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VIE: Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project-Upgrading and Improvement of Boc Bo – Bang Thanh – Son Lo Road, Pac Nam District, Bac Kan Province

Prepared by Planning and Investment Department of Bac Kan province for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 27 April 2017)

Currency unit	–	Viet Nam Dong (D)
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$1.00	=	Đ 22,730

ABBREVIATIONS

ADB	–	Asian Development Bank
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
ESS	–	Environmental Safeguard Specialist
IEE	–	Initial Environmental Examination
IPM	–	Integrated Pest Management
LEP	–	Law on Environmental Protection
MASL		Meters above sea level
MONRE	–	Ministry of Natural Resources and Environment
MPI	–	Ministry of Planning and Investment
MPN	–	Most Probable Number of viable cells of a pathogen - a measure of water quality
PMU	–	Provincial Project Management Unit
PPC	–	Provincial People's Committee
PPE	–	Personal Protective Equipment
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	–	Basic Infrastructure for Inclusive Growth Sector Project in Northeast Provinces
The Subproject	–	Construction and Upgrading of Boc Bo - Bang Thanh - Son Lo Road, Pac Nam District, Bac Kan Province
UXO	–	Unexploded ordnance

WEIGHTS AND MEASURES

Km^2 (square kilometer)	–	unit of length
m^3 (cubic meter)	–	A measure of volume

Note:

(i) In this report, "$" refers to US dollars.

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I. EXECUTIVE SUMMARY

1. The proposed Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project (BIIG1) will improve the economic competitiveness of the four northeastern provinces (FNEP) of Bac Kan, Cao Bang, Ha Giang and Lang Son. The Project's impact will be closer economic integration enhancing the subregional competitiveness of the FNEP by providing critical infrastructure, which will increase the “connectivity” and access to basic services of poo and remote ethnic minority communities.

2. The project has four outputs being (i) FNEP road network connectivity improved, (ii) rural water supply improved, (iii) ARVCs in Lang Son improved, and (iv) decentralized public asset management processes implemented.

A. Subproject Summary

3. The subproject is entitled "Construction and Upgrading of Boc Bo - Bang Thanh - Son Lo Road, Pac Nam District, Bac Kan Province" and is a representative subproject for Output 1 of BIIG 1: Improved FNEP Road Network Connectivity. The route travels through Boc Bo and Bang Thanh communes, Pac Nam district, Bac Kan province with the total length of 23.1 km

4. The works will bring the road to the standard of Category V Mountain road as classified in Vietnamese national standards TCVN (Tieu chuan Viet Nam) 4054:2005. This may require realignment in some sections to meet technical specifications. The main specifications are:

- Subproject length: 23.1 km;
- Roadbed width: 6.5m;
- Road surface width: 3.5m;
- Pavement width: 2 x 1.5m;
- Reinforced shoulder: 2 x 1.5m;
- Width of hard shoulder: 2 x 1.0m;
- Road surface structure: Bituminous macadam road surface

5. There are 10 stream crossing positions along the road. Nine of them have bridges or causeways. Construction of a bridge at Km8 + 150 has stopped due to lack of funds. The route includes the construction of 5 bridges to meet Cat V_{MN} standard.

B. Environment impacts and mitigation

6. The Project is categorized as B on environmental issues during the Project Concept note, which identified few significant adverse impacts, of which none are irreversible.

7. This IEE has been prepared to screen and assess impacts and formulate mitigation measures in an Environmental Management Plan (EMP) covering the three phases of subproject implementation including the design, pre-construction; construction and operation phases and to set out institutional arrangements to ensure that the subproject EMP will be implemented.

8. In the design and preconstruction phases, the potential issues that have been identified are (i) land acquisition and resettlement, especially in the residential area near the start point of

the road - at Boc Bo commune center, and (ii) potential disturbance of unexploded ordinance (UXO). To minimize the impact, the PMU will check and review the Land acquisition and resettlement process before 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. The PMU will also sign a contract with an authorized UXO clearance company to ensure no mine and bomb left in the subproject area.

9. The potential negative impacts in the construction phase have been identified as (i) Impact on flora and fauna along the proposed route; (ii) impact on utilities (public infrastructure); (iii) impacts of excavation and materials extraction; (iv) impact from temporary materials stockpiles; (v) generation of surplus soil; (vi) generation of construction waste and domestic waste; (vii) dust, noise and vibration from construction machinery; (viii) risks of landslide, soil erosion and runoff; (ix) impacts on drainage and hydrology; water resources and quality; (x) social issues associated with the presence of temporary non-local workers; (xi) safety risks to workers and also to the local public; and (xiii) impacts on local traffic.

