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)

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

Prepared for
THE ASIAN DEVELOPMENT BANK

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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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Place	**Buon Ma Thuot, Vietnam**	*Date*	**15-07-2016**
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ACRONYMS AND ABBREVIATIONS

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

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I. EXECUTIVE SUMMARY

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

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

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

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

A. Subproject Summary

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

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

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

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

B. Environment impacts and mitigations

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

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

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

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

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

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

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

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

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

C. Institutional arrangement

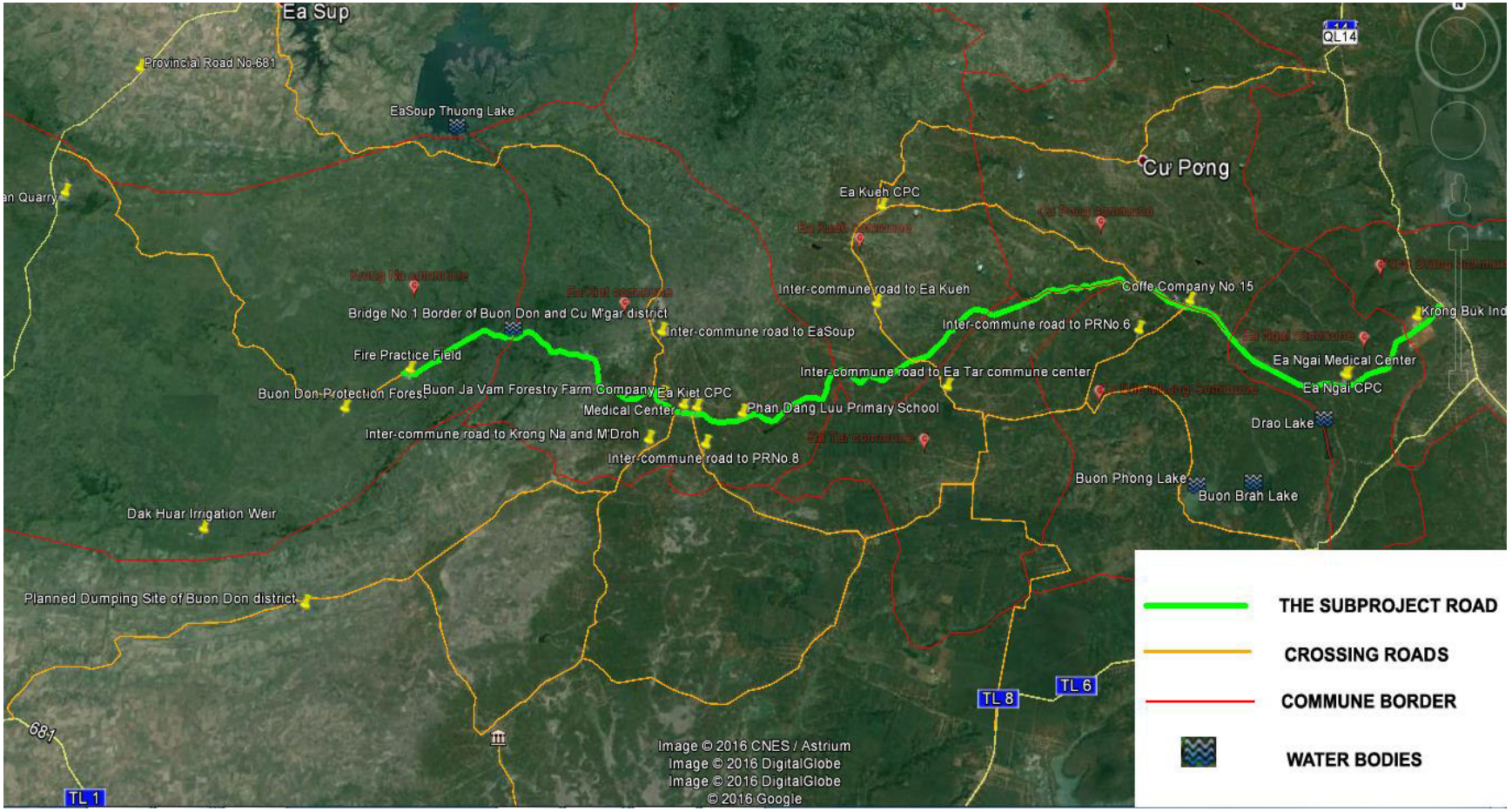
17. Dak Lak PPC has established a Project Preparation Unit (PPU) to support the preparation of the subproject in the PPTA period. One safeguard staff from other ODA Project has been assigned as Environmental Safeguards Officer (ESO) of PPU. Ideally, the ESO will become ESO of Dak Lak PMU in the construction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

