Initial Environmental Examination

July 2016

VIE: Support to Border Areas Development Project

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) for the Asian Development Bank

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

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In joint venture with Transport Engineering Consultant Joint Stock Company No.2 (TECCO2) (Vietnam) and
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CURRENCY EQUIVALENT
(As of 15th July 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

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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

	Page
I. EXECUTIVE SUMMARY	1
A. Subproject Summary	1
B. Environment impacts and mitigations	1
C. Institutional arrangement	3
D. Conclusion	3
II. BACKGROUND	1
III. POLICY AND LEGAL FRAMEWORK	2
A. Asian Development Bank SPS requirement	2
B. Legal and Administrative Framework for Environmental Protection in Vietnam	3
IV. DESCRIPTION OF THE SUBPROJECT	4
A. The need for subproject	4
B. Location and scope	4
V. DESCRIPTION OF THE ENVIRONMENT	8
A. Physical Environment	8
B. Biological Environment	10
C. Socio-economical Condition and Infrastructure	9
D. Archaeological, Historical and Cultural Treasures	15
E. Key Environmental Features	15
VI. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES	16
A. Potential impacts and mitigation measures in the design phase	16
B. Potential impacts and mitigation measures in the preconstruction phase	16
C. Potential impacts and mitigation measures in the construction phase	17
D. Potential impacts and mitigation measures in the operation phase	22
VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION	24
A. Public consultation preparation	24
B. Information dissemination during public consultation	24
C. Obtained results and use of results from public consultation	24
VIII. GRIEVANCE REDRESS MECHANISM	26
A. Purpose of the mechanism	26
B. Grievance redress mechanism	26
IX. ENVIRONMENTAL MANAGEMENT PLAN	27
A. Implementation arrangements	27
B. Environmental Management Plan	30
C. Environmental mornitoring	43

D. Reporting 48
E. Capacity building 49

X. CONCLUSIONS AND RECOMMENDATIONS 51

XI. Appendix 1 52

Appendix 1: Photos of the subproject road and the vicinity 52
Appendix 2: Environmental criteria for subproject selection 53
Appendix 3: Sources of reference information 55
Appendix 4: Environmental Mitigation Measures to Include into Bidding Documents 56

LIST OF FIGURES

Figure 1 – General Map of Binh Phuoc and Subproject Area 1
Figure 2 – EMP Implementation Organization Chart 29

LIST OF TABLES

Table 1 - Number of bridges and designed elevation based on 2005 peak water level 5
Table 2 – Land Acquisition Data 6
Table 3 – Estimated budget of the subproject 7
Table 4 - Type of natural disaster in the recent year 9
Table 5 – Land use statistic of the subproject area in 2015 8
Table 6 – Population and ethnic groups in the subproject area 9
Table 7 – Labour distribution in the subproject area 10
Table 8 – Number of poor households in 2015 under new standards 11
Table 9 – Environmental sensitive point in the subproject area 12
Table 10 – Infrastructure system in the subproject area 14
Table 11 – Main issues and information from local authorities 25
Table 12 – Main environmental concerns from public consultation 25
Table 13 – Responsibilities for EMP implementation 27
Table 14 - Detail Environmental Management Plan 31
Table 15 - Environmental Monitoring Compliance 44
Table 16 – Reporting procedures 48
Table 17 - Estimated cost for EMP Implementation (2-year construction/ 4-year in total) 49
Table 18 – Detail capacity building program 50