10. The proposed mitigation measures for these impacts in the construction phase are:

(i) Prohibit cutting of trees for firewood and for use in the subproject and also construction camps, concrete mixing plants, material storage sites from being located in the forest area; (ii) contact all relevant local authorities for facilities and local people to plan any re-provisioning of power, water supply, and telecommunication systems; (iii) store construction material stockpiles on impervious ground with covers or roof at least 50m away from water bodies; install sediment ditches, silt fences at the area with high potential of runoff, erosion and sedimentation; procure materials only from Bac Kan DONRE authorized quarries and borrow sites and update the list of quarries and borrow pits monthly and report to PMU; (iv) stockpile topsoil for later use and fence and re-contour borrow pits after use; temporary stockpiles shall not be located in productive land and forested areas; (v) surplus material to be distributed to local people for use in landscaping/forming building platforms and shall only be disposed to areas approved by local authorities; (vi) areas suitable for disposal to be agreed with Boc Bo and Bang Thanh CPCs and Bac Kan DONRE checked and recorded by the CSC, ESP/PMU and monitored; (vii) locate mixing plant, bitumen heating off road and (whenever practicable) at least 500 m from nearest sensitive receivers (residential areas, schools, clinics, etc.) and streams and install and maintain dust suppression equipment; restrict works to daylight hours within 500 m of residential settlements and local clinics, powered mechanical equipment and vehicle emissions to meet national TCVN/QCVN standards; (viii) establish vegetation and erosion protection immediately after completion of works in each stretch/ sector, check weather forecasts and minimize work in wet weather; (ix) 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; (x) hire and train as many local workers as practicable; provide adequate housing for all workers at the construction camps and establish clean canteen/eating and cooking areas; (xi) workers shall be provided with appropriate personal protective equipment (PPE), and receive regular scheduled briefings on health and safety issues related to their activities as well as on proper use of PPE and fencing on all hazardous sites such as excavation sites, borrow pits and sides of temporary bridges; (xii) 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.

11. In the operation phase, potential negative impacts have been identified as (i) noise impacts arising from increasing traffic density; (ii) dangers associated with increased driving

speeds that are likely to result from improvements to the road surface. Increases in traffic flow indicated additional future traffic should be moderate and unlikely to create many community safety issues. To minimize the negative impacts, the Bac Kan Department of Transportation (DOT), the responsible agency for subproject management in the operation phase, will maintain the road regularly and cooperate with traffic police to control speed and vehicle load on the road, especially at sensitive areas along the road such as kindergartens, medical clinics and residential areas etc.

12. 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 identified were (i) concerns over poor quality of the construction, which would reduce the longevity of improvements, (ii) possibility of inadequate compensation, which would impact on local people's lives, and (iii) possibility of inadequate construction supervision. All of these concerns are addressed in the EMP (See Table 15 – 16 for more details).

13. 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 arrangements

14. Bac Kan DPI has established an Official Development Assistance (ODA) Project Management Unit (PMU) and assigned relevant staff to support the preparation of the subproject in the PPTA period. One member of the PMU has been assigned as the Safeguards Officer (ESO). An Environmental Safegurad Specialist (ESS) for subproject implementation will organize a formal and on-the-job training for relevant PMU staff, CSC, communities, contractors in implementation of the EMP; and will support the establishment and operation of the subproject environment management system in construction phase. The ESS will also support the PMU's capacity building by reviewing and evaluating the capacity for environmental protection of the PMU and Bac Kan Department of Transportation (DOT) – subproject management organization in the operation phase.

15. To ensure that environmental protection and mitigation measures are included in the civil works contracts, the EMP will be included in the bidding documents and civil works 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 documents 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

16. 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 encountered, further detailed environmental impact assessment (EIA)

is not required. In case of any change in the subproject design, the ESS will update EMP before detailed design finalization.

II. BACKGROUND

A. Objectives of the Project

1. The Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project

17. The subproject objectives will be achieved through investment in construction and improvement of basic infrastructure, including improve and expand the north - south transport corridors to become the economic corridors, increase infrastructure linkage including the subproject - construction and upgrading of Boc Bo - Bang Thanh - Son Lo road, Pac Nam district, Bac Kan province with the total length of 23.1 km to V class road for mountainous area.