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

D. Conclusion

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

Figure 1 – General Map of Dak Lak and Subproject Area



II. BACKGROUND

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

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

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

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

III. POLICY AND LEGAL FRAMEWORK

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

A. Asian Development Bank Requirements

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

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

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

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

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

B. Legal and Administrative Framework for Environmental Protection in Vietnam

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

28. Laws:

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

29. Others

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

- QCVN 14: 2008/BTNMT on domestic wastewater

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

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

IV. DESCRIPTION OF THE SUBPROJECT

A. The need for subproject

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

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

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

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

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

B. Location and scope

36. The subproject will improve road condition of National Road No.29 from Km186+26 to Km226+00 in Buon Don, Cu M'Gar and Krong Buk districts. This road section goes through 08 communes of 03 districts Buon Don, Cu M'Gar, and Krong Buk districts namely Krong Na, Cu Dlie Mnong, Ea Kueh, Ea Kiet, Ea Tar, Cu Pong, Ea Ngai and Pong Drang with total length of 40km. The expected results of construction of the road is to create arterial roads, transport corridors from west to east, connecting traffic from Vung Ro port of Phu Yen province, National Highway No.1 to Dak Rue border gate - Chi Miet leading to other provinces of Cambodia, Laos and connecting to the Northeast of Thailand. When National Road No.29 crossing Dak Lak province is completely invested, it will facilitate movement, goods transporation, commercial connectivity, promotion of socio-economic development for the area along the road, creating conditions for the formation of Dak Rue - Chi Miet border economic zone.

37. The last 5 km section of the subproject is going through Buon Don Protection forest. The protection forest has been established in 2008 with the total area of 10,229 ha to reserve the specific Dipterocarp forest of Central Highlands. This is the natural forest and has been evaluated as "poor" forest by an investigation in 2015. Buon Don Protection Forest Management Board has 20 staff with 4 of them belong to Unit No.7, located at the roadside near the end point of the subproject route.

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

+ Road base width: 9 m.

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

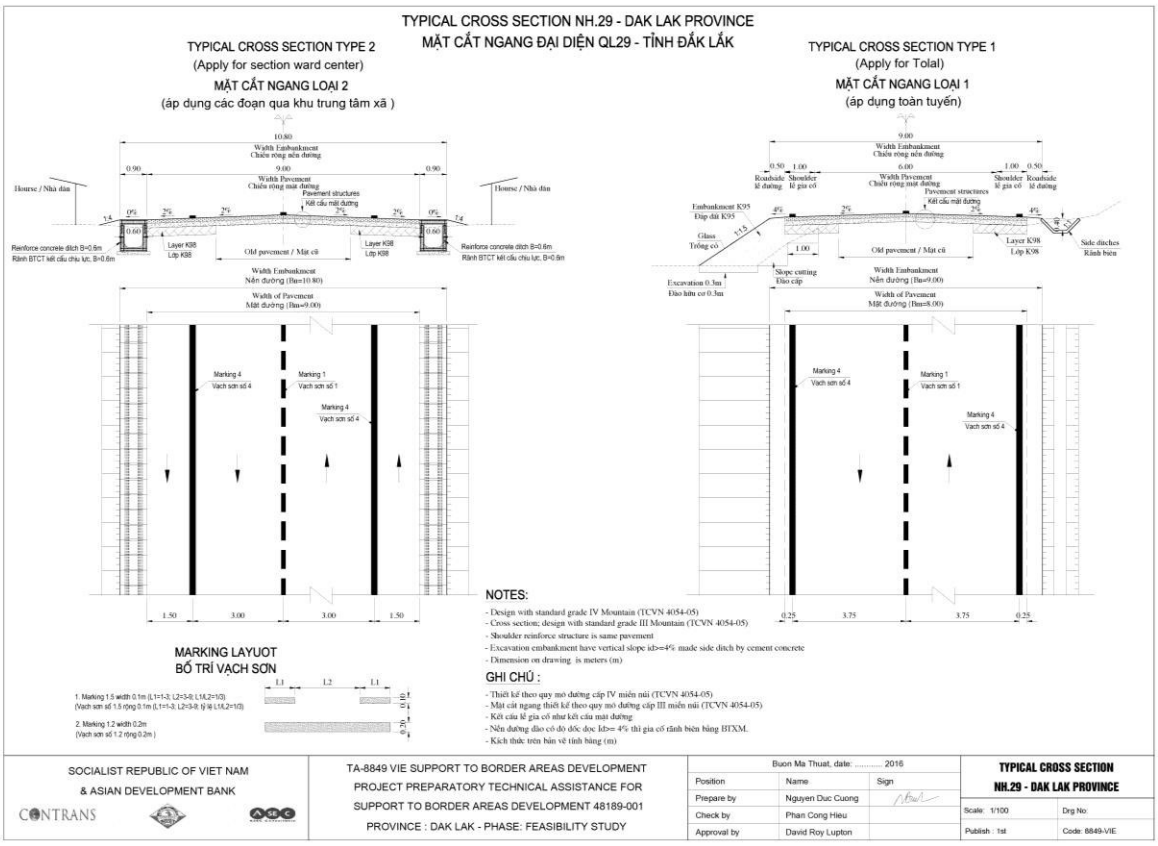
+ Improved roadside width (same material with road surface): 2x0.5m