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

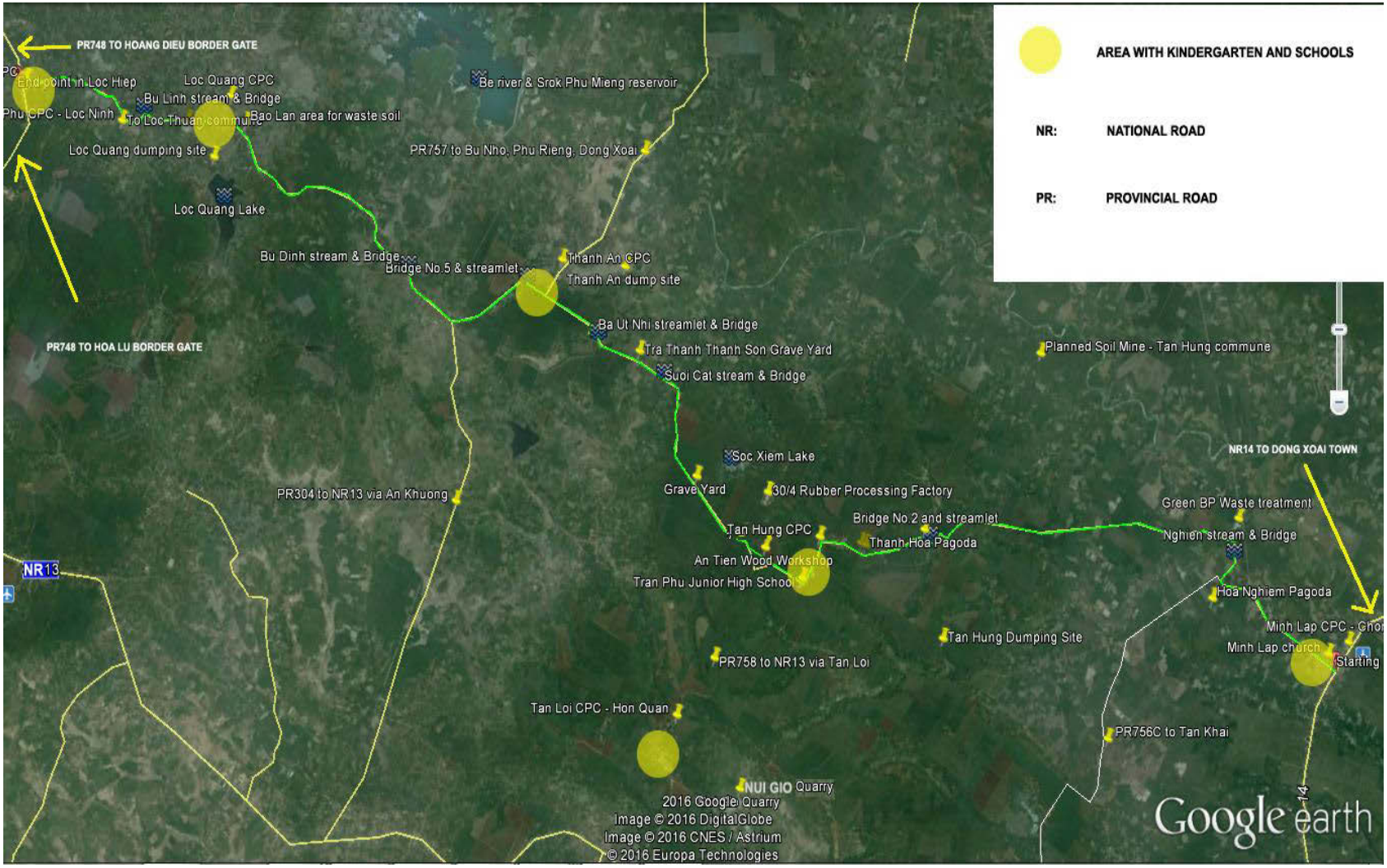
16. Binh Phuoc Provincial People Committee (PPC) has established a Project Preparation Unit (PPU) to support the preparation of the subproject in the PPTA period. One staff of Binh Phuoc Department of Natural Resources and Environment (DONRE) has been assigned as Environmental Safeguards Officer (ESO) 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