18. The subproject is initially categorized as 'B' for environmental safeguards, and this IEE is required according to the ADB Safeguards Policy Statement (SPS) of 2009. The objectives and scope of this IEE are to (i) assess the existing environmental conditions 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) carry out 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

19. The subproject shall comply with requirements of ADB SPS 2009 and the GOV's Guidelines on Implementation of the Law on Environmental Protection 2014. Decree No. 18/2015/ND-CP has detailed information on strategic environmental assessment, environmental impact assessment and environmental protection plans. However certain activities commonly associated with infrastructure subprojects such as quarry operations, extraction of gravel, etc., will also require permission from the relevant provincial level authorities. The bridges and spillways which will be constructed or upgraded by the subproject are all in small scale and will not be required for separate environmental impact assessment

A. ADB SPS REQUIREMENTS

20. The ADB safeguard policy statement (SPS) 2009 imposes safeguard requirements for all its funded projects. The SPS 2009 clarifies the rationale, scope and contents of the environmental assessment. It emphasizes environmental and social sustainability in progress of economic growth and poverty reduction in Asia and the Pacific, with the following aims:

(i) Avoid adverse impacts of projects on the environment and affected people, where possible;

(ii) Minimize/mitigate and/or compensate for adverse impacts on environment and affected people when avoidance is not possible; and

(iii) Help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks

21. For environmental safeguards, the subproject is initially categorized as 'B'. A subproject, which would be classified as category A on environmental safeguards, would be ineligible as a BIIG I subproject.

B. Legal and Administrative Framework for Environmental Protection in Vietnam

22. 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 Conservation
- 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. Decrees and Regulations

- 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-MT:2015/BTNMT on surface water quality
    - QCVN 09-MT:2015/BTNMT on underground water quality
    - QCVN 14: 2008/BTNMT on domestic wastewater

3. Other legislation applicable to the subproject are the following:

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

IV. DESCRIPTION OF THE SUBPROJECT

A. Location and Scope of Subproject

23. Pac Nam district, Bac Kan province is one of the poorest provinces of the country with the non-homogenous infrastructure construction investment, underdeveloped economy, high poverty rate (poverty rate is 23.85% in 2015)[1]. Investments in improving the road system have only taken place for some routes, failing to meet the requirements for economic activity and access to markets and services for local people in the district. The areas, which the route passes, are remote villages with a majority of members of ethnic minorities and difficult economic conditions. The income of people is mainly enough for subsistence with only small income surplus for meeting basic needs. The road from the center of Pac Nam district of Bac Kan province to Son Lo of Bao Lac district of Cao Bang province passes through two communes of Bac Bo and Bang Thanh of Pac Nam district. In the region, mostly ethnic groups of Tay, Nung, Mong, Dao, San Chi, San Diu, Kinh live concentrated in villages along valleys and on hillsides. Their economic conditions are still underdeveloped with the main income source from agriculture and livestock. In spite of the wide geographical area, the level of cultivation land is relatively limited, mostly used for agricultural production on self-sufficiency basis. Local people's lives are difficult and literacy levels generally low. Many villages and hamlets are not connected to roads, resulting in difficulties in travel and commodity transport and exchange. The existing A-graded asphalted rural road is currently in a seriously degraded condition, with damage in many sections, attributed to a lack of regular maintenance. At several locations the pavement has subsided, forming potholes and drainage structures are in poor condition.[2]

[1] The subproject Poverty and Social Analysis Report
[2] The Project Outline of Bac Kan