+ Soil roadside width: 2x0.5m

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

+ Axle load for road surface: 100 KN.

Figure 2 – Typical Cross Section of the National Road No.29



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

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

41. As the subproject road goes through 3 high denstiy population area of Ea Kiet, Cu Pong and Ea Ngai commues, Cu M'Gar and Krong Buk district, the worker camps and large material stockpiles will be located at least 100 m away from these areas. Moreover, no worker camps and large material stockpiles will be located at the last 5 km section as it goes through Buon Don Protection Forest.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

No.	District/ Commune	House (m^2)	Fence (m)	Steel roof (m^2)	Gate (m^2)	Concrete Yard (m^2)	Culvert (each)	Power transformer station (each)	Electric pole (each)	Biogas tank (m^3)
A	**Krong Buk**	**0**	**509**	**55**	**42**	**3,124.82**	**221**	**0**	**1**	**0**
1	Cu Pong	0	64	0	0	2,214.0	48	0	1	0
2	Ea Ngai	0	445	55	42	910.82	173	0	0	0

B	**Cu M'Gar**	**10**	**367**	**21**	**4.9**	**2,307.85**	**133**	**2**	**1**	**6**
3	Ea Kiet	0	96	21	4.9	994.85	37	1	1	6
4	Ea Tar	0	20	0	0	0	0	0	0	0
5	Ea Keuh	0	251	0	42	291.0	20	1	0	0
6	Cu Dlie Mnong	10	0	0	0	1,022.0	76	0	0	0
	Total	**10**	**876**	**76**	**88.9**	**5,432.67**	**381**	**2**	**2**	**6**

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

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

Table 3 – Estimated budget of the subproject implementation

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

					29/9/2009
4	Shop drawing cost (*1,2 design improvement)	0.909%*CPXD*1,2	3 587 277 645	160 864	Decided 957/QD-BXD dated 29/9/2009
5	Survey cost for shop drawing (Calculation temporary 120 mil vnd/km)	Temporary	4 800 000 000	215 247	
6	Establish bidding document; Evaluation bidding document cost	0.2%*GGT	100 000 000	4 484	Decree 63/2014/ND-CP dated 26/6/2014
7	Supervision cost	0.97%*CPXD	2 170 906 293	97 350	Decided 957/QD-BXD dated 29/9/2009
8	Verification shop drawing cost	0.05%*CPXD	169 884 663	7 618	Decided 957/QD-BXD dated 29/9/2009
9	Verification estimates cost	0.05%*CPXD	160 816 056	7 211	Decided 957/QD-BXD dated 29/9/2009
10	Others cost for consultant (temporary)	0.50%*CPXD	1 733 092 625	77 717	
V	**OTHERS**		**27 882 252 000**	**1 250 325**	-
1	Clearance mine cost (calculation temporary:: 5000đ/m2)		**2 312 708 200**	**103 709**	
2	General cost		**19 364 018 875**	**868 342**	
2.1	Temporary housing cost	2.0%*CPXD	6 932 370 500	310 869	
2.2	Others undefined cost (2%)	2.0%*CPXD	6 932 370 500	310 869	
2.3	Mobilization and remobilization cost (calculation temporary)	0.5%*CPXD	1 733 092 625	77 717	
2.4	Ensuring transport cost (Calculation temporary)	1.0%*CPXD	3 466 185 250	155 434	
2.5	Setup Asphalt plant station	Temporary	300 000 000	13 453	
3	Insurance works cost (Temporary)	0.42%*CPXD	1 455 797 805	65 282	Decided 33/2004/QD-BTC dated 12/4/2004
4	Expertise fees (*TMDT)	0.009%*TMDT	34 439 250	1 544	
5	Verification fees for design document	0.01%*CPXD	37 021 765	1 660	Circulars 75/2014/TT-BTC dated 12/6/2014
6	Verification fees for estimate document	0.01%*CPXD	35 131 119	1 575	Circulars 75/2014/TT-BTC dated

