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)

CONSTRUCTION OF PROVINCIAL ROAD NO.675A

Prepared for
THE ASIAN DEVELOPMENT BANK

July 2016

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In joint venture with Transport Engineering Consultant Joint Stock Company No.2 (TECCO2) (Vietnam) and
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CURRENCY EQUIVALENT
(As of 15th July 2016)

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

WEIGHTS AND MEASURES
km^2 – square kilometre
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
ASEAN	Association of Southeast Asian Nations
CLV-DTA	Cambodia – Lao PDR – Vietnam Development Triangle Area
CPC	Commune People's Committee
CSC	Construction Supervision Consultant
DARD	Department of Agriculture and Rural Development
DONRE	Department of Natural Resources and Environment
DOT	Department of Transportation
DPC	District People's Committee
DPI	Department of Planning and Investment
ECT	Emergency Control Team
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
ESO	Environmental Safeguards Staff
ESP	Environmental Safeguard Specialist
GMS	Greater Mekong Sub-region
IEE	Initial Environmental Examination
IPM	Integrated Pest Management
LEP	Law on Environmental Protection
MONRE	Ministry of Natural Resources and Environment
MMP	Materials Management Plan
MPI	Ministry of Planning and Investment
PPU	Project Preparation Unit
PPC	Provincial People's Committee
PPE	Personal Protective Equipment
PMU	Provincial Project Management Unit
PPTA	Project Preparatory Technical Assistant
ROW	Right of Way
SPS	Safeguard Policy Statement
SST	Subproject Support Teams
The PPTA	The Project Preparatory Technical Assistant Consultants
The Project	Support to Border Areas Development Project
The Subproject	Construct Provincial Road No.675A

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

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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]. The Central Highlands is also the second largest rubber plantation area in Viet Nam, mainly in Dak Lak province.

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

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

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

A. Subproject Summary

3. The provincial road No.675A in Ia Tang, Sa Thay district and Ia Dal, Ia Toi communes, Ia H'Drai district was the short-listed sub-project in Kon Tum province. The Subproject will upgrade 58.7 km of earth road in Section 1 and construct 12.1 km roads in Section 2 of provincial road No. 675A. The start point of the subproject is the junction with Provincial Road No. 675 in Ia Tang commune, Sa Thay district and the end point is Ho Da Auxiliary Border Gate through Ia Toi and Ia Dal communes of Ia H'Drai district. Along the Section 1 of the subproject are vast rubber plantation area; Se San River and Reservoirs of SeSan 3A and SeSan 4 Hydropower Plants; 15 km natural forest and other small cultivation area of the rubber workers (Duy Tan Rubber Company) in village No.7 and Village No.9, Ia Dal commune, Ia H'Drai district. Along the section 2 of the subproject are mainly rubber plantation area of Chu Mom Ray Rubber Company; Sa Thay River cross the route at Km83+534.76 and village No.4 for the workers of Chu Mom Ray Rubber Company in Ia Toi commune, Ia H'Drai district.

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

4. The subproject route, with a total length of 70.8 km, goes from North East to South West of the district through the area of Ia Toi and Ia Dal communes. The subproject will upgrade two sections with cement concrete with detail information as follow:

- Section 1 from junction with Road No.675 to junction with Road No.14C – total of 58.7km will be upgraded to Rural Road Type B in accordance TCVN 10380:2014 (road base: 5m; road surface: 3.5m; road side: 2x0.75m).
- Section 2 from junction with Road No.14C to Ho Da Auxiliary Border Gate will be constructed to Grade V Mountain in accordance to TCVN4054-05 road base: 6.5m; road surface: 3.5m; road side: 2x1.0m).

5. There are total 11 crossing river/ streams along the route with 3 crossing river/ streams for Section 2 and 8 crossing stream for Section 1. Ya Toi Bridge at Km58+556 in Section 1 is now already under construction by Provincial budget. 10 bridges will be newly constructed along the route. These bridges have been designed in a suitable way with the road grade and based on 100 years water level. The result has showed that the peak in 100 years has been reached at the historical flood in 2009. The bridge, location and design information is listed in Table 1 below.

Table 1 – Number of bridges and designed elevation based on 2009 peak water level

No.	Location	Name (river/ stream)	Section	Designed Length (m)	Designed elevation MSL (m)
1	Km24+802	Yari stream	1	81.75	247.31
2	Km25+763	Stream No.2	1	35.3	247.3
3	Km29+619.28	Stream No.3	1	37.5	247.8
4	Km36+449.01	Ya Blook stream	1	45.7	280.8
5	Km49+069	Ya Doi Stream	1	47.1	221.92
6	Km50+012	Ya Ko Ring Stream	1	45.4	222.96
7	Km52+883.57	Ya Mo Nang Stream	1	39.9	219.43
8	Km83+534.76	Sa Thay River	2	175.8	156.76
9	Km89+262.96	Stream No.4	2	38.1	202.49
10	Km90+390.74	Stream No.5	2	47.1	201.36

B. Environment impacts and mitigations

6. The Project has been ranked as B on environmental issues during the Project Concept note as it has few potential significantly adverse impacts and none of them are irreversible. The initial environmental concern is the potential negative impact of the subproject implementation on natural forest located 15 km along Section 1 of the subproject road (from Km60 to Km74). The completion of the road will provide access to the forest; potentially creating favourable conditions for wood logging and forestry product exploitation. The completion of the road could also facilitate land use change from natural forest to agricultural plantation as this land area has already been handed over to Duy Tan Rubber Company and Sa Thay Forestry Company.

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

8. In the design, preconstruction phase, the potential impacts have been identified relating to (i) improper road surface material and construction method selection; and (ii) land acquisition and resettlement. To minimize the first impact, cement concrete has been selected as the road surface material to ensure the road quality and longevity and prevent landslide, road erosion during the operation phase. To minimize the impact on income and disturbance of local people's lives, PMU will check and review the Land acquisition and resettlement process before the construction starts to ensure that all affected households have received compensation adequately in accordance with the current provincial market and ADB safeguard Policy be implemented.

9. The potential negative impact in the construction phase has been identified as (i) forest encroachment in the 15 km along the natural forest. To minimize the impact, a close collaboration between Kon Tum Project Management Unit (PMU), Environment Safeguard Specialist (ESP); Sa Thay Forestry Company, Duy Tan Rubber Company, relevant Divisions of Ia H'Drai district, Forest Ranger, Kon Tum DONRE, Construction Supervision Consultant (CSC) and Contractors will be established to identify, manage and control the construction activities along the section 1, especially from Km60 – Km74 for tree cutting and vegetation clearance activities and to ensure construction activities will be done properly on the existing road foundation. Workers should be informed and prohibited from cutting trees for firewood and for use in the subproject activities before construction starts.

10. (ii) Careless construction and poor materials control can cause blockage to river/ streams at 11 crossing locations. Runoff water during its rain could bring waste and soil into the rivers and stream. That could lead to siltation and reduce the water quality of Se San and Sa Thay River and affect downstream users in Ia Khai and Ia Grai districts (down stream of Se San River) or some residential areas in Cambodia (down stream of Sa Thay River). The eleven crossing streams/ rivers, especially Sa Thay river could be affected by the construction activities, as a bridge will be newly constructed or to replace the existing bridge. The proposed mitigation measures are to store lubricants, oils and other construction material stockpiles on impervious ground with covers or roof at least 100m away from streams/ rivers; install sediment ditches, silt fences at the area with high potential of runoff, erosion and sedimentation.

11. (iii) The operation of construction machines and material transportation could damage local facilities such as low-voltage electricity lines, communication cables, existing drainage system and other roads in the subproject area (NR14C, PR675...) They will also impact on local traffic; increase the risk of work accidents and traffic accidents especially in sensitive areas such as commune administration centre, medical centres, schools, kindergartens. Dust, noise and vibration from construction machines such as concrete mixing plants or trucks could disturb local people, damage their houses, increase risk of respiratory and skin diseases. However, this is a minor impact as the low population density of the subproject area and people living along the road are mainly rubber plantation workers from Chu Mom Ray and Duy Tan Rubber Companies. To minimize the impact, the contractor will collaborate with relevant authorities to set up detailed plans for machines and workers mobilization as well as a material transportation plan; inform in advance that plan to local authorities and local people in accordance with that plan, while PMU, CSC and relevant authorities will monitor the compliance of the contractor in applying designated mitigation measures. If any buildings, structures in the subproject area are damaged by construction activities, the contractor should compensate them adequately at their own expense.

12. In the operation phase, the potential negative impact has been identified as relating to an increased chance of access to the natural forest along Section 1 and changing land use from natural forest to cultivation land; dust and noise arising from increasing of traffic density and higher risk of traffic accidents as a result of better driving conditions. To minimize the negative impacts, Kon Tum Department of Transportation (DOT), the responsible agency for subproject management in the operation phase, will cooperate with Kon Tum DONRE, Ia H'Drai DPC, Ia Dal CPC, Sa Thay Forestry Company and Duy Tan Rubber Company in forest management, will periodically maintain the road, and will install speed limit, warning signs or road humps (if applicable) at sensitive areas along the road such as kindergartens, medical centres etc.

13. The PPTA Consultant has also identified key stakeholders and conducted public consultations from provincial to commune level with a focus on the affected people's views. The main concerns are (i) risk of forest fire during construction phase, especially in dry season along the section with natural forest. (ii) fallen material from transportation trucks will increase risks of accident along the road. (iii) unfinished work at bridge construction areas could lead to landslides, soil erosion and runoff when it rains, impacting on the cultivation area of local people. (iv) impact on the natural forest as land use changes in the operation phase. All of these concerns are addressed in the EMP (See Table 11 – 12 for more details).

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

C. Institutional arrangement

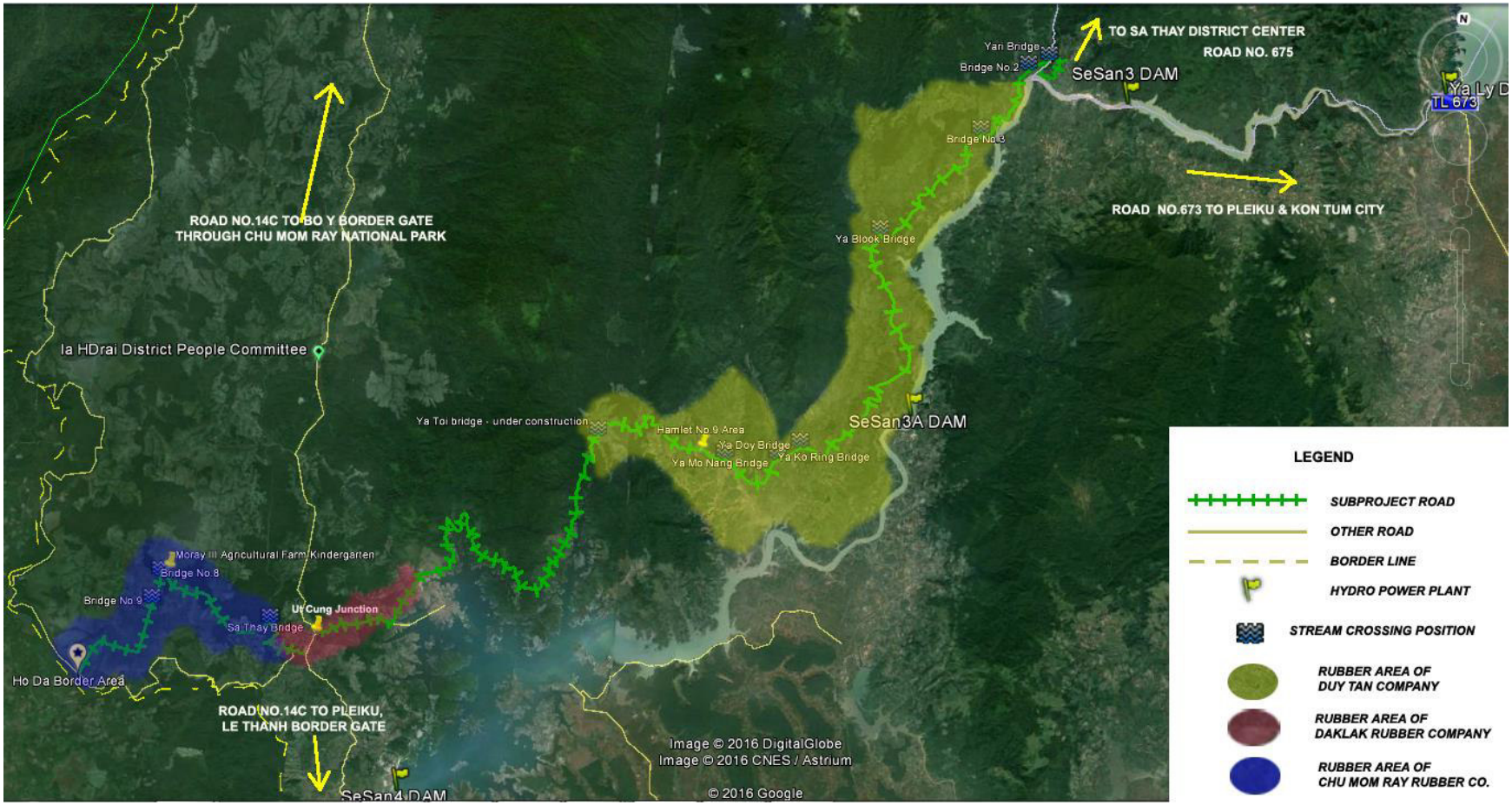
15. Kon Tum Provincial People Committee (CPC) has established a Project Preparation Unit (PPU) to support the preparation of the subproject in the PPTA period. One staff from Kon Tum Department of Planning and Investment (DPI) has been assigned as Environmental Safeguards Officer (ESO) of PPU. Ideally,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

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

D. Conclusion

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

Figure 1 – General Map of Kon Tum and Subproject Area



II. BACKGROUND

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

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

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

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

in actions to maximize the socioeconomic benefits such as impacts on poverty, gender and fair employment practices; (vii) provide project start up support to the government.

