

		locations for disposal / endorsement from DONRE and local groups. iv) Methods for treatment and disposal of all solid and liquid wastes. v) Methods of transportation to minimize interference with normal traffic. vi) Establishment of regular disposal schedule and constraints for hazardous waste. vii) Program for disposal of general waste / hazardous waste. viii) Discussion of the ESP, PMU/CSC inspection/ monitoring role. ix) Establishment of complaints management system for duration of the works x) Agreement on publicity/ public consultation requirements. 4. The WMSDP shall include a section on Hazardous Materials and Waste section. This will detail the mitigation measures, organizational arrangements, resources, facilities, etc. to avoid environmental as well as health and safety impacts due to use and disposal of hazardous materials/substances.				
7. Environmental Capacity Development	Develop environmental management capacity of PMU to ensure proper EMP implementation and promote environmental awareness among workers.	1. PMU to commit and retain dedicated staff for subproject duration to oversee EMP implementation. 2. ESP to train PMU to build their capacity on EMP implementation, monitoring and reporting using workshops and on-the-job training techniques and case studies. 3. Conduct workers' orientation on EMP provisions. The ESP shall periodically conduct such orientation as every new contractor is engaged.	PMU; ESP	Through out the pre-construction and construction phase	N/A	Included in the contract with ESP and PMU operation budget
Construction Phase						
1. Loss of trees and impact to fauna	Avoid and minimize impact to the plant and wild animal in the subproject area	1. Inform construction schedule and scope to Ia Mor Protection Forest Management Board, Ia Mor Border Defence Post, Ia Mor CPC in advance Minimized vegetation covers clearances. 2. Prohibit workers from using guns or any other kind of hunting tools at the subproject area.	6 CPCs; Contractors	Through out construction phase	Along the subproject road; worker camps area	Included in the contract with contractors and CPCs operation budget

		3. Prohibit cutting of trees for firewood and for use in subproject. 4. During replanting/ vegetation recover works, new alien plant species (i.e., species not currently established in the country or region of the subproject) shall not be used. Invasive species shall not be introduced into new environments. 5. The contractors will not use or permit the use of wood as a fuel for the execution of any part of the works, including but not limited to the heating of bitumen and bitumen mixtures, and to the extent practicable shall ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 6. No construction camps, large material storage site, heavy construction machine, concrete mixing plant is to be in the forest area. 7. Contractors will take all precautions necessary to ensure that damage to vegetation is avoided due to fires resulting from execution of the works. The Contractors will immediately suppress the fire, if it occurs, and shall undertake replanting to replace damaged vegetation.				
2. Local facilities	Prevent interruption of services such as electricity and water supply during relocation of the local facilities. Repair damaged access roads.	1. Reconfirm power, water supply, and telecommunications likely to be interrupted by the works. 2. Contact all relevant local authorities for facilities and local people to plan re-provisioning of power, water supply, and telecommunication systems. 3. Facilities shall be relocated and reconnected well ahead of commencement of construction works and contractors shall coordinate with facility company for relocation and reconnection well before works commence. 4. Affected communities shall be properly informed in advance. 5. Reconnection of facilities shall be done at the shortest practicable time before	Contractors	Before construction start and through out the construction phase	Along the subproject route; at the residential areas	Included in the contract with contractors

		construction commences. 6. Facilities damaged during construction shall be reported to the CSC, PMU and facility authority and repairs arranged immediately. 7. Access roads, agricultural land and other properties damaged during transport of construction materials and other project-related activities shall be reinstated upon completion of construction works at each section				
3. Materials exploitation and management of quarry, borrow pits and temporary storage area	Minimize impacts from materials extraction, transportation and storage.	1. Implement MMP prepared by ESP during detailed design phase. 2. Balance excavation and fill requirements to minimization negative impacts 3. Prioritize use of existing quarry sites with suitable materials and update the list of quarries and borrow pits monthly in MMP and report to PMU and minimize impacts on other local resources. 4. Procure materials only from Gia Lai DONRE authorized quarries and borrow sites. 5. Replant tree and vegetation cover of any vegetation clearance area in quarries and borrow pits 6. Stockpile topsoil for later use and fence and re-contour borrows pits after use. Topsoil, overburden, and low-quality materials shall be properly removed, stockpiled near the site, and preserved for rehabilitation. 7. Do not use quarries in areas of natural woodland or near rivers, which provide food and shelters for birds and other animals. 8. Borrow/quarry sites shall not be located in productive land and forested areas. 9. During quarry/borrow site operation; provide adequate drainage to avoid accumulation of stagnant water. 10. Ensure borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of water bodies favourable for mosquito breeding. 11. Upon completion of extraction activities,	Contractors	Though out construction phase	Subproject site, quarries and borrow pit areas	Included in the contract with contractors

		quarry and borrow pits shall be dewatered and fences shall be installed, as appropriate, to minimize health and safety risks. 12. To avoid drowning when pits become water filled, measures such as fencing, providing flotation devices such as a buoy tied to a rope, etc. shall be implemented.				
4. Waste and spoil disposal	Control spoils and waste disposal, lubricant and hazardous wastes.	1. Implement corresponding provisions of WMSDP prepared by the ESP. (including hazardous wastes) 2. Areas for disposal to be agreed with CPCs and Gia Lai DONRE checked and recorded by the CSC, ESP/PMU and monitored 3. Spoil and waste will not be disposed of in streams or other surrounding water bodies. 4. Spoils and waste shall only be disposed to areas approved by local authorities. 5. Spoil disposals shall not cause sedimentation and obstruction of flow of watercourses, damage to agricultural land and densely vegetated areas. 6. Under no circumstances will spoils be dumped into watercourses (rivers, streams, drainage, irrigation canals, etc.) 7. The spoils disposal site shall be located at least 50 m from surface watercourses and shall be protected from erosion by avoiding formation of steep slopes and grassing.	Contractors	Through out construction phase	Through out construction site, material storage areas, machines and vehicles maintenance area	Included in the contract with contractors
5. Noise, dust and vibration	To minimize negative impacts from noise, dust and vibration during construction period	1. Restrict works to daylight hours within 500 m of sensitive area. 3. Powered mechanical equipment and vehicle emissions to meet national TCVN/QCVN standards. All construction equipment and vehicles shall have valid certifications indicating compliance to vehicle emission and noise creation standards. 4. Monitor and investigate complaints; propose alternative mitigation measures. 5. Keep material storage site moist 6. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emission.	Contractors	Through out construction phase	Through out construction site especially at the sensitive areas such as schools/ kindergarten, medical centres, pagodas and church	Included in the contract with contractors

		7. On rainless day undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials storage sites, construction sites, access roads, quarry areas, borrow sites and other subproject areas where residential sites and other sensitive points such as schools, clinics… are located nearby. If works are within 15m of any sensitive points, the contractors shall install dust barrier between the works at the road edge and the sensitive points (e.g. 2.5 m high temporary walls, etc.) 8. Mixing, bitumen heating and crushing plants operations will be equipped with dust suppression devices such as water sprays. 9. Clean up road surfaces after work. 10. To protect buildings and structures from vibration, non-vibrating roller shall be used in construction sites near buildings and structures. 11. Structures, which are damaged due to vibration caused by the construction activities, shall be repaired immediately as directed by ESP/PMU. 12. Machinery shall be turned off when not in use. 13. Pile driving during to be schedule for daytime if construction site is near sensitive points or approved by DONRE, CPCs and ESP/PMU. 14. Impose speed limits on construction machines and transportation vehicles to minimize dust emission along areas where sensitive points are located (houses, schools, medical centres etc.).				
6. Erosion control/ run off	Protect established facilities	1. Establish vegetation and erosion protection immediately after completion of works in each stretch / sector. 2. Check weather forecasts and minimize work in wet weather. 3. Stockpile topsoil for immediate replanting after cutting. 4. Minimize damage and excavation of surrounding vegetation during slope formation.	Contractors	Through out construction phase	Through out construction site	Included in the contract with contractors

		5. Include and implement appropriate measures for slope protection, i.e. vegetation cover and stone pitching, as required in the detailed construction drawings. 6. Prevent erosion and protect the excavated slope with temporary or permanent drainage as soon as practicable after cutting. 7. If new erosion occurs accidentally, back fill immediately to restore original contours. 8. Low embankments will be protected from erosion by seeding and planting indigenous grasses that can flourish under local conditions. 9. Payments will be linked to the completion of the works as indicated by the installation of erosion control measures to protect the works to the satisfaction of ESP/PMU.				
7. Stream protection and bridge/culvert construction	Protect stream and maintain flows especially 5 stream crossing positions	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed not to block streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.	Contractors	Through out construction phase	5 streams/ flows crossing point	Included in the contract with contractors
8. Impact on water resources and quality	To minimize impact from wastewater drainage and prevent potential impact on water quality due to subproject activities	1. Provide adequate drainage facilities at construction sites and worker camps to avoid stagnant water. 2. Implement agreed designs for bridges/ culverts sufficient to control flooding as designed. 3. Store lubricants, fuels and wastes in dedicated enclosures at least 50 m from	Contractors	Through out construction phase	5 stream/ flow crossing positions, material storage sites, temporary waste disposal area	Included in the contract with contractors

		water bodies on high and impervious ground with top cover 4. Solid waste from construction activities and workers camps will not be thrown in streams and other water bodies (drainage, lake, pond, etc.) 5. Construction storage/stockpiles shall be provided with bunds to prevent silted run-off. 6. Stockpiled materials will be covered to reduce silted run-off. 7. No stockpiling or borrow sites at least 100m of water body. 8. Work in streams at bridge repair sites will be scheduled during dry season and work duration shall be as short as possible. 9. Washing of machinery and vehicles in surface waters shall be prohibited.				
9. Large influx of construction workers	Construction camps and worker camps not to cause any negative impact to surrounding environment (forest area, water bodies); Control of infectious diseases	1. Construction and worker camp location and facilities located at least 500m from settlements and agreed with local communities and facilities approved by ESP and managed to minimize impacts. 2. Hire and train as many local workers as possible. 3. Provide adequate housing for all workers at the construction camps and establish clean canteen/eating and cooking areas. 4. Mobile toilets (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and prevented by cleaning lavatories daily and by keeping toilets clean at all times. 5. Provide separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supply for male and female workers.. 6. Camp site will be cleaned up to the satisfaction of and local community after use. 7. Solid and liquid waste will be managed in line with WMSDP. 8. All waste materials shall be removed and disposed to disposal sites approved by local authorities 9. Land used for campsites shall be restored	Contractors	Through out construction phase	Through out construction sites and worker camps	Included in the contract with contractors

		to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned. 10. Standing water will not be allowed to accumulate in the temporary drainage facilities or along the roadside to prevent proliferation of mosquitoes. 11. Temporary and permanent drainage facilities will be designed to facilitate the rapid removal of surface water from all areas and prevent the accumulation of surface water ponds. 12. Malaria controls (e.g., provision of insecticide treated mosquito nets to workers, installation of proper drainage to avoid formation of stagnant water, etc.) and HIV-AIDS education will be implemented in line with social plans for the subproject. 13. HIV/AIDS awareness and prevention program shall be implemented in line with social plans under the subproject.				
10. Safety precautions for workers and public safety	Ensure worker safety; Prevent accident with local people	1. Establish safety measures as required by law and by good engineering practice and provide first aid facilities that are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, earplugs, gloves, etc. at no cost to the employee. 5. Where worker exposure to traffic cannot be completely eliminated, protective barriers shall be provided to shield workers from traffic vehicles. 6. Workers shall be provided with reliable supply of potable water. 7. Construction camps shall be provided with adequate drainage to avoid	Contractors	Through out construction phase	Through out construction sites, quarries and borrow areas, material transportation roads, especially near schools/ kindergartens, medical centres, church.	Included in the contract with contractors

		accumulation of stagnant water. 8. Construction camps shall be provided with toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained to allow effective operation. 9. Ensure reversing signals are installed on all construction vehicles. 10. Install barriers (e.g., temporary fence) at construction areas to deter pedestrian access to the roadway except at designated crossing points. 11. The general public/local residents shall not be allowed in high-risk areas, e.g., excavation sites and areas where heavy equipment is in operation and such sites have a watchman to keep public out. 12. Speed restrictions shall be imposed on subproject vehicles and equipment when traveling through residential areas, especially through the sensitive points such as schools, local clinics, pagodas… 13. Upon completion of construction works, borrow areas will be backfilled (if suitable materials are available, e.g., excavation spoils) or fenced.				
11. Traffic Management	Minimize disturbance of traffic	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience due to subproject operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold ups and congestion 3. In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction	Contractors	Through out construction phase	Through out construction sites; at Phu My T-junction and junction with PR663, junction to la Lau commune; junction with NR 14C.	Included in the contract with contractors

		sites to minimize traffic build-up. 4. Provide safe vehicle and pedestrian access around construction areas. 5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. 6. Provide sufficient lighting at night within and in the vicinity of construction sites. 7. Designate traffic officers in construction sites.				
12. Cumulative impact	Minimize the intensify impacts of two subproject construction at the same time	1. Inform construction schedule and scope to Ia Mor CPC in advance 2. Work with the contractor of Ia Mor Irrigation Project to find out suitable construction, material transportation time. 3. Consider the capacity of material mines, borrow pits and disposal sites for both project.	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors
13. Environmental recovery	Provide environmental recovery of the subproject	Contractors to reconfirm and implement recovery (e.g., landscaping, tree replanting) identified at the detailed design stage	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors
Operation Phase						
1. Increase forest access	To minimize illegal wood logging and forest production gathering in Ia Mor Protection Forest	1. Cooperate with Ia Mor Protection Forest Management Boards and Ia Mor CPCs to setup a suitable O&M plan 2. Participate in the Forest Protection Campaign if applicable 3. Install sign board, propaganda board on forest protection along the section goes through Ia Mor Protection Forest	Gia Lai Department of Transportation (DOT)	Through out operation phase	At the section goes through Ia Mor Protection Forest	Included in operation and maintenance cost
2. Generate dust, noise, vibration	To minimize dust, noise and vibration	1. Install sign board, speed limit/ loading limit to prevent dust, noise and vibration from over speed vehicles 2. Install road humps at the residential area to reduce the impact from noise, dust and vibration.	Gia Lai Department of Transportation (DOT)	Through out operation phase	At the start and end point and 3 main junctions along the subproject route. At the sensitive areas closed to schools/ kindergarten, medical centres, church	Included in operation and maintenance cost
3. Traffic and	Minimize road	1. Undertake road safety awareness	Gia Lai DOT	Through out	Along two	Included in

road safety	accident	campaigns for local residents and other road users of the subproject road. 2. Install and maintain road warning signs and markings. 3. Monitor road accidents and implement necessary preventive measures (awareness campaigns, provision of appropriate road furniture to enhance road safety and control traffic).		operation phase	sections subproject road	operation and maintenance cost

C. Environmental monitoring

1. Compliance Monitoring

149. Table 15 below shows the program for monitoring the compliance on various provisions of the EMP during pre-construction, construction and operation phases. ESP needs to implement a number of measures during detailed design phase (e.g., incorporation of environmental design measures into the detailed design, update EMP, etc.) and this will be confirmed by PMU to ADB. During construction, most of the mitigation the contractors shall implement measures and CSC and ESP shall monitor their environmental performance, in terms of implementation of such measures. The timing or frequency of monitoring is also specified in Table 15. During operation EMP implementation shall be the responsibility of Gia Lai DOT.

150. At design phase, PMU shall ensure that EMP measures for the design stage are incorporated in the detailed design. The effective incorporation of the EMP in the civil works contracts shall also be ensured be by PMU with assistance from ESP and this, along with implementation of EMP provisions, shall be audited by ADB as part of the loan conditions.

151. Prior to implementation of the subproject the IEE and EMP will be updated and amended, as necessary, by ESP after the detailed designs are complete and contracting arrangements are known. Such updating shall be based on reconfirmation and any additional information on the assumptions made at this feasibility stage on location scale and expected conditions of the subproject.

152. At pre-construction phase, PMU with the support from ESP will prepare all environmental protection compliance certificates under Vietnam's regulations as guided through LEP 2014. CSC and ESP will also need to confirm that Contractors and their suppliers have complied with all statutory requirements for permits from DONRE and provincial authorities. CSC and ESP will check that Contractors have all the necessary valid licenses and permits for use of powered mechanical equipment if necessary and the use of local water supplies (and to construct or operate plant such as for cement batching or asphalt/bitumen (if required) in line with all environmental regulations and permit conditions from provincial authorities.

153. At construction phase, the ESP will undertake regular monitoring of the contractor's implementation of mitigation measures specified in the Subproject EMP if applicable. On the other hand, CSC will also monitor the construction activities on daily basis. They will ensure that the contractors comply with all environmental regulations as specify in subproject EMP if applicable.

154. Gia Lai Department of Transportation will be in charge of EMP implementation in the operation phase. The tasks are including monitoring of dust, noise and water quality... They also monitor the accidents along the subproject road as basis for implementation of mitigation measures to improve road safety.

2. Environmental Effects Monitoring

155. ESP undertakes baseline environmental monitoring for air quality, noise and surface water quality. Sampling will be conducted prior to start of site works at the specified locations. During construction, ESP shall undertake quarterly monitoring of surface water quality and semi-

annual monitoring of air quality and noise in the same locations sampled during pre-construction. Additional sampling occasions shall be carried out and additional parameters shall be analysed (as necessary) to validate complaints and/or investigate pollution events caused by the subproject.

Table 15 - Environmental Monitoring Compliance

Performance and Impact Monitoring					
Environmental Concern	Parameter to monitor	Location	Frequency & Verification	Responsible to Monitor	Monitoring Cost
Design and Pre-construction Phase					
1. Environment and climate change	Detail designs with environment and climate change cooperated	N/A	Only one time before the construction commence	PMU	Included in the operation budget of PMU
2. Land acquisition and resettlement	Compensation documents	N/A	Only one time before the construction commence	Gia Lai DPI/ DONRE; PMU	Included in the operation budget of PMU
3. Public facilities	Checking documents	N/A	Only one time before the construction commence	PMU	Included in the operation budget of PMU
4. Environmentally responsible procurement	Include in bidding documents. Check compliance	N/A	Bidding preparation period. Before start site works	PMU	Included in the operation budget of PMU
5. Material Management Plan	Require in contract with ESP. Check at Detailed Design.	N/A	Only one time in detailed design phase	PMU	Included in the operation budget of PMU
6. Plan spoil and waste disposal	Require in contract with ESP. Check at Detailed Design.	N/A	Only one time in detailed design phase	PMU	Included in the operation budget of PMU
7. Environmental Capacity Development	Require in contract with ESP. Check at Detailed Design. Complete training and check before and during the construction works.	N/A	Before construction commencement and at the beginning period of the construction phase	PMU	Included in the operation budget of PMU
Construction Phase					
1. Loss of trees and impact to fauna	Check of implementation	Along the subproject road, especially area goes through Ia Mor Protection Forest; worker camps area	Before construction commencement and through out construction phase. Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
2. Local facilities	Check of implementation	Along the subproject road	Before construction commencement and through out construction phase. Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
3. Materials exploitation and	Check of implementation	Subproject site, quarries and	Bi-weekly	ESP/ PMU	Included in the operation budget

management of quarry and borrow pits		borrow pit areas	Part of daily construction supervision	CSC	of PMU/ ESP/ CSC
4. Waste and spoil disposal	Check of implementation	Through out construction site, material storage areas, machines and vehicles maintenance area	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
5. Noise, dust and vibration	Check of implementation	Through out construction site	Bi-weekly and spot checks Part of daily construction supervision	ESP/ PMU	Included in the operation budget of PMU/ ESP CSC
	Ambient air quality (temperature, moisture, wind direction and speed, PM10, NO_2, SO_2…); Noise level (average noise level, maximum noise level, vehicles frequency…)	9 monitoring points: 2 point at start and end points the road. 4 point at junctions: with PR663; Road to Ia Me commune; Road to Ia Lau commune; with NR14C. 3 points in front of Ia Pia; Ia Ga and Ia Mor CPCs.	1 time before construction start and semi-annually during 2 years construction time (5 times in total)	ESP	2,700 USD[6]
6. Land slide, erosion control/ run off	Check of implementation	Through out construction site	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
7. Stream protection and bridge/culvert construction	Check of implementation	5 streams/ rivers crossing point	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC

[6] Due to there is no cost norm for Gia Lai province, figures has been estimated base on cost norm of Chu Prong Environmental Monitoring 2013 for ambient air quality by Chu Prong Division of Natural Resources and Environment. (1 USD = 22255 VND)

8. Water resources and quality	Check of implementation	Through out construction sites; 5 stream crossing positions, material storage sites, temporary waste disposal areas	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
	Surface water quality	5 sampling points at 20m downstream of the crossing streams.	1 time before construction start and every quarter during 2 years construction time (9 times in total)	ESP	4,050 USD[7]
9. Construction and worker camps, sanitation and Diseases	Check of implementation	Through out construction sites and worker camps	Before establishment of the facilities and through out the construction phase Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
10. Safety precautions for workers and public safety	Check of implementation. Check compliance to Labour Code of Vietnam and other relevant Decision, Decree and Circular under Government requirements	Through out construction sites, subproject roads, quarries and borrow areas, transportation road	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
11. Traffic Management	Check of implementation	Through out construction sites; at junction with PR663; Road to Ia Me commune; Road to Ia Lau	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC

[7] Due to there is no cost norm for Gia Lai province, figures has been estimated base on cost norm of Chu Prong Environmental Monitoring 2013 for surface water quality by Chu Prong Division of Natural Resources and Environment. (1 USD = 22255 VND)

		commune; with NR14C			
12. Collaborate with Ia Mor Irrigation Project	Check of implementation, checking documents	Construction sites in Ia Mor commune; material transportation road, borrow pit, mines and dumping site	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
13. Environmental recovery	Confirmed implementation of required enhancements	Through out construction sites	Before construction and bi-weekly check Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
Operation Phase					
1. Increase access to forest	Check of implementation	At the section passing Ia Mor Protection Forest	Semi-annual in the first two years	Gia Lai PPC	Included in operation budget of Gia Lai PPC
2. Dust, noise, vibration	Check of implementation; Ambient air environment, noise level at the road and in the areas which are adjacent to road	At the start and end point of the road. At the sensitive areas (schools/ kindergarten, medical centres, churches.	Semi-annual in the first two years	Gia Lai PPC	Included in operation and maintenance cost
2. Road safety	Check of implementation	Along the subproject road	Semi-annual	Gia Lai PPC	Included in the operation budget of PPC

D. Reporting

156. PMU will submit the following reports to ADB:

- *Monitoring report for baseline environment:* this report shows the result of baseline environment as implemented by ESP on ambient air quality, surface water quality... This report will be submitted to ADB before the construction start.
- *Environmental monitoring reports:* Environmental monitoring reports will cover the status of EMP implementation in terms of required mitigation measures for different phases of the subproject, results of environmental effects monitoring (air quality, noise and surface water quality), necessary remedial actions to effectively address negative environmental impacts due to subproject implementation, status of environmental capacity building activities as well as documentation of complaints received and corresponding action/resolution. The environmental monitoring reports will be submitted to ADB semi-annually during the construction phase and annually for two years after completion of construction.