					12/6/2014
7	Expertise fees for Bidding document and result bidding	0.1%*GGT	100 000 000	4 484	Decree 63/2014/ND-CP dated 26/6/2014
8	Approval settlement report fees	0.28%*TMDT	1 073 891 250	48 157	Circulars 09/2016/TT-BTC dated 18/01/2016
9	Audit cost (*TMĐT)	0.409%*TMDT*1, 1vat	1 736 150 625	77 854	Circulars 09/2016/TT-BTC dated 18/01/2016
10	Others (Temporary)	0.5%	1 733 092 625	77 717	
VI	**CONTIGENCY**		**99 014 763 000**	**4 440 124**	-
	Variation works cost	10%	39 605 905 000	1 776 050	
	Inflation cost	15%	59 408 857 500	2 664 074	Indicator construction

V. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

1. Topography, Geology, and Soils

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

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

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

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

2. Hydrology and Climate

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

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

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

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

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

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

3. Surface and ground water

Surface water resources and quality

59. There is no large water body located along the subproject route. The largest lake is EaSoup Thuong lake – about 6 km from the route in Buon Don district. There are also several small irrigation lakes along the subproject road with the distance varied from 200 m to 3 km. Due to the serious drought situation in the subproject area recent years, many irrigation lakes have dried up in the dry seasons like Buon Thai and Buon Vin lakes in Ea Kueh commune, Cu M'gar district. According to the result of surface water monitoring of Dak Lak[2] in 2015 with the monitoring parameters are pH, COD, BOD5, DO, NH4+, NO3-, phosphate, chlorine, iron, copper, zinc, lead, cyanide, arsenic coliform, oil by Center for Environmental Monitoring and Analysis, under Dak Lak DONRE, the surface water quality is still in good condition with most of the analyzed parameters are still under the QCVN 08:2008/BTNMT – National Technical Regulation on Surface Water Quality. The nearest sampling location for surface water quality to the subproject is EaSoup Thuong Lake – about 6 km from the subproject road. Only NO_2- parameter is higher than allowed level in most of the sampling locations.

Underground water resources and quality

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

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

4. Natural Disaster

62. Based on the result of the PPTA investigation with local people along the subproject road, the main natural disasters in the recent years are drought and tornado. Tornados usually

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

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

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

5. Air quality and noise

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

B. Biological Environment

1. Agriculture

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

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

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

- Area	ha	905	1,306	982
- Productivity	Ton/ha	2.2	2.97	2.6
- Output	Ton/year	1.011,3	2,336.40	1,274
d. Rice				
- Area	ha	387.5	2,725.44	2,653
- Productivity	Ton/ha	8.0	6.23	5.39
- Output	Ton/year	1,188.7	16,979.49	14,305
e. Cassava				
- Area	ha	890	785	1,840
- Productivity	Ton/ha	7.5	30	11.5
- Output	Ton/year	6,675.0	23,548	21,130
f. Corn				
- Area	ha	1.868	10,638	7,354
- Productivity	Ton/ha	11.2	6.43	5.13
- Output	Ton/year	10,495.6	68,430.5	37,695

2. Forestry

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

3. Faunna and Flora

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

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

69. In accordance to a survey of Animal Resources Institute, there are 598 bird species under 46 families in Dak Lak; 228 mammal species in 26 families; 129 reptile species under 12 families; 79 amphibian species in 5 families; 96 fish species and other species... In particular there are rare species such as the elephant, tiger, leopard, gaur, bear, brow-antlered deer, Indian hog deer, flying squirrel... However, they are now mainly concentrated in national parks and nature reserves of Dak Lak like York Don, Chu Yang Sin, Nam Ka. The nearest biodiversity

conservation area to the subproject road is York Don National Park, which is more than 16 km away from the end point of the road.

C. Socio-economical Condition and Infrastructure

1. Population and Ethnic

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

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

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

Data sources:

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

2. Living Standards:

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

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

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

Data sources:

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

3. Employment and income

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

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

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

4. Education and Public Health

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

74. Each subproject commune has one medical clinic with some normal medicines and first aid kits for simple treatment. There is also one medical doctor assigned to work in every commune of the subproject districts. Pong Drang commune, Krong Buk district has two medical

doctors working in the commune but it also has the highest number of drug users with 31 people over 87 people of Krong Buk district.

5. Water supply and electricity cover

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

6. HIV and human trafficking

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

7. Infrastructure

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

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

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

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

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

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

Data sources: .....