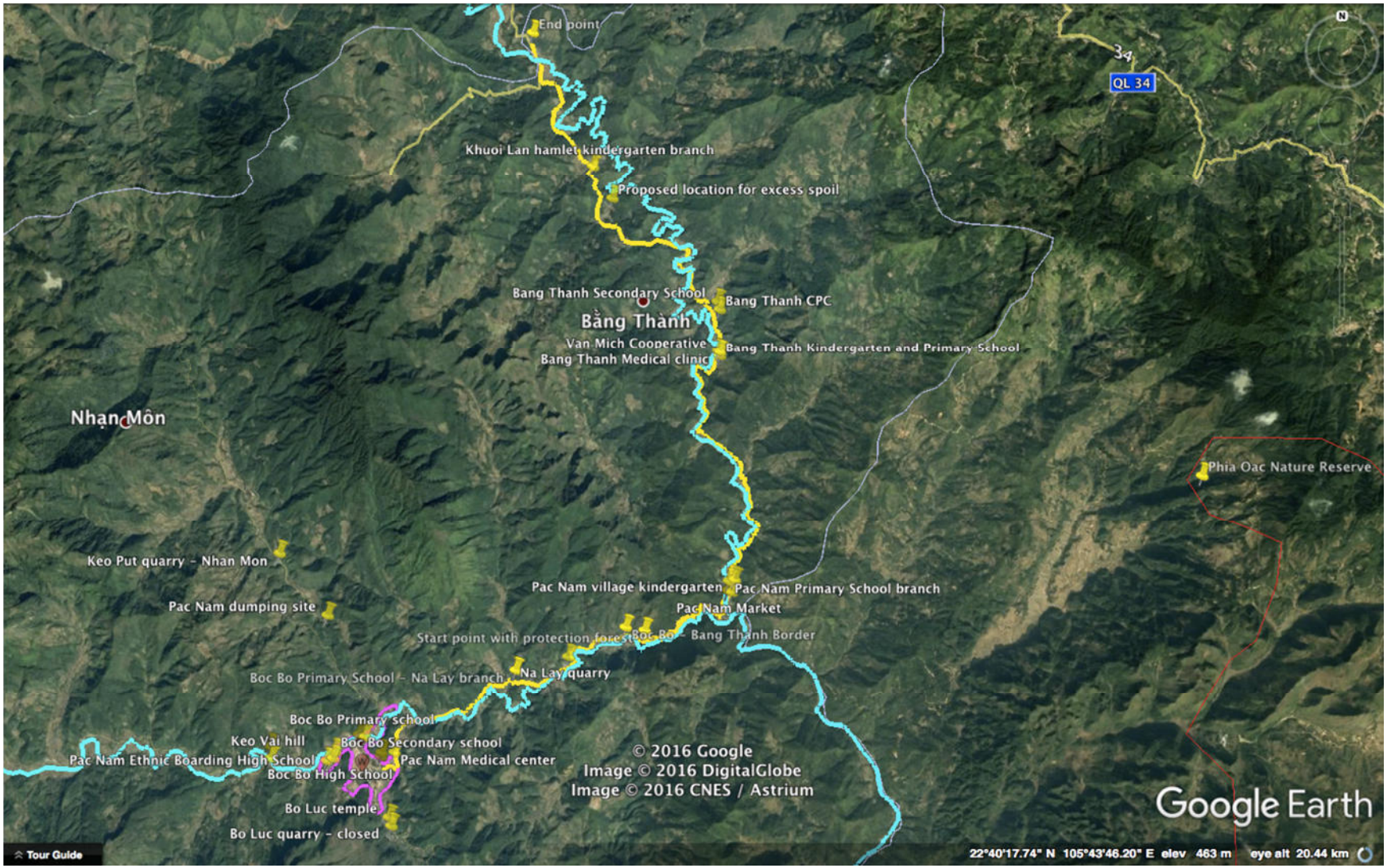


Figure 1 – General map of Bac Kan and subproject location

B. Subproject scope

24. The subproject starts from Na Phay hamlet, the center of Boc Bo commune, Pac Nam district, running about 8 km eastwards along the west tributary to the confluence of the Nang River. At that point, the road turns left, goes northwards, along the north tributary of Nang River. The subproject road ends at the border between Pac Nam district and Bao Lac district, Cao Bang province, in the administrative area of Ban Man village, Bang Thanh commune, Bac Kan district.

25. This road can be divided into two sections with following features:

(i) Section 1 from Boc Bo to the center of Bang Thanh commune, 15km length: Current road surface is good-quality bituminous macadam; a few of sections are damaged with the appearance of pot-holes that are not currently severe enough to affect the transport of local people. The side drain is in poor condition; some sections are filled with soil and rocks due to landslides, there is no side drain in some sections. There are 04 bridges an 01 spillway on this road section of which consruction of two, Pac Cop (Km1+258) and Khuoi Nung (Km3+134) are in progress. Vehicle travel is difficult. The remaining two bridges are small ones of 6m span and 6m width, partly damaged and therefore with poor loading capacity. The spillway at Km 8+100 is also in a seriously damaged condition. At this location, there is the Pac Nam bridge construction project, which is now suspended due to shortage of funds.