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

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

III. POLICY AND LEGAL FRAMEWORK

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

A. ASIAN DEVELOPMENT BANK SPS requirement

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

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

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

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

26. For environmental safeguards, the Project is initially categorized as 'B' for environmental safeguards. Environmental criteria for the long list multi-criteria system has been developed and contributed for the evaluation and short-listed subproject roads. Detail of the environmental criteria could be found in Appendix 03. The subproject has been classified as category A on environmental safeguards will not be short-listed as it will rescale the whole Project to category A on environment

B. Legal and Administrative Framework for Environmental Protection in Vietnam

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

1. Laws:

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

2. Others

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

- QCVN 01: 2009/BYT on drinking water quality
- QCVN 02: 2009/BYT on domestic water quality
- QCVN 08: 2008/BTNMT on surface water quality
- QCVN 09: 2008/BTNMT on underground water quality
- QCVN 14: 2008/BTNMT on domestic wastewater

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

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

IV. DESCRIPTION OF THE SUBPROJECT

A. The need for subproject

28. Ia H'Drai – the Project district of Kon Tum – has officially separated from Sa Thay district in 2015. The district is including three communes: Ia Toi, Ia Dal and Ia Dom. District located at the South West of the province, border with Sa Thay district to the North; Gia Lai province to the South and the East by Sesan River; Ratanakiri province of Cambodia to the West.

29. As the district has a vast area of mountain and valley terrain with large area of natural forest and water bodies, the movement of local people in the district is facing with many difficulties. The main transportation route of the district is National Road No.14C connect from Le Thanh International Border Gate area in Gia Lai province through the district to Bo Y International Border Gate in Ngoc Hoi district of Kon Tum. This bitumen road is in good condition and will also go through Chu Mom Ray National Park, which is located in Ngoc Hoi and Sa Thay districts before reaching the Junction to Bo Y International Park. The new administrative area of the district is also located at the roadside of Road No.14C about 10km to the North of the proposed road.

30. The other main road is the proposed road – Provincial Road No.675A from area near Se San 3 Hydropower Plant to Ho Le Border Protection Station, Ho Da Auxiliary Border Gate. Kon Tum PPC at the Decision No. 599/QD-UBND dated June 23, 2008 and adjusted by Decision No.1159/QD-UBND dated September 29, 2009 has approved the investment of Section 1 of the proposed road with the total length of 58.7km from area near Se San 3 Hydropower Plant to National Road No.14C and No.348/QD-UBND dated June 2015. The foundation, road base and cross drainage system have been constructed. However, in the rainy season, the earth road surface turn into muddy condition and people must travel 120km from district centre to Kon Tum city via Pleiku instead of 90km if travel via the proposed route.

31. Section 2 of the proposed road is currently earth road goes from National Road No.14C to Ho Da Auxiliary Border Gate. The total length of Section 2 is 12.1km and its investment has been approved by the PPC at the Decision No.1536/QD-UBND dated December 31, 2010. Up to now the province still could not find out suitable budget for construction.

32. Upon the completion of the whole route, it will work as a backbone road of the district, connects the district to Kon Tum city and the main residential area of the old Sa Thay district. In accordance to the estimation of Investment Report of Kon Tum DPI, about 42627 tons of the district's agricultural production will transfer through Road No.675A per year with the value up to 36.8 millions USD. It will also be the transportation road for fertilizers, estimated 4841 tons/year with the value up to 24.3 millions USD.

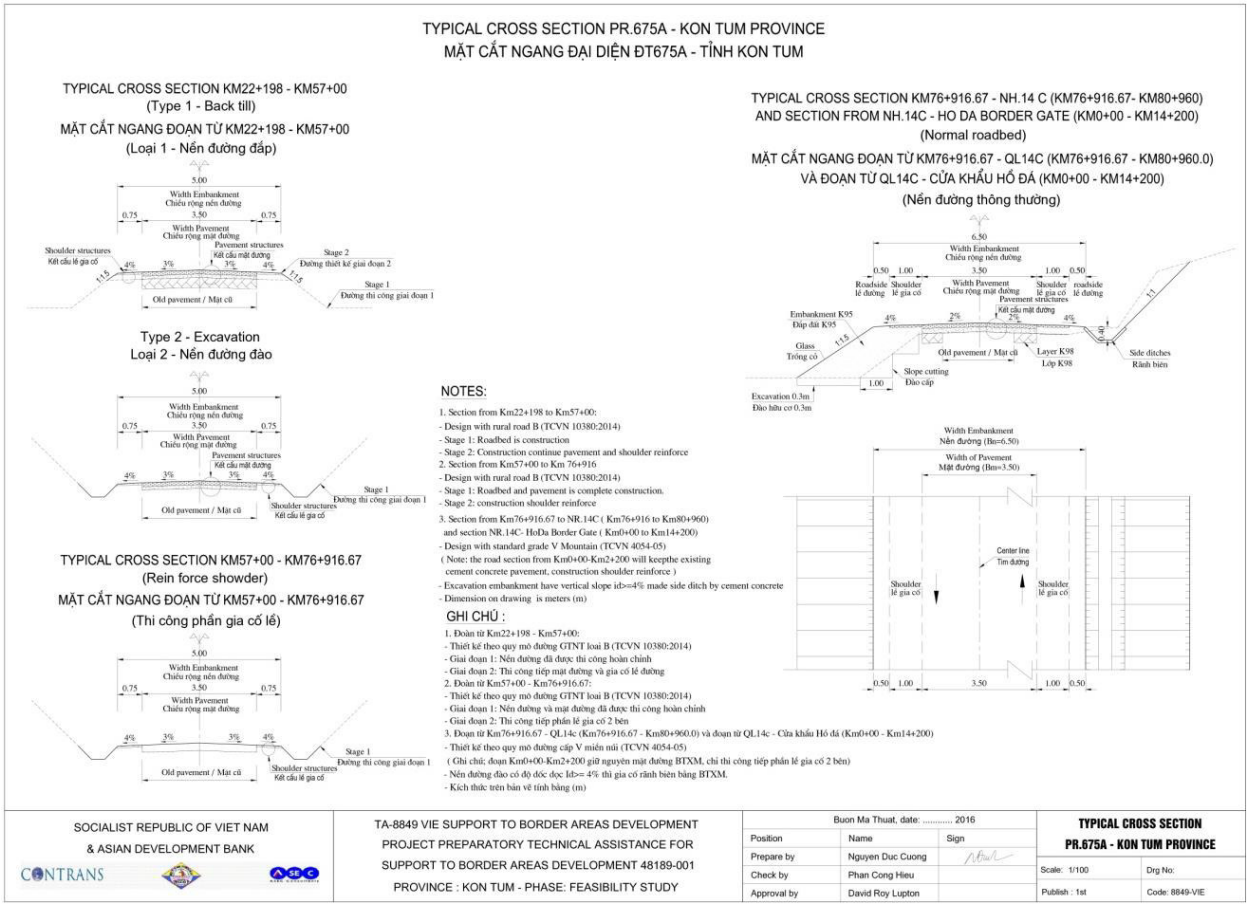
B. Location and scope

33. The subproject is located in Ia H'Drai district and goes through communes of Ia Toi and Ia Dal. When the construction of Provincial Road No.675A is completed, it will facilitate transportation connection of Ia H'Drai - the border district with Kon Tum city and other areas, create good condition for movement and product circulation for the people in the area, especially improve road connection between Ia H'Drai District with potential consumption market, the places creating value-added and encourage income creating activities for non-agriculture business, and promote economic cooperation and development for border area of Vietnam and Cambodia.

34. The subproject route has the total length of 70.8 km, goes from North East to South West of the district through the area of Ia Toi and Ia Dal communes. The subproject will have two section:

- Section 1 from junction with Road No.675 to junction with Road No.14C – total of 58.7km will be upgraded to Rural Road Type B in accordance TCVN 10380:2014 (road base: 5m; road surface: 3.5m; road side: 2x0.75m). The phase 1 for this section has been implemented by provincial budget. However due to budget constraint, only some major items were constructed in the first phase to ensure for basic transport for local people including: i) completed road embankment; ii) drainage culverts; iii) Ia Toi Bridge at Km58+556. The subproject will support the construction of road pavement and other auxiliary works within the existing road embankment. The subproject will also construct 7 remaining bridges of the Section 1.
- Section 2 from junction with Road No.14C to Ho Da Auxiliary Border Gate will be constructed to Grade V Mountain in accordance to TCVN4054-05 road base: 6.5m; road surface: 3.5m; road side: 2x1.0m). According to the proposed alignment, the Government in Border patrol road project has invested the first 2.2 km. The remaining section passes through rubber farm of Chu Mom Ray Rubber Company.

Figure 2 – Typical Cross Section of PR 675A



35. The 15 km section (from Km60 to Km74) of Section 1 goes along the natural forest. The contractor will not locate worker camps and large material stockpiles in that section. Moreover, no worker camps and large material stockpiles will be located close (at least 100m away) to the large water bodies such as 11 river/ stream crossing positions or near Se San 4 hydro power reservoir.

36. The stone source could be used for construction activities in the subproject area is come from quarry and soil mine of Sesan 4A Hydro Power Plant. The stone capacity of the quarry is about 500000m^3 and filling soil could be provided at customer's demands while estimated stone volume for subproject construction is about 123900 m^3. The quarry is located in IA O commune, Ia Grai district of Gia Lai province. The distance to subproject route is 17.4 km with good road condition (National road No.14C). The other option is Duc Trung Thanh quarry in Le Dai Hanh road, Pleiku city with total exploitation area of 4.5ha. The distance to the subproject route is 60.3km via national road No.14 and provincial road No.673. The estimated excavated soil is 156006.4 m^3, of which 31327.47 m^3 is unstable organic soil that could not be reused as filling soil and will be transfer to the dumping site or designated area for spoil.

37. There is no dumping sites existed in the district. In Ia Dal commune, 2 areas have been assigned as temporary dumping area. However, as the land resources along the proposed route is still a lot, the Contractor will discussed with CPCs and relevant authorities to find out suitable location for waste soil as well as domestic waste from worker before the construction start.

38. Land acquisition and resettlement: There is neither house be relocated nor major affected households (lost more than 10% of their land holding). The construction of the subproject will affect some land area of Chu Mom Ray Rubber Company and Duy Tan Investment & Trade Company. Total permanent land acquisition area is 10,794m^2; of which 4216m^2 is garden land of Sa Thay Border Post (4000m^2) and 216m^2 of Chu Mom Ray Rubber Company. 6578m^2 perennial plants under Chu Mom Ray Rubber Company. The detail information could be finding out in the land acquisition and resettlement report.

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

Table 2 – Estimated budget of the subproject

No	ITEMS COST	METHOLD	SUB COST (VND)	(USD)	Notes
	Invesment Cost		**528 223 255 219**	**23 687 141**	
I	**Construction cost**		**378 255 624 000**	**16 962 136**	**22 300**
	Route		**264 020 121 935**	11 839 467	
1	Embankment		28 434 691 559	1 275 098	
2	pavement		180 827 662 086	8 108 864	
3	Drainage; culverts		8 200 648 185	367 742	
4	Long drainage		23 084 548 447	1 035 182	
5	Embankment protection works		11 805 129 114	529 378	
6	Traffic safety		10 916 566 519	489 532	

7	Temporary works		750 876 024	33 672	
	Bridge		**114 235 502 427**	**5 122 668**	
1	Km24+802.96 Bridge		17 244 697 306	773 305	
2	Km25+763.89 Bridge		7 677 045 283	344 262	
3	Km29+619.28 Bridge		7 878 944 031	353 316	
4	Km36+449.01 Bridge		8 962 228 223	401 894	
5	Km49+069 Bridge		8 232 683 421	369 179	
6	Km50+012.34 Bridge		7 505 204 770	336 556	
7	Km52+883.57 Bridge		8 198 972 951	367 667	
8	Km83+534.76 Bridge		30 543 216 659	1 369 651	
9	Km89+262.96 Bridge		8 534 882 555	382 730	
10	Km90+390.74 Bridge		9 457 627 228	424 109	
II	**SITE CLEARANCE COST**		**5 590 452 219**	**250 693**	
III	**MANAGEMENT COST**	1.205% *CPXDTT	**4 149 916 000**	**186 095**	
IV	**INVESTMENT ADVICE COST**		**22 771 384 000**	**1 021 138**	-
1	Report investment cost (*1,2 design improvement)	0.172%*CPXD*1,2	784 801 365	35 193	Decided 957/QD-BXD dated 29/9/2009
2	Survey cost (calculation temporary 100mil vnd /km)	Temporary	3 400 000 000	152 466	
3	Verification cost	0.02%*CPXD	89 740 438	4 024	Decided 957/QD-BXD dated 29/9/2009
4	Shop drawing cost (*1,2 design improvement)	0.846%*CPXD*1,2	3 849 427 108	172 620	Decided 957/QD-BXD dated 29/9/2009
5	Survey cost for shop drawing (Calculation temporary 120 mil vnd /km)	Temporary	8 760 000 000	392 825	
6	Establish bidding document; Evaluation bidding document cost	0.2%*GGT	100 000 000	4 484	Decree 63/2014/ND-CP dated 26/6/2014
7	Supervision cost	0.93%*CPXD	3 544 318 321	158 938	Decided 957/QD-BXD dated 29/9/2009
8	Verification shop drawing cost	0.05%*CPXD	180 676 399	8 102	Decided 957/QD-BXD dated 29/9/2009