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

Table 9 – Health care in the subproject area in 2015

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

Data sources:

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

Table 10 – Infrastructure system in the subproject area

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

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

Data sources:

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

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

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

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

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

D. Archaeological, Historical and Cultural Treasures

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

E. Key Environmental Features

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

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

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

VI. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

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

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

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

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

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

1. Improper subproject location and design

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

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

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

2. Land acquisition and resettlement

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

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

3. Public facilities affected and relocation

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

4. Disturbance of unexploded mine and bomb (UXO)

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

B. Potential impacts and mitigation measures in the construction phase

1. Loss of trees and impact to faunna

95. ***Impacts:*** The last 5 km of the subproject road goes through Buon Don Protection Forest with two subzones of 454 and 436. The forest is now under the management of BPMB to protect the specific dry Dipterocarp forest of Central Highlands. The construction activities could have severely negative impact to the forest as trees could be cut down for construction activities and for using as fuel woods for bitumen or water heating. Forest fire could also be happened due to careless construction activities. Some kind of wild animals will be affected from the noise and vibration of construction activities or being hunted by the construction workers. However, as it is the poor forest with only few small trees and shrubs, no large wild animal has been found in recent years, the negative impacts could be minimized through suitable mitigation measures. There are only some trees from local garden along the road will be cut down: 30 coffe trees, 31 pepper tree poles, 122 timber trees, 30 fruit trees and nearly 400 curry trees.

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

2. Impact on local facilities

96. ***Impacts:*** As the first 36 km of the subproject road goes through 3 main residential areas in Ea Kiet, Cu Pong and Ea Ngai commues, Cu M'Gar and Krong Buk district. The water

supplies, electrical power supply, and telecommunications, drainage systems of these areas could be maintained during the works. It will affect local people in their daily activities. It is minor impact as the road will be upgraded based on the existing foundation and no current public infrastructures will be relocated. The impact will be happened in 24-month of construction and stop upon the construction complete.

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

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

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

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

4. Generation of excavated soil

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

road and near the temporary dumping sites could be affected by soil erosion from these temporary dumping areas. This is a minor impact as in the negative side, the subproject road will be upgraded base on the existing foundation so the levelling work is minimized and the volumes of spoil will be not much. On the other hand the flat terrain along the subproject route is also minimizing the filling soil volume. The vacant land areas along the road are still available for temporary dumping area of spoil. In the positive side: local people could use the spoil for their garden or house foundation.

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

5. Generation of construction waste and domestic waste from workers

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

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

6. Impact from hazardous materials and hazadous waste disposal

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

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

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

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

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

8. Impact on crossing streams or bridge construction locations

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

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

9. Employment or livelihood benefits from employment of local people

110. ***Impacts:*** Contractors will use local labour for simple works such as smooth the road, moving soil, give priority to poor families, female householders, woman if they need jobs. It aims to raise their income, create more jobs and contribute to poverty reduction for local community. Local people in the residential area of 8 subproject communes will have benefits from the subproject construction. However, this is a small positive impact and it requires the coordination between the contractor and CPCs of subproject communes and nearby communes in recruiting

local labors (contractors often prefer to engage their own trained workforces rather than training unskilled laborers). The duration of the impact is also short, only in 24 months construction time.

10. Impact on water resources and quality

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

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

11. Impact by the large influx of construction worker

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

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

unskilled labourers). The duration of the impact is also short, only in 24 months construction time.

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

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

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

13. Impact on the local traffic

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

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

14. Environmental impacts due to inappropriate enivronmental recovery responsibility

Impacts: If after construction work has been completed, the sites are not cleaned up, construction and domestic waste will pollute surrounding environment. If site restoration such as replanting trees; grass; filling up construction pit; removing camp site have not been

implemented in accordance with environmental regulation then the environmental issues like erosion, sedimentation and accident may occur. Construction waste and waste soil could also impact on the soil quality of the temporary acquired land area.

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

C. Potential impacts and mitigation measures in the operation phase

1. Increase access to the forest

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

119. ***Mitigation measures:*** A better road condition will support movement and good transportation along National Road No.29, thus support Forest Management Board and other forestry production management organizations in forest patroling and forest fire prevention. On the other hand, a coordinating regulation between the management unit of the road in the operation phase, Buon Don Protection Forest Management Board, Buon Don DPC, and Krong Na CPC will be established. This regulation will define the coordinating principles and set up suitable control system in order to provide the forest management unit information on illegal forest encrouchment in time.

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

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

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

3. Favorable conditions for transportation of goods and people movement

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

4. Driving conditions and community safety

123. ***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.