Table 16 – Reporting procedures

Project Phase	Type Of Report	Frequency	Responsibility	Submitted To Whom
Construction	**Environmental Performance Report** indicating compliance with EMP and monitoring results at the contractor site	Monthly	Construction contractor	CSC
	Subproject EMP Compliance Report indicating compliance with subproject EMP and monitoring results	Quarterly	CSC	PMU
	EMP Compliance Report indicating compliance with subproject EMP and monitoring results	Semi-annually during construction phase	ESP/ PMU	ADB
Operation	**EMP Compliance Report: Operation** indicating compliance with subproject EMP commitments during operation	Annually in the first two years of operation. On going frequency to be determined based on review after 2 years.	Gia Lai DOT	Gia Lai DONRE

Table 17 - Estimated cost for EMP Monitoring (2-year construction/ 4-year in total)

Item	Estimated cost (US$)
1. Environment Safeguard Specialist of ESP	***76,910***
1 National ESP - 14 man-months (intermittent in the first 2 years; 6 – 4 – 4) – 4000 US$/ man-month	56,000
Per diem for ESP: 48 US$ x 30 days x 14 months	20,160
Air fare + taxi (to and from airports) for 3 round trips: 250 US$ x 3 trips	750
2. Environmental effects monitoring (implemented by ESP)	***6,750***
Ambient air quality: 9 monitoring locations x 5 times x 60 US$/sample[8]	2,700
Surface water quality: 5 monitoring locations x 9 times x 90 US$/sample[9]	4,050
3. Training/orientation, local transportation, supplies (by ESP)	***21,500***
a) Training/orientation: 1 formal training course for PMU, CSC, Contractors and Gia Lai DOT and other "on the job" training	1,500
b) Local transportation and supplies	20,000
4. Printing Environmental monitoring report by ESP (8 reports)	***8,000***
Subtotal (1+2+3+4)	**113,160**
5. Contingency	**11,840**
Total (1+2+3+4+5)	**125,000**

E. Capacity building

157. In Viet Nam, the environmental assessment process is established but environmental awareness and capability for implementation of EMP in infrastructure projects of both the executing agency and the implementation agency (PMU) are limited and in development. The safeguards staff of the PMU is usually responsible for many different task and capacity building will be implemented more to have sufficient EMP implementation. Usually, the engineer will also be in charge of the environmental monitoring and his/ her capacity is not suitable to check the adequacy of the subproject EMP. The IEEs and EMP are referred to the environmental department in DONRE for approval. During the Project PPTA phase, PPU has been established under Gia Lai DPI with one staff has been assigned as ESO.

158. The most significant challenge is the lack of human and financial resources and necessary infrastructure. To address this constraint, Gia Lai DPI/PMU will designate a full time staff as environmental safeguards officer (ESO) to handle the environmental aspects of the sub-project during implementation stage. Ideally, ESO of the Project Preparation Board (PPB) will be come ESO of the subproject PMU also. The ESO and other relevant staff of PMU will be trained by the environment specialists of the ESP during subproject implementation as "on the job" training or by formal training courses.

[8] Due to there is no cost norm for Dak Lak province, figures has been estimated base on environmental monitoring cost norm of Dak Nong – Decision No. 17/2015/QD-UBND.
[9] Due to there is no cost norm for Dak Lak province, figures has been estimated base on environmental monitoring cost norm of Dak Nong – Decision No. 17/2015/QD-UBND.

Table 18 – Detail capacity building program

Objective	1. Build capacity and procedures in undertaking systematic environmental assessments in accordance with Government regulations and ADB guidelines 2. Provide training on international best practice on environmental management, monitoring and reporting. 3. Provide guidance on how to effectively incorporate environmental measures into project design and how to incorporate EMP provisions into tender and contract documents.
Tasks/Scope of Work	1. Undertake training needs analyses and review prevailing government regulations and donor guidelines governing the assessment and management of environmental impacts for road development. 2. Review the skills of PMU and Gia Lai DOT staff to establish existing capacity on environmental assessments, environmental monitoring and implementation of mitigation measures for road development project. 3. Prepare the training plan and relevant training materials. 4. Deliver the training, which may be through a combination of hands on assistance, on-the-job training, and training workshops. 5. Evaluate the effectiveness of the training measuring improvements in attitudes and skills achieved. 6. Modify the training documents/materials as necessary. 7. Hand-over the amended training documents/ material to the project manager for use in the delivery of the training. 8. Prepare report on result of training.
Time frame	Possible within 3 months after construction commencement
Target participant	Staff in PMU and Gia Lai DOT who responsible for environmental management
Staff resources	International and national environmental specialist with at least 15 years experience on environmental management of road projects and must possess relevant post-graduate degree in civil engineering, environmental management and other relevant courses. With working knowledge of safety issues and at least 3 years experience in conducting environmental management training.

X. CONCLUSIONS AND RECOMMENDATIONS

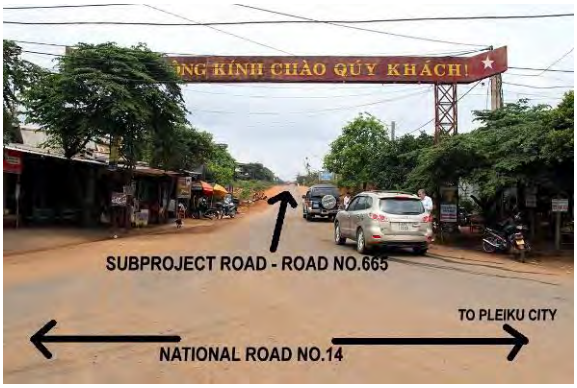
159. This IEE study was carried out in the Technical Assistant for Project Preparation (PPTA) phase. Primary and secondary data were used to assess potential environmental impacts in a comprehensive manner and public consultation and route reconnaissance were carried out in order complete the environmental assessments and recommend suitable mitigation measures. The IEE report provides a picture of potential environmental impacts associated with the upgrading of the subproject road and suitable mitigation measures have been recommended.

160. The implementation of the subproject "Upgrade Provincial Road No.665 Ia Bang-Ia Mor, Chu Prong District, Gia Lai Province" will steadily improve the road quality; make it favourable for transportation in both dry and rainy season, support stable goods transportation from agricultural production area of Chu Prong to National Road 14C and Le Thanh Border Gate. Several actions are required during the detailed design stage to minimize impacts to acceptable levels. The negative environmental impacts from the upgrading works will mostly take place during the construction stage. All of the impacts during construction phase should be very predictable and manageable and with appropriate mitigation and few residual impacts are likely. Additional human and financial resources will be required to improve environmental capability and to progress and achieve necessary statutory compliance and environmental clearance certification for the subproject or associated activities that also require environmental permits under the environmental laws of Viet Nam – LEP 2014.

161. No further or additional impact assessment is considered necessary at this stage. At the implementation stage, PMU through ESP will develop detail EMP to monitor the schedules of mitigation measures and conduct of environmental effects monitoring activities. EMP must be updated to ensure effective environmental monitoring and should be developed follow monitoring plan as specified in the EMP. With these measures in place, environmental impacts of the subproject should be manageable and will not result in any residual impacts, which are above accepted environmental standards.

XI. APPENDIX

Appendix 1: Photos of the subproject road and the vicinity



Subproject road: Starting point

Subproject road: End point

At junction to Ia Lau and Ia Pior communes

Protection and production forest (the one between dash lines is rubber plantation after 100m corridor of protection forest)

Road section in Ia Mor – rainy season

Road section in Ia Mor – dry season

Ia Mor stream at the crossing point

Main dam of Ia Mor Irrigation Project

Borrow pit at Km45 – Ia Mor commune

Doc Trang borrow pit – on the way to Ia Lau and Ia Pior communes (500 m from junction)

Ditch created by runoff water from drainage system of subproject road in Not hamlet, Ia Me commune

Appendix 2: Environmental criteria for subproject selection

Province	Road	Environmental Criteria (100 points)				(Points remaining over 100 points) Environmental grading and remarks
		(Deduction/40) National Park, Nature Reserve, Historical Site, Forest	(Deduction/20) Flood prone, water bodies	(Deduction/20) Land slide, soil erosion	(Deduction/20) Alteration of surface water bodies	
Kon Tum	No. 675A	(-35) Some type of forest along the road	(-15) Sesan river, several large reservoirs	(-15) Some steep slopes on the road	(-15) 7 bridges/ total 237 m of length	**Rank 1 – 10 points** Category B. Pay attention to land slide, soil erosion and flood. Wood logging activities still happen.
	No. 673A	(-40) Ngoc Linh Nature Reserve	N/A	(-10) Winding road with high mountains	(-5) 4/24	**Rank 3 – 30 points** Category A. The first 9km go through Ngoc Linh Nature Reserve. Pay attention to land slide also.
Gia Lai	No. 665	N/A	(-5) Some streams and river	N/A	(-20) 3/231	**Rank 4 – 40 points** Category B. Pay attention to flooding
	ChuTy– la Nan	N/A	N/A	N/A	(-5) 1/33	**Rank 5 – 50 points** Category B
	No. 670	N/A	(-10) Some rivers and streams	(-10) Some steep slopes on the road	(-5) 3/30	**Rank 4 – 40 points** Category B. Pay attention to land slide, soil erosion.
Dak Lak	No. 29	(-20) York Don National Park	N/A	N/A	N/A	**Rank 5 – 50 points** Category B. The part connect to Dak Rue Border Gate go near the buffer zone of York Don National Park.
	Cu Ne – Ea Sup	N/A	(-10) Ea Sup Lakes and some small streams and lakes	N/A	(-5) 2/20	**Rank 5 – 50 points** Category B. Pay attention to flooding
Dak Nong	Dak Buk So – Bu Prang	(-20) Border protection forest. Bu Gia Map National Park (in Binh Phuoc	(-5) Dak Buk So; Dak Blung lakes. Some small irrigation system	(-15) Some slopes along the route, hilly parts of the road	N/A	**Rank 3 – 30 points** Category B. Pay attention to forest protection and land slide

		province)				
	No. 685	(-20) Cat Tien South Protection Forest	(-5) Some lakes and river	(-10) Mountainous area	N/A	**Rank 4 – 40 points** Category B. Cat tien South Protection Forest is 7 km away from the road. Pay attention to forest protection and land slide
	Pr.Rd No. 6	N/A	(-5) Dak Buk So lake and other small lakes	(-15) Some land slide point	N/A	**Rank 4 – 40 points** Category B. Pay attention to land slide
	Gia Nghia Rd	N/A	N/A	N/A	N/A	**Rank 5 – 50 points** Category B
Binh Phuoc	Pr.Rd No.756	N/A	(-5) Some small lakes and streams	N/A	N/A	**Rank 5 – 50 points** Category B
	No. 754; 754A	(-30) Ta Thiet Protection Forest; Historical Site	(-5) Some small rivers and lakes	N/A	N/A	**Rank 4 – 40 points** Category B. The road goes along Ta Thiet Protection Forest for around 3.5 km. Historical Site of Southern Army General Staff is far from the road. Pay attention to forest protection.
	756B	N/A	(-5) Some small streams and lakes	N/A	(-5) 1/10	**Rank 5 – 50 points** Category B
	756C	N/A	N/A	N/A	N/A	**Rank 5 – 50 points** Category B

Appendix 3: Sources of reference information

1. *Gia Lai Environmental Monitoring Report 2015*
2. *Chu Prong Environmental Statistic Report 2013*
3. *Statistics of poor households and marginal poor households of Chu Prong District People's Committee in 2015*
4. *Statistics of poor households of Labour Invalids and Social Affairs of Chu Prong District People's Committee in 2015*
5. *Statistics Division of Chu Prong District people's committee in 2015*
6. *Statistic Division of area by administrative unit of Chu Prong district in 2015*
7. *Healthcare Centre of Chu Prong Districts people's committee in 2015*

Appendix 4: Environmental Mitigation Measures to Include into Bidding Documents

1. Loss of trees and impact to fauna	1. Inform construction schedule and scope to Ia Mor Protection Forest Management Board, Ia Mor Border Defence Post, Ia Mor CPC in advance Minimized vegetation covers clearances. 2. Prohibit workers from using guns or any other kind of hunting tools at the subproject area. 3. Prohibit cutting of trees for firewood and for use in subproject. 4. During replanting/ vegetation recover works, new alien plant species (i.e., species not currently established in the country or region of the subproject) shall not be used. Invasive species shall not be introduced into new environments. 5. The contractors will not use or permit the use of wood as a fuel for the execution of any part of the works, including but not limited to the heating of bitumen and bitumen mixtures, and to the extent practicable shall ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 6. No construction camps, large material storage site, heavy construction machine, concrete mixing plant is to be in the forest area. 7. Take all precautions necessary to ensure that damage to vegetation is avoided due to fires resulting from execution of the works. Immediately suppress the fire, if it occurs, and shall undertake replanting to replace damaged vegetation.
2. Local facilities	1. Reconfirm power, water supply, and telecommunications likely to be interrupted by the works. 2. Contact all relevant local authorities for facilities and local people to plan re-provisioning of power, water supply, and telecommunication systems. 3. Facilities shall be relocated and reconnected well ahead of commencement of construction works and contractors shall coordinate with facility company for relocation and reconnection well before works commence. 4. Affected communities shall be properly informed in advance. 5. Reconnection of facilities shall be done at the shortest practicable time before construction commences. 6. Facilities damaged during construction shall be reported to the CSC, PMU and facility authority and repairs arranged immediately. 7. Access roads, agricultural land and other properties damaged during transport of construction materials and other project-related activities shall be reinstated upon completion of construction works at each section
3. Materials exploitation and management of quarry, borrow pits and temporary storage area	1. Implement MMP prepared by ESP during detailed design phase. 2. Balance excavation and fill requirements to minimization negative impacts 3. Prioritize use of existing quarry sites with suitable materials and update the list of quarries and borrow pits monthly in MMP and report to PMU and minimize impacts on other local resources. 4. Procure materials only from Gia Lai DONRE authorized quarries and borrow sites. 5. Replant tree and vegetation cover of any vegetation clearance area in quarries and borrow pits 6. Stockpile topsoil for later use and fence and re-contour borrows pits after use. Topsoil, overburden, and low-quality materials shall be properly removed, stockpiled near the site, and preserved for rehabilitation. 7. Do not use quarries in areas of natural woodland or near rivers, which provide food and shelters for birds and other animals. 8. Borrow/quarry sites shall not be located in productive land and forested areas. 9. During quarry/borrow site operation; provide adequate drainage to avoid accumulation of stagnant water. 10. Ensure borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of water bodies favourable for mosquito breeding. 11. Upon completion of extraction activities, quarry and borrow pits shall be dewatered and fences shall be installed, as appropriate, to minimize health and safety risks. 12. To avoid drowning when pits become water filled, measures such as fencing, providing flotation devices such as a buoy tied to a rope, etc. shall be implemented.
4. Waste and spoil	1. Implement corresponding provisions of

disposal	WMSDP prepared by the ESP. (including hazardous wastes) 2. Areas for disposal to be agreed with CPCs and Gia Lai DONRE checked and recorded by the CSC, ESP/PMU and monitored 3. Spoil and waste will not be disposed of in streams or other surrounding water bodies. 4. Spoils and waste shall only be disposed to areas approved by local authorities. 5. Spoil disposals shall not cause sedimentation and obstruction of flow of watercourses, damage to agricultural land and densely vegetated areas. 6. Under no circumstances will spoils be dumped into watercourses (rivers, streams, drainage, irrigation canals, etc.) 7. The spoils disposal site shall be located at least 50 m from surface watercourses and shall be protected from erosion by avoiding formation of steep slopes and grassing.
5. Noise, dust and vibration	1. Restrict works to daylight hours within 500 m of sensitive area. 3. Powered mechanical equipment and vehicle emissions to meet national TCVN/QCVN standards. All construction equipment and vehicles shall have valid certifications indicating compliance to vehicle emission and noise creation standards. 4. Monitor and investigate complaints; propose alternative mitigation measures. 5. Keep material storage site moist 6. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emission. 7. On rainless day undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials storage sites, construction sites, access roads, quarry areas, borrow sites and other subproject areas where residential sites and other sensitive points such as schools, clinics… are located nearby. If works are within 15m of any sensitive points, the contractors shall install dust barrier between the works at the road edge and the sensitive points (e.g. 2.5 m high temporary walls, etc.) 8. Mixing, bitumen heating and crushing plants operations will be equipped with dust suppression devices such as water sprays. 9. Clean up road surfaces after work. 10. To protect buildings and structures from vibration, non-vibrating roller shall be used in construction sites near buildings and structures. 11. Structures, which are damaged due to vibration caused by the construction activities, shall be repaired immediately as directed by ESP/PMU. 12. Machinery shall be turned off when not in use. 13. Pile driving for Ia Mor Bridge to be schedule for daytime or approved by DONRE, CPCs and ESP/PMU. 14. Impose speed limits on construction machines and transportation vehicles to minimize dust emission along areas where sensitive points are located (houses, schools, medical centres etc.).
6. Erosion control/ run off	1. Establish vegetation and erosion protection immediately after completion of works in each stretch / sector. 2. Check weather forecasts and minimize work in wet weather. 3. Stockpile topsoil for immediate replanting after cutting. 4. Minimize damage and excavation of surrounding vegetation during slope formation. 5. Include and implement appropriate measures for slope protection, i.e. vegetation cover and stone pitching, as required in the detailed construction drawings. 6. Prevent erosion and protect the excavated slope with temporary or permanent drainage as soon as practicable after cutting. 7. If new erosion occurs accidentally, back fill immediately to restore original contours. 8. Low embankments will be protected from erosion by seeding and planting indigenous grasses that can flourish under local conditions. 9. Payments will be linked to the completion of the works as indicated by the installation of erosion control measures to protect the works to the satisfaction of ESP/PMU.
7. Stream protection and bridge/culvert construction	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed not to block streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.
8. Impact on water	1. Provide adequate drainage facilities at construction sites and worker camps to avoid

resources and quality	stagnant water. 2. Implement agreed designs for bridges/ culverts sufficient to control flooding as designed. 3. Store lubricants, fuels and wastes in dedicated enclosures at least 50 m from water bodies on high and impervious ground with top cover 4. Solid waste from construction activities and workers camps will not be thrown in streams and other water bodies (drainage, lake, pond, etc.) 5. Construction storage/stockpiles shall be provided with bunds to prevent silted run-off. 6. Stockpiled materials will be covered to reduce silted run-off. 7. No stockpiling or borrow sites at least 100m of water body. 8. Work in streams at bridge repair sites will be scheduled during dry season and work duration shall be as short as possible. 9. Washing of machinery and vehicles in surface waters shall be prohibited.
9. Large influx of construction workers	1. Construction and worker camp location and facilities located at least 500m from settlements and/ or agreed with local communities and facilities approved by ESP and managed to minimize impacts. 2. Hire and train as many local workers as possible. 3. Provide adequate housing for all workers at the construction camps and establish clean canteen/eating and cooking areas. 4. Mobile toilets (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and prevented by cleaning lavatories daily and by keeping toilets clean at all times. 5. Provide separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supply for male and female workers. 6. Camp site will be cleaned up to the satisfaction of and local community after use. 7. Solid and liquid waste will be managed in line with WMSDP. 8. All waste materials shall be removed and disposed to disposal sites approved by local authorities 9. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned. 10. Standing water will not be allowed to accumulate in the temporary drainage facilities or along the roadside to prevent proliferation of mosquitoes. 11. Temporary and permanent drainage facilities will be designed to facilitate the rapid removal of surface water from all areas and prevent the accumulation of surface water ponds. 12. Malaria controls (e.g., provision of insecticide treated mosquito nets to workers, installation of proper drainage to avoid formation of stagnant water, etc.) and HIV-AIDS education will be implemented in line with social plans for the subproject. 13. HIV/AIDS awareness and prevention program shall be implemented in line with social plans under the subproject.
10. Safety precautions for workers and public safety	1. Establish safety measures as required by law and by good engineering practice and provide first aid facilities that are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, earplugs, gloves, etc. at no cost to the employee. 5. Where worker exposure to traffic cannot be completely eliminated, protective barriers shall be provided to shield workers from traffic vehicles. 6. Workers shall be provided with reliable supply of potable water. 7. Construction camps shall be provided with adequate drainage to avoid accumulation of stagnant water. 8. Construction camps shall be provided with toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained to allow effective operation. 9. Ensure reversing signals are installed on all construction vehicles. 10. Install barriers (e.g., temporary fence) at construction areas to deter pedestrian

	access to the roadway except at designated crossing points. 11. The general public/local residents shall not be allowed in high-risk areas, e.g., excavation sites and areas where heavy equipment is in operation and such sites have a watchman to keep public out. 12. Speed restrictions shall be imposed on subproject vehicles and equipment when traveling through residential areas, especially through the sensitive points such as schools, local clinics, pagodas… 13. Upon completion of construction works, borrow areas will be backfilled (if suitable materials are available, e.g., excavation spoils) or fenced.
11. Traffic Management	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience due to subproject operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold ups and congestion 3. In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up. 4. Provide safe vehicle and pedestrian access around construction areas. 5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. 6. Provide sufficient lighting at night within and in the vicinity of construction sites. 7. Designate traffic officers in construction sites.
12. Cumulative impact	1. Inform construction schedule and scope to Ia Mor CPC in advance 2. Work with the contractor of Ia Mor Irrigation Project to find out suitable construction, material transportation time. 3. Consider the capacity of material mines, borrow pits and disposal sites for both project.
13. Environmental recovery	Contractors to reconfirm and implement recovery (e.g., landscaping, tree replanting) identified at the detailed design stage

Support to Border Areas Development Project (48189-002)

Initial Environmental Examination (IEE)

CONSTRUCTION OF PROVINCIAL ROAD NO.675A

Prepared for
THE ASIAN DEVELOPMENT BANK

June 2016

Prepared by CONTRANS AB, SWEDEN
In joint venture with Transport Engineering Consultant Joint Stock Company No.2 (TECCO2) (Vietnam) and
In association with ASEAN Development and Management Consulting Ltd (ASEC) (Vietnam)

CURRENCY EQUIVALENT
(As of 21st June 2016)

Currency unit: Viet Nam Dong (VND)
USD1 = VND 22300

WEIGHTS AND MEASURES
km^2 – square kilometre
m^3 cubic meter

NOTE
In this report "$" refers to US Dollars

Consultants Quality Assurance Protocol

Prepared By	**CONTRANS SWEDEN AB**		
Auditor/Reviewer	**David Lupton Team Leader (TL)**		
Place	**Buon Ma Thuot, Vietnam**	*Date*	**21-06-2016**
Approved By	**Ta Ngoc Quang, Asia Manager**		

ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
CLV-DTA	Cambodia – Lao PDR – Vietnam Development Triangle Area
CPC	Commune People's Committee
CSC	Construction Supervision Consultant
DARD	Department of Agriculture and Rural Development
DONRE	Department of Natural Resources and Environment
DOT	Department of Transportation
DPC	District People's Committee
DPI	Department of Planning and Investment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
ESO	Environmental Safeguards Staff
ESP	Environmental Safeguard Specialist
GMS	Greater Mekong Sub-region
IEE	Initial Environmental Examination
IPM	Integrated Pest Management
LEP	Law on Environmental Protection
MONRE	Ministry of Natural Resources and Environment
MMP	Materials Management Plan
MPI	Ministry of Planning and Investment
PPU	Project Preparation Unit
PPC	Provincial People's Committee
PPE	Personal Protective Equipment
PMU	Provincial Project Management Unit
PPTA	Project Preparatory Technical Assistant
ROW	Right of Way
SPS	Safeguard Policy Statement
SST	Subproject Support Teams
The PPTA	The Project Preparatory Technical Assistant Consultants
The Project	Support to Border Areas Development Project
The Subproject	Construct Provincial Road No.675A

TTF	Trade and Transport Facilitation
UXO	Unexploded ordnance
WMSDP	Waste Management and Spoil Disposal Plan

CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. EXECUTIVE SUMMARY

1. The Central Highland of Vietnam has many natural resources with more than 2 million hectares of rich basalt soil; make up 60% of the basalt soils of Vietnam. The soil is suitable for a variety of commercial crops including coffee, cocoa, pepper, and tea. The coffee production area has reached more than 290000 ha, about 80% of the total coffee area of the country. On the global scale, Vietnam has radically changed global coffee supply chains since 1990, increasing from less than 3% to more than 17% of global production[1]. The Central Highlands is also the second largest rubber plantation area in Viet Nam, mainly in Dak Lak province.