(ii) Section 2 from the center of Bang Thanh commune to the end of Bang Thanh commune land boundary (Ban Man village, Bang Thanh commune) 9.4 km in length. The present road surface is aggregate and macadam in very bad condition, discontinuous, eroded and potholed, as repairs are limited and carried out only on impassable sections. Travel is very difficult. On this section there are three spillways including Ban Khua at Km17+185, one at Km23+337 and Ban Man at Km23+756. These spillways are in reasonable condition, however in they are prone to flooding in the rainy season. There are two small bridges on this road section at Km15+928 and Km21+185, both of them are span bridges with 6m span and 5-6m width. These bridges in poor condition and therefore have poor loading capacities.

26. The whole route will be upgraded and constructed to meet the Road Grade V - Mountain of TCVN 4054:2005 Highway - Specifications for design:

- Project length: 23.1 km
- Roadbed width: 6.5m;
- Road surface width: 3.5m;
- Road shoulder: 2 x 1.5m;
- Reinforced shoulder: 2 x 1.0m;
- Road surface structure: Bituminous macadam
- Works on the route: 5 new bridges will be constructed crossing streams along the route. These bridges were designed permanently with pre-stressed concrete, designed load of HL93.

1. Hydrological investigations

27. The hydrological study and description of sites is summarized in Table 1 below.

Table 1 – Hydrological survey results of bridges on the road

No	Bridge Name _ Location	Beam / L bridge (m)	Width (m)	Notes
1	Beam bridge Km8+100	2I24 / 60.55	8.0 (7 + 2x0.5)	Existing construction unfinished. Will use the Bridge design, the subproject will complete the remaining works items.
2	Slab bridge Km10+680	6 / 7.6	6.5 (6 + 2x0.25)	Design a new bridge to replace the old bridge, the new bridge location is 50m away from the existing bridge
3	Beam bridge Km22+650	I24 / 36.1	8.0 (7 + 2x0.5)	Design a new bridge over the stream, the new bridge location is close to the existing bridge
4	Beam bridge Km22+230	I24 / 36.1	8.0 (7 + 2x0.5)	Design new bridge replacing the old causeway, the position of the location is close to the existing causeway.
5	Beam bridge Km22+650	I24 / 36.1	8.0 (7 + 2x0.5)	Design new bridge replacing the old causeway, the position of the location is close to the existing causeway.