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

5. Affects on employment or livelihood

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

6. Impacts on ethnic groups

126. ***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

127. 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

128. Stakeholders are people, groups, or institutions that may be affected by, can significantly influence, or are important to the achievement of the stated purpose of a proposed intervention. The stakeholders consulted for the construction of the National Road No.29 included representatives from Dak Lak DPI, DONRE, DARD, DOT, relevant Divisions of Krong Buk, Cu M'Gar and Buon Don districts, York Don National Park Management Board, Buon Don Protection Forest Management Board. Consultation has also been implemented with representatives from 8 CPCs in the 3 districts. The consultation for local authorities has been conducted in mutual information exchange to get information from relevant authorities as well as record their concerns on potential environmental impact of the subproject implementation. Several local people living along the subproject road have been consulted using questionnaire and concentrated on the inconvenient condition for local people during the construction phase of the subproject. There are 36 local people have been interviewed with 13 of them are women. Consultations took place in April 2016.

B. Information dissemination during public consultation

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

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

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

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

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

130. 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

131. The results of the public consultations are recorded in Table 11 and 12 below. In general, all the relevant stakeholders are support the implementation of the subproject. As the subproject road foundation has been constructed long time ago, the subproject will mainly upgrade the road surface based on the existing foundation, no house must be relocated and no major land acquisition will be taken, the local people is totally support the subproject implementation.

Table 11 – Main issues and information from local authorities

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

Table 12 – Main environmental concerns from public consultation

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

132. The environmental assessment process under the SPS 2009 requires the disclosure of the IEE to the public during the completion of the IEE to be in strict adherence to the rules. This process will be concluded by displaying the IEE at the PPC Headquarters during the period when the IEE is disclosed on the ADB website. Dak Lak PMU will responsible for IEE translation to suitable local language and disclose at 8 subproject communes of Krong Buk, Cu M'Gar and Buon Don districts.