2. Despite of these advantages, socio-economic development of the Central Highland, especially four border provinces of Kon Tum, Gia Lai, Dak Lak and Dak Nong are still facing many difficulties, with less developed infrastructure and low living standards with many different ethnic groups. Their poverty rate is the second highest in the country, standing at 20.3% compared to 12.6% for the whole country in 2011.

1. The Support to Border Areas Development Project (Project) will help the five participating provinces (the Provinces) of Kon Tum, Binh Phuoc, Dak Lak, Dak Nong, and Gia Lai to better realize their growth potential and become more closely integrated into sub-regional frameworks including the Greater Mekong Sub-region (GMS). The project will include three main outputs and activities: i) Output 1: Road infrastructure in five VDTA provinces rehabilitated; ii) Output 2: VDTA plans and facilities for transport and trade facilitation (TTF) with a focus on inclusive growth developed and iii) Output 3: Institutional capacity for VDTA investment planning, project design and implementation, and resource management strengthened

2. Following extensive data collection, a multi-criteria analysis was used to make the final selection of the roads to be included in the shortlist. Measures were used that reflected the likely impact of the roads including eight themes: (i) agricultural productivity; (ii) population served; (iii) rural population; (iv) traffic count; (v) poor households; (vi) ethnic minority population; (vii) safeguards compliance (environment and social safeguards); and (viii) access to National Road No.14.

A. Subproject Summary

3. The provincial road No.675A in Ia Tang, Sa Thay district and Ia Dal, Ia Toi communes, Ia H'Drai district was the short-listed sub-project in Kon Tum province. The Subproject will upgrade 58.7 km of earth road in Section 1 and construct 12.1 km roads in Section 2 of provincial road No. 675A. The start point of the subproject is the junction with Provincial Road No. 675 in Ia Tang commune, Sa Thay district and the end point is Ho Da Auxiliary Border Gate through Ia Toi and Ia Dal communes of Ia H'Drai district. Along the Section 1 of the subproject are vast rubber plantation area; Se San River and Reservoirs of SeSan 3A and SeSan 4 Hydropower Plants; 15 km natural forest and other small cultivation area of the rubber workers (Duy Tan Rubber Company) in village No.7 and Village No.9, Ia Dal commune, Ia H'Drai district. Along the section 2 of the subproject are mainly rubber plantation area of Chu Mom Ray Rubber Company; Sa Thay River cross the route at Km83+534.76 and village No.4 for the workers of Chu Mom Ray Rubber Company in Ia Toi commune, Ia H'Drai district.

[1] Coffee in the 21st Century – Timothy J Killeen, PhD & Grady Harper

4. The subproject route, with a total length of 70.8 km, goes from North East to South West of the district through the area of Ia Toi and Ia Dal communes. The subproject will upgrade two sections with cement concrete with detail information as follow:

- Section 1 from junction with Road No.675 to junction with Road No.14C – total of 58.7km will be upgraded to Rural Road Type B in accordance TCVN 10380:2014 (road base: 5m; road surface: 3.5m; road side: 2x0.75m).
- Section 2 from junction with Road No.14C to Ho Da Auxiliary Border Gate will be newly constructed in Grade V Mountain in accordance to TCVN4054-05 road base: 6.5m; road surface: 3.5m; road side: 2x1.0m).

5. There are total 11 crossing river/ streams along the route with 3 crossing river/ streams for Section 2 and 8 crossing stream for Section 1. Ya Toi Bridge at Km58+556 in Section 1 is now already under construction by Provincial budget. 10 bridges will be newly constructed along the route. These bridges have been designed in a suitable way with the road grade and based on 100 years water level. The result has showed that the peak in 100 years has been reached at the historical flood in 2009. The bridge, location and design information is listed in Table 1 below.

Table 1 – Number of bridges and designed elevation based on 2009 peak water level

No.	Location	Name (river/ stream)	Section	Designed Length (m)	Designed elevation MSL (m)
1	Km24+802	Yari stream	1	81.75	247.31
2	Km25+763	Stream No.2	1	35.3	247.3
3	Km29+619.28	Stream No.3	1	37.5	247.8
4	Km36+449.01	Ya Blook stream	1	45.7	280.8
5	Km49+069	Ya Doi Stream	1	47.1	221.92
6	Km50+012	Ya Ko Ring Stream	1	45.4	222.96
7	Km52+883.57	Ya Mo Nang Stream	1	39.9	219.43
8	Km83+534.76	Sa Thay River	2	175.8	156.76
9	Km89+262.96	Stream No.4	2	38.1	202.49
10	Km90+390.74	Stream No.5	2	47.1	201.36

B. Environment impacts and mitigations

6. The Project has been ranked as B on environmental issues during the Project Concept note as it has few potential significantly adverse impacts and none of them are irreversible. The initial environmental concern is the potential negative impact of the subproject implementation on natural forest located 15 km along Section 1 of the subproject road (from Km60 to Km74). The completion of the road will provide access to the forest; potentially creating favourable conditions for wood logging and forestry product exploitation. The completion of the road could also facilitate land use change from natural forest to agricultural plantation as this land area has already been handed over to Duy Tan Rubber Company and Sa Thay Forestry Company.

7. This IEE has been prepared to screen impacts and formulate mitigation measures in three phases of subproject implementation including design, pre-construction; construction and operation phases and institutional arrangement to ensure that subproject Environment Management Plan (EMP) will be implemented.

8. In the design, preconstruction phase, the potential impacts have been identified relating to (i) improper road surface material and construction method selection; and (ii) land acquisition and resettlement. To minimize the first impact, cement concrete has been selected as the road surface material to ensure the road quality and longevity and prevent landslide, road erosion during the operation phase. To minimize the impact on income and disturbance of local people's lives, PMU will check and review the Land acquisition and resettlement process before the construction starts to ensure that all affected households have received compensation adequately in accordance with the current provincial market and ADB safeguard Policy be implemented.

9. The potential negative impact in the construction phase has been identified as (i) forest encroachment in the 15 km along the natural forest. To minimize the impact, a close collaboration between Kon Tum Project Management Unit (PMU), Environment Safeguard Specialist (ESP); Sa Thay Forestry Company, Duy Tan Rubber Company, relevant Divisions of Ia H'Drai district, Forest Ranger, Kon Tum DONRE, Construction Supervision Consultant (CSC) and Contractors will be established to identify, manage and control the construction activities along the section 1, especially from Km60 – Km74 for tree cutting and vegetation clearance activities and to ensure construction activities will be done properly on the existing road foundation. Workers should be informed and prohibited from cutting trees for firewood and for use in the subproject activities before construction starts.

10. (ii) Careless construction and poor materials control can cause blockage to river/ streams at 11 crossing locations. Runoff water during its rain could bring waste and soil into the rivers and stream. That could lead to siltation and reduce the water quality of Se San and Sa Thay River and affect downstream users in Ia Khai and Ia Grai districts (down stream of Se San River) or some residential areas in Cambodia (down stream of Sa Thay River). The eleven crossing streams/ rivers, especially Sa Thay river could be affected by the construction activities, as a bridge will be newly constructed or to replace the existing bridge. The proposed mitigation measures are to store lubricants, oils and other construction material stockpiles on impervious ground with covers or roof at least 100m away from streams/ rivers; install sediment ditches, silt fences at the area with high potential of runoff, erosion and sedimentation.

11. (iii) The operation of construction machines and material transportation could damage local facilities such as low-voltage electricity lines, communication cables, existing drainage system and other roads in the subproject area (NR14C, PR675...) They will also impact on local traffic; increase the risk of work accidents and traffic accidents especially in sensitive areas such as commune administration centre, medical centres, schools, kindergartens. Dust, noise and vibration from construction machines such as concrete mixing plants or trucks could disturb local people, damage their houses, increase risk of respiratory and skin diseases. However, this is a minor impact as the low population density of the subproject area and people living along the road are mainly rubber plantation workers from Chu Mom Ray and Duy Tan Rubber Companies. To minimize the impact, the contractor will collaborate with relevant authorities to set up detailed plans for machines and workers mobilization as well as a material transportation plan; inform in advance that plan to local authorities and local people in accordance with that plan, while PMU, CSC and relevant authorities will monitor the compliance of the contractor in applying designated mitigation measures. If any buildings, structures in the subproject area are damaged by construction activities, the contractor should compensate them adequately at their own expense.

12. In the operation phase, the potential negative impact has been identified as relating to an increased chance of access to the natural forest along Section 1 and changing land use from natural forest to cultivation land; dust and noise arising from increasing of traffic density and higher risk of traffic accidents as a result of better driving conditions. To minimize the negative impacts, Kon Tum Department of Transportation (DOT), the responsible agency for subproject management in the operation phase, will cooperate with Kon Tum DONRE, Ia H'Drai DPC, Ia Dal CPC, Sa Thay Forestry Company and Duy Tan Rubber Company in forest management, will periodically maintain the road, and will install speed limit, warning signs or road humps (if applicable) at sensitive areas along the road such as kindergartens, medical centres etc.

13. The PPTA Consultant has also identified key stakeholders and conducted public consultations from provincial to commune level with a focus on the affected people's views. The main concerns are (i) risk of forest fire during construction phase, especially in dry season along the section with natural forest. (ii) fallen material from transportation trucks will increase risks of accident along the road. (iii) unfinished work at bridge construction areas could lead to landslides, soil erosion and runoff when it rains, impacting on the cultivation area of local people. (iv) impact on the natural forest as land use changes in the operation phase. All of these concerns are addressed in the EMP (See Table 11 – 12 for more details).

14. An EMP has been prepared under this IEE to detail responsibilities of relevant stakeholders on mitigation measures to be implemented during construction and operation phases of the subproject.

C. Institutional arrangement

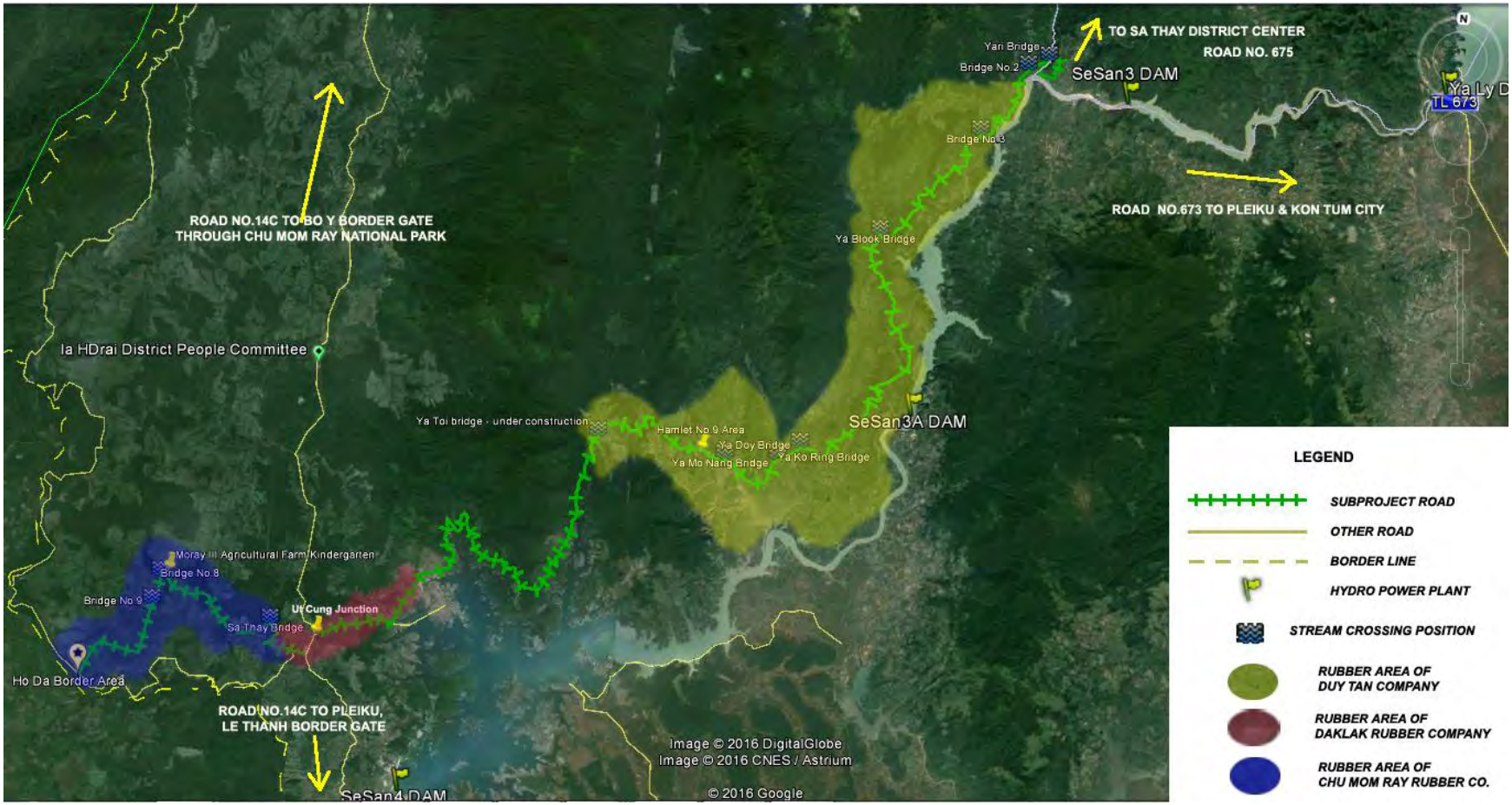
15. Kon Tum Provincial People Committee (CPC) has established a Project Preparation Unit (PPU) to support the preparation of the subproject in the PPTA period. One staff from Kon Tum Department of Planning and Investment (DPI) has been assigned as Environmental Safeguards Officer (ESO) of PPU. Ideally, the ESO will become ESO of Kon Tum PMU in the construction phase. ESP will organize a formal training course and on-the-job training for relevant PMU staff, CSC, communities, contractors; and support for establishment and operation of the subproject environment management system in construction phase. ESP will also support PMU's capacity building by reviewing and evaluating the capacity for environmental protection of the PMU and Kon Tum Department of Transportation (DOT) – subproject management organization in the operation phase.

16. To fully reflect the environmental protection cost of the civil works and engage the environmental responsibilities of civil contractors, environmental requirements will be included in biding documents and civil work contracts. Any omission of environmental management costs will create high risks for implementing mitigation measures during the construction phase due to lack of resources and capacity, thus the environmental protection cost and responsibilities need to be involved from the beginning. Bid document will also specify that contractors shall engage capable and trained staff to take responsibility for the environmental management and safety issues at the working level and to monitor the effectiveness and review mitigation measures as the subproject proceeds.

D. Conclusion

17. The IEE concludes that the feasibility study of the subproject combined with available information is sufficient to identify the scope of potential environmental impacts and formulate mitigation measures for the subproject. Providing that significant changes to the subproject description do not occur at the detailed design phase, and that new sensitive environmental, or cultural resources are not determined, further detailed environmental impact assessment (EIA) is not required. The ESP will update EMP before finalization of the detail design.

Figure 1 – General Map of Kon Tum and Subproject Area



II. BACKGROUND

18. The Support to Border Areas Development Project (Project) will help the five participating provinces (the Provinces) of Kon Tum, Binh Phuoc, Dak Lak, Dak Nong, and Gia Lai to better realize their growth potential and become more closely integrated into subregional frameworks including the Greater Mekong Subregion (GMS), the Cambodia – Lao PDR – Viet Nam Development Triangle Area (CLV-DTA), and the ASEAN Economic Community. It will improve the project area's connectivity by developing critical transport infrastructure, leading to increased movement of people, agricultural produce, and other goods. Moreover, it will facilitate logistics and trade, and help develop the Provinces' capacity for investment planning from a regional integration perspective. As the Provinces are at the joint borders of the CLV-DTA, the Project will enable them to serve as an engine and gateway to wider markets for this subregional initiative. The Project will be implemented in 5 provinces in the CLV-DTA of Vietnam including Kon Tum, Binh Phuoc, Dak Lak, Dak Nong and Gia Lai.

19. The proposed Project will include 3 outputs and activities:

- ***Output 1: Road infrastructure in five VDTA provinces rehabilitated*.** The Project will improve transport infrastructure of the DTA area, including selected sections of provincial roads and roads that are important for filling the missing links for accessing national and international wider markets, tourism, healthcare facilities, and heritage and conservation areas. The project will provide the critical road infrastructure in service of selected value chains to ensure the smooth flow of products along the value chain to the market.
- ***Output 2: VDTA plans and facilities for transport and trade facilitation (TTF) with a focus on inclusive growth developed.*** This output will stimulate inclusive economic activity by (i) improving TTF within the VDTA leading to easier movement of goods and people across the borders, which in turn will stimulate the formation of strong value chains to support trade and tourism; and (ii) expanding the tourism industry which will involve the local population, with a special emphasis on the inclusion of ethnic minorities. Moreover, tourism also leads to demand for high quality local agricultural produce and rural products such as traditional handicrafts.
- ***Output 3: Institutional capacity for VDTA investment planning, project design and implementation, and resource management strengthened***. This output will consolidate the long-term development program for the VDTA. The indicators for achieving this output are: (i) VDTA master plan updated and implementation action plan prepared with ecosystem services, gender and EM considerations; and (ii) Officials nominated by the PPC trained to implement the updated master and action plans.

20. In order to reached these above outputs as well as avoid and minimize any possible negative impact of the Project implementation, the Project Preparatory Technical Assistant Consultants (the PPTA) has been recruited. The main tasks of the PPTA are (i) detail a project design that is economically, financially and technically feasible; (ii) provide advance drafts of the complete set of documentation necessary for the ADB to proceed with internal processing of the ensuing Project; (iii) prepare feasibility studies and comprehensive criteria for road sections, logistics and institutional arrangements to be improved under the Project; (iv) define the scope, cost, procedures for identifying subprojects, financing plan, implementation arrangements, procurement strategy, technology issues, capacity development needs and post-project operation and maintenance arrangements for the project (v) establish measures that will ensure adherence to the safeguard policies of both the ADB and the Government; (vi) provide guidance

in actions to maximize the socioeconomic benefits such as impacts on poverty, gender and fair employment practices; (vii) provide project start up support to the government.

21. The Government of Vietnam has assigned Ministry of Planning and Investment (MPI) as the line agency for the preparation phase of the Project. Department of Planning and Investment (DPI) of the five provinces are responsible for the Project preparation phase in their provinces. DPIs have prepared a long list of the proposed roads in their provinces based on the Provincial Transportation Master Plans and the demand for road upgrade at the moment. The long list subprojects have been detailed feasibility and preliminary designs have been undertaken by the PPTA. A multi-criteria system with weight has been developed to screen and short-listed these subproject roads. The parameters have been listed in the Paragraph 4 above.

22. The Project is initially categorized as 'B' for environmental safeguards, and IEE is required to meet requirement of ADB SPS 2009. The objectives and scope of this IEE are to (i) assess the existing environmental conditions along and in the vicinity of the subproject road; (ii) identify potential environmental impacts from the proposed road improvement works; (iii) evaluate and determine the significance of the impacts; (iv) develop an environmental management plan (EMP) detailing mitigation measures, monitoring activities, reporting requirements, institutional responsibilities and cost estimates to address adverse environmental impacts; and (v) carryout public consultations to document any issues/ concerns that stakeholders may have on the subproject and to ensure that such concerns are addressed in the subproject design and mitigation measures.

III. POLICY AND LEGAL FRAMEWORK

23. The subproject shall comply with requirements of ADB SPS 2009 and the GOV's Guidelines on Implementation of Law on Environmental Protection 2014. Decree No. 18/2015/ND-CP has detailed information on environmental protection assessment, environmental impact assessment and environmental protection plans. However certain activities commonly associated with infrastructure subproject such as quarry operations, extraction of gravel, etc., will also require permission from the relevant provincial level authorities. Depend on the scale; some constructions on the proposed road such as bridge or spillway shall require separated environmental impact assessment.

A. ASIAN DEVELOPMENT BANK SPS requirement

24. ADB safeguard policy statement (SPS) 2009 imposes safeguard requirements for all its funded projects. The SPS 2009 clarifies reason, scope and contents of the environmental assessment. Safeguard policy statement emphasizes on environmental and social sustainability in progress of economic growth and poverty reduction in Asia and the Pacific, therefore the objectives of SPS focus on:

- Avoid adverse impacts of projects on the environment and affected people, where possible;
- Minimize/mitigate and/or compensate for adverse impacts on environment and affected people when avoidance is not possible; and
- Help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks

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

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

26. For environmental safeguards, the Project is initially categorized as 'B' for environmental safeguards. Environmental criteria for the long list multi-criteria system has been developed and contributed for the evaluation and short-listed subproject roads. Detail of the environmental criteria could be found in Appendix 03. The subproject has been classified as category A on environmental safeguards will not be short-listed as it will rescale the whole Project to category A on environment

B. Legal and Administrative Framework for Environmental Protection in Vietnam

27. The subproject has to comply with the environmental legal framework of Vietnam which is outlined in this section. The main components of the framework, if not, the more applicable ones are shown here.

1. Laws:

- Law No. 55/2014/QH13 of 23 June 2014 by the National Assembly on environment protection
- Law No. 17/2012/QH13 of 21 June 2012 by the National Assembly on water resources
- Law No. 20/2008/QH12 of 13 November 2008 by the National Assembly on biodiversity
- Law No. 68/2006/QH11 of 29 June 2006 by the National Assembly on standards and technical regulations
- Law No. 29/2004/QH11 of 03 December 2004 by the National Assembly on forest protection and development

2. Others

- Decree No. 18/2015/ND-CP dated February 14, 2015 on environmental protection planning, strategic environmental assessment, environmental impact assessment and environmental protection plans.
- Circular No. 27/2015/TT-BTNMT dated May 29, 2015 on strategic environmental assessment, environmental impact assessment and environmental protection plans.
- Circular No. 36/2015/TT-BTNMT of 30 June 2015 by the Ministry of Natural Resources and Environment stipulating hazardous waste management
- Decision 07/2012/QD-TTg dated February 08, 2012 of the Prime Minister promulgating some regulations on intensified enforcement of forest protection
- Decision 186/2006/QD-TTg dated August 14, 2006 of the Prime Minister promulgating the Regulation on forest management
- Decree 09/2006/ND-CP dated 16th January, 2006 of the Government on forest fire prevention and control
- National Technical Regulations on air and noise quality
    - QCVN 05: 2013/BTNMT on ambient air quality
    - QCVN 26: 2010/BTNMT on noise
    - QCVN 27: 2010/BTNMT on vibration
- National Technical Regulations on water quality

- QCVN 01: 2009/BYT on drinking water quality
- QCVN 02: 2009/BYT on domestic water quality
- QCVN 08: 2008/BTNMT on surface water quality
- QCVN 09: 2008/BTNMT on underground water quality
- QCVN 14: 2008/BTNMT on domestic wastewater

3. Other legislations applicable to the Project are the following:

- Law No. 27/2001/QH10 of 29 June 2001 by the National Assembly on fire prevention and fighting
- Law No. 40/2013/QH13 of 22 November 2013 by the National Assembly on amending and adding a number of articles of the Law No. 27/2001/QH10 of 29 June 2001 on fire prevention and fighting
- Decision No. 3733/2002/QD-BYT of 10 October 2002 by the Ministry of Health promulgating 21 labour hygiene standards, 5 principles and 7 labour hygiene measurements
- Law No. 50/2014/QH13 of 18 June 2014 by the National Assembly on construction
- Circular No. 22/2010/TT-BXD of 03 December 2010 by the Ministry of Construction on labour safety in work construction
- Law No. 10/2012/QH13 of 18 June 2012 by the National Assembly on labour code.