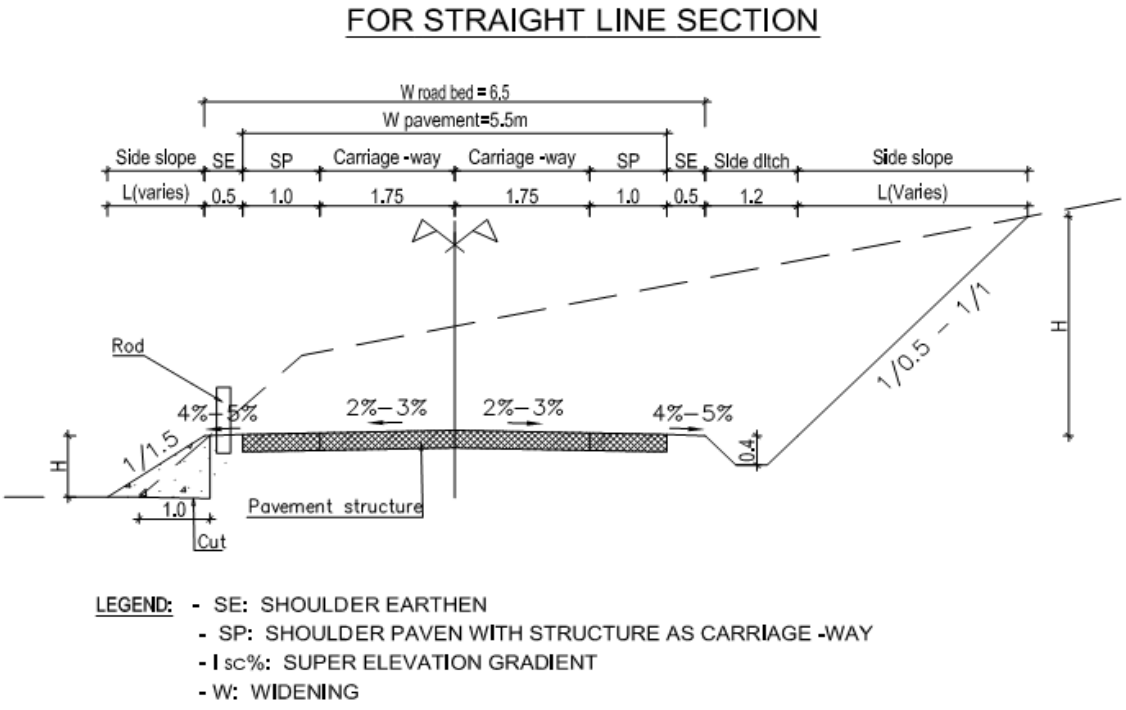


Figure 2 – Typical cross section for straight-line section

2. Construction Material Sources

28. The potential materials source for the subproject construction is Keo Put quarry. The quarry is located on the left side of Boc Bo – Nhan Mon, at Km 4 + 200, 50m from the route, in Nhan Mon commune, Pac Nam district, Bac Kan province. Nam Hai ltd. Company was licensed to manage and exploit the quarry by the People's Committee of Bac Kan province in August 2011. Exploitable reserves under License No. 968 / GP-Bac Kan PPC dated 19/08/2011 are 135,000m^3 of stone with the area of 0.8ha. This is a limestone quarry of good quality and very favorable for the extraction and transportation because the quarry is located right by the road. Stone from the quarry will be transported on the communal road Boc Bo – Nhan Mon to Boc Bo town, then continue 1km internal road to reach the starting point of the project route. The distance from the quarry to the starting point of the route is 5.2 km and to the end point is 28.2km. Currently the quarry can supply many kinds of crushed stones of different sizes The estimated volume required for construction is 35,790m^3, of which 19,792m^3 is for base course and 15,998m^3 for sub-base course.[3]

29. Potential soil borrow pits are as follows:

(i) Mine 01: The mine is located right on the left side of the project road at Km1 + 200, on the territory of uncultivated hill land of Mr. Ca Van Bo, Na Nghe village, Boc Bo commune. Visual inspection shows that the soil composition in the mine is clay with gravel, yellow-brown, in semi-hard state. Soil mines quality is satisfactory to serve roadbed embankment works. Expected reserves of the mine are approximately 20,000 m^3. Because open-pit mine is located adjacent to the route so it is very favorable to exploit for the construction. Transport distance from the mine to the points along the route does not exceed 21km;

(ii) Mine 02: The mine is located on the left side of the project road in the Km2 + 200, in the area of uncultivated hill land of Mr. Loc Duong Thuy, Na Nghe village, Boc Bo commune. Visual inspection shows that the land component is clay with gravel, yellow-brown, semi-hard state. Soil mines quality is satisfactory to serve roadbed embankment works. Expected reserves of the mine are approximately 50,000 m^3. Because open-pit mine is located adjacent to the route so it is very favorable for the exploitation to serve construction. Transport distance from the mine to the places along the route does not exceed 20km.

(iii) Mine 03: The mine is located on the right side of the project road in Km9 + 200, 20 meters from the centerline, on the territory of uncultivated land of Mr. Long Van Truong, Pac Nam village, Bang Thanh commune. Visual inspection shows that the land component is clay with gravel, yellow-brown, semi-hard state. oil mines quality is satisfactory to serve roadbed embankment works. Expected reserves of the mine land approximately 20,000m^3. Because open-pit mine is located adjacent to the route it is very favorable for the exploitation to serve construction. Transport distance from the mine to the places along the route does not exceed 14km;

(iv) Mine 04: Mine is located on the right side of the project road in Km12 + 350, 50 meters from the heart line, on the territory of the land uncultivated hill Hoang Van Thi, Ban Khua village, Bang Thanh commune, Pac Nam district. Visual inspection shows that the land component is clay with gravel, yellow-brown, semi-hard state.

[3] Geological survey report for the subproject road by the PPTA

Soil mines quality is satisfactory to serve roadbed embankment works. Expected reserves of the mine are around 40,000m^3. Because open-pit mine is located adjacent to the route so it is very favorable for the exploitation to serve construction. Transport distance from the mine to the places along the route does not exceed 12km;

(v) Mine 05: Mine is located adjacent left side of the project road in Km16 + 950, in the area of uncultivated land of Mr. Hoang Van Thuc, Na Vai village, Bang Thanh commune, Pac Nam district. Visual inspection shows that the land component is clay with gravel, yellow-brown, semi-hard state. Soil mines quality is satisfactory to serve roadbed embankment works. Expected reserves of the mine are approximately 70,000m^3. Because open-pit mine is located adjacent to the route it is very favorable for the exploitation to serve construction. Transport distance from the mine to the places along the route does not exceed 17km;

(vi) Mine 06: Mine is located on the left side of the project road in Km19 + 200, on the territory of uncultivated land of Mr. Luc Van Ly, Na Vai village, Bang Thanh commune, Pac Nam district. Visual inspection shows that the land component is clay with gravel, yellow-brown, semi-hard state. Land mines quality satisfactory to provide roadbed embankment works. Land reserves of the mine expected around 100,000m^3. Because open-pit mine is located adjacent to the route it is very favorable for the exploitation to serve construction. Transport distance from the mine to the places along the route does not exceed 20km [4].