9	Verification estimates cost	0.05%*CPXD	171 142 703	7 675	Decided 957/QD-BXD dated 29/9/2009
10	Others cost for consultant (temporary)	0.50%*CPXD	1 891 278 120	84 811	
V	**OTHERS**		**30 350 412 000**	**1 361 005**	-
1	Clearance mine cost (calculation temporary: 5000 vnd /m^2)		**1 561 163 700**	**70 007**	
2	General cost		**21 404 059 320**	**959 823**	
2.1	Temporary housing cost	2.0%*CPXD	7 565 112 480	339 243	
2.2	Others undefined cost (2%)	2.0%*CPXD	7 565 112 480	339 243	
2.3	Mobilization and remobilization cost (calculation temporary)	0.5%*CPXD	1 891 278 120	84 811	
2.4	Ensuring transport cost (Calculation temporary)	1.0%*CPXD	3 782 556 240	169 621	
2.5	Setup Asphalt plant station	Temporary estimated	600 000 000	26 906	
3	Insurance works cost (Temporary)				Decided 33/2004/QD-BTC dated 12/4/2004
	Insurance for Route cost (Temporary)	0.42%*CPXD	1 108 884 512	49 726	
	Insurance for Bridge cost (Temporary)	0.42%*CPXD	685 413 015	30 736	
4	Expertise fees (*TMDT)	0.007%*TMDT	44 118 704	1 978	Circulars 176/2011/TT-BTC dated 06/12/2011
5	Verification fees for design document	0.01%*CPXD	39 411 872	1 767	Circulars 75/2014/TT-BTC dated 12/6/2014
6	Verification fees for estimate document	0.01%*CPXD	37 348 659	1 675	Circulars 75/2014/TT-BTC dated 12/6/2014
7	Expertise fees for Bidding document and result bidding	0.1%*GGT	100 000 000	4 484	Decree 63/2014/ND-CP dated 26/6/2014
8	Approval settlement report fees	0.21%*TMDT	1 345 438 500	60 334	Circulars 09/2016/TT-BTC dated 18/01/2016

9	Audit cost (*TMDT)	0.309%*TMDT*1,1vat	2 133 295 780	95 663	Circulars 09/2016/TT-BTC dated 18/01/2016
10	Others (Temporary)	0.5%	1 891 278 120	84 811	
VI	**CONTIGENCY**		**87 105 467 000**	**3 906 075**	-
	Variation works cost	10%	43 552 733 600	1 953 037	
	Inflation cost	15%	43 552 733 600	1 953 037	Indicator construction

V. DESCRIPTION OF THE ENVIRONMENT

A. PHYSICAL ENVIRONMENT

1. Topography, Geology, and Soils

40. The terrain of Kon Tum is gradually going down from high area in the North to low area in the South of the province. The highest peak is Ngoc Linh with the height of 2598m above MSL. The topography of Kon Tum is quite diversified and complicated, divided in four main types: (i) high mountain; (ii) average mountain; (iii) low mountain; (iv) valleys and geosynclinals depression.

41. There are five main types and 16 units of soil in Kon Tum. The yellow-red soil and red-yellow humus soil made up 96% of the province.

42. The result of geological investigation has showed that the geological cross section of the subproject route is including 1-3 main basaltic layers interfered by few thin layers of basaltic weathered red soil. The thickness of this section is varied from 20-70m. The rock composition are including olivine-augite basalt; basaltic olivine-plagioclase-augite. Section 1 has a homogeneous geological foundation with basaltic clayey soil mixed with red brown or yellow brown gravel.

2. Hydrology and Climate

43. There are four main rivers in Kon Tum province. They are Se San River; Dak Bla River; Po Ko River and Sa Thay River. The annual water capacity of all rivers in the province is 911,110 m^3. The water flow is in the Dak Bla catchment with 2,803,196 m^3; make up 30.78% of the total annual capacity. Se San River catchment flow through different terrain with steep slope and it has a great hydropower potential. Along the Se San River in Kon Tum, four hydropower plants have been built including Ya Ly, Se San 3, Se San 3A and Se San 4. Sa Thay River has the total catchment area of 1471 km, flowing 115 km along the borderline with Cambodia.

44. In general, Kon Tum has a tropical monsoon climate but as its topography is quite diversified, the climate has divided into three sub-regions: (i) Ngoc Linh high mountain sub-region; (ii) Sa Thay low mountain sub-region; (iii) Kon Tum geosynclinals depression sub-region;

45. The subproject area is located in the Sa Thay low mountain climate with the annual precipitation varied from 2000 mm to 3000 mm and the temperature of 20 – 23^0C. The rainy season starts from May to October with the total rainfall made up 87% of the year. The dry season starts from November to April next year. The average humidity of the year is 80 – 85%. However, it is not distribute equally over the year. In the dry season, the humidity is only 65-70% and it poses a high risk of forest fire during this season. The flood usually come in July and ends in November.

46. The deputy chairman of Ia Toi commune has mentioned that drought, forest fire and tornado are the main natural disaster in the commune recently. More information related to natural disaster of the commune could be found in Table 3 below

Table 3 - Type of natural disaster in the recent year

Year of occurrence	Type of disaster	Affected area		Number of affected people	Affected area	Estimated damage
		Name of district	Name of commune	(HH)	m^2	(Mil.dong)
2015	Drought	Ia H'Drai	Ia Toi, Ia Dal, Ia Dom	The whole district	The whole district	
2015	Fire in 3-year Eucalyptus forest	Ia H'Drai	Ia Toi	Chu Mom Ray Rubber Co.	150000 (15ha)	
2014	Tornado	Ia H'Drai	Ia Toi	8	1.260	0.150
2015	Paddy farm fire	Sa Thay		Burned 1173 rubber trees		0.365

3. Surface and ground water

47. As Ia H'Drai district has just separated from Sa Thay district in 2015, there is no monitoring program for the district. The nearest monitoring centre for 2011-2014 period is in Sa Thay district centre, about 45km from the subproject area. Representative from Kon Tum DONRE said that monitoring program for Ia H'Drai district will be included in the 2016-2020 monitoring program.

Surface water resources

48. The 2011-2014 monitoring result in several river/stream and lake in the province has showed that surface water has been polluted by organic substance (BOD, COD); chemical agent content N, P and micro bacteria (Total coliform) so it is only suitable for irrigation, transportation purposes or other purpose which do not require high quality water. Some parameters have already over the allowed level under QCVN 08:2008/BTNMT. The monitoring parameters are pH, COD, BOD5, DO, NH4+, NO3-, phosphate, chlorine, iron, copper, zinc, lead, cyanide, arsenic coliform, oil. There are 14 monitoring locations in the whole provinces. The nearest location is in Sa Binh commune, Sa Thay district, about 22 km from the start point of Section 1.

Underground water resources

49. In general, ground water reserve is quite abundant in some areas of Kon Tum. However, the quality of underground water is going down recently. The test of underground water in Sa Thay has showed that it has a low PH; NH4+ and Pb parameters have higher than the allowed level in QCVN 09:2008/BTNMT. Coliform in the dry season of 2015 has 2.3 times higher than the allowed level.

4. Air quality and noise

50. According to Status of Environment report (SOE) of Kon Tum province 2011 - 2015, the level of CO, NO2, SO2 and TSP dust at subproject area is in the allowable limit of QCVN 05-

2013/BTNMT. Their variation from 2011 to 2014 is also minor. The air quality in the province is still good and clean.

51. In general, noise level of the province is still in the allowed level of QCVN 26:2010/BTNMT. Only in some crowed area as in bus stop of Kon Tum city, Dak Ha Industrial zone, Ho Chi Minh Road and National Road No.14 noise level sometimes over the allowed level.

B. BIOLOGICAL ENVIRONMENT

52. The main ecosystem along the subproject route is rubber plantation forest interfere with some natural forest area, mainly timber-bamboo forest on earth mountain. Section 1 of the subproject goes along Sesan River with the catchment of Sesan3; Sesan3A and Sesan4 hydropower reservoirs.

1. Agriculture

53. The main cultivation area of the three communes in Ia H'Drai district is rubber and cassava. Along Section 1 of subproject road is rubber plantation area of Duy Tan Investment & Trade Company. According to the representative of the company, Duy Tan has received total 10000 ha for rubber plantation. Up to now, rubber has been planted on 230 ha but they are not harvested yet due to the downtrend of the global rubber price. Section 2 of the subproject road is go through the land area of Chu Mom Ray Rubber Co. Ltd. The company manage 5124.56 ha in Ia H'Drai and Sa Thay district with 171.37 ha of rubber plantation at the moment. Detail information related to agricultural sectors in 2014-2015 of the district is listed in Table 4 below.

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

Production type	Unit	District	Ia Dal commune	Ia Toi commune	Ia Dom commune
1. Main cultivation type					
a. Coffee					
- Area	Ha	0	0.5	9	8
- Capacity	Ton/ha	0	0	0	0
- Production	Ton/year	0	0	0	0
b. Rubber					
- Area	Ha	25,328	10,961.06	17,328	5,285.21
- Capacity	Ton/ha	15	0.9	15	1,515
- Production	Ton/year	2,783	222.63	1,583	713.37
c. Pepper					
- Area	Ha	9	0	0	1.25
- Capacity	Ton/ha	0	0	0	0
- Production	Ton/year	0	0	0	0
d. Rice					
- Area	Ha	235	30	55	95
- Capacity	Ton/ha	19	4.5	19	19
- Production	Ton/year	445	135	98	182
e. Cassava					

- Area	Ha	80	742	30	254.5
- Capacity	Ton/ha	31	15	31	1.505
- Production	Ton/year	250	11,129	93	3,830.225
f. Corn					
- Area	Ha				
- Capacity	Ton/ha				
- Production	Ton/year				
f. Main livestock and poultry					
- Water buffalo	Head	15	14	5	507
- Cow	Head	600	352	290	173
- Pig	Head	620	77	230	5,005
- Poultry	Head	16,359	7,150	5,083	

2. Forestry

54. Kon Tum is a poor province of the Central Highlands but its forest coverage is one of the highest in Vietnam. According to statistic data of 2014, the total forest area of the province is 604257.92 ha and unplanted forestry land is 176478.08 ha. Of which, forest area under "Three forest type planning" is 593657.8 ha. The forest coverage has reduced from 66.6% of 2010 to 62.4% of 2014. Besides, the forest quality has also reduced with less rich forest area and increase poor forest area.

55. 61.08% area of Ia H'Drai district is covered by forest with mainly natural forest. Sa Thay One Member Forestry Co. Ltd manages 34,346 ha land area in the district, of which 30,491 ha is natural forest. However, main land area along the proposed route is also under the management of Duy Tan Investment & Trade Company and Chu Mom Ray Rubber Co. Ltd.

3. Fauna and Flora

56. Kon Tum has rich biodiversity resources with more than 1610 plant species and 429 animal species. Some kind of good timber tree like Burmese Rosewood, Burma padauk, Cassia tree, India mahogany... Big mammals are elephant, gaur, wild buffalo, deer and muntjac. The province also has many famous and high value fish species. However, these species are located in the rich biodiversity area in the province including Chu Mom Ray National Park in Sa Thay district; Ngoc Linh Nature Reserve in Ngoc Hoi district and Dak Uy Special Forest in Dak Ha district.

57. There is no endangered or specific animal and plant species have been recognized in the subproject area in the recent years. The nearest rich biodiversity area to the subproject route is Chu Mom Ray National Park, about 20 km from the start point of Section 1 in Ia Tang commune, Sa Thay district.

C. SOCIO-ECONOMICAL CONDITION AND INFRASTRUCTURE

1. Population and Ethnic

58. The total population of the district is 11,644 people. The local population is mainly workers of rubber plantation companies so local people of Central Highlands like Jrai and

Sedang occupied only small part of the total population. Detail information could be seen in Table 5.

Table 5 – Ethnic groups of Ia H'Drai district

No	Ia H'Drai	Total	Ethnic group							
			Kinh	Jrai	Thai	Muong	Tay	Sedang	Dao	Other
1		**11,644**	**3,694**	**100**	**4,804**	**1,435**	**720**	**83**	**328**	**480**
2	Ia Dom	2,619	1002	49	838	301	181	17	115	116
3	Ia Dal	6,007	1,440	12	2,991	882	363	61	61	197
4	Ia Toi	3,018	1,252	39	975	252	176	5	152	167

2. Living Standards and housing

59. The new district – Ia H'Drai is one of the poorest districts of the province. There are 1520 poor household over 2739 households of the district, make up more than 50%. The number of household live closed to the poverty line is also 82. People are mainly workers of Rubber Company. The Company has allocated them to several hamlets. There is only one hamlet (hamlet No.9) located at the roadside of Section 1 and newly constructed hamlet No.4 at the roadside of Section 2.

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

	Poor household		Reason (%)					
District/ Commune	**Total**	**Ethnic minorities**	**Women headed**	**Lack of cultivation area**	**Lack of capital**	**Lack of knowledge**	**A lot of kids**	**Other**
Ia H'Drai	**1,520**	**1,368**		100	100	100		
Ia Dal	672	592	0.01	100	100	100	0.005	
Ia Toi	347	337	9.52	100	76.93	80.06		
Ia Dom	501	439	29	100	96.7		24	

3. Employment and income

60. From the investigation result of the Consultants, local people in Ia H'Drai district are mainly working in agriculture. Most of the people are workers for rubber Production Company migrated from the Northern provinces.