IV. DESCRIPTION OF THE SUBPROJECT

A. The need for subproject

28. Ia H'Drai – the Project district of Kon Tum – has officially separated from Sa Thay district in 2015. The district is including three communes: Ia Toi, Ia Dal and Ia Dom. District located at the South West of the province, border with Sa Thay district to the North; Gia Lai province to the South and the East by Sesan River; Ratanakiri province of Cambodia to the West.

29. As the district has a vast area of mountain and valley terrain with large area of natural forest and water bodies, the movement of local people in the district is facing with many difficulties. The main transportation route of the district is National Road No.14C connect from Le Thanh International Border Gate area in Gia Lai province through the district to Bo Y International Border Gate in Ngoc Hoi district of Kon Tum. This bitumen road is in good condition and will also go through Chu Mom Ray National Park, which is located in Ngoc Hoi and Sa Thay districts before reaching the Junction to Bo Y International Park. The new administrative area of the district is also located at the roadside of Road No.14C about 10km to the North of the proposed road.

30. The other main road is the proposed road – Provincial Road No.675A from Se San 3 Hydropower Plant to Ho Le Border Protection Station, Ho Da Auxiliary Border Gate. Kon Tum PPC at the Decision No. 599/QD-UBND dated June 23, 2008 and adjusted by Decision No.1159/QD-UBND dated September 29, 2009 has approved the investment of Section 1 of the proposed road with the total length of 58.7km from Se San 3 Hydropower Plant to National Road No.14C and No.348/QD-UBND dated June 2015. The foundation, road base and cross drainage system have been constructed. However, in the rainy season, the earth road surface turn into muddy condition and people must travel 120km from district centre to Kon Tum city via Pleiku instead of 90km if travel via the proposed route.

31. Section 2 of the proposed road is currently earth road goes from National Road No.14C to Ho Da Auxiliary Border Gate. The total length of Section 2 is 12.1km and its investment has been approved by the PPC at the Decision No.1536/QD-UBND dated December 31, 2010. Up to now the province still could not find out suitable budget for construction.

32. Upon the completion of the whole route, it will work as a backbone road of the district, connects the district to Kon Tum city and the main residential area of the old Sa Thay district. In accordance to the estimation of Investment Report of Kon Tum DPI, about 42627 tons of the district's agricultural production will transfer through Road No.675A per year with the value up to 36.8 millions USD. It will also be the transportation road for fertilizers, estimated 4841 tons/year with the value up to 24.3 millions USD.

B. Location and scope

33. The subproject route has the total length of 70.8 km, goes from North East to South West of the district through the area of Ia Toi and Ia Dal communes. The subproject will have two section:

- Section 1 from junction with Road No.675 to junction with Road No.14C – total of 58.7km will be upgraded to Rural Road Type B in accordance TCVN 10380:2014 (road base: 5m; road surface: 3.5m; road side: 2x0.75m).

- Section 2 from junction with Road No.14C to Ho Da Auxiliary Border Gate will be newly constructed in Grade V Mountain in accordance to TCVN4054-05 road base: 6.5m; road surface: 3.5m; road side: 2x1.0m).

34. The stone source could be used for construction activities in the subproject area is come from quarry and soil mine of Sesan 4A Hydro Power Plant. The stone capacity of the quarry is about 500000m^3 and filling soil could be provided at customer's demands while estimated stone volume for subproject construction is about 123900 m^3. The quarry is located in IA O commune, Ia Grai district of Gia Lai province. The distance to subproject route is 17.4 km with good road condition (National road No.14C). The other option is Duc Trung Thanh quarry in Le Dai Hanh road, Pleiku city with total exploitation area of 4.5ha. The distance to the subproject route is 60.3km via national road No.14 and provincial road No.673. The estimated excavated soil is 156006.4 m^3, of which 31327.47 m^3 is unstable organic soil that could not be reused as filling soil and will be transfer to the dumping site or designated area for spoil.

35. There is no dumping sites existed in the district. In Ia Dal commune, 2 areas have been assigned as temporary dumping area. However, as the land resources along the proposed route is still a lot, the Contractor will discussed with CPCs and relevant authorities to find out suitable location for waste soil as well as domestic waste from worker before the construction start.

36. Land acquisition and resettlement: There is neither house be relocated nor major affected households (lost more than 10% of their land holding). The construction of the subproject will affect some land area of Chu Mom Ray Rubber Company and Duy Tan Investment & Trade Company. Total permanent land acquisition area is 10,794m^2; of which 4216m^2 is garden land of Sa Thay Border Post (4000m^2) and 216m^2 of Chu Mom Ray Rubber Company. 6578m^2 perennial plants under Chu Mom Ray Rubber Company. The detail information could be finding out in the land acquisition and resettlement report.

37. In the plan, the subproject will be constructed in 24 months with the estimated budget in Table 2 below:

Table 2 – Estimated budget of the subproject

No	ITEMS COST	METHOLD	SUB COST (VND)	(USD)	Notes
	Invesment Cost	-	**528 223 255 219**	**23 687 141**	
I	**Construction cost**	-	**378 255 624 000**	**16 962 136**	**22 300**
	Route		**264 020 121 935**	11 839 467	
1	Embankment		28 434 691 559	1 275 098	
2	pavement		180 827 662 086	8 108 864	
3	Drainage; culverts		8 200 648 185	367 742	
4	Long drainage		23 084 548 447	1 035 182	
5	Embankment protection works		11 805 129 114	529 378	
6	Traffic safety		10 916 566 519	489 532	
7	Temporary works		750 876 024	33 672	
	Bridge		**114 235 502 427**	**5 122 668**	

1	Km24+802.96 Bridge		17 244 697 306	773 305	
2	Km25+763.89 Bridge		7 677 045 283	344 262	
3	Km29+619.28 Bridge		7 878 944 031	353 316	
4	Km36+449.01 Bridge		8 962 228 223	401 894	
5	Km49+069 Bridge		8 232 683 421	369 179	
6	Km50+012.34 Bridge		7 505 204 770	336 556	
7	Km52+883.57 Bridge		8 198 972 951	367 667	
8	Km83+534.76 Bridge		30 543 216 659	1 369 651	
9	Km89+262.96 Bridge		8 534 882 555	382 730	
10	Km90+390.74 Bridge		9 457 627 228	424 109	
II	**SITE CLEARANCE COST**		**5 590 452 219**	**250 693**	
III	**MANAGEMENT COST**	1.205% *CPXDTT	**4 149 916 000**	**186 095**	
IV	**INVESTMENT ADVICE COST**		**22 771 384 000**	**1 021 138**	-
1	Report investment cost (*1,2 design improvement)	0.172%*CPXD*1 ,2	784 801 365	35 193	Decided 957/QD-BXD dated 29/9/2009
2	Survey cost (calculation temporary 100mil vnd /km)	Temporary	3 400 000 000	152 466	
3	Verification cost	0.02%*CPXD	89 740 438	4 024	Decided 957/QD-BXD dated 29/9/2009
4	Shop drawing cost (*1,2 design improvement)	0.846%*CPXD*1 ,2	3 849 427 108	172 620	Decided 957/QD-BXD dated 29/9/2009
5	Survey cost for shop drawing (Calculation temporary 120 mil vnd /km)	Temporary	8 760 000 000	392 825	
6	Establish bidding document; Evaluation bidding document cost	0.2%*GGT	100 000 000	4 484	Decree 63/2014/ND-CP dated 26/6/2014
7	Supervision cost	0.93%*CPXD	3 544 318 321	158 938	Decided 957/QD-BXD dated 29/9/2009
8	Verification shop drawing cost	0.05%*CPXD	180 676 399	8 102	Decided 957/QD-BXD dated 29/9/2009
9	Verification estimates cost	0.05%*CPXD	171 142 703	7 675	Decided 957/QD-BXD dated

					29/9/2009
10	Others cost for consultant (temporary)	0.50%*CPXD	1 891 278 120	84 811	
V	**OTHERS**		**30 350 412 000**	**1 361 005**	
1	Clearance mine cost (calculation temporary: 5000 vnd /m^2)		**1 561 163 700**	**70 007**	
2	General cost		**21 404 059 320**	**959 823**	
2.1	Temporary housing cost	2.0%*CPXD	7 565 112 480	339 243	
2.2	Others undefined cost (2%)	2.0%*CPXD	7 565 112 480	339 243	
2.3	Mobilization and remobilization cost (calculation temporary)	0.5%*CPXD	1 891 278 120	84 811	
2.4	Ensuring transport cost (Calculation temporary)	1.0%*CPXD	3 782 556 240	169 621	
2.5	Setup Asphalt plant station	Temporary estimated	600 000 000	26 906	
3	Insurance works cost (Temporary)				Decided 33/2004/QD-BTC dated 12/4/2004
	Insurance for Route cost (Temporary)	0.42%*CPXD	1 108 884 512	49 726	
	Insurance for Bridge cost (Temporary)	0.42%*CPXD	685 413 015	30 736	
4	Expertise fees (*TMDT)	0.007%*TMDT	44 118 704	1 978	Circulars 176/2011/TT-BTC dated 06/12/2011
5	Verification fees for design document	0.01%*CPXD	39 411 872	1 767	Circulars 75/2014/TT-BTC dated 12/6/2014
6	Verification fees for estimate document	0.01%*CPXD	37 348 659	1 675	Circulars 75/2014/TT-BTC dated 12/6/2014
7	Expertise fees for Bidding document and result bidding	0.1%*GGT	100 000 000	4 484	Decree 63/2014/ND-CP dated 26/6/2014
8	Approval settlement report fees	0.21%*TMDT	1 345 438 500	60 334	Circulars 09/2016/TT-BTC dated 18/01/2016
9	Audit cost (*TMDT)	0.309%*TMDT*1 ,1vat	2 133 295 780	95 663	Circulars 09/2016/TT-BTC dated

					18/01/2016
10	Others (Temporary)	0.5%	1 891 278 120	84 811	
VI	**CONTIGENCY**		**87 105 467 000**	**3 906 075**	
	Variation works cost	10%	43 552 733 600	1 953 037	
	Inflation cost	15%	43 552 733 600	1 953 037	Indicator construction

V. DESCRIPTION OF THE ENVIRONMENT

A. PHYSICAL ENVIRONMENT

1. Topography, Geology, and Soils

38. The terrain of Kon Tum is gradually going down from high area in the North to low area in the South of the province. The highest peak is Ngoc Linh with the height of 2598m above MSL. The topography of Kon Tum is quite diversified and complicated, divided in four main types: (i) high mountain; (ii) average mountain; (iii) low mountain; (iv) valleys and geosynclinals depression.

39. There are five main types and 16 units of soil in Kon Tum. The yellow-red soil and red-yellow humus soil made up 96% of the province.

40. The result of geological investigation has showed that the geological cross section of the subproject route is including 1-3 main basaltic layers interfered by few thin layers of basaltic weathered red soil. The thickness of this section is varied from 20-70m. The rock composition are including olivine-augite basalt; basaltic olivine-plagioclase-augite. Section 1 has a homogeneous geological foundation with basaltic clayey soil mixed with red brown or yellow brown gravel.

2. Hydrology and Climate

41. There are four main rivers in Kon Tum province. They are Se San River; Dak Bla River; Po Ko River and Sa Thay River. The annual water capacity of all rivers in the province is 911,110 m^3. The water flow is in the Dak Bla catchment with 2,803,196 m^3; make up 30.78% of the total annual capacity. Se San River catchment flow through different terrain with steep slope and it has a great hydropower potential. Along the Se San River in Kon Tum, four hydropower plants have been built including Ya Ly, Se San 3, Se San 3A and Se San 4. Sa Thay River has the total catchment area of 1471 km, flowing 115 km along the borderline with Cambodia.

42. In general, Kon Tum has a tropical monsoon climate but as its topography is quite diversified, the climate has divided into three sub-regions: (i) Ngoc Linh high mountain sub-region; (ii) Sa Thay low mountain sub-region; (iii) Kon Tum geosynclinals depression sub-region;

43. The subproject area is located in the Sa Thay low mountain climate with the annual precipitation varied from 2000 mm to 3000 mm and the temperature of 20 – 23^0C. The rainy season starts from May to October with the total rainfall made up 87% of the year. The dry season starts from November to April next year. The average humidity of the year is 80 – 85%. However, it is not distribute equally over the year. In the dry season, the humidity is only 65-70% and it poses a high risk of forest fire during this season. The flood usually come in July and ends in November.

44. The deputy chairman of Ia Toi commune has mentioned that drought, forest fire and tornado are the main natural disaster in the commune recently. More information related to natural disaster of the commune could be found in Table 3 below

Table 3 - Type of natural disaster in the recent year

Year of occurrence	Type of disaster	Affected area		Number of affected people	Affected area	Estimated damage
		Name of district	Name of commune	(HH)	m^2	(Mil.dong)
2015	Drought	Ia H'Drai	Ia Toi, Ia Dal, Ia Dom	The whole district	The whole district	
2015	Fire in 3-year Eucalyptus forest	Ia H'Drai	Ia Toi	Chu Mom Ray Rubber Co.	150000 (15ha)	
2014	Tornado	Ia H'Drai	Ia Toi	8	1.260	0.150
2015	Paddy farm fire	Sa Thay		Burned 1173 rubber trees		0.365

3. Surface and ground water

45. As Ia H'Drai district has just separated from Sa Thay district in 2015, there is no monitoring program for the district. The nearest monitoring location for 2011-2014 period is in Sa Thay district centre, about 45km from the subproject area. Representative from Kon Tum DONRE said that monitoring program for Ia H'Drai district will be included in the 2016-2020 monitoring program.

Surface water resources

46. The 2011-2014 monitoring result in several river/stream and lake in the province has showed that surface water has been polluted by organic substance (BOD, COD); chemical agent content N, P and micro bacteria (Total coliform) so it is only suitable for irrigation, transportation purposes or other purpose which do not require high quality water. Some parameters have already over the allowed level under QCVN 08:2008/BTNMT.

Underground water resources

47. In general, ground water reserve is quite abundant in some areas of Kon Tum. However, the quality of underground water is going down recently. The test of underground water in Sa Thay has showed that it has a low PH; NH4+ and Pb parameters have higher than the allowed level in QCVN 09:2008/BTNMT. Coliform in the dry season of 2015 has 2.3 times higher than the allowed level.

4. Air quality and noise

48. According to Status of Environment report (SOE) of Kon Tum province 2011 - 2015, the level of CO, NO2, SO2 and TSP dust at subproject area is in the allowable limit of QCVN 05-2013/BTNMT. Their variation from 2011 to 2014 is also minor. The air quality in the province is still good and clean.

49. In general, noise level of the province is still in the allowed level of QCVN 26:2010/BTNMT. Only in some crowed area as in bus stop of Kon Tum city, Dak Ha Industrial zone, Ho Chi Minh Road and National Road No.14 noise level sometimes over the allowed level.

B. BIOLOGICAL ENVIRONMENT

50. The main ecosystem along the subproject route is rubber plantation forest interfere with some natural forest area, mainly timber-bamboo forest on earth mountain. Section 1 of the subproject goes along Sesan River with the catchment of Sesan3; Sesan3A and Sesan4 hydropower reservoirs.

1. Agriculture

51. The main cultivation area of the three communes in Ia H'Drai district is rubber and cassava. Along Section 1 of subproject road is rubber plantation area of Duy Tan Investment & Trade Company. According to the representative of the company, Duy Tan has received total 10000 ha for rubber plantation. Up to now, rubber has been planted on 230 ha but they are not harvested yet due to the downtrend of the global rubber price. Section 2 of the subproject road is go through the land area of Chu Mom Ray Rubber Co. Ltd. The company manage 5124.56 ha in Ia H'Drai and Sa Thay district with 171.37 ha of rubber plantation at the moment. Detail information related to agricultural sectors in 2014-2015 of the district is listed in Table 4 below.

Table 4 - Main agricultural production type of the district (2014-2015)

Production type	Unit	District	Ia Dal commune	Ia Toi commune	Ia Dom commune
1. Main cultivation type					
a. Coffee					
- Area	Ha	0	0.5	9	8
- Capacity	Ton/ha	0	0	0	0
- Production	Ton/year	0	0	0	0
b. Rubber					
- Area	Ha	25,328	10,961.06	17,328	5,285.21
- Capacity	Ton/ha	15	0.9	15	1,515
- Production	Ton/year	2,783	222.63	1,583	713.37
c. Pepper					
- Area	Ha	9	0	0	1.25
- Capacity	Ton/ha	0	0	0	0
- Production	Ton/year	0	0	0	0
d. Rice					
- Area	Ha	235	30	55	95
- Capacity	Ton/ha	19	4.5	19	19
- Production	Ton/year	445	135	98	182
e. Cassava					
- Area	Ha	80	742	30	254.5
- Capacity	Ton/ha	31	15	31	1.505
- Production	Ton/year	250	11,129	93	3,830.225

f. Corn					
- Area	Ha				
- Capacity	Ton/ha				
- Production	Ton/year				
f. Main livestock and poultry					
- Water buffalo	Head	15	14	5	507
- Cow	Head	600	352	290	173
- Pig	Head	620	77	230	5,005
- Poultry	Head	16,359	7,150	5,083	

2. Forestry

52. Kon Tum is a poor province of the Central Highlands but its forest coverage is one of the highest in Vietnam. According to statistic data of 2014, the total forest area of the province is 604257.92 ha and unplanted forestry land is 176478.08 ha. Of which, forest area under “Three forest type planning” is 593657.8 ha. The forest coverage has reduced from 66.6% of 2010 to 62.4% of 2014. Besides, the forest quality has also reduced with less rich forest area and increase poor forest area.

53. 61.08% area of Ia H’Drai district is covered by forest with mainly natural forest. Sa Thay One Member Forestry Co. Ltd manages 34,346 ha land area in the district, of which 30,491 ha is natural forest. However, main land area along the proposed route is also under the management of Duy Tan Investment & Trade Company and Chu Mom Ray Rubber Co. Ltd.

3. Fauna and Flora

54. Kon Tum has rich biodiversity resources with more than 1610 plant species and 429 animal species. Some kind of good timber tree like Burmese Rosewood, Burma padauk, Cassia tree, India mahogany... Big mammals are elephant, gaur, wild buffalo, deer and muntjac. The province also has many famous and high value fish species. The rich biodiversity area in the province are Chu Mom Ray National Park in Sa Thay district; Ngoc Linh Nature Reserve in Ngoc Hoi district and Dak Uy Special Forest in Dak Ha district.

C. SOCIO-ECONOMICAL CONDITION AND INFRASTRUCTURE

1. Population and Ethnic

55. The total population of the district is 11,644 people. The local population is mainly workers of rubber plantation companies so local people of Central Highlands like Jrai and Sedang occupied only small part of the total population. Detail information could be seen in Table 5.

Table 5 – Ethnic groups of Ia H'Drai district

No	Ia H'Drai	Total	Ethnic group							
			Kinh	Jrai	Thai	Muong	Tay	Sedang	Dao	Other
1		**11,644**	**3,694**	**100**	**4,804**	**1,435**	**720**	**83**	**328**	**480**
2	Ia Dom	2,619	1002	49	838	301	181	17	115	116
3	Ia Dal	6,007	1,440	12	2,991	882	363	61	61	197
4	Ia Toi	3,018	1,252	39	975	252	176	5	152	167

2. Living Standards and housing

56. The new district – Ia H'Drai is one of the poorest districts of the province. There are 1520 poor household over 2739 households of the district, make up more than 50%. The number of household live closed to the poverty line is also 82. People are mainly workers of Rubber Company. The Company has allocated them to several hamlets. There is only one hamlet (hamlet No.9) located at the roadside of Section 1 and newly constructed hamlet No.4 at the roadside of Section 2.

Table 6 – Number of poor households in the subproject area (2014-2015)

	Poor household		Reason (%)					
District/ Commune	**Total**	**Ethnic minorities**	**Women headed**	**Lack of cultivation area**	**Lack of capital**	**Lack of knowledge**	**A lot of kids**	**Other**
Ia H'Drai	**1,520**	**1,368**		100	100	100		
Ia Dal	672	592	0.01	100	100	100	0.005	
Ia Toi	347	337	9.52	100	76.93	80.06		
Ia Dom	501	439	29	100	96.7		24	

3. Employment and income

57. From the investigation result of the Consultants, local people in Ia H'Drai district are mainly working in agriculture. Most of the people are workers for rubber Production Company migrated from the Northern provinces.

Table 7 – Production value of the district and three communes (2014-2015)

	Unit	Ia H'Drai	Ia Dal	Ia Toi	Ia Dom
I. Total production value (millions VND)	**Millions VND**	33,087			
1. Agri-Foretry, Aquaculture	Mil.		26,377.2		28,037.46
- Agriculture	Mil.	32,982	26,002.53		31,529.10
+ Cultivation	Mil.		25,619.08		1,399,000
+ Breeding	Mil.		383.45		335
- Aqualculture	Mil.		53.35		280.08
- Forestry	Mil.		321.12		
2. Industrial - Construction	Mil.	105	17,957		
3. Business – services	Mil.		13,493.2	180	
II. Production sectors (%)	%	100	100	100	100
1. Agri-Foretry, Aquaculture	%	91.06	84.38	96.76	90.76
2. Construction	%	0.00	0.00	0.00	0.00
3. Trade - Services	%	5.88	5.83	3.24	9.24
4. Other type of production	%	3.07	9.79	0.00	0.00
III. Total agriculture production (ton)			104.65		
Food availablility (per capita)	Ton	47.38	66.45		
IV. GDP (milllions VND)	Mil.	21	26.62	22,42	21

4. Education and Public Health

58. Each commune has a clinic to serve local people in the commune with some simple treatment. Chu Mom Ray Rubber Company has also setup two medical centres in Ia Dal and Ia Toi communes. The information related to medical system of the district is showed in Table 8 below.

Table 8 – Medical care in the subproject area (2014 – 2015)

	Unit	Ia H'Drai	Ia Dal	Ia Toi	Ia Dom
1. Hospital/ Clinic	Unit	3	2 (Commune clinic and medical center of Chu Mom Ray Rubber Co.)	2 (Commune clinic and medical center of Chu Mom Ray Rubber Co.)	Commune clinic and a general clinic

2. Medical staff		27	12	21	3
- Medical Doctor	Head	3	2	2	1
- Nurse	Head	12	9	13	5
- Nurse's Aid	Head	3	1	2 and other 4 staffs	Nurse's Aid and other staffs (3)
3. People have medical treatment	Head	7,666	101	6,244	1,321
4. Drug addicted people	Head	0	0	0	0
5. HIV inffection case	Head	0	0	0	0
6. Malnutrition	Head	64	8	50	6

59. There is only one secondary school in the district. Along the route, there is only one kindergarten for children of Chu Mom Ray 3 Rubber Farm under Chu Mom Ray Rubber Co. Ltd located at Km88+691 in Section 2 of the subproject.

Table 9 – Education and training in 2014 -2014 plan

	Ia Hdrai	Ia Dal	Ia Toi	Ia Dom
1. Number of class				
Kindergarten	14	0	6	8
Primary school	20	7	7	6
Secondary school	3	0	3	0
Junior high school	0	0	0	0
2. Number of pupil attend the class				
Kindergarten	323	118	118	87
a. Primary school	399	111	153	135
b. Secondary school	186	0	186	0
c. Junior High school	127	0	0	0
3. Drop out ratio (%)	0	0	0	0
4. Primary school graduated ratio	100%	99.9%	97-100%	
5. Secondary school graduated ratio			98-100%	
6. Illiteracy ratio	3.7%			

5. Water supply and electricity cover

60. Rubber Plantation Companies has set up residential area for their workers with electricity from national network. About 60% people of the district using electricity from national network. Drinking water for local people are mainly come from rainwater or drilling well. Two or three households shared one well. Water from stream or river/ reservoir will be used for domestic purpose. The water resource is enough for domestic use purpose of local people.