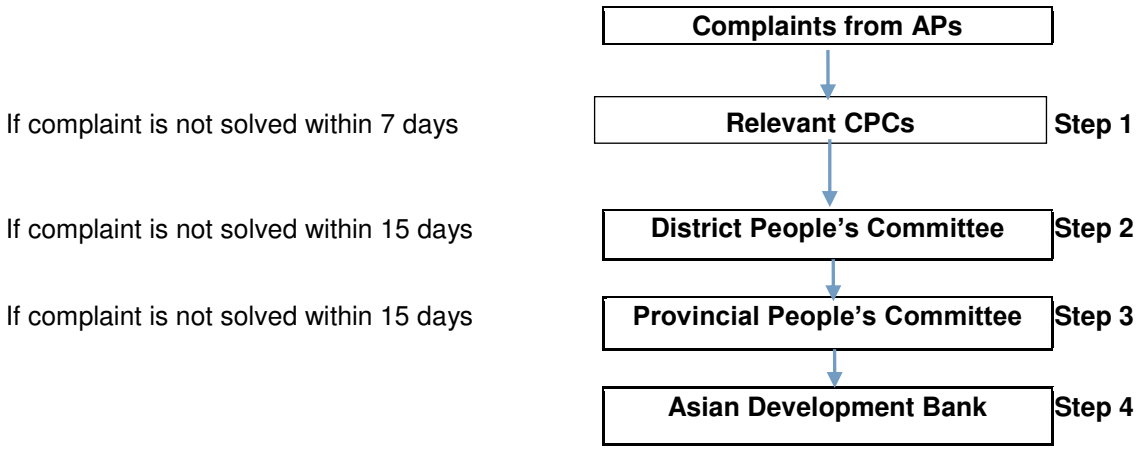
A. Purpose of the mechanism

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

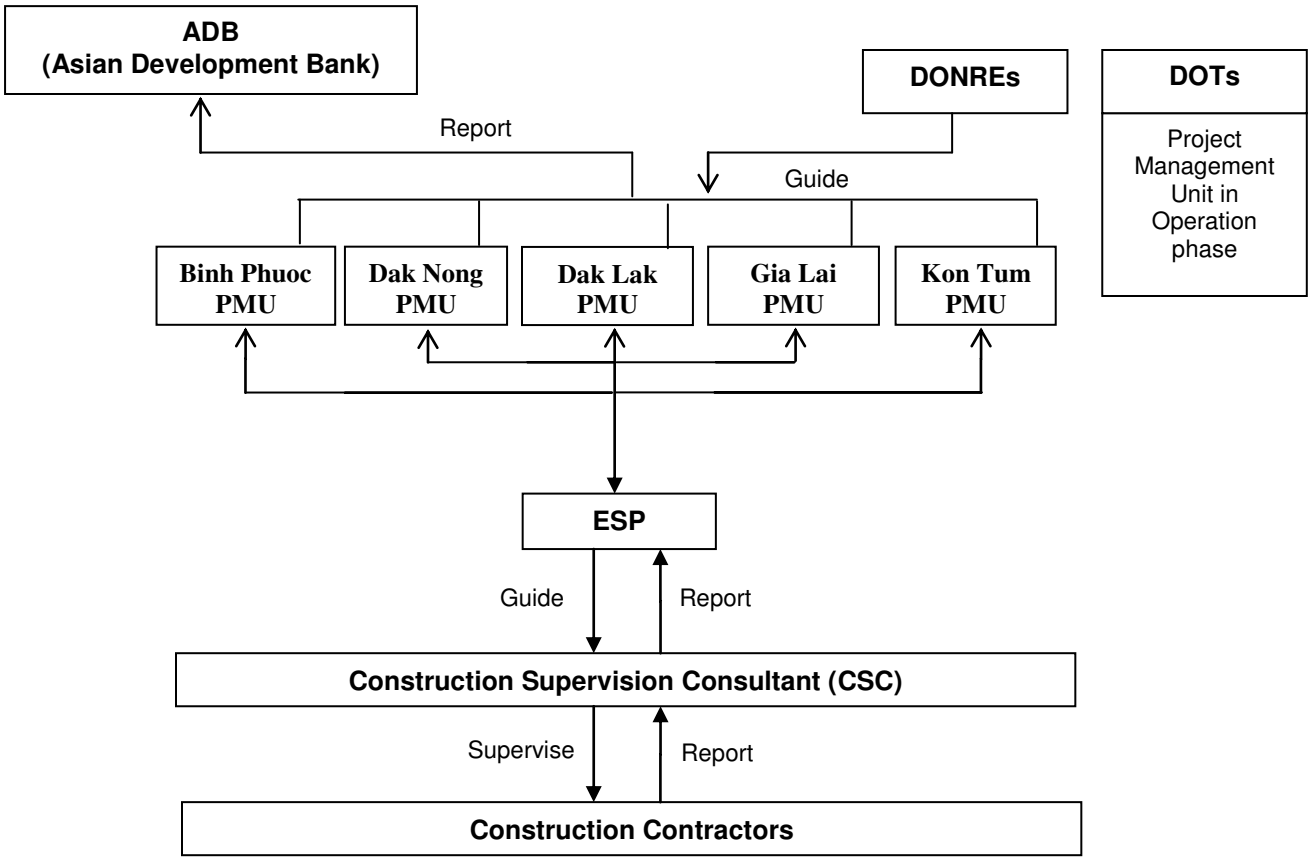
Agency	Responsibilities
Binh Phuoc Department of Planning and Investment	- Executing agency with overall responsibility for subproject construction and operation - Ensure that sufficient funds are available to properly implement the EMP Ensure that the Subproject, regardless of financing source, complies 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

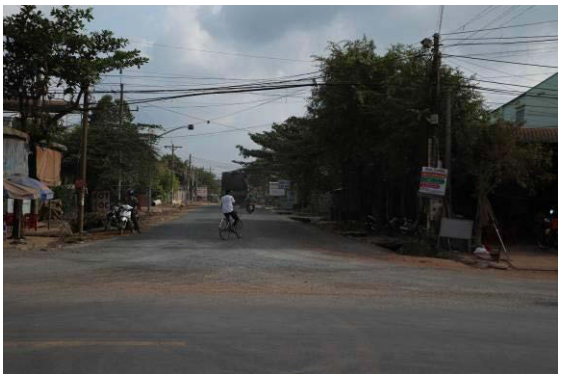
117. This IEE study was carried out in the Technical Assistant for Project Preparation (PPTA) phase. Primary and secondary data were used to assess potential environmental impacts in a comprehensive manner and public consultation and route reconnaissance were carried out in order complete the environmental 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					