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

	Unit	Ia H'Drai	Ia Dal	Ia Toi	Ia Dom
I. Total production value (millions VND)	**Millions VND**	33,087			
1. Agri-Foretry, Aquaculture	Mil.		26,377.2		28,037.46
- Agriculture	Mil.	32,982	26,002.53		31,529.10
+ Cultivation	Mil.		25,619.08		1,399,000
+ Breeding	Mil.		383.45		335
- Aquaculture	Mil.		53.35		280.08
- Forestry	Mil.		321.12		
2. Industrial - Construction	Mil.	105	17,957		
3. Business – services	Mil.		13,493.2	180	
II. Production sectors (%)	%	100	100	100	100
1. Agri-Foretry, Aquaculture	%	91.06	84.38	96.76	90.76
2. Construction	%	0.00	0.00	0.00	0.00
3. Trade - Services	%	5.88	5.83	3.24	9.24
4. Other type of production	%	3.07	9.79	0.00	0.00
III. Total agriculture production (ton)			104.65		
Food availability (per capita)	Ton	47.38	66.45		
IV. GDP (millions VND)	Mil.	21	26.62	22,42	21

4. Education and Public Health

61. Each commune has a clinic to serve local people in the commune with some simple treatment. Chu Mom Ray Rubber Company has also setup two medical centres in Ia Dal and Ia Toi communes. The information related to medical system of the district is showed in Table 8 below.

Table 8 – Medical care in the subproject area (2014 – 2015)

	Unit	Ia H'Drai	Ia Dal	Ia Toi	Ia Dom
1. Hospital/ Clinic	Unit	3	2 (Commune clinic and medical center of Chu Mom Ray Rubber Co.)	2 (Commune clinic and medical center of Chu Mom Ray Rubber Co.)	Commune clinic and a general clinic

2. Medical staff		27	12	21	3
- Medical Doctor	Head	3	2	2	1
- Nurse	Head	12	9	13	5
- Nurse's Aid	Head	3	1	2 and other 4 staffs	Nurse's Aid and other staffs (3)
3. People have medical treatment	Head	7,666	101	6,244	1,321
4. Drug addicted people	Head	0	0	0	0
5. HIV infection case	Head	0	0	0	0
6. Malnutrition	Head	64	8	50	6

62. There is only one secondary school in the district. Along the route, there is only one kindergarten for children of Chu Mom Ray 3 Rubber Farm under Chu Mom Ray Rubber Co. Ltd located at Km88+691 in Section 2 of the subproject.

Table 9 – Education and training in 2014 -2014 plan

	Ia Hdrai	Ia Dal	Ia Toi	Ia Dom
1. Number of class				
Kindergarten	14	0	6	8
Primary school	20	7	7	6
Secondary school	3	0	3	0
Junior high school	0	0	0	0
2. Number of pupil attend the class				
Kindergarten	323	118	118	87
a. Primary school	399	111	153	135
b. Secondary school	186	0	186	0
c. Junior High school	127	0	0	0
3. Drop out ratio (%)	0	0	0	0
4. Primary school graduated ratio	100%	99.9%	97-100%	
5. Secondary school graduated ratio			98-100%	
6. Illiteracy ratio	3.7%			

5. Water supply and electricity cover

63. Rubber Plantation Companies has set up residential area for their workers with electricity from national network. About 60% people of the district using electricity from national network. Drinking water for local people are mainly come from rainwater or drilling well. Two or three households shared one well. Water from stream or river/ reservoir will be used for domestic purpose. The water resource is enough for domestic use purpose of local people.

6. HIV and human trafficking

64. There is neither HIV infection case nor drug addiction has been recorded in the district. Human traffing is also has not been recorded in the subproject area.

7. Infrastructure

65. ***Transportation***: The province neither has an airport nor major river port. The main transportation is through the road network with National Road No.14 or Ho Chi Minh road play a backbone role connects Kon Tum with Gia Lai and Quang Nam provinces. The other main roads are National Road No.24 from Kon Tum city to Quang Ngai province and National Road No.40 to Bo Y Border Gate with Lao PDR. Up to 2015, Kon Tum has total 3955.2 km road with 298 bridges. Because of it's complicated terrain and rich water resources, 49% of the road with asphalt concrete and cement concrete surface. Bitumen road is made up only 16% and the rest is aggregate and earth road.

66. Ia H'Drai district has only two main road systems – National Road No.14C and the proposed road – provincial road No.675A. The road system is not developed with mainly earth road. Only 27km road have been paved with bitumen or concreted.

67. ***Industrial activites***: At the moment, there is no industrial activity happen in the district.

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

Table 10 – Infrastructure system in the subproject area

	Unit	**Ia H'Drai district**	Ia Dal comn.	Ia Toi comn.	Ia Dom comn.
1. Road	Km	**504**	286	165	53
- Earth road	km	**477**	404	23	50
- Concrete/ bitumen	km	**27**	24	0	3
2. Car/ truck		**87**	12	75	0
3. Number of motorbike	Mtbike	**1,794**	507	1,287	0
4. Commune market	Market	**0**	0	0	0
- Distance to commune centre	km	**0**			
5. Market of the nearby commune	Market	**1**	1	1	1
Distance to the administrative centre	km	**25**	22	45	45
6. Household using national electricity network	%	**60**	17.18	21.37	20.65
7. Household using clean water	%	**35.5**		0	19.86
8. Household with multi floor	%	**0**	0	0	0.1
9. House made of brick/ wood, one floor/ flat roof	%	**98**	98	98	0.25
10. Cottage/ temporary house	%	**2**	2	2	99.65
11. Phone using ratio (Table and mobile phone)	%	**50**	82	80	60
12. Household with toilet	%	**5**	5	0.1	16.47

D. Archaeological, Historical and Cultural Treasures

69. No major archaeological site has been discovered in Kon Tum. There are only some historical sites related to victory monuments, prisons during Vietnam War. There are no archaeological, historical or cultural sites in Ia H'Drai district.

E. Key Environmental Features

70. ***Physical environmental features:*** About 15 km along roadside of section 1 of the subproject road - from Km60 to Km74 – is natural forest area with timber-bamboo forest on earth mountain. One side of subproject road in Section 1 is also goes along Se San River and reservoirs of Sesan 3; Sesan 3A and Sesan 4 Hydropower Plant. The other side are natural forest, rubber plantation area of several companies. Sa Thay River crosses the subproject road in Section 2 at Km83+534.76. There are 10 streams/ flows cross the subproject road, of which 8 located in Section 1 and 2 located in Section 2. More information could be found in Table 1 above.

71. ***Social environmental features:*** No school located at side of the proposed road. There is only on kindergarten for children of Chu Mom Ray 3 Rubber Farm under Chu Mom Ray Rubber Co. Ltd located at Km88+691in Section 2 of the subproject.

VI. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

72. This section discusses the potential environmental impacts of the subproject and identifies mitigation measures to minimize the impacts in all design, construction and operation phases of the subproject. 15 km natural forest along Section 1 of the subproject road from KM60 to Km74 could be adversely affected due to subproject implementation.

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

74. The subproject implementation will also impact on the lives of local people, especially the one who live along the subproject road. There are three residential areas along the subproject road with workers from Duy Tan Investment & Trade Company along Section 1 (hamlet No.7 and hamlet No.9) and from Chu Mom Ray Rubber Co. Ltd. (hamlet No.4)

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

A. POTENTIAL IMPACTS AND MITIGATION MEASURES IN THE PRE-CONSTRUCTION PHASE

1. Improper road surface material and construction method selection

76. **Impacts**: The proposed subproject involves upgrading 70.8 km road in two Sections. Section 2 – 12.1 km from junction with National Road No.14C to Ho Da Auxiliary Border Gate will be constructed to Road Grade V – Mountain in accordance to TCVN 4054-05 with 6.5 m road base width; 3.5 m road surface width and 2x1.0 m road side width. Section 1 – 58.7km running along the Se San River and several hydropower reservoirs. This section has some steep slopes and there are some landslide sites along the route. This section has been designed as Rural Road Grade B in accordance to TCVN 10380:2014 with 5 m road base width; 3.5 m road surface width and 2x0.75 m pavement width.

77. The improper construction method could also posed negative impact to the natural forest along 15km subproject road during construction time. As bitumen has been selected as the material for pavement construction, heating bitumen for construction of the pavement will posed risk of forest fire if the contractor using old technology like fuel wood for bitumen heating.

78. There are 3 options for road base and road surface:

- Option 1: Using cement concrete for the whole route.
- Option 2: Using bitumen for road surface along the route, Eyc=80Mpa (in accordance to 22TCN 211-06). Steep slope area will be constructed with cement concrete.
- Option 3: Using asphalt concrete road surface along the route, roadside will be reinforced with 2 layer-bitumen TCN 3.0 kg/m^2. Steep slope area will be constructed with cement concrete.

79. Option 1 has the highest construction cost but it is the most suitable road surface design as the route has a high potential land slide, soil erosion as well as steep slope along the route. Options 2 and 3 have lower construction cost but higher cost for Operation and Maintenance cost and high risk of road damage due to landslide and soil erosion.

80. **Mitigation measures:** Environmental consideration for road surface material selection should be considered in detail design. Option 1 – using cement concrete for upgrading road surface of the Section 1, has been selected. Moreover, culverts have been designed to withstand a 25-year return and 100-year return for the bridges. In line with ADB policy on environmentally responsible procurement, a new environmental assessment report will be undertaken for submission to ADB if there are any changes to subproject design that would result to environmental impacts or risks that are not within the scope of the current IEE.

81. PMU will require the contractor using new technology for bitumen heating, avoid using fuel wood and put it as part of condition in the bidding document.

2. Land acquisition and resettlement

82. **Impacts:** The impact is mainly on some households of Chu Mom Ray Rubber Company – Unit 3 and Sa Thay Border Protection Military Station. About 10,794m^2 of land will be affected permanently including 6794m^2 perennial plants area of Chu Mom Ray Rubber Company and 4000m^2 garden land of Sa Thay Border Protection Military Station. There are 12,800m^2 of land

will be temporary affected, including riverbed and borrow pits area. 2 wells and 60m^2 fish cultivation pond from local household will be affected as well as 100m fence of Sa Thay Border Protection Military Station. This is a minor impact due to no households must relocate or loss of residential land in the subproject area and no household will be serious affected due to loss more than 10% of total land holding.

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

3. Public relocation

84. **Impacts:** The road in section 2 will be constructed with the same road alignment while section 1 is mainly upgrading the road surface. The subproject construction will not relocate any public infrastructure or buildings.

4. Disturbance of unexploded mine and bomb (UXO)

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

86. **Mitigation measures**: PMU will work with the Kon Tum Provincial Military Commands to check whether the area along the subproject route has been UXO cleared in the first phase or not. If it is not, the authorized UXP clearing contractor will be engaged in UXO clearing along the subproject road. The impact is only temporary in the pre-construction phase. PMU must ensure that the construction contractors shall only commence site works after the UXO clearing firm has certified that the subproject areas are already cleared.

B. POTENTIAL IMPACTS AND MITIGATION MEASURES IN THE CONSTRUCTION PHASE

1. Loss of trees and impact to fauna

87. **Impacts:** The implementation of the subproject will involve in cut down some trees along the route including 2 timber trees, 75 fruit trees, 37 cashew trees and 378 rubber trees. Vegetation clearance area for other kind of crop is 2706 m^2. The construction activities will create noise, vibration that disturbed wild animals living in the forest area next to the road. Workers could hunt wild animals and cut down trees in the forest for fuel wood in cooking, water heating. Vegetation cover along the route could also get fires resulting from execution of the works. Invasive plant species could be introduced during roadside tree plantation or replant vegetation cover for high slope. The impact will be happened along the subproject route, worker camps area especially 15 km natural forest along the Section 1 of subproject road. This is an average impact and will take place in 24 months construction time. Even the number of trees will

be cut down is small and there is only 15 km of natural "average to poor" forests along the road, the impact on the forest along the road will be large as forest also play a watershed protection role for the reservoirs of Sesan 3A and Sesan 4 hydropower plants.

88. **Mitigation measures:** To reduce the impact, Sa Thay Forestry Company; Duy Tan Rubber Plantation Company; Chu Mom Ray Rubber Company and Dak Lak Rubber Company will be informed about the construction time and schedule, scope of works as well as location of worker camps and material storage sites. On the other hand, no construction camps, concrete mixing plants, material storage sites are to be located in the forest areas. Avoid locate construction camps, concrete mixing plants or any machines that could create loud noise and vibration in the section of natural forest from Km60-Km74. The contractors will not use or permit the use of woods as fuel for construction activities or use for cooking and water heating in worker camp. The contractors should not buy or use wood from illegal sources. PMU, ESP and CSC will strictly supervise and monitor the construction activities to ensure they will be done properly on the existing road base; no tree out of the cut down list will be cut down.

2. Impact on local facilities

89. **Impacts:** Not so many people living along most of the Section 1 of the subproject road. Hamlet No. 7 and No.9 of Ia Dal communes using well water so there is no public facilities in this section will be affected during road construction. The construction activities could impact electrical power supply along the Section 2 of the subproject, at the location of hamlet No.4. It will affect local people of hamlet No.4 in their daily activities as the power could be cut off. It is minor impact as there is only some low voltage electric wires located at some short sections in the area of hamlet No.4. The impact will be happened in 24-month of construction.

90. **Mitigation measures:** To minimize the impact, the contractors will inform in advance the construction schedule, the affected electric and cable system to Ia Dal and Ia Toi CPCs. If any facilities are accidentally damaged during construction period, it should be reported to CSC and PMU as well as the owner to the facilities before repaired at the contractor's expenses.