6. HIV and human trafficking

61. There is neither HIV infection case nor drug addiction has been recorded in the district. Human traffing is also has not been recorded in the subproject area.

7. Infrastructure

62. ***Transportation***: The province neither has an airport nor major river port. The main transportation is through the road network with National Road No.14 or Ho Chi Minh road play a backbone role connects Kon Tum with Gia Lai and Quang Nam provinces. The other main roads are National Road No.24 from Kon Tum city to Quang Ngai province and National Road No.40 to Bo Y Border Gate with Lao PDR. Up to 2015, Kon Tum has total 3955.2 km road with 298 bridges. Because of it's complicated terrain and rich water resources, 49% of the road with asphalt concrete and cement concrete surface. Bitumen road is made up only 16% and the rest is aggregate and earth road.

63. Ia H'Drai district has only two main road systems – National Road No.14C and the proposed road – provincial road No.675A. The road system is not developed with mainly earth road. Only 27km road have been paved with bitumen or concreted.

64. ***Industrial activites***: At the moment, there is no industrial activity happen in the district.

65. ***Other public facilities***: Detail information related to infrastructure system could be found in Table 10 below.

Table 10 – Infrastructure system in the subproject area

	Unit	**Ia H'Drai district**	Ia Dal comn.	Ia Toi comn.	Ia Dom comn.
1. Road	Km	**504**	286	165	53
- Earth road	km	**477**	404	23	50
- Concrete/ bitumen	km	**27**	24	0	3
2. Car/ truck		**87**	12	75	0
3. Number of motorbike	Mtbike	**1,794**	507	1,287	0
4. Commune market	Market	**0**	0	0	0
- Distance to commune centre	km	**0**			
5. Market of the nearby commune	Market	**1**	1	1	1
Distance to the administrative centre	km	**25**	22	45	45
6. Household using national electricity network	%	**60**	17.18	21.37	20.65
7. Household using clean water	%	**35.5**		0	19.86
8. Household with multi floor	%	**0**	0	0	0.1
9. House made of brick/ wood, one floor/ flat roof	%	**98**	98	98	0.25
10. Cottage/ temporary house	%	**2**	2	2	99.65
11. Phone using ratio (Table and mobile phone)	%	**50**	82	80	60
12. Household with toilet	%	**5**	5	0.1	16.47

D. Archaeological, Historical and Cultural Treasures

66. No major archaeological site has been discovered in Kon Tum. There are only some historical sites related to victory monuments, prisons during Vietnam War. There are no archaeological, historical or cultural sites in Ia H'Drai district.

E. Key Environmental Features

67. ***Physical environmental features:*** About 15 km along roadside of section 1 of the subproject road - from Km60 to Km74 – is natural forest area with timber-bamboo forest on earth mountain. One side of subproject road in Section 1 is also goes along Se San River and reservoirs of Sesan 3; Sesan 3A and Sesan 4 Hydropower Plant. The other side are natural forest, rubber plantation area of several companies. Sa Thay River crosses the subproject road in Section 2 at Km83+534.76. There are 10 streams/ flows cross the subproject road, of which 8 located in Section 1 and 2 located in Section 2. More information could be found in Table 1 above.

68. ***Social environmental features:*** No school located at side of the proposed road. There is only on kindergarten for children of Chu Mom Ray 3 Rubber Farm under Chu Mom Ray Rubber Co. Ltd located at Km88+691in Section 2 of the subproject.

VI. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

69. This section discusses the potential environmental impacts of the subproject and identifies mitigation measures to minimize the impacts in all design, construction and operation phases of the subproject. 15 km natural forest along Section 1 of the subproject road from KM60 to Km74 could be adversely affected due to subproject implementation.

70. The constructions activities during the construction phase will be mainly upgrade the existing road. The main physical issues relate to impacts such as vegetation clearance, earthworks, erosion control, obtaining rock based construction materials, noise, dust, spoil disposal, disposal of other waste, and water quality. The construction for the civil works will create dust; noise and vibration that could be affect local people during the construction side.

71. The subproject implementation will also impact on the lives of local people, especially the one who live along the subproject road. There are three residential areas along the subproject road with workers from Duy Tan Investment & Trade Company along Section 1 (hamlet No.7 and hamlet No.9) and from Chu Mom Ray Rubber Co. Ltd. (hamlet No.4)

72. The potential environmental impacts as well as the mitigation measures in the pre-construction, construction and operational phases are assessed below. The criteria for assessment are in line with ADBs SPS as specified in ADB Safeguard Policy Statement 2009 and the GOV standards based on Environmental Protection Law 2014. Where GOV standards or guidelines have some kind of conflict with ADB SPS, ADB SPS will be applied as the policy for the subproject implementation. The EMP is presented below including mitigation measures and monitoring plan for the implementation of the subproject road.

A. POTENTIAL IMPACTS AND MITIGATION MEASURES IN THE PRE-CONSTRUCTION PHASE

1. Improper road surface material and construction method selection

73. **Impacts**: The proposed subproject involves upgrading 70.8 km road in two Sections. Section 2 – 12.1 km from junction with National Road No.14C to Ho Da Auxiliary Border Gate will be newly constructed to Road Grade V – Mountain in accordance to TCVN 4054-05 with 6.5 m road base width; 3.5 m road surface width and 2x1.0 m road side width. Section 1 – 58.7km running along the Sesan River and several hydropower reservoirs. This section has some steep slopes and there are some landslide sites along the route. This section has been designed as Rural Road Grade B in accordance to TCVN 10380:2014 with 5 m road base width; 3.5 m road surface width and 2x0.75 m pavement width.

74. The improper construction method could also posed negative impact to the natural forest along 15km subproject road during construction time. As bitumen has been selected as the material for pavement construction, heating bitumen for construction of the pavement will posed risk of forest fire if the contractor using old technology like fuel wood for bitumen heating.

75. There are 3 options for road base and road surface:

- Option 1: Using cement concrete for the whole route.
- Option 2: Using bitumen for road surface along the route, Eyc=80Mpa (in accordance to 22TCN 211-06). Steep slope area will be constructed with cement concrete.
- Option 3: Using asphalt concrete road surface along the route, roadside will be reinforced with 2 layer-bitumen TCN 3.0 kg/m^2. Steep slope area will be constructed with cement concrete.

76. Option 1 has the highest construction cost but it is the most suitable road surface design as the route has a high potential land slide, soil erosion as well as steep slope along the route. Options 2 and 3 have lower construction cost but higher cost for Operation and Maintenance cost and high risk of road damage due to landslide and soil erosion.

77. **Mitigation measures:** Environmental consideration for road surface material selection should be considered in detail design. Option 1 – using cement concrete for upgrading road surface of the Section 1, has been selected. Moreover, culverts have been designed to withstand a 25-year return and 100-year return for the bridges. In line with ADB policy on environmentally responsible procurement, a new environmental assessment report will be undertaken for submission to ADB if there are any changes to subproject design that would result to environmental impacts or risks that are not within the scope of the current IEE.

78. PMU will require the contractor using new technology for bitumen heating, avoid using fuel wood and put it as part of condition in the bidding document.

2. Land acquisition and resettlement

79. **Impacts:** The impact is mainly on some households of Chu Mom Ray Rubber Company – Unit 3 and Sa Thay Border Protection Military Station. About 10,794m^2 of land will be affected permanently including 6794m^2 perennial plants area of Chu Mom Ray Rubber Company and 4000m^2 garden land of Sa Thay Border Protection Military Station. There are 12,800m^2 of land

will be temporary affected, including riverbed and borrow pits area. 2 wells and 60m^2 fish cultivation pond from local household will be affected as well as 100m fence of Sa Thay Border Protection Military Station. This is a minor impact due to no households must relocate or loss of residential land in the subproject area and no household will be serious affected due to loss more than 10% of total land holding.

80. **Mitigation measures:** Before the construction start, PMU will review the Land Acquisition and Resettlement report and check at the field to ensure that all affected households have received compensation adequately in accordance with the current provincial market price. ESP wills response for quarterly monitoring and record any complaints from these affected households and local people before submit to PMU for resolution. A grievance redress mechanism will be established and inform to relevant stakeholders before construction start.

3. Public relocation

81. **Impacts:** The road in section 2 will be newly constructed based on the existing road foundation while section 1 is mainly upgrading the road surface. The subproject construction will not relocate any public infrastructure or buildings.

4. Disturbance of unexploded mine and bomb (UXO)

82. **Impacts:** Along the two sections of the subproject road, UXO can be left in some areas that have not been used for construction. Mine detector in subproject area may obstruct moving or agricultural works of local people. However, to help in securing safety for people UXO clearance team will be hire from professional UXO detector team. The clearance process could impact on local people living and cultivated activities. However, the impact is minor due to most of the route will be constructed on the existing road base. This affect will be temporary and can be controlled by hiring mine detector team.

83. **Mitigation measures**: PMU will work with the Kon Tum Provincial Military Commands to check whether the area along the subproject route has been UXO cleared in the first phase or not. If it is not, the authorized UXP clearing contractor will be engaged in UXO clearing along the subproject road. The impact is only temporary in the pre-construction phase. PMU must ensure that the construction contractors shall only commence site works after the UXO clearing firm has certified that the subproject areas are already cleared.

B. POTENTIAL IMPACTS AND MITIGATION MEASURES IN THE CONSTRUCTION PHASE

1. Loss of trees and impact to faunna

84. **Impacts:** The implementation of the subproject will involve in cut down some trees along the route including 2 timber trees, 75 fruit trees, 37 cashew trees and 378 rubber trees. Vegetation clearance area for other kind of crop is 2706 m^2. The construction activities will create noise, vibration that disturbed wild animals living in the forest area next to the road. Workers could hunt wild animals and cut down trees in the forest for fuel wood in cooking, water heating. Vegetation cover along the route could also get fires resulting from execution of the works. Invasive plant species could be introduced during roadside tree plantation or replant vegetation cover for high slope. The impact will be happened along the subproject route, worker camps area especially 15 km natural forest along the Section 1 of subproject road. This is an average impact and will take place in 24 months construction time. Even the number of trees will

be cut down is small and there is only 15 km of natural "average to poor" forests along the road, the impact on the forest along the road will be large as forest also play a watershed protection role for the reservoirs of Sesan 3A and Sesan 4 hydropower plants.

85. **Mitigation measures:** To reduce the impact, Sa Thay Forestry Company; Duy Tan Rubber Plantation Company; Chu Mom Ray Rubber Company and Dak Lak Rubber Company will be informed about the construction time and schedule, scope of works as well as location of worker camps and material storage sites. On the other hand, no construction camps, concrete mixing plants, material storage sites are to be located in the forest areas. Avoid locate construction camps, concrete mixing plants or any machines that could create loud noise and vibration in the section of natural forest from Km60-Km74. The contractors will not use or permit the use of woods as fuel for construction activities or use for cooking and water heating in worker camp. The contractors should not buy or use wood from illegal sources. PMU, ESP and CSC will strictly supervise and monitor the construction activities to ensure they will be done properly on the existing road base; no tree out of the cut down list will be cut down.

2. Impact on local facilities

86. **Impacts:** Not so many people living along most of the Section 1 of the subproject road. Hamlet No. 7 and No.9 of Ia Dal communes using well water so there is no public facilities in this section will be affected during road construction. The construction activities could impact electrical power supply along the Section 2 of the subproject, at the location of hamlet No.4. It will affect local people of hamlet No.4 in their daily activities as the power could be cut off. It is minor impact as there is only some low voltage electric wires located at some short sections in the area of hamlet No.4. The impact will be happened in 24-month of construction.

87. **Mitigation measures:** To minimize the impact, the contractors will inform in advance the construction schedule, the affected electric and cable system to Ia Dal and Ia Toi CPCs. If any facilities are accidentally damaged during construction period, it should be reported to CSC and PMU as well as the owner to the facilities before repaired at the contractor's expenses.

3. Impact by material exploitation activities at the quarry, borrow pits and temporary storage areas

88. **Impacts:** In the work of excavating and material exploitation for the subproject construction activities if excavated soil is not collected then siltation will be occurred. It will be able to cause stuck in water flow closed to the mines and quarry area, create filling situation that affects cultivation areas of residents. Earthwork activities will also change soil structure and raise the amount of unconsolidated sediments at the borrow pits. When it rains, runoff of rainwater will take away them into the surrounding water bodies causing sedimentation and erosion also. Runoff water could also take construction material such as sand, soil from material storage sites into the surrounding water bodies if material stored for a long duration at the construction site. This impact will happen in the area of quarries; borrow pits and temporary material storage along the subproject road. It will affect local people living in the subproject area and near the quarries; borrow pits. The impact is minor as the main work at 58.7km of longer section – Section 1 – is upgrading the road surface based on the existing road base. On the other hand, there is not so many people living along the subproject road. People in the 3 hamlets are mainly workers of the rubber companies.

89. **Mitigation measures:** To minimize the impact, in the detail design period, ESP will provide a MMP for implementation by contractors. The MMP will support to balance the excavation soil and the filling soil to utilize most of the excavation soil for filling purpose. MMP will also list the suitable quarry and mines for construction materials. These mines should own operation licenses from MONRE of Kon Tum to ensure material exploitation at the mines would not cause any uncontrolled negative environmental impacts. The temporary storage areas must be covered with canvas and fenced with signboard to avoid passing people. Replant tree and vegetation cover of any vegetation clearance area in the quarries and borrow pits.

4. Generation of excavated soil

90. **Impacts:** The soil from cutting activities, which could not be reused as filling soil, could have significant impacts and environmental degradation due to the improper disposal of these materials. People in 3 hamlets in the subproject area and near the temporary dumping sites could be affected by soil erosion from these temporary dumping areas. This is a minor impact as in the negative side, the subproject road will be upgraded/ constructed base on the existing foundation so the levelling work is minimized and the volumes of spoil will be not much. The construction work for 58.7km of Section 1 is mainly paved the road with cement concrete. The land resources along the road is still a lot so many place could be used as temporary dumping area for spoil. In the positive side: Rubber plantation companies and Sa Thay Forestry Company could use the spoil for their plantation area however the impact is minor due to the small quantity of spoil. To minimize the negative impacts during 24-month of construction.

91. **Mitigation measures:** the contractors should evaluate and grade the spoil and the suitable spoil will be used for filling purpose. This will reduce the need to extract soil for filling. The spoil could be stored at locations agreed with CPCs of Ia Dal and Ia Toi for local people could take soil to fertilize their land.

5. Generation of construction waste and domestic waste from workers

92. **Impacts:** Solid waste that will be generated from construction mainly includes domestic waste of workers and scraps of transported soil and stone, debris, mud. Domestic waste is mainly generated from construction workers at campsites. Uncontrolled waste disposal operations can cause significant impacts. It will impact firstly the workers in the campsite and areas surround the construction sites and local residential area along the subproject area. This is an average impact, as the construction sites will scattered along 70.8km of the subproject road with different ecosystems including natural forest, streams, rivers and reservoirs. Uncontrolled waste disposal could reduce the water and soil quality and heavily impacts on these ecosystems. To minimize the impact during 24-month of construction time.

93. **Mitigation measures:** ESP will assist PMU to monitor the contractor progress of WMSDP implementation, to ensure the contractors will provide enough trash bins at the worker camps. Contractors need work with 3 CPCs in Ia H'Drai district to find out suitable place for domestic waste disposal. CSC and PMU will supervise to ensure waste and unused construction material will be treated properly and transfer to designated location.

6. Impact from hazardous materials and hazadous waste disposal

94. **Impacts:** Use of hazardous substances such as oils and lubricants can cause significant impacts at the construction sites along the subproject road if uncontrolled or if waste is not disposed correctly. It will affect surrounding environment and local residential area. However,

this impact could be considered as insignificant because the main construction activity in 58.7km of Section 1 is paving the road surface and the construction machines are not large.

95. **Mitigation measures:** The PMU assisted by the ESP and CSC will be responsible to monitor the contractor's progress of implementing the WMSDP to avoid or minimize impacts from use of hazardous substances such as oils and lubricants. The contractors must ensure that safe storage of fuel; oils... are agreed by PMU/ESP. They must storage in the areas provide with roof, impervious floor.

7. Impact from bitumen heating activities and asphalt concrete mixing plant

96. ***Description:*** The operation of asphalt concrete mixing plant will generate noise and dust and paved works will generate gas and odour from the bitumen heating and noise from the compaction machine. Although the emissions from powered mechanical equipment and asphalt concrete mixing will be rapidly dispersed in the open terrain they will need to be sited carefully to avoid complaints. The impact will happen at the construction sites along the subproject road and affect on local people living in the surrounding areas. However, the affected level is insignificant because the small construction activities. The surface of the road is only 3.5m and the subproject located in the open terrain with low population density. On the other hand, bitumen heating for pavement construction could create risk of forest fire, especially the old technology using fuel wood for bitumen heating

97. **Mitigation measures:** To minimize the negative impact, the contractors should arrange activities with loud noise and vibration or bitumen heating machine at least 500 m away from sensitive areas such as hamlet No.4 in Ia Dal commune, Hamlet No.7 and No.9 in Ia Toi commune and especially the natural forest area along the subproject road from Km60-Km74 of Section 1. PMU and CSC will responsible to monitor this mitigation measure during 24-month of construction phase.

8. Impact from noise, dust and vibration generated during from the construction activities

98. **Impacts:** Earthworks and rock crushing activities will be the main sources of dust. Construction machines will generate gaseous emissions (NOx SOx, CO, CO_2, etc.) when they are in operation. Transportation vehicles could also create dust along the transportation route. These gaseous and dust could cause health problems to the residents who living near the construction site and along the transportation route, especially in the Hamlet No.4 in Ia Dal and Hamlet No.7 and No.9 in Ia Toi commune. Wild animal in the natural forest area along the road from Km60 – Km74 in Section 1 could also be affected from noise, vibration and dust from construction activities. The impact could be considered as minor due to noise, dust and vibration were also considered acceptable in view of the likely short duration of the works and that there were good benefits from future improved road conditions. There is also only 3 hamlets along the subproject road with residents are workers from rubber plantation companies. The road foundation is already existed and truck already travelled along the road in dry seasons so the impact on wild animal is also minor.

99. **Mitigation measures:** Similar to the mitigation measure for impact from bitumen heating and asphalt concrete mixing plant, the contractors should not located any noisy machines along 15km natural forest in Section 1; Sa Thay Border Protection Station and in 3 residential areas of Hamlet No.4, No.7 and No.9. The contractors should not locate large material storage sites in the section along natural forest or in the residential areas of 3 hamlets. The large storage sites

should be located at least 100m away from these sensitive points. The contractors will work with Ia Dal and Ia Toi CPCs, with the representative of ESP and PMU, to identify areas for large material storage site as well as material transportation plan. PMU and CSC will responsible to monitor these mitigation measures.

9. Landslide, soil erosion and runoff

100. **Impacts:** Roadside erosion and runoff could happen when its rain, especially at the roadside un-level section and the borrow areas. Erosion and runoff could impact on the cultivation areas of local people. Landslide could happen in the section with high slope side, for instance the area in Section 1 that running along Sesan River and Reservoir, especially when the vegetation cover is cleared. Landslide will damage the road and block movement. The objects of the impact are mainly water bodies located near the subproject and local people who has cultivated land in the subproject area and people living along the subproject road. The impact could be considered as average. The traffic density is low so the impact on traffic of landslide is not much. However, the risk of land slide and soil erosion, especially in Section 1 area along the Sesan River is high and could impact on the cultivation areas of local people in Hamlet No.7 of Ia Toi commune.

101. **Mitigation measures:** To minimize the negative impacts during 24-month of construction time, the contractors should limit to store material near the area of rivers/ stream crossing point and in the roadside along Se San River. The main construction activities such as bridges/ culverts construction, especially Sa Thay Bridge should be implemented in dry season. The contractors will also update weather forecast daily during construction time to avoid heavy rain day. Work with relevant authorities for vegetation clearance in the area along Se San River of Section 1 and other rivers/ streams crossing locations. PMU and CSC will responsible to monitor these mitigation measures.

10. Impact on crossing streams or bridge construction locations

102. **Impacts:** Careless construction and poor materials control can cause blockage to streams. Runoff water during its rain could bring waste and soil into the Se San and Sa Thay Rivers. That could lead to siltation and reduce the water quality. 10 bridge construction sites; Ya Toi Stream area and the culverts construction areas could be impact by the construction activities and it will lead to reduce water quality of Rivers and stream crossing areas; Sesan 3A and Sesan 4 reservoirs; and downstream of Se San River in Ia Khai and Ia Grai districts and some residential areas in Cambodia, downstream of Sa Thay River. This is a minor impact as the scale of the bridges will suitable with the road grade and the road in Section 1 (58.7km) is only Rural road Grade B and the road width of the whole route is 3.5m so the scale of bridges are not large.

103. **Mitigation measures:** To minimize the negative impact, the contractors should disposed soils, spoils and construction waste out of the bridges/ culverts construction immediately. They should also discuss with relevant authorities for MMP and WMSDP implementation especially Sa Thay Border Protection Station for the construction of Sa Thay Bridge. Silt fences and sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and drilling operation within streams/ rivers. The steep slopes should be covered with vegetation to avoid landslide and siltation in the nearby rivers/ streams. PMU and CSC should work and collaborate closely with relevant authorities such as Ia Dal, Ia

Toi CPCs and Sa Thay Border Protection Unit to monitor the implantation of these mitigation measures.

11. Impact on drainage and hydrology; water resources and quality

104. **Impacts:** The drainage system, irrigation and water resources on surrounding lands will be affected by construction activities as follows: a) local water supplies will need to be tapped to meet campsite and construction requirements, so bringing subproject based water use into competition with local use; b) surface and subsurface water resources near the provincial road No.675A could be contaminated by fuel and chemical spills, or by solid waste and effluents generated by the kitchens and toilets at construction campsites; (c) natural streams may become silted by borrow material (earth) in the runoff from the construction area, workshops and equipment washing-yards. (d) Water flow could be temporary blocked during construction period at the crossing positions. Construction activities could impact on the quality of the nearby water bodies. Waste and construction material could fall into the water bodies if the waste is not control carefully or material stockpiles area not be covered and well monitored. The impact will mainly on water bodies along the subproject road and worker camps area, especially at the Stream/ River crossing points. It is an average impact as the road running along larger water bodies as Se San River or reservoirs of Sesan 3A and Sesan 4 hydropower plants. The subproject will also cross Sa Thay River in Section 2 and construct 10 bridge in total. However, the duration of the impact is only 24 months of construction time.

105. **Mitigation measures:** In order to minimize this negative impact, the contractors will inform construction schedule and scope to Ia Toi, Ia Dal CPCs and Ia H'Drai DPC in advance. The contractors will also work with relevant Divisions of Ia H'Drain DPC to find out suitable water cut (Streams/ Rivers blocking) schedule, avoid impact to downstream users in Ia Khai, Ia Grai districts and Se San 4, Se San 4A Hydropower Plant. The contractors will store lubricants, oils in designated area with roof covered and impervious foundation at least 50m from rivers/ streams. Sediment ditches, silt fences should be installed in suitable location to avoid runoff, erosion and siltation in rivers/ streams. Material storage sites should also be covered carefully with canvas and located at least 50m away from water bodies. PMU and CSC will responsible to monitor these mitigation measures.