VIII. GRIEVANCE REDRESS MECHANISM

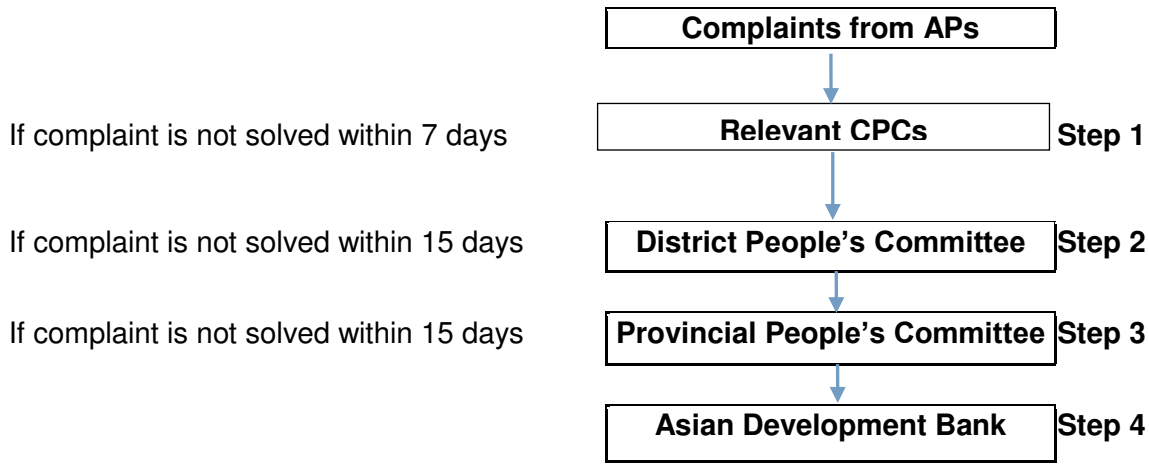
A. Purpose of the mechanism

133. 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

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

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



IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation arrangements

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

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

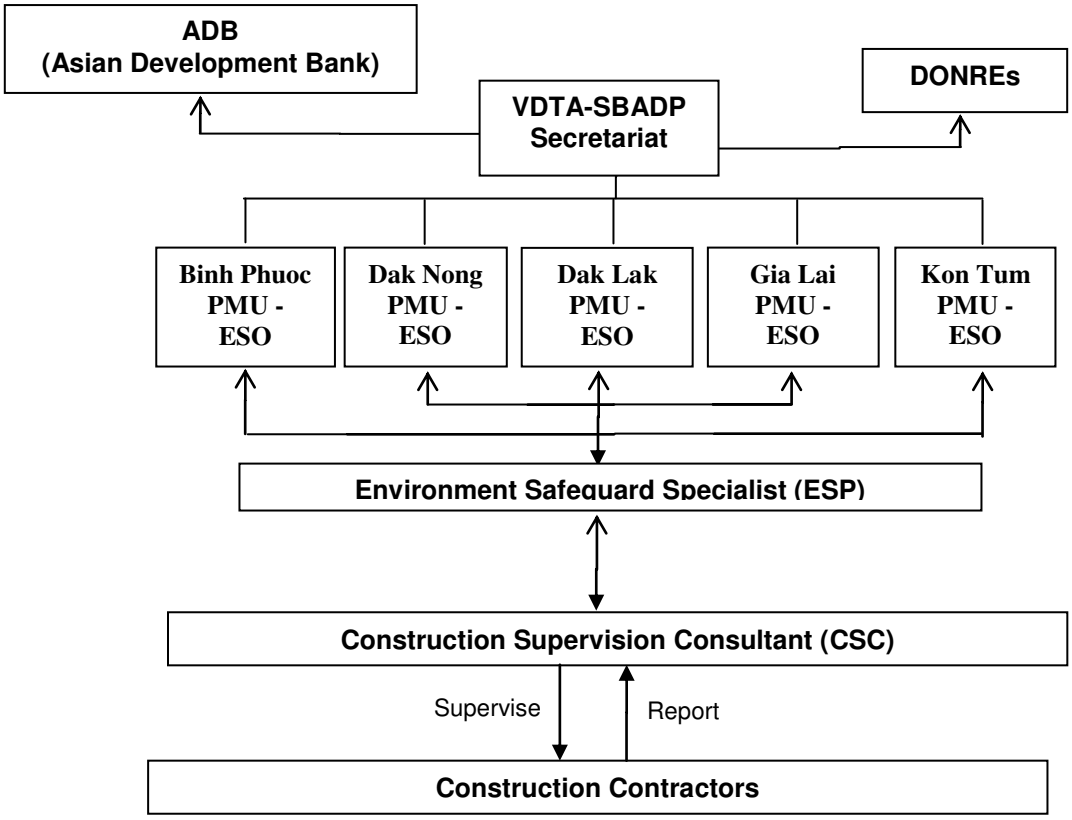
Table 13 – Responsibilities for EMP implementation

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

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

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

Figure 3 – EMP Implementation Organization Chart



B. Emergency Response Plan

135. The main type of emergency cases covered by the subproject are (i) spills: transportation accident of vehicles; spills during material handling operations or transport; overflow of contaminated water; spilling contents of infectious solid wastes… (ii) fire and explosion: machines, property or waste container; (iii) personal injury: traffic accident, work accident (heart attack, serious fall, severe injury...) or contact with chemical; (iv) natural disaster: flash flood, landslide, tropical storms...

136. Emergency Control Team (ECT): In construction phase, the Contractor will establish an ECT from the worker at site. The Team will have the responsibility of providing first response actions in an emergency case. The tasks of the Team including organizing the necessary resources, communications, and evacuation of people and implement corrective actions that may be necessary to return the emergency case back to normal. All member of the team should be trained to implement suitable actions for certain emergency case. Team member should also be physically capable; have certain leadership qualities and command authorities; have clear diction; good decision making skills; and be able to remaining calm under pressure.

137. With the four types of emergency case listed in paragraph 135 above, ECT will have to control and response as follow:

- In major emergency case, the role of the ECT is to ensure that the damage or danger caused by the emergency is controlled or minimized until external professional aid arrives. The Team leader will assign team member for appropriate case.

- Rescue and first aid: One member of the Team will have main response for this action called First Aid Officer. The task is render assistance in removing any injured person from the accident location and to provide effective management of injuries until the Ambulance arrives on-site.

- Communications: The task of Communication Officer is monitor communication and facilitates the effective information exchange between construction site and the suitable State Organizations (Polices, Ambulance, Fire workers…). The communication methods could be air horn or alarm gong (warning system), internal phone system (walkie-talkie…) and mobile phone.

138. The ECT Leader is response for exchange information with external sources (people in surrounding communes, media…)

- Traffic Control: The Traffic Control Officer will be responsible for ensuring the free flow of traffic at the site and adjacent area. He/she may be involved in remove block vehicle/ object.

- Fire detection: Smoke detectors are fitted in the construction and worker camps. Smoke detectors are connected as part of an early warning system. People would raise a Site alarm whenever recognized fire. Members of ECT should be trained in the use of advanced fire fighting techniques and equipment including the use of fire hydrants, water cannons, fire extinguishers and hose reels.

- Site evacuation: The Team Leader will determine and control the evacuation of the site. When emergency grow over the manageable level, the Team leader will direct team member to evacuate people from the site. The Team Leader should have the on-site people checklist to mark names and ensure all people have been safely evacuated.

139. When an emergency case has been identified, the Site Leader/ Contractor Director shall immediately be informed. For certain case, the State services shall be contacted by calling 113 (Police), 114 (Fire worker) or 115 (Ambulance). An information checklist of the ECT and external emergency services is required to present throughout the construction site.