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

91. **Impacts:** In the work of excavating and material exploitation for the subproject construction activities if excavated soil is not collected then siltation will be occurred. It will be able to cause stuck in water flow closed to the mines and quarry area, create filling situation that affects cultivation areas of residents. Earthwork activities will also change soil structure and raise the amount of unconsolidated sediments at the borrow pits. When it rains, runoff of rainwater will take away them into the surrounding water bodies causing sedimentation and erosion also. Runoff water could also take construction material such as sand, soil from material storage sites into the surrounding water bodies if material stored for a long duration at the construction site. This impact will happen in the area of quarries; borrow pits and temporary material storage along the subproject road. It will affect local people living in the subproject area and near the quarries; borrow pits. The impact is minor as the main work at 58.7km of longer section – Section 1 – is upgrading the road surface based on the existing road base. On the other hand, there is not so many people living along the subproject road. People in the 3 hamlets are mainly workers of the rubber companies.

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

4. Generation of excavated soil

93. **Impacts:** The soil from cutting activities, which could not be reused as filling soil, could have significant impacts and environmental degradation due to the improper disposal of these materials. People in 3 hamlets in the subproject area and near the temporary dumping sites could be affected by soil erosion from these temporary dumping areas. This is a minor impact as in the negative side, the subproject road will be upgraded/ constructed base on the existing foundation so the levelling work is minimized and the volumes of spoil will be not much. The construction work for 58.7km of Section 1 is mainly paved the road with cement concrete. The land resources along the road is still a lot so many place could be used as temporary dumping area for spoil. In the positive side: Rubber plantation companies and Sa Thay Forestry Company could use the spoil for their plantation area however the impact is minor due to the small quantity of spoil. To minimize the negative impacts during 24-month of construction.

94. **Mitigation measures:** the contractors should evaluate and grade the spoil and the suitable spoil will be used for filling purpose. This will reduce the need to extract soil for filling. The spoil could be stored at locations agreed with CPCs of Ia Dal and Ia Toi for local people could take soil to fertilize their land.

5. Generation of construction waste and domestic waste from workers

95. **Impacts:** Solid waste that will be generated from construction mainly includes domestic waste of workers and scraps of transported soil and stone, debris, mud. Domestic waste is mainly generated from construction workers at campsites. Uncontrolled waste disposal operations can cause significant impacts. It will impact firstly the workers in the campsite and areas surround the construction sites and local residential area along the subproject area. This is an average impact, as the construction sites will scattered along 70.8km of the subproject road with different ecosystems including natural forest, streams, rivers and reservoirs. Uncontrolled waste disposal could reduce the water and soil quality and heavily impacts on these ecosystems. To minimize the impact during 24-month of construction time.

96. **Mitigation measures:** ESP will assist PMU to monitor the contractor progress of WMSDP implementation, to ensure the contractors will provide enough trash bins at the worker camps. Contractors need work with 3 CPCs in Ia H'Drai district to find out suitable place for domestic waste disposal. CSC and PMU will supervise to ensure waste and unused construction material will be treated properly and transfer to designated location.

6. Impact from hazardous materials and hazadous waste disposal

97. **Impacts:** Use of hazardous substances such as oils and lubricants can cause significant impacts at the construction sites along the subproject road if uncontrolled or if waste is not disposed correctly. It will affect surrounding environment and local residential area. However,

this impact could be considered as insignificant because the main construction activity in 58.7km of Section 1 is paving the road surface and the construction machines are not large.

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

7. Impact from bitumen heating activities and asphalt concrete mixing plant

99. ***Description:*** The operation of asphalt concrete mixing plant will generate noise and dust and paved works will generate gas and odour from the bitumen heating and noise from the compaction machine. Although the emissions from powered mechanical equipment and asphalt concrete mixing will be rapidly dispersed in the open terrain they will need to be sited carefully to avoid complaints. The impact will happen at the construction sites along the subproject road and affect on local people living in the surrounding areas. However, the affected level is insignificant because the small construction activities. The surface of the road is only 3.5m and the subproject located in the open terrain with low population density. On the other hand, bitumen heating for pavement construction could create risk of forest fire, especially the old technology using fuel wood for bitumen heating

100. **Mitigation measures:** To minimize the negative impact, the contractors should arrange activities with loud noise and vibration or bitumen heating machine at least 500 m away from sensitive areas such as hamlet No.4 in Ia Dal commune, Hamlet No.7 and No.9 in Ia Toi commune and especially the natural forest area along the subproject road from Km60-Km74 of Section 1. PMU and CSC will responsible to monitor this mitigation measure during 24-month of construction phase.

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

101. **Impacts:** Earthworks and rock crushing activities will be the main sources of dust. Construction machines will generate gaseous emissions (NOx SOx, CO, CO_2, etc.) when they are in operation. Transportation vehicles could also create dust along the transportation route. These gaseous and dust could cause health problems to the residents who living near the construction site and along the transportation route, especially in the Hamlet No.4 in Ia Dal and Hamlet No.7 and No.9 in Ia Toi commune. Wild animal in the natural forest area along the road from Km60 – Km74 in Section 1 could also be affected from noise, vibration and dust from construction activities. The impact could be considered as minor due to noise, dust and vibration were also considered acceptable in view of the likely short duration of the works and that there were good benefits from future improved road conditions. There is also only 3 hamlets along the subproject road with residents are workers from rubber plantation companies. The road foundation is already existed and truck already travelled along the road in dry seasons so the impact on wild animal is also minor.

102. **Mitigation measures:** Similar to the mitigation measure for impact from bitumen heating and asphalt concrete mixing plant, the contractors should not located any noisy machines along 15km natural forest in Section 1; Sa Thay Border Protection Station and in 3 residential areas of Hamlet No.4, No.7 and No.9. The contractors should not locate large material storage sites in the section along natural forest or in the residential areas of 3 hamlets. The large storage sites

should be located at least 100m away from these sensitive points. The contractors will work with Ia Dal and Ia Toi CPCs, with the representative of ESP and PMU, to identify areas for large material storage site as well as material transportation plan. PMU and CSC will responsible to monitor these mitigation measures.

9. Landslide, soil erosion and runoff

103. **Impacts:** Roadside erosion and runoff could happen when its rain, especially at the roadside un-level section and the borrow areas. Erosion and runoff could impact on the cultivation areas of local people. Landslide could happen in the section with high slope side, for instance the area in Section 1 that running along Sesan River and Reservoir, especially when the vegetation cover is cleared. Landslide will damage the road and block movement. The objects of the impact are mainly water bodies located near the subproject and local people who has cultivated land in the subproject area and people living along the subproject road. The impact could be considered as average. The traffic density is low so the impact on traffic of landslide is not much. However, the risk of land slide and soil erosion, especially in Section 1 area along the Sesan River is high and could impact on the cultivation areas of local people in Hamlet No.7 of Ia Toi commune.

104. **Mitigation measures:** To minimize the negative impacts during 24-month of construction time, the contractors should limit to store material near the area of rivers/ stream crossing point and in the roadside along Se San River. The main construction activities such as bridges/ culverts construction, especially Sa Thay Bridge should be implemented in dry season. The contractors will also update weather forecast daily during construction time to avoid heavy rain day. Work with relevant authorities for vegetation clearance in the area along Se San River of Section 1 and other rivers/ streams crossing locations. PMU and CSC will responsible to monitor these mitigation measures.

10. Impact on crossing streams or bridge construction locations

105. **Impacts:** Careless construction and poor materials control can cause blockage to streams. Runoff water during its rain could bring waste and soil into the Se San and Sa Thay Rivers. That could lead to siltation and reduce the water quality. 10 bridge construction sites; Ya Toi Stream area and the culverts construction areas could be impact by the construction activities and it will lead to reduce water quality of Rivers and stream crossing areas; Sesan 3A and Sesan 4 reservoirs; and downstream of Se San River in Ia Khai and Ia Grai districts and some residential areas in Cambodia, downstream of Sa Thay River. This is a minor impact as the scale of the bridges will suitable with the road grade and the road in Section 1 (58.7km) is only Rural road Grade B and the road width of the whole route is 3.5m so the scale of bridges are not large.

106. **Mitigation measures:** To minimize the negative impact, the contractors should disposed soils, spoils and construction waste out of the bridges/ culverts construction immediately. They should also discuss with relevant authorities for MMP and WMSDP implementation especially Sa Thay Border Protection Station for the construction of Sa Thay Bridge. Silt fences and sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and drilling operation within streams/ rivers. The steep slopes should be covered with vegetation to avoid landslide and siltation in the nearby rivers/ streams. PMU and CSC should work and collaborate closely with relevant authorities such as Ia Dal, Ia

Toi CPCs and Sa Thay Border Protection Unit to monitor the implantation of these mitigation measures.

11. Impact on drainage and hydrology; water resources and quality

107. **Impacts:** The drainage system, irrigation and water resources on surrounding lands will be affected by construction activities as follows: a) local water supplies will need to be tapped to meet campsite and construction requirements, so bringing subproject based water use into competition with local use; b) surface and subsurface water resources near the provincial road No.675A could be contaminated by fuel and chemical spills, or by solid waste and effluents generated by the kitchens and toilets at construction campsites; (c) natural streams may become silted by borrow material (earth) in the runoff from the construction area, workshops and equipment washing-yards. (d) Water flow could be temporary blocked during construction period at the crossing positions. Construction activities could impact on the quality of the nearby water bodies. Waste and construction material could fall into the water bodies if the waste is not control carefully or material stockpiles area not be covered and well monitored. The impact will mainly on water bodies along the subproject road and worker camps area, especially at the Stream/ River crossing points. It is an average impact as the road running along larger water bodies as Se San River or reservoirs of Sesan 3A and Sesan 4 hydropower plants. The subproject will also cross Sa Thay River in Section 2 and construct 10 bridge in total. However, the duration of the impact is only 24 months of construction time.

108. **Mitigation measures:** In order to minimize this negative impact, the contractors will inform construction schedule and scope to Ia Toi, Ia Dal CPCs and Ia H'Drai DPC in advance. The contractors will also work with relevant Divisions of Ia H'Drai DPC to find out suitable water cut (Streams/ Rivers blocking) schedule, avoid impact to downstream users in Ia Khai, Ia Grai districts and Se San 4, Se San 4A Hydropower Plant. The contractors will store lubricants, oils in designated area with roof covered and impervious foundation at least 50m from rivers/ streams. Sediment ditches, silt fences should be installed in suitable location to avoid runoff, erosion and siltation in rivers/ streams. Material storage sites should also be covered carefully with canvas and located at least 50m away from water bodies. PMU and CSC will responsible to monitor these mitigation measures.

12. Impact by the large influx of construction worker

109. ***Impacts:*** Large influx of construction worker will create a burden on local public services like electric and water supply. Construction workers from other area could bring outside disease to the subproject area. The concentration of workers in the work camps could also create a good environment for diseases such as sore eyes, cholera, flu and respiratory problems. Social aspect: concentration of a number of workers could lead to social problems such as gambling, drug addiction, prostitute, violence, conflict amongst workers, or between workers with local people. The impact will affect directly on workers and indirectly on the community near the construction sites in the residential area of hamlet No.4; No.7 and No.9 of Ia Toi and Ia Dal communes. This is a minor impact due to low density of population in the subproject area and local people in the hamlets are mainly rubber plantation workers of Chu Mom Ray and Duy Tan Rubber Companies.

110. ***Mitigation measures:*** Worker camp location and facilities located at least 500m from residential areas as agreed by local communities and approved by ESP and PMU and managed to minimize impacts. All workers should register with local police for temporary residential certificate. The worker camp should be located in the area with sufficient drainage to avoid water

logging and formation of breeding sites for mosquitoes and flies. Worker should have health check before start work in the subproject and should be trained for living and working behaviour before joining the sites. On the other hand, Contractors will use local labours for simple works such as smooth the road, moving soil, give priority to poor families, female householders, woman if they need jobs. It aims to raise their income, create more jobs, contribute to poverty reduction for local community and also reduce the number of construction workers from outside. Local people in the residential area of 8 subproject communes will have benefits from the subproject construction. However, this is a small positive impact and it requires the coordination between the contractor and CPCs of subproject communes and nearby communes in recruiting local labours (contractors often prefer to engage their own trained workforces rather than training unskilled labourers). The duration of the impact is also short, only in 24 months construction time.

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

111. **Impacts:** Dust, exhaust gas and noise generating from earthworks, transporting of material, construction activities and operation of machines, etc. These factors have direct affects on health of workers and local residents. Material transport and construction activities on the existing road may create the risk of affects on traffic safety and houses structure on roadsides especially in Hamlet No.4; No.7 and No.9. The excavation of the trenches for side drain construction can threaten public safety, particularly of pedestrians and children. Waste and wastewater from construction activities and worker camps could also create a favourable environment for the outbreak of some respiratory diseases of local people as well as workers. Accidents may occur if during the construction, workers are not provided with safety equipment and obey construction regulations. The objects of this impact are local people in the subproject area especially local people of hamlet No.4; No.7 and No.9 and the workers working at the site. However, exhaust fume, dust and noise do not have remarkable affects on residents because of the open terrain and construction activities are spread along 80.7km of the subproject road. The traffic density is low in the subproject area especially along the subproject road as it is the new route connects from Sa Thay district centre (old district) to new district centre of Ia H'Drai.

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

14. Impact on the local traffic

113. **Impacts:** Construction activities on the Subproject road are likely to cause hindrance in traffic flow if not mitigated properly especially in the Section 1 with no other options for travelling. Local people and people from other area who travel on the subproject road will be affected during 24 months construction period. However, this is a minor impact due to low traffic density of the subproject road, especially in the Section 1. In the Section 2, local people could have other options for travel through the road of rubber plantation road network or the border patrol road.

114. **Mitigation measures:** To minimize the disturbance to local people, the contractor will work with CPCs on construction plan and the construction schedule and scope will be published in Ia Toi, Ia Dal and also Ia Dom CPCs. The contractor will also construct temporary road and minimizing interference with traffic flows past the works site.