12. Impact by the large influx of construction worker

106. ***Impacts:*** Large influx of construction worker will create a burden on local public services like electric and water supply. Construction workers from other area could bring outside disease to the subproject area. The concentration of workers in the work camps could also create a good environment for diseases such as sore eyes, cholera, flu and respiratory problems. Social aspect: concentration of a number of workers could lead to social problems such as gambling, drug addiction, prostitute, violence, conflict amongst workers, or between workers with local people. The impact will affect directly on workers and indirectly on the community near the construction sites in the residential area of hamlet No.4; No.7 and No.9 of Ia Toi and Ia Dal communes. This is a minor impact due to low density of population in the subproject area and local people in the hamlets are mainly rubber plantation workers of Chu Mom Ray and Duy Tan Rubber Companies.

107. ***Mitigation measures:*** Worker camp location and facilities located at least 500m from residential areas as agreed by local communities and approved by ESP and PMU and managed to minimize impacts. All workers should register with local police for temporary residential certificate. The worker camp should be located in the area with sufficient drainage to avoid water

logging and formation of breeding sites for mosquitoes and flies. Worker should have health check before start work in the subproject and should be trained for living and working behaviour before joining the sites. On the other hand, Contractors will use local labours for simple works such as smooth the road, moving soil, give priority to poor families, female householders, woman if they need jobs. It aims to raise their income, create more jobs, contribute to poverty reduction for local community and also reduce the number of construction workers from outside. Local people in the residential area of 8 subproject communes will have benefits from the subproject construction. However, this is a small positive impact and it requires the coordination between the contractor and CPCs of subproject communes and nearby communes in recruiting local labours (contractors often prefer to engage their own trained workforces rather than training unskilled labourers). The duration of the impact is also short, only in 24 months construction time.

13. Risk to health and safety to local people or construction workers

108. **Impacts:** Dust, exhaust gas and noise generating from earthworks, transporting of material, construction activities and operation of machines, etc. These factors have direct affects on health of workers and local residents. Material transport and construction activities on the existing road may create the risk of affects on traffic safety and houses structure on roadsides especially in Hamlet No.4; No.7 and No.9. The excavation of the trenches for side drain construction can threaten public safety, particularly of pedestrians and children. Waste and wastewater from construction activities and worker camps could also create a favourable environment for the outbreak of some respiratory diseases of local people as well as workers. Accidents may occur if during the construction, workers are not provided with safety equipment and obey construction regulations. The objects of this impact are local people in the subproject area especially local people of hamlet No.4; No.7 and No.9 and the workers working at the site. However, exhaust fume, dust and noise do not have remarkable affects on residents because of the open terrain and construction activities are spread along 80.7km of the subproject road. The traffic density is low in the subproject area especially along the subproject road as it is the new route connects from Sa Thay district centre (old district) to new district centre of Ia H'Drai.

109. **Mitigation measures:** The contractors with the support from ESP will conduct training for workers on safety and environmental hygiene. The workers will be instructed construction camp rules and site arrangement and all of them will be equipped with appropriate PPE such as safety boots, helmets, protective clothes, gloves and ear protection for the one working with noisy equipment. All areas of excavation greater than 1m deep and insides of temporary works should be fenced with sign boards installed. The contractors in collaboration with ESP and PMU will also work with Ia Toi, Ia Dal CPCs and representative of Chu Mom Ray and Duy Tan companies Management Board for the construction plan and scope. The CSC and PMU will responsible for supervision activities during construction phase and response timely for any raised opinions/ comments from local people and authorities.

14. Impact on the local traffic

110. **Impacts:** Construction activities on the Subproject road are likely to cause hindrance in traffic flow if not mitigated properly especially in the Section 1 with no other options for travelling. Local people and people from other area who travel on the subproject road will be affected during 24 months construction period. However, this is a minor impact due to low traffic density of the subproject road, especially in the Section 1. In the Section 2, local people could have other options for travel through the road of rubber plantation road network or the border patrol road.

111. **Mitigation measures:** To minimize the disturbance to local people, the contractor will work with CPCs on construction plan and the construction schedule and scope will be published in Ia Toi, Ia Dal and also Ia Dom CPCs. The contractor will also construct temporary road and minimizing interference with traffic flows past the works site.

15. Environmental impacts due to inappropriate enivronmental recovery responsibility

112. **Impact:** If after construction work has been completed, the sites are not cleaned up, construction and domestic waste will pollute surrounding environment. If site restoration such as replanting trees; grass; filling up construction pit; removing camp site have not been implemented in accordance with environmental regulation then the environmental issues like erosion, sedimentation and accident may occur. Construction waste and waste soil could also impact on the soil quality of the temporary acquired land area. This impact is average impact as the subproject road is located along large water bodies and natural forests. Site restoration has not been implemented correctly will have negative impact on the water and soil quality of the forest and water bodies.

113. **Mitigation measures:** Site cleaning up must be performed right after the work completion. Pit and excavation areas must be filled up by the contractors when the construction complete. PMU and CSC will strictly monitor the site to ensure all construction sites will be fully recovered upon the construction finish.

C. POTENTIAL IMPACTS AND MITIGATION MEASURES IN THE CONSTRUCTION PHASE

1. Land use change from natural forest to agricultural production

114. **Impacts:** The completion of the road will create a favourable condition for goods transportation of Duy Tan Rubber Company, Sa Thay Forestry Company and Chu Mom Ray Rubber Company – Agricultural Farm No.3. As the natural forest along the road has already delivered for these companies and the land use has changed to production forest from Decisions of Kon Tum PPC, the companies could clear the forest and plant agricultural production or type of forest that could be exploit in short duration like eucalyptus or acacia.

115. **Mitigations measures**: Kon Tum DONRE will monitor and control the reservation of 100 m natural forest corridor along Km60 – Km74 of the Section 1. This will ensure a protection belt for the road, avoid road erosion and landslide, and increase the road quality and longevity. Kon Tum DOT collaborated with Kon Tum DONRE and DARD to implement awareness campaign on the important of forest on water reservation and landslide/ soil erosion prevention as well as forest protection in the subproject area.

2. Impact from dust and noise arising from increasing of traffic density

116. **Impacts:** Paved road surface condition will reduce the dust concentration but better road condition will also increase traffic density along the subproject road. Noise, dust and vibration could have negative impact on the local people living along the subproject road, especially local people in hamlet No.4; No.7 and No.9. For both negative/ positive side, the impact is minor as the low traffic density and Section 1 of the subproject will be upgraded to Rural Road Grade B only and the heavy machines could not using the road.

117. **Mitigation measures:** Kon Tum DOT will responsible for dust and noise control along the subproject road in the operation phase. Speed limit/ loading limit will be installed at the start and end points of the two sections. Road humps will be installed when the road goes through the residential area of hamlet No.4, No.7 and No.9, especially the kindergarten of Chu Mom Ray Rubber Company.

3. Favourable conditions for transportation of goods and people movement

118. **Impacts:** The paved road will make travel on the road available in rainy condition. The completion of bridge system will support travel on the road even in high water time. The road will support stable transportation from Kon Tum city and Sa Thay district center to Ia H'Drai center around the year. It will also support transportation of goods, especially agricultural product, save time and increase the profit for local people and companies in Ia H'Drai district. The completion of the road will favor people in the 3 communes of Ia H'Drai district and surrounding residential areas as well as people who doing business in Ia H'Drai district.

4. Driving conditions and community safety

119. The upgrading and construction of the road is likely to increase the vehicle speed on the road. Increases in traffic flow indicate additional future traffic should be moderate and unlikely to create many community safety issues. On the other hand, the condition of the road facilities will be enhanced and driving conditions should improve. The beneficiaries of the subproject are local people in the district and people who travel on the subproject road. This is an average impact as the longer section (58.7km) is only upgraded to Rural road Grade B with 3.5 m road width.

120. **Mitigation measures:** Similar to the mitigation measures of the impact from dust and noise, Kon Tum DOT will install speed limit board and road hump at the residential areas of hamlet No.4; No.7 and No.9, especially the kindergarten of Chu Mom Ray company. Danger cross signboard will be installed at the cross points of two sections with NR14C.

5. Risks caused by natural calamity

121. **Impacts:** Flood could happen in the subproject area and damage the subproject road, block the traffic along the road. Heavy rain could also cause land slide and damage the road, block the movement along the subproject road, especially at the cross section with Sa Thay River and along the Se San River and hydropower reservoir. This will have negative impact on local people who live along or travel on the subproject road. However, this is a minor impact as the construction of bridges will be based on 100 years turn over and the road surface will be constructed with cement concrete to ensure better road condition.

6. Affects on employment or livelihood

122. Increase incomes and living standards for people in the subproject area by means of increasing the profit as save time for transportation and merchant will access production area easier, thus the agricultural production price will be higher. Local people in the subproject area and people who cultivate in the subproject area as well as local people in Ia H'Drai district will be benefited from the completion of the road. This is a permanent impact and has significant effects to local people's lives.

7. Impacts on ethnic groups

123. The completion of the subproject road will support to increase incomes and living standards for ethnic minorities in the subproject area by means of increasing the profit. Most of the population in the district are ethnic minorities so the completion of the road will support them to save time for travel and increase production prices as merchant could access the production area easier.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

124. The objectives of the stakeholder consultation process was to disseminate information on the subproject and its expected impact, long-term as well as short-term, among primary and secondary stakeholders, and to gather information on relevant issues so that the feedback received could be used to address these issues at early stages of subproject design. Another important objective was to determine the extent of the concerns amongst the community, to address these in the subproject implementation and to suggest appropriate mitigation measures.

A. PUBLIC CONSULTATION PREPARATION

125. Stakeholders are people, groups, or institutions that may be affected by, can significantly influence, or are important to the achievement of the stated purpose of a proposed intervention. The stakeholders consulted for the construction of the road 675A included representatives from Kon Tum DPI, DONRE, and DARD. Consultation has also been implemented with representatives from 3 CPCs in Ia H'Drai district, Rubber Plantation Companies. Several local people living along the subproject road have been consulted using questionnaire. Consultations took place in March 2016.

B. INFORMATION DISSEMINATION DURING PUBLIC CONSULTATION

126. Providing information through local authority offices will provide a conduit for the improvement of the subproject implementation to better serve the stakeholders. Public consultation can also assist in:

i) harnessing cooperation from informed people to help local authorities reconfirm the extent of local permits and licenses that will be required at a later stage;
ii) obtaining cooperation from informed residents and groups which to avoid cost and time in dealing with complaints;
iii) identifying local infrastructure subprojects or other local initiatives that will interface with the subproject roads with assistance from informed local authorities;
iv) the collection of relevant information on the current condition of the local environment including aspects of forest and wildlife and conservation.

127. The information disseminated during public consultation is including: (i) background of the Project and subproject; (ii) basic information related to ADB and the Government requirement for environmental protection; (iii) potential impacts during subproject implementation and mitigation measures; and (iv) grievance redress mechanism.

C. OBTAINED RESULTS AND USE OF RESULTS FROM PUBLIC CONSULTATION

128. The results of the public consultations are recorded in Table 11 and 12 below. In general, all the relevant stakeholders are support the implementation of the subproject. As the subproject located in the low population density and the main construction work will be upgrade road surface based on the existing road foundation, no house must be relocated and no major land acquisition will be taken, the local people is totally support the subproject implementation.

Table 11 – Main issues and information from local authorities

Main issues	Information from relevant authorities
About 15km of natural forest along Section 1	DARD: It is the production forest and already delivered to Duy Tan Investment and Trade Company.
Better road condition will make land use change and natural forest will be cut down for rubber plantation	DARD: The forest is delivered to Rubber Company as natural forest. The company must seek for approval from Kon Tum PPC for changing it to rubber plantation. The Central Government and PPC are not support changing natural forest to rubber plantation and a Decision to ban this action will soon be issued. DONRE: 100 m corridor from roadside will be maintained as a protection belt to protect the slope along that section from landslide, soil erosion and water resources for the Reservoirs. DONRE will manage and control to ensure trees in this forest bell will not be cut down and no encroachment to this forest area.
Some bunches of forest closed to the hamlet No.9 – Ia Toi commune, in the middle of rubber plantation area	Ia Toi Deputy Chairman: Soil types in these areas are mainly soil mixed with rock it is difficult to plant rubber. Duy Tan has left these areas for further activities.

Table 12 – Main environmental concerns from public consultation

Concerns expressed	How concerns are addressed in IEE
Forest fire in the dry season	Contractor will train workers to avoid fire and fire prevention. ESP, CSC and PMU will strictly monitor during the construction phase of the subproject
Land use change in 15 km natural forest along the Section 1 of the subproject	A training campaign will be held with the collaboration of Kon Tum DOT, DONRE to local people and representatives of Sa Thay Forestry and Duy Tan Rubber Companies on forest protection, the important of protection forest and the water resources… DONRE will manage and control to maintain 100 m forest corridor to ensure a protection belt for the road along Km60 – Km74 of the Section 1.
Moderate material transportation speed, cover with canvas to avoid dust and fallen materials	Regulation for material transportation will be put as an appendix in the contract with contractor. CPCs in cooperation with PMU and CSC will monitor the compliance during construction phase.
Unlevel at bridge construction area could lead to land slide, soil erosion and runoff when its rain, impact on the cultivation area of local people	The design of the bridge must follow the relevant regulations. Construction methods and schedule will be informed in advance to local people. CPCs in cooperation with PMU and CSC will monitor the compliance during construction phase.

129. The environmental assessment process under the SPS 2009 requires the disclosure of the IEE to the public during the completion of the IEE to be in strict adherence to the rules. This process will be concluded by displaying the IEE at the PPC Headquarters during the period when the IEE is disclosed on the ADB website

VIII. GRIEVANCE REDRESS MECHANISM

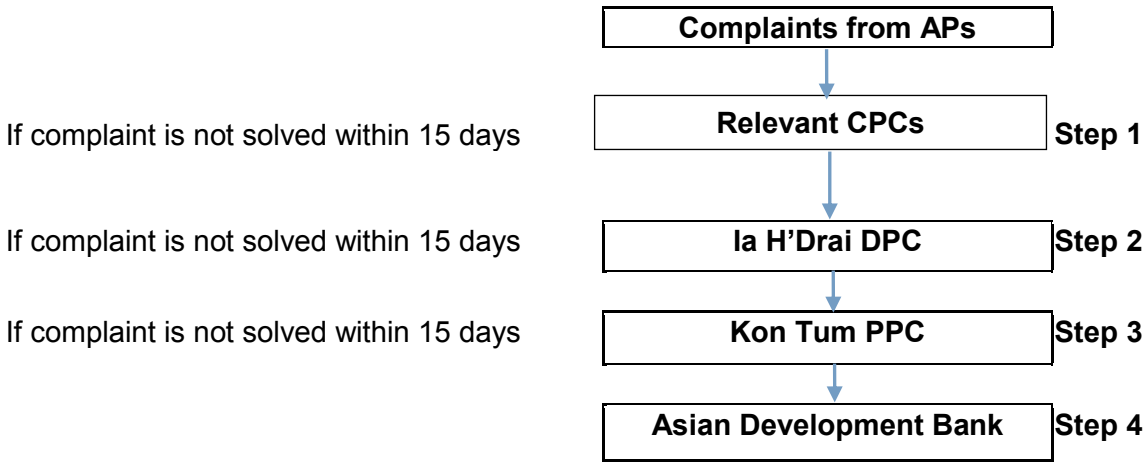
A. Purpose of the mechanism

130. During the deployment of the subproject, local people are disseminated environmental protection activities such as EMP. Negative impacts on the environment may occur during the construction and operational phases. Any comments/ suggestions of local people will be solved quickly, transparently and protected by law, particularly for affected people by the subproject. Complaint handling mechanism was classified by level and responsibilities of involved parties.

B. Grievance redress mechanism

131. Per the environmental management frame, there are 03 steps to redress complaint as below:

- ***Stage 1***: If a household has any complaint he/she can submit a complaint to the CPC-community monitoring board. CPC will work with CSC and CC to solve complaints.
- ***Stage 2***: If the complaint is not resolved, the complainant will submit an application to the Ia H'Drai DPC to resolve the complaint.
- ***Stage 3***: If more than 15 days but no response from Ia H'Drai DPC, the complainant may submit a complaint to the Kon Tum PPC (through Kon Tum DONRE). Kon Tum PPC will require Ia H'Drai DPC to solve the complaint. In case the complaint is still not resolved, Kon Tum PPC will require environmental police to investigate and requested stakeholders to resolve the complaint.
- If efforts to resolve disputes using the grievance procedures remain unresolved or unsatisfactory, APs have the right to directly discuss their concerns or problems with the ADB Southeast Asia Department through the ADB Viet Nam Resident Mission (VRM). If APs are still not satisfied with the responses of VRM, they can directly contact the ADB Office of the Special Project Facilitator (OSPF).



IX. ENVIRONMENTAL MANAGEMENT PLAN

A. IMPLEMENTATION ARRANGEMENTS

132. Kon Tum PMU will recruit Environment Safeguard Specialist (ESP) under Loan Implementation Consultants (LIC) to support subproject implementation in Kon Tum. ESP will support PMU updated EMP and as well as monitor the compliance of the contractors during construction phase. ESP will also responsible for training and capacity building on the implementation of EMP.

133. PMU will engage Construction Supervision Consultant (CSC) for the monitoring and supervision of the subproject in general and for environmental monitoring as well. CSC will ensure that the contractors implement the provisions of the subproject EMP.

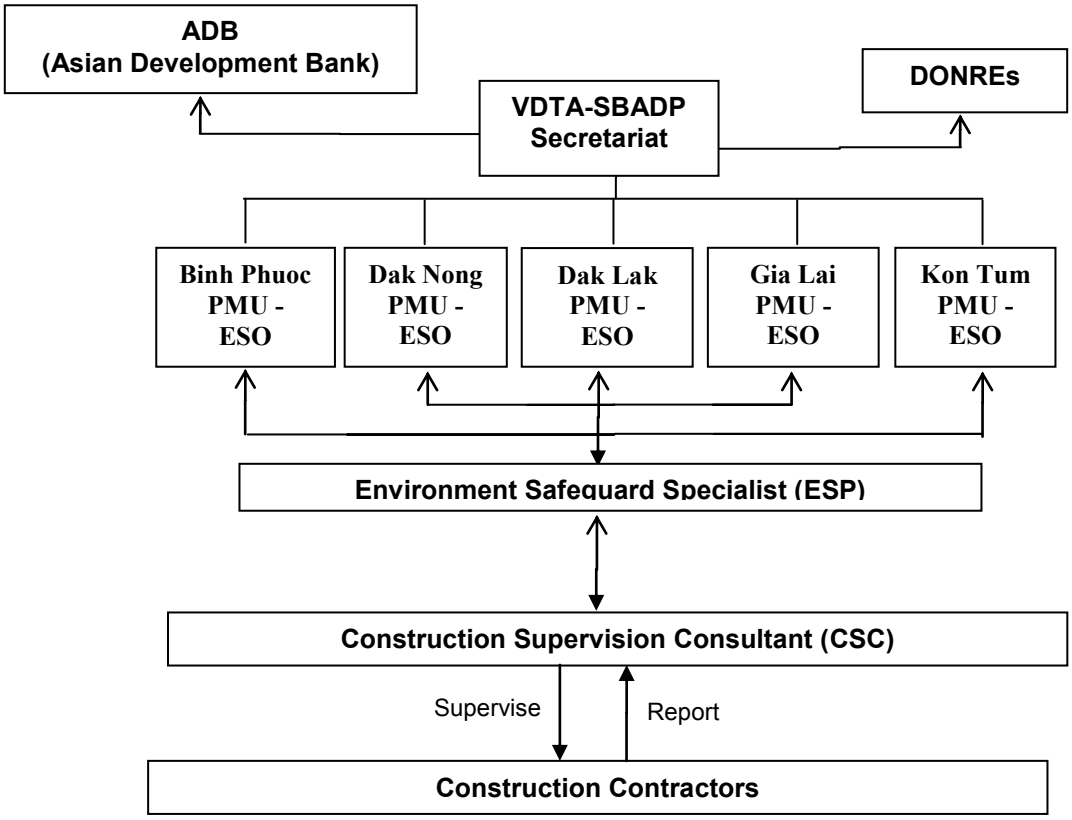
Table 13 – Responsibilities for EMP implementation

Agency	Responsibilities
Kon Tum Project Management Unit under DPI (PMU)	- Ensure that EMP provisions are strictly implemented during various subproject phases (design/pre-construction, construction and operation) to mitigate environmental impacts to acceptable levels. - Undertake monitoring of the implementation of the EMP (mitigation and monitoring measures) with assistance from CSC and ESP. - Ensure that Subproject implementation complies with ADB's environmental policy and safeguards policy statement (SPS 2009) principles and requirements - For subproject duration, commit and retain a dedicated staff within PMU as environment and safeguards staff to oversee EMP implementation - Ensure that environmental protection and mitigation measures in the EMP are incorporated in the detailed design - Obtain necessary environmental approval(s) from DONRE prior to award of civil works contracts - Include the Subproject updated EMP in the bid and contract documents for civil works - Establish an environmental grievance redress mechanism, as described in the IEE, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the Subproject's environmental performance - With assistance from ESP, prepare semi-annual environmental monitoring reports for submission to ADB - Based on the results of EMP monitoring, identify environmental corrective actions and prepare a corrective action plan, as necessary, for submission to ADB.
Environmental Safeguards Staff (ESO)	- PMU staff support for EMP implementation - Work closely with ESP of LIC to daily supervise of EMP implementation and preparation of EMP monitoring report
Environment Safeguard Specialist (ESP)	- Ensure that the environmental protection and mitigation measures identified in the EMP for the design stage has been incorporated in the detail design; - Assist PMU to ensure that all environmental requirements and mitigation measures from the IEE and EMP are incorporated in the bidding documents and contracts. - During detailed design phase carry out baseline data collection on air quality, noise and surface water quality (as specified in the EMP)

	- During detailed design phase, prepare method statement (Waste Management and Spoils Disposal Plan) described in the IEE/EMP. - Implement all mitigation and monitoring measures for various subproject phases specified as ESP's tasks in the EMP - Work with PMU to execute any additional environmental assessment prior to subproject construction as required in the EMP (e.g., preparation of new or supplementary environmental assessment in case of change in alignment that will result to adverse environmental impacts that are not within the scope of the IEE prepared during loan processing, etc.) - Undertake environmental management capacity building activities for PMU as described in the IEE and EMP. - Engage international and national environment specialists to ensure proper implementation of EMP provisions. Through these specialists, the ESP shall: (i) ensure proper and timely implementation of ESP's tasks specified in the EMP, (ii) conduct environmental training as specified in the IEE/EMP for PMU, (iii) conduct workers' orientation on EMP provisions, (iv) undertake regular monitoring of the contractor's environmental performance, as scheduled in the EMP (v) conduct field measurements for surface/ground water quality, dust and noise as required in the EMP, and (v) prepare environmental baseline report and environmental semi-annual environmental monitoring reports , as specified in the EMP, for submission to ADB.
Construction Supervision Consultant (CSC)	- Provide the ESP relevant information as well as full access to the subproject site and all project-related facilities (such as construction yards, workers' camps, borrow and quarry areas, crushing plants, concrete mixing plants, etc.) to monitor contractors' implementation of the subproject EMP, assess environmental impacts resulting from on-going site works and operation related facilities, undertake environmental effects monitoring and orientation of workers on EMP implementation. - Undertake day-to-day subproject supervision to ensure that contractors properly implement the EMP. - Orient workers on EMP implementation, and health and safety procedures - Document and report to PMU on occupational accidents, diseases and incidents - As part of regular progress report submission to PMU, prepare reports on the status of the contractors' implementation of the EMP and health and safety issues - Engage a national environment specialist to ensure proper implementation of the above tasks.
Contractors	- Recruit qualified environmental officer to ensure compliance with environmental statutory and contractual obligations and proper implementation of the Subproject EMP - Provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the EMP - Implement additional environmental mitigation measures, as necessary
Kon Tum Department of Transportation (DOT)	- Responsible for operation and maintenance of Subproject road - Implement EMP monitoring during operation
Kon Tum Department of Natural Resources and Environment (DONRE)	Review and approve environmental assessment reports required by the Government. - Undertake monitoring of the subproject's environmental performance based on their mandate

The organization structure of Environmental Management Plan is showed in the chart below:

Figure 2 – EMP Implementation Organization Chart



B. ENVIRONMENTAL MITIGATION

134. The anticipated environmental impacts and mitigation measures discussed in the previous section is presented in Table 14. The table also shows responsibilities and timeframe/schedule for implementation of mitigation measures and monitoring.