30. The estimated volume of filling soil (for use to form embankments) is 55,736m^3 while the estimated volume of excavated soil is 443,957m^3 of which 34,784m^3 is unsuitable for re-use as back fill.

31. There is no sand pit near the road that could supply sand as material to the construction work but at Cho Ra town, Ba Be district there is a sand supplier to provide sand for construction at the region and adequate quality for use in construction of bridges and culverts on the project road. This supplier is located about 53km from the subproject road.

C. Land Acquisition

32. According to Resettlement and Ethnic Minority Development Plan, there are 157 households that will be affected by the implementation of the subproject of which 4 households must be relocated and number of households with affected assets are 28. In these 157 affected households, there are 6 seriously affected households (households that lost more than 10% of the total area of cultivated land and residential part and relocate or rebuilt houses on the remaining land). The total affected area is 67,089 m^2 of which 54,563 m^2 is production forest.

D. Budget

33. The planned period of construction is 24 months with the estimated budget in Table 2 below:

Table 2 – Estimated budget of the subproject[5]

[4] Geological survey report for the subproject road by the PPTA
[5] The subproject feasibility report

No.	Cost Items	Cost Norms	Before tax costs	VAT	After Tax Cost (VND)	After Tax Cost (USD)
1	**Civil Works Cost**		**160,088,894,545**	**16,008,889,455**	**176,097,784,000**	**7,879,095**
2	**Project Management Cost**	**1.32%**	**2,114,614,208**	**211,461,421**	**2,326,075,629**	**104,075**
3	**Construction Investment Consultancy Cost**		**11,510,509,947**	**1,151,050,995**	**12,661,560,942**	**566,513**
-	*Construction Investment Consultancy Cost*		*7,272,727,273*	*727,272,727*	*8,000,000,000*	357,942
-	*Project Investment Survey Cost*	*Temporarily Estimated*	*2,727,272,727*	*272,727,273*	*3,000,000,000*	134,228
-	*Design Survey Cost*	*Temporarily Estimated*	*4,545,454,545*	*454,545,455*	*5,000,000,000*	223,714
-	*Project Investment Cost*	*0.23%*	*366,123,302*	*36,612,330*	*402,735,632*	18,019
-	*Environmental Impact Assessment Cost*	*Temporarily Estimated*	*181,818,182*	*18,181,818*	*200,000,000*	8,949
-	*Shop Drawings Design Cost*	*0.84%*	*1,338,183,070*	*133,818,307*	*1,472,001,377*	65,861
-	*Shop Drawings Design Verification Cost*	*0.06%*	*96,053,337*	*9,605,334*	*105,658,671*	4,727
-	*Construction Works Cost Estimates Verification Cost*	*0.06%*	*92,531,381*	*9,253,138*	*101,784,519*	4,554
-	*Bidding Documents Preparation Cost*		*50,000,000*	*5,000,000*	*55,000,000*	2,461
-	*Bidding Documents Evaluation Cost*		*50,000,000*	*5,000,000*	*55,000,000*	2,461
-	*Expression of Interest & Prequalification Bidding Documents Evaluation Costs*		*30,000,000*	*3,000,000*	*33,000,000*	1,477
-	*Bidding Document & Request for Proposal Evaluation Costs*		*50,000,000*	*5,000,000*	*55,000,000*	2,461
-	*Contractor Selection Results Evaluation Cost*		*50,000,000*	*5,000,000*	*55,000,000*	2,461
-	*Cost of the consultant Committee to resolve Contractors' Requests*		*32,017,779*	*3,201,778*	*35,219,557*	1,576
-	*Construction Supervision Cost*	*1.19%*	*1,901,055,623*	*190,105,562*	*2,091,161,185*	93,564
4	**Other Costs**		**10,159,650,920**	**1,015,965,092**	**11,175,616,012**	**500,028**
-	*General Costs*		*6,403,555,782*	*640,355,578*	*7,043,911,360*	315,164
-	*Design Verification Cost*	*0.03%*	*46,095,640*	*4,609,564*	*50,705,204*	2,269
-	*Construction Works Evaluation & Approval Cost*	*0.02%*	*49,844,813*	*4,984,481*	*54,829,294*	2,453
-	*Construction Investment project evaluation Cost*	*0.32%*	*395,033,259*	*39503325.9*	*434,536,585*	19,442