15. Environmental impacts due to inappropriate enivronmental recovery responsibility

115. **Impact:** If after construction work has been completed, the sites are not cleaned up, construction and domestic waste will pollute surrounding environment. If site restoration such as replanting trees; grass; filling up construction pit; removing camp site have not been implemented in accordance with environmental regulation then the environmental issues like erosion, sedimentation and accident may occur. Construction waste and waste soil could also impact on the soil quality of the temporary acquired land area. This impact is average impact as the subproject road is located along large water bodies and natural forests. Site restoration has not been implemented correctly will have negative impact on the water and soil quality of the forest and water bodies.

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

C. POTENTIAL IMPACTS AND MITIGATION MEASURES IN THE CONSTRUCTION PHASE

1. Land use change from natural forest to agricultural production

117. **Impacts:** The completion of the road will create a favourable condition for goods transportation of Duy Tan Rubber Company, Sa Thay Forestry Company and Chu Mom Ray Rubber Company – Agricultural Farm No.3. As the natural forest along the road has already delivered for these companies and the land use has changed to production forest from Decisions of Kon Tum PPC, the companies could clear the forest and plant agricultural production or type of forest that could be exploit in short duration like eucalyptus or acacia.

118. **Mitigations measures**: Kon Tum DONRE will monitor and control the reservation of 100 m natural forest corridor along Km60 – Km74 of the Section 1. This will ensure a protection belt for the road, avoid road erosion and landslide, and increase the road quality and longevity. Kon Tum DOT collaborated with Kon Tum DONRE and DARD to implement awareness campaign on the important of forest on water reservation and landslide/ soil erosion prevention as well as forest protection in the subproject area.

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

119. **Impacts:** Paved road surface condition will reduce the dust concentration but better road condition will also increase traffic density along the subproject road. Noise, dust and vibration could have negative impact on the local people living along the subproject road, especially local people in hamlet No.4; No.7 and No.9. For both negative/ positive side, the impact is minor as the low traffic density and Section 1 of the subproject will be upgraded to Rural Road Grade B only and the heavy machines could not using the road.

120. **Mitigation measures:** Kon Tum DOT will responsible for dust and noise control along the subproject road in the operation phase. Speed limit/ loading limit will be installed at the start and end points of the two sections. Road humps will be installed when the road goes through the residential area of hamlet No.4, No.7 and No.9, especially the kindergarten of Chu Mom Ray Rubber Company.

3. Favourable conditions for transportation of goods and people movement

121. **Impacts:** The paved road will make travel on the road available in rainy condition. The completion of bridge system will support travel on the road even in high water time. The road will support stable transportation from Kon Tum city and Sa Thay district center to Ia H'Drai center around the year. It will also support transportation of goods, especially agricultural product, save time and increase the profit for local people and companies in Ia H'Drai district. The completion of the road will favor people in the 3 communes of Ia H'Drai district and surrounding residential areas as well as people who doing business in Ia H'Drai district.

4. Driving conditions and community safety

122. The upgrading and construction of the road is likely to increase the vehicle speed on the road. Increases in traffic flow indicate additional future traffic should be moderate and unlikely to create many community safety issues. On the other hand, the condition of the road facilities will be enhanced and driving conditions should improve. The beneficiaries of the subproject are local people in the district and people who travel on the subproject road. This is an average impact as the longer section (58.7km) is only upgraded to Rural road Grade B with 3.5 m road width.

123. **Mitigation measures:** Similar to the mitigation measures of the impact from dust and noise, Kon Tum DOT will install speed limit board and road hump at the residential areas of hamlet No.4; No.7 and No.9, especially the kindergarten of Chu Mom Ray company. Danger cross signboard will be installed at the cross points of two sections with NR14C.

5. Risks caused by natural calamity

124. **Impacts:** Flood could happen in the subproject area and damage the subproject road, block the traffic along the road. Heavy rain could also cause land slide and damage the road, block the movement along the subproject road, especially at the cross section with Sa Thay River and along the Se San River and hydropower reservoir. This will have negative impact on local people who live along or travel on the subproject road. However, this is a minor impact as the construction of bridges will be based on 100 years turn over and the road surface will be constructed with cement concrete to ensure better road condition.

6. Affects on employment or livelihood

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

7. Impacts on ethnic groups

126. The completion of the subproject road will support to increase incomes and living standards for ethnic minorities in the subproject area by means of increasing the profit. Most of the population in the district are ethnic minorities so the completion of the road will support them to save time for travel and increase production prices as merchant could access the production area easier.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

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 road 675A included representatives from Kon Tum DPI, DONRE, and DARD. Consultation has also been implemented with representatives from 3 CPCs in Ia H'Drai district, Rubber Plantation Companies. Several local people living along the subproject road have been consulted using questionnaire and concentrated on the inconvenient condition for local people during the construction phase of the subproject. There are 7 local people have been interviewed with 1 of them is woman. Consultations took place in March 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; and (iv) grievance redress mechanism.

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 located in the low population density and the main construction work will be upgrade road surface based on the existing road foundation, no house must be relocated and no major land acquisition will be taken, the local people is totally support the subproject implementation.

Table 11 – Main issues and information from local authorities

Main issues	Information from relevant authorities
About 15km of natural forest along Section 1	DARD: It is the production forest and already delivered to Duy Tan Investment and Trade Company.
Better road condition will make land use change and natural forest will be cut down for rubber plantation	DARD: The forest is delivered to Rubber Company as natural forest. The company must seek for approval from Kon Tum PPC for changing it to rubber plantation. The Central Government and PPC are not support changing natural forest to rubber plantation and a Decision to ban this action will soon be issued. DONRE: 100 m corridor from roadside will be maintained as a protection belt to protect the slope along that section from landslide, soil erosion and water resources for the Reservoirs. DONRE will manage and control to ensure trees in this forest bell will not be cut down and no encroachment to this forest area.
Some bunches of forest closed to the hamlet No.9 – Ia Toi commune, in the middle of rubber plantation area	Ia Toi Deputy Chairman: Soil types in these areas are mainly soil mixed with rock it is difficult to plant rubber. Duy Tan has left these areas for further activities.

Table 12 – Main environmental concerns from public consultation

Concerns expressed	How concerns are addressed in IEE
Forest fire in the dry season	Contractor will train workers to avoid fire and fire prevention. ESP, CSC and PMU will strictly monitor during the construction phase of the subproject
Land use change in 15 km natural forest along the Section 1 of the subproject	A training campaign will be held with the collaboration of Kon Tum DOT, DONRE to local people and representatives of Sa Thay Forestry and Duy Tan Rubber Companies on forest protection, the important of protection forest and the water resources… DONRE will manage and control to maintain 100 m forest corridor to ensure a protection belt for the road along Km60 – Km74 of the Section 1.
Moderate material transportation speed, cover with canvas to avoid dust and fallen materials	Regulation for material transportation will be put as an appendix in the contract with contractor. CPCs in cooperation with PMU and CSC will monitor the compliance during construction phase.
Unlevel at bridge construction area could lead to land slide, soil erosion and runoff when its rain, impact on the cultivation area of local people	The design of the bridge must follow the relevant regulations. Construction methods and schedule will be informed in advance to local people. CPCs in cooperation with PMU and CSC will monitor the compliance during construction phase.

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. Kon Tum PMU will responsible for IEE translation to Vietnamese and disclose at all three Ia Toi, Ia Dom, Ia Dal communes of Ia H'Drai district.

VIII. GRIEVANCE REDRESS MECHANISM

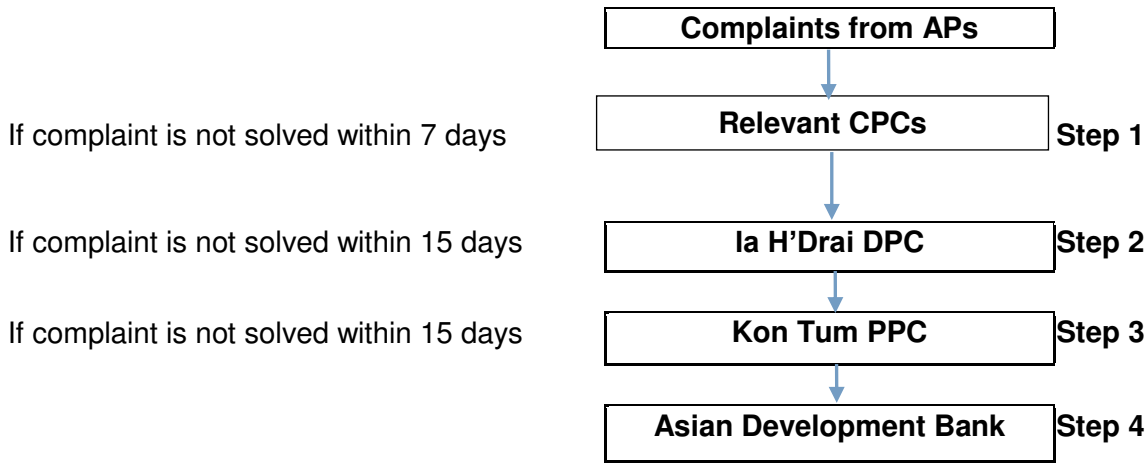
A. Purpose of the mechanism

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 commune). CPC will work with ESP and CSC to solve complaints and representative of the CPCs will response in written form to the complainant.
- ***Stage 2***: If the complaint is not resolved within 7 days, the complainant will submit an application to the Ia H'Drai DPC to resolve the complaint.
- ***Stage 3***: If more than 15 days but no official response from Ia H'Drai DPC, the complainant may submit a complaint in the written form to the Kon Tum PPC (through Kon Tum DONRE). Kon Tum PPC will require Ia H'Drai DPC to solve the complaint. In case the complaint is still not resolved, Kon Tum PPC will require environmental police to investigate and requested stakeholders to resolve the complaint.
- If efforts to resolve disputes using the grievance procedures remain unresolved or unsatisfactory, APs have the right to directly discuss their concerns or problems with the ADB Southeast Asia Department through the ADB Viet Nam Resident Mission (VRM). If APs are still not satisfied with the responses of VRM, they can directly contact the ADB Office of the Special Project Facilitator (OSPF).



IX. ENVIRONMENTAL MANAGEMENT PLAN

A. IMPLEMENTATION ARRANGEMENTS

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

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

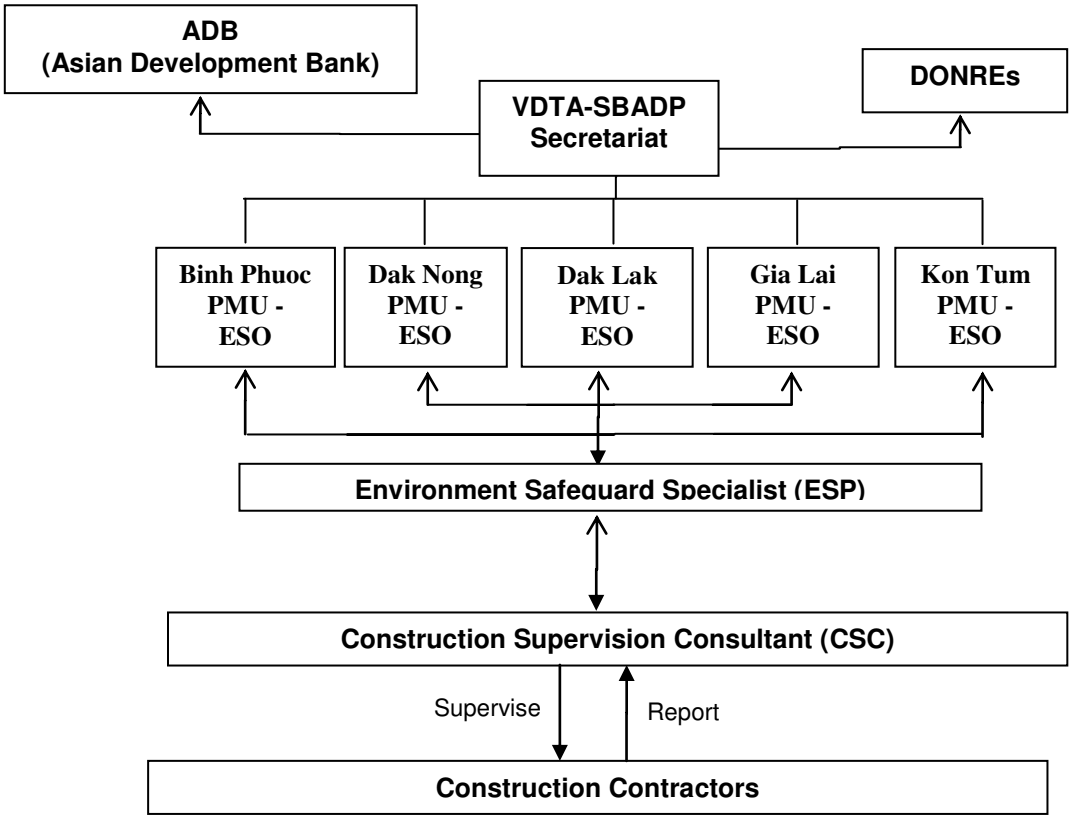
Table 13 – Responsibilities for EMP implementation

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

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

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

Figure 3 – EMP Implementation Organization Chart



B. EMERGENCY RESPONSE PLAN

137. 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...

138. 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.

139. With the four types of emergency case listed in paragraph 137 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.

140. 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.

141. 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

142. 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.