135. Table 14 shows that most mitigation activities during pre-construction are to be implemented by the ESP while during construction, measures shall be primarily implemented by the contractors. During operation stage, DOT shall undertake environmental mitigation and monitoring requirements specified in the EMP. To ensure implementation of mitigation measures during construction, the EMP shall be included in the tender and contract documents for civil works. Contractors' conformity with environmental contract procedures and specifications shall be regularly monitored by PMU with assistance from CSC and results shall be reported semi-annually to ADB.

Table 14 - Detail Environmental Mitigation Plan

		Impact Mitigation				
Environmental Concern	Objective	Proposed Mitigation Measures	Responsible to Implement	Timing	Locations	Mitigation Cost
Design and Pre-construction Phase						
1. Environment and climate change in detail designs	Incorporation of environmental and climate change adaptation design measures into the detailed design	Check the detail design on the incorporation of environment and climate change adaptation, update base on the different scenarios of Kon Tum on climate change. Check the road surface material (cement concrete) and construction method (new bitumen heating technology)	ESP	Before construction	N/A	Included in the contract with ESP
2. Land acquisition and resettlement	Control the impact of land acquisition and resettlement	Monitor the compensation process to ensure it is suitable with the Land Acquisition and Resettlement Report	ESP	Before construction	N/A	Included in the contract with ESP
3. Environmentally responsible procurement	EMP is properly implemented by selected contractors	1. EMP is included in tender documents to ensure that mitigation measures are budgeted and to prepare the contractors for environmental responsibilities. 2. Specify in bid document that Contractors shall engage capable and trained staff to take responsibility for the environmental management and safety issues at the working level and to monitor the effectiveness and review mitigation measures as the subproject proceeds. 3. Contractors recruit qualified staff to oversee implementation of environmental and safety measures specified in EMP.	ESP; PMU	Before bidding and before construction commencement	N/A	Included in the contract with ESP and PMU operation budget
4. Material Management Plan	Manage material storage area to avoid runoff and sedimentation	1. Designs to balance excavation and fill where possible. 2. Prepare the MMP. The plan shall detail the arrangements to be made to facilitate the timely production and supply of construction materials to avoid impacts due to unnecessary stockpiling outside the Subproject site. MMP shall consider the following: (i) Required materials, potential sources and estimated quantities available, (ii) Impacts to identified sources and availability (iii) Excavated slope material for reuse and	ESP	Before bidding	N/A	Included in the contract with ESP

		recycling methods to be employed, (iv) Required endorsements from DONRE and local groups for use of sources. (v) Methods of transportation to minimize interference with normal traffic. (vi) Constraints of regular delivery schedule to reduce stockpiling on site. vii) Measures to be employed to mitigate nuisances to local residents. (viii) Program for reuse of slope excavated material for reuse (ix) Program for delivery of quarry and borrow materials. (x) Discussion of the CSC, PMU/ ESP inspection/monitoring role. (xi) Agreement on publicity/public consultation requirements.				
5. Plan spoil and waste disposal	Minimize waste and pollution	1. Re-use of waste materials & spoil disposal locations included in bid and contract documents. 2. Prepare the WMSDP. The plan shall cover handling, storage, treatment, transport and disposal of solid and liquid wastes, hazardous materials, hazardous wastes and excavation spoils. 3. WMSDP will include consideration of all matters related to solid, liquid waste and spoil disposal including the following: i) Expected types of waste and quantities of waste arising. ii) Waste reduction, reuse and recycling methods to be employed iii) Agreed reuse and recycling options and locations for disposal / endorsement from DONRE and local groups. iv) Methods for treatment and disposal of all solid and liquid wastes. v) Methods of transportation to minimize interference with normal traffic. vi) Establishment of regular disposal schedule and constraints for hazardous waste. vii) Programme for disposal of general waste / hazardous waste. viii) Discussion of the ESP, PMU/CSC	ESP	Before bidding	N/A	Included in the contract with ESP

		inspection/ monitoring role. ix) Establishment of complaints management system for duration of the works x) Agreement on publicity/ public consultation requirements. 4. The WMSDP shall include a section on Hazardous Materials and Waste section. This will detail the mitigation measures, organizational arrangements, resources, facilities, etc. to avoid environmental as well as health and safety impacts due to use and disposal of hazardous materials/substances.				
6. Unexploded Ordnance	Avoid accidents due to any kind of UXO	1. Coordinate with appropriate agencies at the design stage to identify if UXO is a potential threat to works 2. Based on the findings, engage an authorized UXO clearing contractor (usually from Kon Tum Military Command, as necessary. 3. Ensure that the contractors shall only commence site works after the UXO clearing firm has certified that the subproject areas are already cleared.	ESP	Before bidding	N/A	Included in the contract with ESP
7. Environmental Capacity Development	Develop environmental management capacity of PMU to ensure proper EMP implementation and promote environmental awareness among workers.	1. PMU to commit and retain dedicated staff for subproject duration to oversee EMP implementation. 2. ESP to train PMU to build their capacity on EMP implementation, monitoring and reporting using workshops and on-the-job training techniques and case studies. 3. Conduct workers' orientation on EMP provisions. The ESP shall periodically conduct such orientation as every new contractor is engaged.	PMU; ESP	Through out the pre-construction and construction phase	N/A	Included in the contract with ESP and PMU operation budget
Construction Phase						
1. Loss of trees and impacts to fauna	Avoid and minimize impact to flora and fauna in the subproject area	1. Minimized vegetation covers clearances. 3. Prohibit cutting of trees for firewood and for use in subproject. 4. During replanting/replant vegetation cover works, new alien plant species (i.e., species not currently established in the country or region of the subproject) shall not be used. Invasive species shall not be introduced into new environments.	Ia Dal and Ia Toi CPCs; Contractors	Through out construction phase	Along the subproject road, especially 15 km go through natural forest in Section 1; worker camps area	Included in the contract with contractors

		5. The contractors will not use or permit the use of wood as a fuel for the execution of any part of the works, including but not limited to the heating of bitumen and bitumen mixtures, and to the extent practicable shall ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 6. Contractors shall not buy or use wood from the illegal sources (that come from the illegal logging) 7. No construction camps, concrete mixing plants, material storage sites are to be located in the forest area. 10. Contractors will take all precautions necessary to ensure that damage to vegetation is avoided due to fires resulting from execution of the works. The Contractors will immediately suppress the fire, if it occurs, and shall undertake replanting to replace damaged vegetation.				
2. Local facilities	Prevent interruption of services such as electricity and water supply during relocation of the local facilities. Repair damaged access roads.	1. Reconfirm power, water supply, and telecommunications likely to be interrupted by the works. 2. Contact all relevant local authorities for facilities and local people to plan reprovisoning of power, water supply, and telecommunication systems. 3. Facilities shall be relocated and reconnected well ahead of commencement of construction works and contractors shall coordinate with facility company for relocation and reconnection well before works commence. 4. Affected communities shall be properly informed in advance. 5. Reconnection of facilities shall be done at the shortest practicable time before construction commences. 6. Facilities damaged during construction shall be reported to the CSC, PMU and facility authority and repairs arranged immediately. 7. Access roads, agricultural land and other properties damaged during transport of	Contractors	Before construction start and through out the construction phase	Along the Section 2; at the area of hamlet No.7 and No.9 in Section 1	Included in the contract with contractors

		construction materials and other project-related activities shall be reinstated upon completion of construction works at each section				
3. Materials exploitation and management of quarry, borrow pits and temporary storage area	Minimize impacts from materials extraction, transportation and storage.	1. Implement MMP prepared by ESP during detailed design phase. 2. Balance excavation and fill requirements to minimization negative impacts 3. Prioritize use of existing quarry sites with suitable materials and update the list of quarries and borrow pits monthly in MMP and report to PMU and minimize impacts on other local resources. 4. Procure materials only from Kon Tum DONRE authorized quarries and borrow sites. 5. Replant tree and vegetation cover of any vegetation clearance area in quarries and borrow pits 6. Stockpile topsoil for later use and fence and re-contour borrows pits after use. Topsoil, overburden, and low-quality materials shall be properly removed, stockpiled near the site, and preserved for rehabilitation. 7. Do not use quarries in areas of natural woodland or near rivers, which provide food and shelters for birds and other animals. 8. Borrow/quarry sites shall not be located in productive land and forested areas. 9. During quarry/borrow site operation, provide adequate drainage to avoid accumulation of stagnant water. 10. Ensure borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of water bodies favourable for mosquito breeding. 11. Upon completion of extraction activities, quarry and borrow pits shall be dewatered and fences shall be installed, as appropriate, to minimize health and safety risks. 12. To avoid drowning when pits become water filled, measures such as fencing, providing flotation devices such as a buoy tied to a rope, etc. shall be implemented.	Contractors	Though out construction phase	Subproject site, quarries and borrow pit areas	Included in the contract with contractors

4. Waste and spoil disposal	Control spoils and waste disposal, lubricant and hazardous wastes.	1. Implement corresponding provisions of WMSDP prepared by the ESP. 2. Areas for disposal to be agreed with CPCs and Kon Tum DONRE checked and recorded by the CSC, ESP/PMU and monitored 3. Spoil and waste will not be disposed of in streams or other surrounding water bodies. 4. Spoils and waste shall only be disposed to areas approved by local authorities. 5. Spoil disposals shall not cause sedimentation and obstruction of flow of watercourses, damage to agricultural land and densely vegetated areas. 6. Under no circumstances will spoils be dumped into watercourses (rivers, streams, drainage, irrigation canals, etc.) 7. The spoils disposal site shall be located at least 50 m from surface watercourses and shall be protected from erosion by avoiding formation of steep slopes and grassing.	Contractors	Through out construction phase	Through out construction site, material storage areas, machines and vehicles maintenance area	Included in the contract with contractors
5. Bitumen heating and concrete mixing plant	Avoid air pollution, traffic obstacles and contamination	1. Locate mixing plant, bitumen heating off road and (wherever practicable) at least 500 m from nearest sensitive receivers (residential areas, schools, clinics, etc.) and streams and install and maintain dust suppression equipment. 2. Concrete mixing areas shall be protected against spills and all contaminated soil must be properly handled according to applicable national and local laws and regulation. As a minimum, these areas must be contained, such that any spills can be immediately contained and cleaned up. 3. Prevent soil contamination requiring contractors to instruct and train their workers on storage and handling of materials and chemicals that can potentially cause soil contamination. 4. Recycle debris generated by dismantling of existing pavement subject to the suitability of the material.	Contractors	Through out construction phase	Through out construction site	Included in the contract with contractors
6. Noise, dust and vibration	To minimize negative impacts from noise, dust and vibration	1. Restrict works to daylight hours within 500 m of residential settlements and local clinics. 3. Powered mechanical equipment and vehicle emissions to meet national	Contractors	Through out construction phase	Through out construction site especially in Section 2	Included in the contract with contractors

	during construction period	TCVN/QCVN standards. All construction equipment and vehicles shall have valid certifications indicating compliance to vehicle emission and noise creation standards. 4. Monitor and investigate complaints; propose alternative mitigation measures. 5. Keep material storage site moist 6. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emission. 7. On rainless day undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials storage sites, construction sites, access roads, quarry areas, borrow sites and other subproject areas where residential sites and other sensitive points such as schools, clinics… are located nearby. 8. Clean up road surfaces after work. 9. To protect buildings and structures from vibration, non-vibrating roller shall be used in construction sites near buildings and structures. 10. Structures, which are damaged due to vibration caused by the construction activities, shall be repaired immediately as directed by ESP/PMU. 11. Machinery shall be turned off when not in use. 12. Pile driving during to be schedule for daytime if construction site is near sensitive points or approved by DONRE, CPCs and ESP/PMU. 13. Impose speed limits on construction machines and transportation vehicles to minimize dust emission along areas where sensitive pints are located (houses, schools, clinics, pagodas etc.).			and 15 km go through natural forest in Section 1	
7. Erosion control/ run off	Protect established facilities	1. Establish vegetation and erosion protection immediately after completion of works in each stretch / sector. 2. Check weather forecasts and minimize work in wet weather. 3. Stockpile topsoil for immediate replanting	Contractors	Through out construction phase	Through out construction site and high risk slope as agreed with ESP/PMU	Included in the contract with contractors

		after cutting. 4. Minimize damage and excavation of surrounding vegetation during slope formation. 5. Protect the cut slope with planted vegetation, bioengineering or conventional civil engineering structures as soon as practicable after excavation. 6. Include and implement appropriate measures for slope protection, i.e. vegetation cover and stone pitching, as required in the detailed construction drawings. 7. Prevent erosion and protect the excavated slope with temporary or permanent drainage as soon as practicable after cutting. 8. If new erosion occurs accidentally, back fill immediately to restore original contours. 9. Low embankments will be protected from erosion by seeding and planting indigenous grasses that can flourish under local conditions. 10. Payments will be linked to the completion of the works as indicated by the installation of erosion control measures to protect the works to the satisfaction of ESP/PMU.			(especially in Section 1)	
8. Streams/ Rivers protection and bridge/culvert construction	Protect Streams/ Rivers and maintain flows	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed not to block streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.	Contractors	Through out construction phase	11 streams/ rivers crossing point	Included in the contract with contractors
9. Drainage, hydrology, water resources and water quality	To minimize impact from wastewater drainage and prevent potential	1. Province adequate drainage facilities at construction sites and worker camps to avoid stagnant water. 2. Implement agreed designs for bridges/	Contractors	Through out construction phase	Through out construction sites of Section 1; 3	Included in the contract with contractors

	impact on water quality due to subproject activities	culverts sufficient to control flooding as designed. 3. Store lubricants, fuels and wastes in dedicated enclosures at least 50 m from water bodies on high and impervious ground with top cover 4. Solid waste from construction activities and workers camps will not be thrown in streams and other water bodies (drainage, lake, pond, etc.) 5. Construction storage/stockpiles shall be provided with bunds to prevent silted run-off. 6. Stockpiled materials will be covered to reduce silted run-off. 7. No stockpiling or borrow sites at least 100m of water body. 8. Work in streams at bridge repair sites will be scheduled during dry season and work duration shall be as short as possible. 9. Washing of machinery and vehicles in surface waters shall be prohibited. 10. Inform Ia Dal, Ia Toi CPCs and Ia H'Drai DCP in advance construction schedule and scope. 11. Work with relevant Division of Ia H'Drai DPC to find out suitable water block/ water cut schedule, avoid impact to downstream users in Ia Khai, Ia Grai districts and Se San 4, Se San 4A hydropower plants.			river/ stream crossing positions in Section 2, material storage sites, temporary waste disposal area	
10. Large influx of construction worker	Construction camps and worker camps not to cause any negative impact to surrounding environment (forest area, water bodies, wild animal); control of infectious diseases.	1. Construction and worker camp location and facilities located at least 500m from settlements and agreed with local communities and facilities approved by ESP and managed to minimize impacts. 2. Hire and train as many local workers as possible. 3. Provide adequate housing for all workers at the construction camps and establish clean canteen/eating and cooking areas. 4. Mobile toilets (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and prevented by cleaning lavatories daily and by keeping toilets clean at all times. 5. Provide separate hygienic sanitation	Contractors	Through out construction phase	Through out construction sites and worker camps	Included in the contract with contractors

		facilities/toilets and bathing areas with sufficient water supply for male and female workers. 6. Borrow pits and natural depressions with prelaid impervious liners will be used to dispose of scarified/scraped asphalt, and then covered with soil. This will check potential groundwater contamination. 7. As much as possible, food shall be provided from farms nearby and bush meat supplies will be banned to discourage poaching. 8. Camp site will be cleaned up to the satisfaction of and local community after use. 9. Solid and liquid waste will be managed in line with WMSDP. 10. All waste materials shall be removed and disposed to disposal sites approved by local authorities 11. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned. 12. Register temporary stay for workers with police.				
11. Safety precautions for workers and public safety	Ensure worker safety	1. Establish safety measures as required by law and by good engineering practice and provide first aid facilities that are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, ear plugs, gloves, etc. at no cost to the employee. 5. Where worker exposure to traffic cannot be completely eliminated, protective barriers shall be provided to shield workers from traffic vehicles.	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors

		6. Workers shall be provided with reliable supply of potable water. 7. Construction camps shall be provided with adequate drainage to avoid accumulation of stagnant water. 8. Construction camps shall be provided with toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained to allow effective operation. 9. Ensure reversing signals are installed on all construction vehicles.				
12. Traffic Management	Minimize disturbance of traffic	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience due to subproject operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold ups and congestion 3. In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up. 4. Provide safe vehicle and pedestrian access around construction areas. 5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. 6. Provide sufficient lighting at night within and in the vicinity of construction sites. 7. Designate traffic officers in construction sites.	Contractors	Through out construction phase	Through out construction sites in Section 2; at start and end points of Section 1; Area of hamlet No.7 and No.9 of Section 1.	Included in the contract with contractors
13. Environmental recovery	Provide environmental recovery of the subproject	Contractors to reconfirm and implement recovery (e.g., landscaping, tree replanting) identified at the detailed design stage	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors
Operation Phase						

1. Changing land use, increase forest access	To minimize land use change from natural forest to cultivation land	1. Cooperate with DONRE, Sa Thay Forestry Company, Duy Tan Rubber Company, Ia Dal CPC and Ia H'Drai DPC setup a suitable O&M plan and protect 100 m forest corridor along Section from Km60 – Km74. 2. Participate in the Forest Protection Campaign if applicable 3. Install signboard, propaganda board on forest protection along the 15 km natural forest section.	Kon Tum Department of Transportation (DOT)	Through out operation phase	At the section goes along natural forest	Included in operation and maintenance cost
2. Generate dust, noise, vibration	To minimize dust, noise and vibration	1. Install sign board, speed limit/ loading limit to prevent dust, noise and vibration from over speed vehicles 2. Install road humps at the residential area to reduce the impact from noise, dust and vibration.	Kon Tum DOT	Through out operation phase	At the start and end point of two sections. At the residential areas of hamlet No.4; No.7 and No.9	Included in operation and maintenance cost
3. Traffic and road safety	Minimize road accident	1. Undertake road safety awareness campaigns for local residents and other road users of provincial road No.675A. 2. Install and maintain road warning signs and markings. 3. Monitor road accidents and implement necessary preventive measures (awareness campaigns, provision of appropriate road furniture to enhance road safety and control traffic).	Kon Tum DOT	Through out operation phase	Along two sections of the road No. 675A	Included in operation and maintenance cost
4. Risks caused by natural calamity	Minimize impact from natural calamity	1. Ensure that storm drains and highway drainage systems are periodically cleared to maintain clear drainage to allow rapid dispersal of storm water flow. 2. Ensure rapid response in case of landslides and implement thorough maintenance programme along erosion-prone areas. 3. Undertake surveillance and re-vegetation for areas prone to erosion and landslides.	Kon Tum DOT	Through out operation phase	Slopes with high risks of erosion and landslide	Included in operation and maintenance cost

C. Environmental monitoring

1. Compliance Monitoring

136. Table 15 below shows the program for monitoring the compliance on various provisions of the EMP during pre-construction, construction and operation phases. ESP needs to implement a number of measures during detailed design phase (e.g., incorporation of environmental design measures into the detailed design, update EMP, etc.) and this will be confirmed by PMU to ADB. During construction, most of the mitigation the contractors shall implement measures and CSC and ESP shall monitor their environmental performance, in terms of implementation of such measures. The timing or frequency of monitoring is also specified in Table 15. During operation EMP implementation shall be the responsibility of Kon Tum DOT.

137. At design phase, PMU shall ensure that EMP measures for the design stage are incorporated in the detailed design. The effective incorporation of the EMP in the civil works contracts shall also be ensured be by PMU with assistance from ESP and this, along with implementation of EMP provisions, shall be audited by ADB as part of the loan conditions.

138. Prior to implementation of the subproject the IEE and EMP will be updated and amended, as necessary, by ESP after the detailed designs are complete and contracting arrangements are known. Such updating shall be based on reconfirmation and any additional information on the assumptions made at this feasibility stage on location scale and expected conditions of the subproject.

Table 15 - Environmental Monitoring Compliance

Performance and Impact Monitoring					
Environmental Concern	Parameter to monitor	Location	Frequency & Verification	Responsible to Monitor	Monitoring Cost
Design and Pre-construction Phase					
1. Environment and climate change	Detail designs with environment and climate change cooperated	N/A	Only one time before the construction commence	PMU	Included in the operation budget of PMU
2. Land acquisition and resettlement	Compensation documents	N/A	Only one time before the construction commencement	Kon Tum DPI/ DONRE; PMU	Included in the operation budget of PMU
3. Environmentally responsible procurement	Include in bidding documents. Check compliance	N/A	Bidding preparation period. Before start site works	PMU	Included in the operation budget of PMU
4. Material Management Plan	Require in contract with ESP. Check at Detailed Design.	N/A	Only one time in detailed design phase	PMU	Included in the operation budget of PMU
5. Plan spoil and waste disposal	Require in contract with ESP. Check at Detailed Design.	N/A	Only one time in detailed design phase	PMU	Included in the operation budget of PMU
6. Unexploded Ordnance	Checking documents/ certificates	N/A	Once, before construction start	PMU	Included in the operation budget of PMU
7. Environmental Capacity Development	Require in contract with ESP. Check at Detailed Design. Complete training and check before and during the construction works.	N/A	Before construction commencement and at the beginning period of the construction phase	PMU	Included in the operation budget of PMU
Construction Phase					
1. Loss of trees and impacts to fauna	Check of implementation	Along the subproject road, especially 15 km go through natural forest in Section 1; worker camps area	Before construction commencement and through out construction phase. Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
2. Local facilities	Check of implementation	Along the Section 2; at the area of hamlet No.7 and No.9 in Section 1	Before construction commencement and through out construction phase. Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
3. Materials exploitation and management of	Check of implementation	Subproject site, quarries and	Bi-weekly	ESP/ PMU	Included in the operation budget

quarry and borrow pits		borrow pit areas	Part of daily construction supervision	CSC	of PMU/ ESP/ CSC
4. Waste and spoil disposal	Check of implementation	Through out construction site, material storage areas, machines and vehicles maintenance area	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
5. Concrete mixing plant and bitumen heating	Check of implementation	Through out construction site	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
6. Noise, dust and vibration	Check of implementation	Through out construction site	Bi-weekly and spot checks Part of daily construction supervision	ESP/ PMU	Included in the operation budget of PMU/ ESP CSC
	Ambient air quality (temperature, moisture, wind direction and speed, PM10, PM2.5, PB, NO_2, SO_2…); Noise level (average noise level, maximum noise level, vehicles frequency…)	8 monitoring points at start and end points of Section 1 and Section 2. Hamlet No.4; No.7 and No.9; In front of Chu Mom Ray Kindergarten.	1 time before construction start and semi-annually during 2 years construction time	ESP	2,400 USD[2]
7. Land slide, erosion control/ run off	Check of implementation	Through out construction site and high risk slope as agreed with ESP/PMU (especially in Section 1)	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
8. Stream protection and bridge/culvert construction	Check of implementation	11 streams/ rivers crossing point	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC

[2] There is no cost norm for Kon Tum province. Figures has been estimated base on environmental monitoring cost norm of Dak Nong – Decision No. 17/2015/QD-UBND.