C. Environmental mitigation plan

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

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

Table 14 - Detail Environmental Mitigation Plan

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

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

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

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

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

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

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

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

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

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

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

D. Environmental monitoring

1. Compliance Monitoring

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

143. 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.

144. 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.

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

146. 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.

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

2. Environmental Effects Monitoring

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

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

Table 15 - Environmental Monitoring Compliance

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

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

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

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

E. Reporting

149. PMU will submit the following reports to ADB:

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

Table 16 – Reporting procedures

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

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

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

F. Capacity building

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

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

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

Table 18 – Detail capacity building program

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

152. 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.

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

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

XI. APPENDIXES

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

Starting point in Krong Buk Industrial Zone

Existing bridge at Km220+527.45

Current condition of Buon Don Protection Forest

Coffe cultivation area in Ea Kueh commune

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

Through residential area - Ea Kiet commune

B. Appendix 2: Environmental criteria for subproject selection

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

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

C. Appendix 3: Sources of reference information

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

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

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

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

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

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

E. 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	Dissolved oxygen (DO)	mg/l	≥ 6	≥ 5	≥ 4	≥ 2
3	Total suspended solidss (TSS)	mg/l	20	30	50	100
4	COD	mg/l	10	15	30	50
5	BOD_5 (20^0C)	mg/l	4	6	15	25
6	Ammonium (NH^+_4) (as N)	mg/l	0,1	0,2	0,5	1
7	Clorua Chloride (Cl^-)	mg/l	250	400	600	-
8	Florua Fluoride (F^-)	mg/l	1	1,5	1,5	2
9	Nitrite (NO^-_2) (as N)	mg/l	0,01	0,02	0,04	0,05
10	Nitrate (NO^-_3) (as N)	mg/l	2	5	10	15
11	Phosphate (PO_4^{3-}) (as P)	mg/l	0,1	0,2	0,3	0,5
12	Xianua Cyanide (CN-)	mg/l	0,005	0,01	0,02	0,02
13	Asen (As)	mg/l	0,01	0,02	0,05	0,1
14	Cadimi (Cd)	mg/l	0,005	0,005	0,01	0,01
15	Lead (Pb)	mg/l	0,02	0,02	0,05	0,05
16	Chrom III (Cr^{3+})	mg/l	0,05	0,1	0,5	1
17	Chrom VI (Cr^{6+})	mg/l	0,01	0,02	0,04	0,05

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

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

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

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

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

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

3. METHOD FOR DETERMINATION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4. IMPLEMENTATION ORGANIZATION

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

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

QCVN 09 : 2008/BTNMT

NATIONAL TECHNICAL REGULATION

ON UNDERGROUND WATER QUALITY

Introduction

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

NATIONAL TECHNICAL REGULATION

ON UNDERGROUND WATER QUALITY

1. GENERAL PROVISIONS

1.1. Scope of application

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

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

1.2. Explanation of terms

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

2. TECHNICAL REGULATIONS

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

Table 1: Limit values of the underground water quality parameters

No.	Parameters	Unit	Limit values
1	pH	-	5,5 - 8,5
2	Hardness (as CaCO3)	mg/l	500
3	Total solids	mg/l	1500
4	COD ($KMnO_4$)	mg/l	4
5	Ammonium (as N)	mg/l	0,1
6	Chloride (Cl-)	mg/l	250
7	Fluoride (F-)	mg/l	1,0
8	Nitrite (NO^-_2) (as N)	mg/l	1,0
9	Nitrate (NO^-_3) (as N)	mg/l	15
10	Sulgreasee (SO_4^{2-})	mg/l	400
11	Cyanide (CN-)	mg/l	0,01
12	Phenol	mg/l	0,001
13	Asenic (As)	mg/l	0,05

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

3. METHOD FOR DETERMINATION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4. IMPLEMENTATION ORGANIZATION

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

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

QCVN 05:2013/BTNMT

NATIONAL TECHNICAL REGULATIONS ON AMBIENT AIR QUALITY

Introduction

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

National Technical Regulation on Ambient Air Quality

1. GENERAL PROVISIONS

1.1. Scope of applications

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

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

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

1.2. Interpretation of terms

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

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

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

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

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

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

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

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

2. Technical Reputation

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

Table 1: Maximum value of basic parameters of ambient aire

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

No.	Paramater	Average 1 hour	Average 8 hours	Average 24 hours	Annual average
1	SO_2	350	-	125	50

2	CO	30.000	10.000	-	-
3	NO_2	200	-	100	40
4	O_3	200	120	-	-
5	Total Suspended Particle (TSP)	300	-	200	100
6	Dust PM_{10}	-	-	150	50
7	Dust $PM_{2,5}$	-	-	50	25
8	Pb	-	-	1,5	0,5
Note: (-) unspecified					