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

Table 14 - Detail Environmental Mitigation Plan

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

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

		inspection/ monitoring role. ix) Establishment of complaints management system for duration of the works x) Agreement on publicity/ public consultation requirements. 4. The WMSDP shall include a section on Hazardous Materials and Waste section. This will detail the mitigation measures, organizational arrangements, resources, facilities, etc. to avoid environmental as well as health and safety impacts due to use and disposal of hazardous materials/substances.				
6. Unexploded Ordnance	Avoid accidents due to any kind of UXO	1. Coordinate with appropriate agencies at the design stage to identify if UXO is a potential threat to works 2. Based on the findings, engage an authorized UXO clearing contractor (usually from Kon Tum Military Command, as necessary. 3. Ensure that the contractors shall only commence site works after the UXO clearing firm has certified that the subproject areas are already cleared.	ESP	Before bidding	N/A	Included in the contract with ESP
7. Environmental Capacity Development	Develop environmental management capacity of PMU to ensure proper EMP implementation and promote environmental awareness among workers.	1. PMU to commit and retain dedicated staff for subproject duration to oversee EMP implementation. 2. ESP to train PMU to build their capacity on EMP implementation, monitoring and reporting using workshops and on-the-job training techniques and case studies. 3. Conduct workers' orientation on EMP provisions. The ESP shall periodically conduct such orientation as every new contractor is engaged.	PMU; ESP	Through out the pre-construction and construction phase	N/A	Included in the contract with ESP and PMU operation budget
Construction Phase						
1. Loss of trees and impacts to fauna	Avoid and minimize impact to flora and fauna in the subproject area	1. Minimized vegetation covers clearances. 3. Prohibit cutting of trees for firewood and for use in subproject. 4. During replanting/replant vegetation cover works, new alien plant species (i.e., species not currently established in the country or region of the subproject) shall not be used. Invasive species shall not be introduced into new environments.	Ia Dal and Ia Toi CPCs; Contractors	Through out construction phase	Along the subproject road, especially 15 km go through natural forest in Section 1; worker camps area	Included in the contract with contractors

		5. The contractors will not use or permit the use of wood as a fuel for the execution of any part of the works, including but not limited to the heating of bitumen and bitumen mixtures, and to the extent practicable shall ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 6. Contractors shall not buy or use wood from the illegal sources (that come from the illegal logging) 7. No construction camps, concrete mixing plants, material storage sites are to be located in the forest area. 10. Contractors will take all precautions necessary to ensure that damage to vegetation is avoided due to fires resulting from execution of the works. The Contractors will immediately suppress the fire, if it occurs, and shall undertake replanting to replace damaged vegetation.				
2. Local facilities	Prevent interruption of services such as electricity and water supply during relocation of the local facilities. Repair damaged access roads.	1. Reconfirm power, water supply, and telecommunications likely to be interrupted by the works. 2. Contact all relevant local authorities for facilities and local people to plan re-provisioning of power, water supply, and telecommunication systems. 3. Facilities shall be relocated and reconnected well ahead of commencement of construction works and contractors shall coordinate with facility company for relocation and reconnection well before works commence. 4. Affected communities shall be properly informed in advance. 5. Reconnection of facilities shall be done at the shortest practicable time before construction commences. 6. Facilities damaged during construction shall be reported to the CSC, PMU and facility authority and repairs arranged immediately. 7. Access roads, agricultural land and other properties damaged during transport of	Contractors	Before construction start and through out the construction phase	Along the Section 2; at the area of hamlet No.7 and No.9 in Section 1	Included in the contract with contractors

		construction materials and other project-related activities shall be reinstated upon completion of construction works at each section				
3. Materials exploitation and management of quarry, borrow pits and temporary storage area	Minimize impacts from materials extraction, transportation and storage.	1. Implement MMP prepared by ESP during detailed design phase. 2. Balance excavation and fill requirements to minimization negative impacts 3. Prioritize use of existing quarry sites with suitable materials and update the list of quarries and borrow pits monthly in MMP and report to PMU and minimize impacts on other local resources. 4. Procure materials only from Kon Tum DONRE authorized quarries and borrow sites. 5. Replant tree and vegetation cover of any vegetation clearance area in quarries and borrow pits 6. Stockpile topsoil for later use and fence and re-contour borrows pits after use. Topsoil, overburden, and low-quality materials shall be properly removed, stockpiled near the site, and preserved for rehabilitation. 7. Do not use quarries in areas of natural woodland or near rivers, which provide food and shelters for birds and other animals. 8. Borrow/quarry sites shall not be located in productive land and forested areas. 9. During quarry/borrow site operation, provide adequate drainage to avoid accumulation of stagnant water. 10. Ensure borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of water bodies favourable for mosquito breeding. 11. Upon completion of extraction activities, quarry and borrow pits shall be dewatered and fences shall be installed, as appropriate, to minimize health and safety risks. 12. To avoid drowning when pits become water filled, measures such as fencing, providing flotation devices such as a buoy tied to a rope, etc. shall be implemented.	Contractors	Though out construction phase	Subproject site, quarries and borrow pit areas	Included in the contract with contractors

4. Waste and spoil disposal	Control spoils and waste disposal, lubricant and hazardous wastes.	1. Implement corresponding provisions of WMSDP prepared by the ESP. 2. Areas for disposal to be agreed with CPCs and Kon Tum DONRE checked and recorded by the CSC, ESP/PMU and monitored 3. Spoil and waste will not be disposed of in streams or other surrounding water bodies. 4. Spoils and waste shall only be disposed to areas approved by local authorities. 5. Spoil disposals shall not cause sedimentation and obstruction of flow of watercourses, damage to agricultural land and densely vegetated areas. 6. Under no circumstances will spoils be dumped into watercourses (rivers, streams, drainage, irrigation canals, etc.) 7. The spoils disposal site shall be located at least 50 m from surface watercourses and shall be protected from erosion by avoiding formation of steep slopes and grassing.	Contractors	Through out construction phase	Through out construction site, material storage areas, machines and vehicles maintenance area	Included in the contract with contractors
5. Bitumen heating and concrete mixing plant	Avoid air pollution, traffic obstacles and contamination	1. Locate mixing plant, bitumen heating off road and (wherever practicable) at least 500 m from nearest sensitive receivers (residential areas, schools, clinics, etc.) and streams and install and maintain dust suppression equipment. 2. Concrete mixing areas shall be protected against spills and all contaminated soil must be properly handled according to applicable national and local laws and regulation. As a minimum, these areas must be contained, such that any spills can be immediately contained and cleaned up. 3. Prevent soil contamination requiring contractors to instruct and train their workers on storage and handling of materials and chemicals that can potentially cause soil contamination. 4. Recycle debris generated by dismantling of existing pavement subject to the suitability of the material.	Contractors	Through out construction phase	Through out construction site	Included in the contract with contractors
6. Noise, dust and vibration	To minimize negative impacts from noise, dust and vibration	1. Restrict works to daylight hours within 500 m of residential settlements and local clinics. 3. Powered mechanical equipment and vehicle emissions to meet national	Contractors	Through out construction phase	Through out construction site especially in Section 2	Included in the contract with contractors

	during construction period	TCVN/QCVN standards. All construction equipment and vehicles shall have valid certifications indicating compliance to vehicle emission and noise creation standards. 4. Monitor and investigate complaints; propose alternative mitigation measures. 5. Keep material storage site moist 6. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emission. 7. On rainless day undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials storage sites, construction sites, access roads, quarry areas, borrow sites and other subproject areas where residential sites and other sensitive points such as schools, clinics… are located nearby. 8. Clean up road surfaces after work. 9. To protect buildings and structures from vibration, non-vibrating roller shall be used in construction sites near buildings and structures. 10. Structures, which are damaged due to vibration caused by the construction activities, shall be repaired immediately as directed by ESP/PMU. 11. Machinery shall be turned off when not in use. 12. Pile driving during to be schedule for daytime if construction site is near sensitive points or approved by DONRE, CPCs and ESP/PMU. 13. Impose speed limits on construction machines and transportation vehicles to minimize dust emission along areas where sensitive pints are located (houses, schools, clinics, pagodas etc.).			and 15 km go through natural forest in Section 1	
7. Erosion control/ run off	Protect established facilities	1. Establish vegetation and erosion protection immediately after completion of works in each stretch / sector. 2. Check weather forecasts and minimize work in wet weather. 3. Stockpile topsoil for immediate replanting	Contractors	Through out construction phase	Through out construction site and high risk slope as agreed with ESP/PMU	Included in the contract with contractors

		after cutting. 4. Minimize damage and excavation of surrounding vegetation during slope formation. 5. Protect the cut slope with planted vegetation, bioengineering or conventional civil engineering structures as soon as practicable after excavation. 6. Include and implement appropriate measures for slope protection, i.e. vegetation cover and stone pitching, as required in the detailed construction drawings. 7. Prevent erosion and protect the excavated slope with temporary or permanent drainage as soon as practicable after cutting. 8. If new erosion occurs accidentally, back fill immediately to restore original contours. 9. Low embankments will be protected from erosion by seeding and planting indigenous grasses that can flourish under local conditions. 10. Payments will be linked to the completion of the works as indicated by the installation of erosion control measures to protect the works to the satisfaction of ESP/PMU.			(especially in Section 1)	
8. Streams/ Rivers protection and bridge/culvert construction	Protect Streams/ Rivers and maintain flows	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed not to block streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.	Contractors	Through out construction phase	11 streams/ rivers crossing point	Included in the contract with contractors
9. Drainage, hydrology, water resources and water quality	To minimize impact from wastewater drainage and prevent potential	1. Province adequate drainage facilities at construction sites and worker camps to avoid stagnant water. 2. Implement agreed designs for bridges/	Contractors	Through out construction phase	Through out construction sites of Section 1; 3	Included in the contract with contractors

	impact on water quality due to subproject activities	culverts sufficient to control flooding as designed. 3. Store lubricants, fuels and wastes in dedicated enclosures at least 50 m from water bodies on high and impervious ground with top cover 4. Solid waste from construction activities and workers camps will not be thrown in streams and other water bodies (drainage, lake, pond, etc.) 5. Construction storage/stockpiles shall be provided with bunds to prevent silted run-off. 6. Stockpiled materials will be covered to reduce silted run-off. 7. No stockpiling or borrow sites at least 100m of water body. 8. Work in streams at bridge repair sites will be scheduled during dry season and work duration shall be as short as possible. 9. Washing of machinery and vehicles in surface waters shall be prohibited. 10. Inform Ia Dal, Ia Toi CPCs and Ia H'Drai DCP in advance construction schedule and scope. 11. Work with relevant Division of Ia H'Drai DPC to find out suitable water block/ water cut schedule, avoid impact to downstream users in Ia Khai, Ia Grai districts and Se San 4, Se San 4A hydropower plants.			river/ stream crossing positions in Section 2, material storage sites, temporary waste disposal area	
10. Large influx of construction worker	Construction camps and worker camps not to cause any negative impact to surrounding environment (forest area, water bodies, wild animal); control of infectious diseases.	1. Construction and worker camp location and facilities located at least 500m from settlements and agreed with local communities and facilities approved by ESP and managed to minimize impacts. 2. Hire and train as many local workers as possible. 3. Provide adequate housing for all workers at the construction camps and establish clean canteen/eating and cooking areas. 4. Mobile toilets (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and prevented by cleaning lavatories daily and by keeping toilets clean at all times. 5. Provide separate hygienic sanitation	Contractors	Through out construction phase	Through out construction sites and worker camps	Included in the contract with contractors

		facilities/toilets and bathing areas with sufficient water supply for male and female workers. 6. Borrow pits and natural depressions with pre-laid impervious liners will be used to dispose of scarified/scraped asphalt, and then covered with soil. This will check potential groundwater contamination. 7. As much as possible, food shall be provided from farms nearby and bush meat supplies will be banned to discourage poaching. 8. Camp site will be cleaned up to the satisfaction of and local community after use. 9. Solid and liquid waste will be managed in line with WMSDP. 10. All waste materials shall be removed and disposed to disposal sites approved by local authorities 11. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned. 12. Register temporary stay for workers with police.				
11. Safety precautions for workers and public safety	Ensure worker safety	1. Establish safety measures as required by law and by good engineering practice and provide first aid facilities that are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, earplugs, gloves, etc. at no cost to the employee. 5. Where worker exposure to traffic cannot be completely eliminated, protective barriers shall be provided to shield workers from traffic vehicles.	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors

		6. Workers shall be provided with reliable supply of potable water. 7. Construction camps shall be provided with adequate drainage to avoid accumulation of stagnant water. 8. Construction camps shall be provided with toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained to allow effective operation. 9. Ensure reversing signals are installed on all construction vehicles.				
12. Traffic Management	Minimize disturbance of traffic	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience due to subproject operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold ups and congestion 3. In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up. 4. Provide safe vehicle and pedestrian access around construction areas. 5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. 6. Provide sufficient lighting at night within and in the vicinity of construction sites. 7. Designate traffic officers in construction sites.	Contractors	Through out construction phase	Through out construction sites in Section 2; at start and end points of Section 1; Area of hamlet No.7 and No.9 of Section 1.	Included in the contract with contractors
13. Environmental recovery	Provide environmental recovery of the subproject	Contractors to reconfirm and implement recovery (e.g., landscaping, tree replanting) identified at the detailed design stage	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors
Operation Phase						

1. Changing land use, increase forest access	To minimize land use change from natural forest to cultivation land	1. Cooperate with DONRE, Sa Thay Forestry Company, Duy Tan Rubber Company, Ia Dal CPC and Ia H'Drai DPC setup a suitable O&M plan and protect 100 m forest corridor along Section from Km60 – Km74. 2. Participate in the Forest Protection Campaign if applicable 3. Install signboard, propaganda board on forest protection along the 15 km natural forest section.	Kon Tum Department of Transportation (DOT)	Through out operation phase	At the section goes along natural forest	Included in operation and maintenance cost
2. Generate dust, noise, vibration	To minimize dust, noise and vibration	1. Install sign board, speed limit/ loading limit to prevent dust, noise and vibration from over speed vehicles 2. Install road humps at the residential area to reduce the impact from noise, dust and vibration.	Kon Tum DOT	Through out operation phase	At the start and end point of two sections. At the residential areas of hamlet No.4; No.7 and No.9	Included in operation and maintenance cost
3. Traffic and road safety	Minimize road accident	1. Undertake road safety awareness campaigns for local residents and other road users of provincial road No.675A. 2. Install and maintain road warning signs and markings. 3. Monitor road accidents and implement necessary preventive measures (awareness campaigns, provision of appropriate road furniture to enhance road safety and control traffic).	Kon Tum DOT	Through out operation phase	Along two sections of the road No. 675A	Included in operation and maintenance cost
4. Risks caused by natural calamity	Minimize impact from natural calamity	1. Ensure that storm drains and highway drainage systems are periodically cleared to maintain clear drainage to allow rapid dispersal of storm water flow. 2. Ensure rapid response in case of landslides and implement thorough maintenance programme along erosion-prone areas. 3. Undertake surveillance and re-vegetation for areas prone to erosion and landslides.	Kon Tum DOT	Through out operation phase	Slopes with high risks of erosion and landslide	Included in operation and maintenance cost

D. Environmental monitoring

1. Compliance Monitoring

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

145. 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.