9. Drainage, hydrology, water resources and water quality	Check of implementation	Through out construction sites of Section 1; 3 river/ stream crossing positions in Section 2, material storage sites, temporary waste disposal areas	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
	Surface water quality Ground water quality	11 sampling points at 20m downstream of the crossing river/ stream. 1 sampling point in Sesan4 reservoir adjacent to the Section 1 (Km60-Km74) 3 sampling points in the well of Chu Mom Ray Company No.3 Area (near Bridge No.8); Sa Thay Border Military Station (near Sa Thay Bridge); hamlet No.9 (near Ya Doy Bridge)	1 time before construction start and every quarter during 2 years construction time 1 time before construction start and semi-annually during 2 years construction time	ESP ESP	8,910 USD 1,050 USD[3]
10. Large influx of workers. Construction and worker camps, sanitation and diseases	Check of implementation	Through out construction sites and worker camps	Before establishment of the facilities and through out the construction phase Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
11. Safety precautions for workers and public safety	Check of implementation. Check compliance to Labor Code of Vietnam and other relevant Decision, Decree and Circular	Through out construction sites	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC

[3] There is no cost norm for Kon Tum province. Figures has been estimated base on environmental monitoring cost norm of Dak Nong – Decision No. 17/2015/QD-UBND.

	under Government requirements				
12. Traffic Management	Check of implementation	Through out construction sites in Section 2; at start and end points of Section 1; Area of hamlet No.7 and No.9 of Section 1.	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
13. Environmental recovery	Confirmed implementation of required enhancements	Through out construction sites	Before construction and bi-weekly check Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
Operation Phase					
1. Changing land use, increase access to forest	Check of implementation	At the 15 km along natural forest in Section 1	Semi-annual in the first two years	Kon Tum DOT	Included in operation budget of Kon Tum DOT
2. Dust, noise, vibration	Check of implementation; Ambient air environment, noise level at the road and in the areas which are adjacent to road	At the start and end point of two sections. At the residential areas of hamlet No.4; No.7 and No.9	Semi-annual in the first two years	Kon Tum DOT	Included in operation and maintenance cost
3. Road safety	Check of implementation	Along two sections of the road No. 675A	Semi-annual	Kon Tum DOT	Included in the operation budget of DOT
4. Natural calamity	Check of implementation	Slopes with high risks of erosion and landslide	Semi-annual	Kon Tum DOT	Included in the operation budget of DOT

D. REPORTING

139. PMU will submit the following reports to ADB:

- *Monitoring report for baseline environment:* this report shows the result of baseline environment as implemented by ESP on ambient air quality, surface water quality... This report will be submitted to ADB before the construction start.
- *Environmental monitoring reports:* Environmental monitoring reports will cover the status of EMP implementation in terms of required mitigation measures for different phases of the subproject, results of environmental effects monitoring (air quality, noise and surface water quality), necessary remedial actions to effectively address negative environmental impacts due to subproject implementation, status of environmental capacity building activities as well as documentation of complaints received and corresponding action/resolution. The environmental monitoring reports will be submitted to ADB semi-annually during the construction phase and annually for two years after completion of construction.

Table 16 – Reporting procedures

Project Phase	Type Of Report	Frequency	Responsibility	Submitted To Whom
Construction	**Environmental Performance Report** indicating compliance with EMP and monitoring results at the contractor site	Monthly	Construction contractor	CSC
	Subproject EMP Compliance Report indicating compliance with subproject EMP and monitoring results	Quarterly	CSC	PMU
	EMP Compliance Report indicating compliance with subproject EMP and monitoring results	Semi-annually during construction phase	ESP/ PMU	ADB
Operation	**EMP Compliance Report: Operation** indicating compliance with subproject EMP commitments during operation	Annually in the first two years of operation. On-going frequency to be determined based on review after 2 years.	Kon Tum DOT	Kon Tum DONRE

Table 17 – Estimated cost for EMP Implementation (2-year construction/ 4-year in total)

Item	Estimated cost (US$)
1. Environment Safeguard Specialist of ESP	***76,910***
1 National ESP - 14 man-months (intermittent in the first 2 years; 6 – 4 – 4) – 4000 US$/ man-month	56,000
Per diem for ESP: 48 US$ x 30 days x 14 months	20,160
Air fare + taxi (to and from airports) for 3 round trips: 250 US$ x 3 trips	750
2. Environmental effects monitoring (implemented by ESP)	***12,360***
Ambient air quality: 8 monitoring locations x 5 times x 60 US$/sample[4]	2,400
Ground water quality: 3 monitoring locations x 5 times x 70 US$/sample[5]	1,050
Surface water quality: 11 monitoring locations x 9 times x 90 US$/sample[6]	8,910
3. Training/orientation, local transportation, supplies (by ESP)	***21,500***
a) Training/orientation: 1 formal training course for PMU, CSC, Contractors and Kon Tum DOT and other "on the job" training	1,500
b) Local transportation and supplies	20,000
4. Printing Environmental monitoring report by ESP (8 reports)	***8,000***
Subtotal (1+2+3+4)	**118,770**
5. Contingency	**11,230**
Total (1+2+3+4+5)	**130,000**

E. CAPACITY BUILDING

140. In Viet Nam, the environmental assessment process is established but environmental awareness and capability for implementation of EMP in infrastructure projects of both the executing agency and the implementation agency (PMU) are limited and in development. The safeguards staff of the PMU is usually responsible for many different task and do not have good background on safeguards issues. Usually, the engineer will also be in charge of the environmental monitoring and his/ her capacity is not suitable to check the adequacy of the subproject EMP. The IEEs and EMP are referred to the environmental department in DONRE for approval. During the Project PPTA phase, PPU has been established under Kon Tum DPI with one staff has been assigned as ESO.

141. The most significant challenge is the lack of human and financial resources and necessary infrastructure. To address this constraint, Kon Tum DPI/PMU will designate a full time staff as environmental safeguards officer (ESO) to handle the environmental aspects of the subproject during implementation stage. Ideally, ESO of the Project Preparation Unit (PPU) will be come ESO of the subproject PMU also. The ESO and other relevant staff of PMU will be

[4] Due to there is no cost norm for Dak Lak province, figures has been estimated base on environmental monitoring cost norm of Dak Nong – Decision No. 17/2015/QD-UBND.
[5] Due to there is no cost norm for Dak Lak province, figures has been estimated base on environmental monitoring cost norm of Dak Nong – Decision No. 17/2015/QD-UBND.
[6] Due to there is no cost norm for Dak Lak province, figures has been estimated base on environmental monitoring cost norm of Dak Nong – Decision No. 17/2015/QD-UBND.

trained by the Environment Safeguard Specialist (ESP) during subproject implementation as “on the job” training or by formal training courses.

Table 18 – Detail capacity building program

Objective	1. Build capacity and procedures in undertaking systematic environmental assessments in accordance with Government regulations and ADB guidelines 2. Provide training on international best practice on environmental management, monitoring and reporting. 3. Provide guidance on how to effectively incorporate environmental measures into project design and how to incorporate EMP provisions into tender and contract documents.
Tasks/Scope of Work	1. Undertake training needs analyses and review prevailing government regulations and donor guidelines governing the assessment and management of environmental impacts for road development. 2. Review the skills of PMU and Kon Tum DOT staff to establish existing capacity on environmental assessments, environmental monitoring and implementation of mitigation measures for road development project. 3. Prepare the training plan and relevant training materials. 4. Deliver the training, which may be through a combination of hands-on assistance, on-the-job training, and training workshops. 5. Evaluate the effectiveness of the training measuring improvements in attitudes and skills achieved. 6. Modify the training documents/materials as necessary. 7. Hand-over the amended training documents/ material to the project manager for use in the delivery of the training. 8. Prepare report on result of training.
Time frame	Possible within 3 months after construction commencement
Target participant	Staff in PMU and Kon Tum DOT who responsible for environmental management
Staff resources	International and national environmental specialist with at least 15 years experience on environmental management of road projects and must possess relevant post-graduate degree in civil engineering, environmental management and other relevant courses. With working knowledge of safety issues and at least 3 years experience in conducting environmental management training.

X. CONCLUSIONS AND RECOMMENDATIONS

142. This IEE study was carried out in the Technical Assistant for Project Preparation (PPTA) phase. Primary and secondary data were used to assess potential environmental impacts in a comprehensive manner and public consultation and route reconnaissance were carried out in order complete the environmental assessments and recommend suitable mitigation measures. The IEE report provides a picture of potential environmental impacts associated with the upgrading of the subproject road and suitable mitigation measures have been recommended.

143. The implementation of the subproject "Construct Provincial Road No.675A" will steadily improve the road quality; make it favourable for transportation in both dry and rainy season. Several actions are required during the detailed design stage to minimize impacts to acceptable levels. The negative environmental impacts from the upgrading works will mostly take place during the construction stage. All of the impacts during construction phase should be very predictable and manageable and with appropriate mitigation and few residual impacts are likely. Additional human and financial resources will be required to improve environmental capability and to progress and achieve necessary statutory compliance and environmental clearance certification for the subproject or associated activities that also require environmental permits under the environmental laws of Viet Nam – LEP 2014.

144. No further or additional impact assessment is considered necessary at this stage. At the implementation stage, PMU through ESP will develop detail EMP to monitor the schedules of mitigation measures and conduct of environmental effects monitoring activities. EMP must be updated to ensure effective environmental monitoring and should be develop follow-monitoring plan as specified in the EMP. With these measures in place, environmental impacts of the subproject should be manageable and will not result in any residual impacts, which are above accepted environmental standards.

XI. APPENDIX

A. Appendix 1: Photos of the subproject road and the vicinity

Section 1: Starting point – junction with PR675

Subproject road: End point view from Ut Cung Junction

Section 2: End point – view to Ho Da

At the cross section with Sa Thay River

Running along Sesan 4 Reservoir

Rubber plantation of Duy Tan company

B. Appendix 2: Environmental criteria for subproject selection

Province	Road	Environmental Criteria (100 points)				(Points remaining over 100 points) Environmental grading and remarks
		(deduction/40) National Park, Nature Reserve, Historical Site, Forest	(deduction/20) Flood prone, water bodies	(deduction/20) Land slide, soil erosion	(deduction/20) Alteration of surface water bodies	
Kon Tum	No. 675A	(-35) Some type of forest along the road	(-15) Sesan river, several large reservoirs	(-15) Some steep slopes on the road	(-15) 7 bridegs/ total 237 m of length	**Rank 1 – 10 points** Category B. Pay attention to land slide, soil erosion and flood. Wood logging activities still happen.
	No. 673A	(-40) Ngoc Linh Nature Reserve	N/A	(-10) Winding road with high mountains	(-5) 4/24	**Rank 3 – 30 points** Category A. The first 9km go through Ngoc Linh Nature Reserve. Pay attention to land slide also.
Gia Lai	No. 665	N/A	(-5) Some streams and river	N/A	(-20) 3/231	**Rank 4 – 40 points** Category B. Pay attention to flooding
	ChuTy– Ia Nan	N/A	N/A	N/A	(-5) 1/33	**Rank 5 – 50 points** Category B
	No. 670	N/A	(-10) Some rivers and streams	(-10) Some steep slopes on the road	(-5) 3/30	**Rank 4 – 40 points** Category B. Pay attention to land slide, soil erosion.
Daklak	No. 29	(-20) York Don National Park	N/A	N/A	N/A	**Rank 5 – 50 points** Category B. The part connect to Dak Rue Border Gate go near the buffer zone of York Don National Park.
	Cu Ne – Ea Sup	N/A	(-10) Ea Sup Lakes and some small streams and lakes	N/A	(-5) 2/20	**Rank 5 – 50 points** Category B. Pay attention to flooding
Daknong	Dak Buk So – Bu Prang	(-20) Border protection forest. Bu Gia Map National Park (in Binh Phuoc province)	(-5) Dak Buk So; Dak Blung lakes. Some small irrigation system	(-15) Some slopes along the route, hilly parts of the road	N/A	**Rank 3 – 30 points** Category B. Pay attention to forest protection and land slide

	No. 685	(-20) Cat Tien South Protection Forest	(-5) Some lakes and river	(-10) Mountainous area	N/A	**Rank 4 – 40 points** Category B. Cat Tien South Protection Forest is 7 km away from the road. Pay attention to forest protection and land slide
	Pr.Rd No. 6	N/A	(-5) Dak Buk So lake and other small lakes	(-15) Some land slide point	N/A	**Rank 4 – 40 points** Category B. Pay attention to land slide
	Gia Nghia Rd	N/A	N/A	N/A	N/A	**Rank 5 – 50 points** Category B
Binh Phuoc	Pr.Rd No.756	N/A	(-5) Some small lakes and streams	N/A	N/A	**Rank 5 – 50 points** Category B
	No. 754; 754A	(-30) Ta Thiet Protection Forest; Historical Site	(-5) Some small rivers and lakes	N/A	N/A	**Rank 4 – 40 points** Category B. The road goes along Ta Thiet Protection Forest for around 3.5 km. Historical Site of Southern Army General Staff is far from the road. Pay attention to forest protection.
	756B	N/A	(-5) Some small streams and lakes	N/A	(-5) 1/10	**Rank 5 – 50 points** Category B
	756C	N/A	N/A	N/A	N/A	**Rank 5 – 50 points** Category B

C. Appendix 3: Source of Reference Information

1. *Kon Tum Environmental Monitoring Report 2014*
2. *Kon Tum Climate Change Adaptation Plan (2010-2015)*
3. *Statistics of poor households and marginal poor households of Ia H'Drai District People's Committee in 2015*
4. *Statistics of poor households of Labour Invalids and Social Affairs of Ia HDrai District People's Committee in 2015*
5. *Statistics Division of Ia H'Drai District people's committee in 2015*
6. *Statistic Division of area by administrative unit of Ia H'Drai district in 2015*
7. *Healthcare Centre of Ia H'Drai Districts people's committee in 2015*

D. Appendix 4: Environmental Mitigation Measures to Include into Bidding Documents

1. Loss of trees and impacts to fauna	1. Minimized vegetation covers clearances. 3. Prohibit cutting of trees for firewood and for use in subproject. 4. During replanting/replant vegetation cover works, new alien plant species (i.e., species not currently established in the country or region of the subproject) shall not be used. Invasive species shall not be introduced into new environments. 5. Will not use or permit the use of wood as a fuel for the execution of any part of the works, including but not limited to the heating of bitumen and bitumen mixtures, and to the extent practicable shall ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 6. Shall not buy or use wood from the illegal sources (that come from the illegal logging) 7. No construction camps, concrete mixing plants, material storage sites are to be located in the forest area. 10. Take all precautions necessary to ensure that damage to vegetation is avoided due to fires resulting from execution of the works. Immediately suppress the fire, if it occurs, and shall undertake replanting to replace damaged vegetation.
2. Local facilities	1. Reconfirm power, water supply, and telecommunications likely to be interrupted by the works. 2. Contact all relevant local authorities for facilities and local people to plan reprovisoning of power, water supply, and telecommunication systems. 3. Facilities shall be relocated and reconnected well ahead of commencement of construction works and coordinate with facility company for relocation and reconnection well before works commence. 4. Affected communities shall be properly informed in advance. 5. Reconnection of facilities shall be done at the shortest practicable time before construction commences. 6. Facilities damaged during construction shall be reported to the CSC, PMU and facility authority and repairs arranged immediately. 7. Access roads, agricultural land and other properties damaged during transport of construction materials and other project-related activities shall be reinstated upon completion of construction works at each section
3. Materials exploitation and management of quarry, borrow pits and temporary storage area	1. Implement MMP prepared by ESP during detailed design phase. 2. Balance excavation and fill requirements to minimization negative impacts 3. Prioritize use of existing quarry sites with suitable materials and update the list of quarries and borrow pits monthly in MMP and report to PMU and minimize impacts on other local resources. 4. Procure materials only from Kon Tum DONRE authorized quarries and borrow sites. 5. Replant tree and vegetation cover of any vegetation clearance area in quarries and borrow pits 6. Stockpile topsoil for later use and fence and re-contour borrows pits after use. Topsoil, overburden, and low-quality materials shall be properly removed, stockpiled near the site, and preserved for rehabilitation. 7. Do not use quarries in areas of natural woodland or near rivers, which provide food and shelters for birds and other animals. 8. Borrow/quarry sites shall not be located in productive land and forested areas. 9. During quarry/borrow site operation, provide adequate drainage to avoid accumulation of stagnant water. 10. Ensure borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of water bodies favourable for mosquito breeding. 11. Upon completion of extraction activities, quarry and borrow pits shall be dewatered and fences shall be installed, as appropriate, to minimize health and safety risks. 12. To avoid drowning when pits become water filled, measures such as fencing, providing flotation devices such as a buoy tied to a rope, etc. shall be implemented.
4. Waste and spoil disposal	1. Implement corresponding provisions of WMSDP prepared by the ESP. 2. Areas for disposal to be agreed with CPCs and Kon Tum DONRE checked and recorded by the CSC, ESP/PMU and monitored

	3. Spoil and waste will not be disposed of in streams or other surrounding water bodies. 4. Spoils and waste shall only be disposed to areas approved by local authorities. 5. Spoil disposals shall not cause sedimentation and obstruction of flow of watercourses, damage to agricultural land and densely vegetated areas. 6. Under no circumstances will spoils be dumped into watercourses (rivers, streams, drainage, irrigation canals, etc.) 7. The spoils disposal site shall be located at least 50 m from surface watercourses and shall be protected from erosion by avoiding formation of steep slopes and grassing.
5. Bitumen heating and concrete mixing plant	1. Locate mixing plant, bitumen heating off road and (wherever practicable) at least 500 m from nearest sensitive receivers (residential areas, schools, clinics, etc.) and streams and install and maintain dust suppression equipment. 2. Concrete mixing areas shall be protected against spills and all contaminated soil must be properly handled according to applicable national and local laws and regulation. As a minimum, these areas must be contained, such that any spills can be immediately contained and cleaned up. 3. Prevent soil contamination, instruct and train workers on storage and handling of materials and chemicals that can potentially cause soil contamination. 4. Recycle debris generated by dismantling of existing pavement subject to the suitability of the material.
6. Noise, dust and vibration	1. Restrict works to daylight hours within 500 m of residential settlements and local clinics. 3. Powered mechanical equipment and vehicle emissions to meet national TCVN/QCVN standards. All construction equipment and vehicles shall have valid certifications indicating compliance to vehicle emission and noise creation standards. 4. Monitor and investigate complaints; propose alternative mitigation measures. 5. Keep material storage site moist 6. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emission. 7. On rainless day undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials storage sites, construction sites, access roads, quarry areas, borrow sites and other subproject areas where residential sites and other sensitive points such as schools, clinics… are located nearby. 8. Clean up road surfaces after work. 9. To protect buildings and structures from vibration, non-vibrating roller shall be used in construction sites near buildings and structures. 10. Structures, which are damaged due to vibration caused by the construction activities, shall be repaired immediately as directed by ESP/PMU. 11. Machinery shall be turned off when not in use. 12. Pile driving during to be schedule for daytime if construction site is near sensitive points or approved by DONRE, CPCs and ESP/PMU. 13. Impose speed limits on construction machines and transportation vehicles to minimize dust emission along areas where sensitive pints are located (houses, schools, clinics, pagodas etc.).
7. Erosion control/ run off	1. Establish vegetation and erosion protection immediately after completion of works in each stretch / sector. 2. Check weather forecasts and minimize work in wet weather. 3. Stockpile topsoil for immediate replanting after cutting. 4. Minimize damage and excavation of surrounding vegetation during slope formation. 5. Protect the cut slope with planted vegetation, bioengineering or conventional civil engineering structures as soon as practicable after excavation. 6. Include and implement appropriate measures for slope protection, i.e. vegetation cover and stone pitching, as required in the detailed construction drawings. 7. Prevent erosion and protect the excavated slope with temporary or permanent drainage as soon as practicable after cutting. 8. If new erosion occurs accidentally, back fill immediately to restore original contours. 9. Low embankments will be protected from erosion by seeding and planting indigenous grasses that can flourish under local conditions. 10. Payments will be linked to the completion of the works as indicated by the installation of erosion control measures to protect the works to the satisfaction of ESP/PMU.
8. Streams/ Rivers protection and bridge/culvert	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed not to block streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate

construction	based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.
9. Drainage, hydrology, water resources and water quality	1. Province adequate drainage facilities at construction sites and worker camps to avoid stagnant water. 2. Implement agreed designs for bridges/ culverts sufficient to control flooding as designed. 3. Store lubricants, fuels and wastes in dedicated enclosures at least 50 m from water bodies on high and impervious ground with top cover 4. Solid waste from construction activities and workers camps will not be thrown in streams and other water bodies (drainage, lake, pond, etc.) 5. Construction storage/stockpiles shall be provided with bunds to prevent silted run-off. 6. Stockpiled materials will be covered to reduce silted run-off. 7. No stockpiling or borrow sites at least 100m of water body. 8. Work in streams at bridge repair sites will be scheduled during dry season and work duration shall be as short as possible. 9. Washing of machinery and vehicles in surface waters shall be prohibited. 10. Inform Ia Dal, Ia Toi CPCs and Ia H'Drai DCP in advance construction schedule and scope. 11. Work with relevant Division of Ia H'Drai DPC to find out suitable water block/ water cut schedule, avoid impact to downstream users in Ia Khai, Ia Grai districts and Se San 4, Se San 4A hydropower plants.
10. Large influx of construction worker	1. Construction and worker camp location and facilities located at least 500m from settlements and agreed with local communities and facilities approved by ESP and managed to minimize impacts. 2. Hire and train as many local workers as possible. 3. Provide adequate housing for all workers at the construction camps and establish clean canteen/eating and cooking areas. 4. Mobile toilets (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and prevented by cleaning lavatories daily and by keeping toilets clean at all times. 5. Provide separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supply for male and female workers. 6. Borrow pits and natural depressions with prelaid impervious liners will be used to dispose of scarified/scraped asphalt, and then covered with soil. This will check potential groundwater contamination. 7. As much as possible, food shall be provided from farms nearby and bush meat supplies will be banned to discourage poaching. 8. Camp site will be cleaned up to the satisfaction of and local community after use. 9. Solid and liquid waste will be managed in line with WMSDP. 10. All waste materials shall be removed and disposed to disposal sites approved by local authorities 11. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned. 12. Register temporary stay for workers with police.
11. Safety precautions for workers and public safety	1. Establish safety measures as required by law and by good engineering practice and provide first aid facilities that are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, ear plugs, gloves, etc. at no cost to the employee. 5. Where worker exposure to traffic cannot be completely eliminated, protective barriers shall be provided to shield workers from traffic vehicles. 6. Workers shall be provided with reliable supply of potable water.

	7. Construction camps shall be provided with adequate drainage to avoid accumulation of stagnant water. 8. Construction camps shall be provided with toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained to allow effective operation. 9. Ensure reversing signals are installed on all construction vehicles.
12. Traffic Management	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience due to subproject operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold ups and congestion 3. In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up. 4. Provide safe vehicle and pedestrian access around construction areas. 5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. 6. Provide sufficient lighting at night within and in the vicinity of construction sites. 7. Designate traffic officers in construction sites.
13. Environmental recovery	1.Reconfirm and implement recovery (e.g., landscaping, tree replanting) identified at the detailed design stage