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

Table 15 - Environmental Monitoring Compliance

Performance and Impact Monitoring					
Environmental Concern	Parameter to monitor	Location	Frequency & Verification	Responsible to Monitor	Monitoring Cost
Design and Pre-construction Phase					
1. Environment and climate change	Detail designs with environment and climate change cooperated	N/A	Only one time before the construction commence	PMU	Included in the operation budget of PMU
2. Land acquisition and resettlement	Compensation documents	N/A	Only one time before the construction commencement	Kon Tum DPI/ DONRE; PMU	Included in the operation budget of PMU
3. Environmentally responsible procurement	Include in bidding documents. Check compliance	N/A	Bidding preparation period. Before start site works	PMU	Included in the operation budget of PMU
4. Material Management Plan	Require in contract with ESP. Check at Detailed Design.	N/A	Only one time in detailed design phase	PMU	Included in the operation budget of PMU
5. Plan spoil and waste disposal	Require in contract with ESP. Check at Detailed Design.	N/A	Only one time in detailed design phase	PMU	Included in the operation budget of PMU
6. Unexploded Ordnance	Checking documents/ certificates	N/A	Once, before construction start	PMU	Included in the operation budget of PMU
7. Environmental Capacity Development	Require in contract with ESP. Check at Detailed Design. Complete training and check before and during the construction works.	N/A	Before construction commencement and at the beginning period of the construction phase	PMU	Included in the operation budget of PMU
Construction Phase					
1. Loss of trees and impacts to fauna	Check of implementation	Along the subproject road, especially 15 km go through natural forest in Section 1; worker camps area	Before construction commencement and through out construction phase. Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
2. Local facilities	Check of implementation	Along the Section 2; at the area of hamlet No.7 and No.9 in Section 1	Before construction commencement and through out construction phase. Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
3. Materials exploitation and management of	Check of implementation	Subproject site, quarries and	Bi-weekly	ESP/ PMU	Included in the operation budget

quarry and borrow pits		borrow pit areas	Part of daily construction supervision	CSC	of PMU/ ESP/ CSC
4. Waste and spoil disposal	Check of implementation	Through out construction site, material storage areas, machines and vehicles maintenance area	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
5. Concrete mixing plant and bitumen heating	Check of implementation	Through out construction site	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
6. Noise, dust and vibration	Check of implementation	Through out construction site	Bi-weekly and spot checks Part of daily construction supervision	ESP/ PMU	Included in the operation budget of PMU/ ESP CSC
	Ambient air quality (temperature, moisture, wind direction and speed, PM10, PM2.5, PB, NO_2, SO_2…); Noise level (average noise level, maximum noise level, vehicles frequency…)	8 monitoring points at start and end points of Section 1 and Section 2. Hamlet No.4; No.7 and No.9; In front of Chu Mom Ray Kindergarten.	1 time before construction start and semi-annually during 2 years construction time	ESP	2,400 USD[2]
7. Land slide, erosion control/ run off	Check of implementation	Through out construction site and high risk slope as agreed with ESP/PMU (especially in Section 1)	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
8. Stream protection and bridge/culvert construction	Check of implementation	11 streams/ rivers crossing point	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC

[2] There is no cost norm for Kon Tum province. Figures has been estimated base on environmental monitoring cost norm of Dak Nong – Decision No. 17/2015/QD-UBND.

9. Drainage, hydrology, water resources and water quality	Check of implementation	Through out construction sites of Section 1; 3 river/ stream crossing positions in Section 2, material storage sites, temporary waste disposal areas	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
	Surface water quality Ground water quality	11 sampling points at 20m downstream of the crossing river/ stream. 1 sampling point in Sesan4 reservoir adjacent to the Section 1 (Km60-Km74) 3 sampling points in the well of Chu Mom Ray Company No.3 Area (near Bridge No.8); Sa Thay Border Military Station (near Sa Thay Bridge); hamlet No.9 (near Ya Doy Bridge)	1 time before construction start and every quarter during 2 years construction time 1 time before construction start and semi-annually during 2 years construction time	ESP ESP	8,910 USD 1,050 USD[3]
10. Large influx of workers. Construction and worker camps, sanitation and diseases	Check of implementation	Through out construction sites and worker camps	Before establishment of the facilities and through out the construction phase Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
11. Safety precautions for workers and public safety	Check of implementation. Check compliance to Labor Code of Vietnam and other relevant Decision, Decree and Circular	Through out construction sites	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC

[3] There is no cost norm for Kon Tum province. Figures have been estimated base on environmental monitoring cost norm of Dak Nong – Decision No. 17/2015/QD-UBND.

	under Government requirements				
12. Traffic Management	Check of implementation	Through out construction sites in Section 2; at start and end points of Section 1; Area of hamlet No.7 and No.9 of Section 1.	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
13. Environmental recovery	Confirmed implementation of required enhancements	Through out construction sites	Before construction and bi-weekly check Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
Operation Phase					
1. Changing land use, increase access to forest	Check of implementation	At the 15 km along natural forest in Section 1	Semi-annual in the first two years	Kon Tum DOT	Included in operation budget of Kon Tum DOT
2. Dust, noise, vibration	Check of implementation; Ambient air environment, noise level at the road and in the areas which are adjacent to road	At the start and end point of two sections. At the residential areas of hamlet No.4; No.7 and No.9	Semi-annual in the first two years	Kon Tum DOT	Included in operation and maintenance cost
3. Road safety	Check of implementation	Along two sections of the road No. 675A	Semi-annual	Kon Tum DOT	Included in the operation budget of DOT
4. Natural calamity	Check of implementation	Slopes with high risks of erosion and landslide	Semi-annual	Kon Tum DOT	Included in the operation budget of DOT

E. REPORTING

147. PMU will submit the following reports to ADB:

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

Table 16 – Reporting procedures

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

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

Item	Estimated cost (US$)
1. Environment Safeguard Specialist (ESP)	***76,910***
1 National ESP - 14 man-months (intermittent in the first 2 years; 6 – 4 – 4) – 4000 US$/ man-month	56,000
Per diem for ESP: 48 US$ x 30 days x 14 months	20,160
Air fare + taxi (to and from airports) for 3 round trips: 250 US$ x 3 trips	750
2. Environmental effects monitoring (implemented by ESP)	***12,360***
Ambient air quality: 8 monitoring locations x 5 times x 60 US$/sample[4]	2,400
Ground water quality: 3 monitoring locations x 5 times x 70 US$/sample[5]	1,050
Surface water quality: 11 monitoring locations x 9 times x 90 US$/sample[6]	8,910
3. Training/orientation, local transportation, supplies (by ESP)	***21,500***
a) Training/orientation: 1 formal training course for PMU, CSC, Contractors and Kon Tum DOT and other "on the job" training	1,500
b) Local transportation and supplies	20,000
4. Printing Environmental monitoring report by ESP (8 reports)	***8,000***
Subtotal (1+2+3+4)	**118,770**
5. Contingency	**11,230**
Total (1+2+3+4+5)	**130,000**

F. CAPACITY BUILDING

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

149. The most significant challenge is the lack of human and financial resources and necessary infrastructure. To address this constraint, Kon Tum DPI/PMU will designate a full time staff as environmental safeguards officer (ESO) to handle the environmental aspects of the subproject during implementation stage. Ideally, ESO of the Project Preparation Unit (PPU) will be come ESO of the subproject PMU also. The ESO and other relevant staff of PMU will be

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

trained by the Environment Safeguard Specialist (ESP) during subproject implementation as “on the job” training or by formal training courses.

Table 18 – Detail capacity building program

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

X. CONCLUSIONS AND RECOMMENDATIONS

150. 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.

151. The implementation of the subproject "Construct Provincial Road No.675A" will steadily improve the road quality; make it favourable for transportation in both dry and rainy season. Several actions are required during the detailed design stage to minimize impacts to acceptable levels. The negative environmental impacts from the upgrading works will mostly take place during the construction stage. All of the impacts during construction phase should be very predictable and manageable and with appropriate mitigation and few residual impacts are likely. Additional human and financial resources will be required to improve environmental capability and to progress and achieve necessary statutory compliance and environmental clearance certification for the subproject or associated activities that also require environmental permits under the environmental laws of Viet Nam – LEP 2014.

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

XI. APPENDIX

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

Section 1: Starting point – junction with PR675

Subproject road: End point view from Ut Cung Junction

Section 2: End point – view to Ho Da

At the cross section with Sa Thay River

Running along Sesan 4 Reservoir

Rubber plantation of Duy Tan company

B. Appendix 2: Environmental criteria for subproject selection

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

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

C. Appendix 3: Source of Reference Information

1. *Kon Tum Environmental Monitoring Report 2014*
2. *Kon Tum Climate Change Adaptation Plan (2010-2015)*
3. *Statistics of poor households and marginal poor households of Ia H'Drai District People's Committee in 2015*
4. *Statistics of poor households of Labour Invalids and Social Affairs of Ia HDrai District People's Committee in 2015*
5. *Statistics Division of Ia H'Drai District people's committee in 2015*
6. *Statistic Division of area by administrative unit of Ia H'Drai district in 2015*
7. *Healthcare Centre of Ia H'Drai Districts people's committee in 2015*

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

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

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

construction	based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.
9. Drainage, hydrology, water resources and water quality	1. Province adequate drainage facilities at construction sites and worker camps to avoid stagnant water. 2. Implement agreed designs for bridges/ culverts sufficient to control flooding as designed. 3. Store lubricants, fuels and wastes in dedicated enclosures at least 50 m from water bodies on high and impervious ground with top cover 4. Solid waste from construction activities and workers camps will not be thrown in streams and other water bodies (drainage, lake, pond, etc.) 5. Construction storage/stockpiles shall be provided with bunds to prevent silted run-off. 6. Stockpiled materials will be covered to reduce silted run-off. 7. No stockpiling or borrow sites at least 100m of water body. 8. Work in streams at bridge repair sites will be scheduled during dry season and work duration shall be as short as possible. 9. Washing of machinery and vehicles in surface waters shall be prohibited. 10. Inform Ia Dal, Ia Toi CPCs and Ia H'Drai DCP in advance construction schedule and scope. 11. Work with relevant Division of Ia H'Drai DPC to find out suitable water block/ water cut schedule, avoid impact to downstream users in Ia Khai, Ia Grai districts and Se San 4, Se San 4A hydropower plants.
10. Large influx of construction worker	1. Construction and worker camp location and facilities located at least 500m from settlements and agreed with local communities and facilities approved by ESP and managed to minimize impacts. 2. Hire and train as many local workers as possible. 3. Provide adequate housing for all workers at the construction camps and establish clean canteen/eating and cooking areas. 4. Mobile toilets (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and prevented by cleaning lavatories daily and by keeping toilets clean at all times. 5. Provide separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supply for male and female workers. 6. Borrow pits and natural depressions with prelaid impervious liners will be used to dispose of scarified/scraped asphalt, and then covered with soil. This will check potential groundwater contamination. 7. As much as possible, food shall be provided from farms nearby and bush meat supplies will be banned to discourage poaching. 8. Camp site will be cleaned up to the satisfaction of and local community after use. 9. Solid and liquid waste will be managed in line with WMSDP. 10. All waste materials shall be removed and disposed to disposal sites approved by local authorities 11. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned. 12. Register temporary stay for workers with police.
11. Safety precautions for workers and public safety	1. Establish safety measures as required by law and by good engineering practice and provide first aid facilities that are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, ear plugs, gloves, etc. at no cost to the employee. 5. Where worker exposure to traffic cannot be completely eliminated, protective barriers shall be provided to shield workers from traffic vehicles. 6. Workers shall be provided with reliable supply of potable water.

	7. Construction camps shall be provided with adequate drainage to avoid accumulation of stagnant water. 8. Construction camps shall be provided with toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained to allow effective operation. 9. Ensure reversing signals are installed on all construction vehicles.
12. Traffic Management	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience due to subproject operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold ups and congestion 3. In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up. 4. Provide safe vehicle and pedestrian access around construction areas. 5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. 6. Provide sufficient lighting at night within and in the vicinity of construction sites. 7. Designate traffic officers in construction sites.
13. Environmental recovery	1.Reconfirm and implement recovery (e.g., landscaping, tree replanting) identified at the detailed design stage

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					