No.	Cost Items	Cost Norms	Before tax costs	VAT	After Tax Cost (VND)	After Tax Cost (USD)
-	*Independent audit cost*	*0.48%*	*1,193,282,971*	*119,328,297*	*1,312,611,269*	58,730
-	*Construction insurance cost*	*1.03%*	*1,648,915,614*	*164,891,561*	*1,813,807,175*	81,155
-	*Project Investment supervision Cost*	*20.00%*	*422,922,842*	*42,292,284*	*465,215,126*	20,815
5	**Land Acquisition and Resettlement Costs**		**10,742,823,141**	**1,074,282,314**	**11,817,105,455**	**528,730**
6	**Contingency**	**16.00%**	**30,975,375,621**	**3,097,537,562**	**34,072,913,183**	**1,524,515**
	Total (1+2+3+4+5+6)				**248,151,055,220**	**11,102,955**

V. DESCRIPTION OF THE ENVIRONMENT

A. PHYSICAL ENVIRONMENT

1. Topography, Geology, and Soils

34. Bac Kan has a complex topography with large altitudinal variation and different topography types including valleys, high hills, low mountains and limestone mountains. The topography of Bac Kan can be divided into four main areas: the high mountain area, low mountain area, limestone mountain area; and valley.

35. The subproject located in Pac Nam district, west and northwest of the province, in the high mountain area with mountain ranges lying in a Northwest - Southeast direction.

36. The total land area of Bac Kan is 485,941 ha. In general, soils in Bac Kan are fertile with a thick topsoil layer. The main soil types in Bac Kan are: alluvial soils; soil on slopes and ferrosols. The subproject location near the west tributary of the Nang River is on alluvial soil, rich in nutrients and suitable for agriculture.[6]

2. Weather, natural disaster and climate change

37. Bac Kan has a tropical monsoon climate with rainy summers and cold winters and relatively little rain. The climate varies with elevation and the direction of the mountain ranges. Affected by an arch shaped mountain range, the climate in Bac Kan is divided into 3 main areas:

(i) The central area: the low area located between the Song Gam mountain range to the west and Ngan Son mountain range to the.

(ii) The East and Northeast area: the mountainous area of the Ngan Son mountain range in a North - South direction with an open valley top the Northeast.

(iii) The West and Southwest area, where the subproject is located. This includes the mountain ridges of Cho Moi, Pac Nam and Ba Be districts and has typically cold winter with less rain and rainy hot summers.

38. The average annual temperature varies from 20^0C - 22^0C. The hottest months of the year are May, June, July and August while the coolest months are December and January. The average temperature of Bac Kan has a rising trend in recent years as shown in Table 3 below.

[6] Status of Environment report (SOE) of Bac Kan province 2015 prepared by Environmental Protection Agency under Bac Kan DONRE

Table 3 – Average annual temperature of Bac Kan 2011 - 2014

Year / Month	2011	2012	2013	2014
1	11.4	14.1	14.30	14.9
2	19.8	15.6	18.9	16.1
3	21	19.9	23.1	19.6
4	22.7	25.6	24	24.3
5	27.4	28	27.1	27.7
6	28.3	28.3	28.1	28.3
7	28.4	27.8	27.3	28.1
8	27.2	27.9	27.4	27.6
9	27.1	26	25.8	27.3
10	23.6	24.4	22.9	24.4
11	19.2	21.3	21	21
12	17.2	17	13.5	15.3
Average annual temperature	**21.98**	**22.99**	**22.78**	**22.9**

39. The annual average rainfall is about 1,756mm, distributed different based on the geological area and seasons. The rainfall is reducing from the West to the East of the province and from the high area to lower area. The largest rainfall area of the province is Cho Don district with the average annual rainfall is 1800mm - 2000mm. In the rainy season (from April to October) the total rainfall make up 85% - 90% of the total rainfall of the year. The rainfall of the province in the 2011-2014 periods has been showed in the Figure 4.[7]

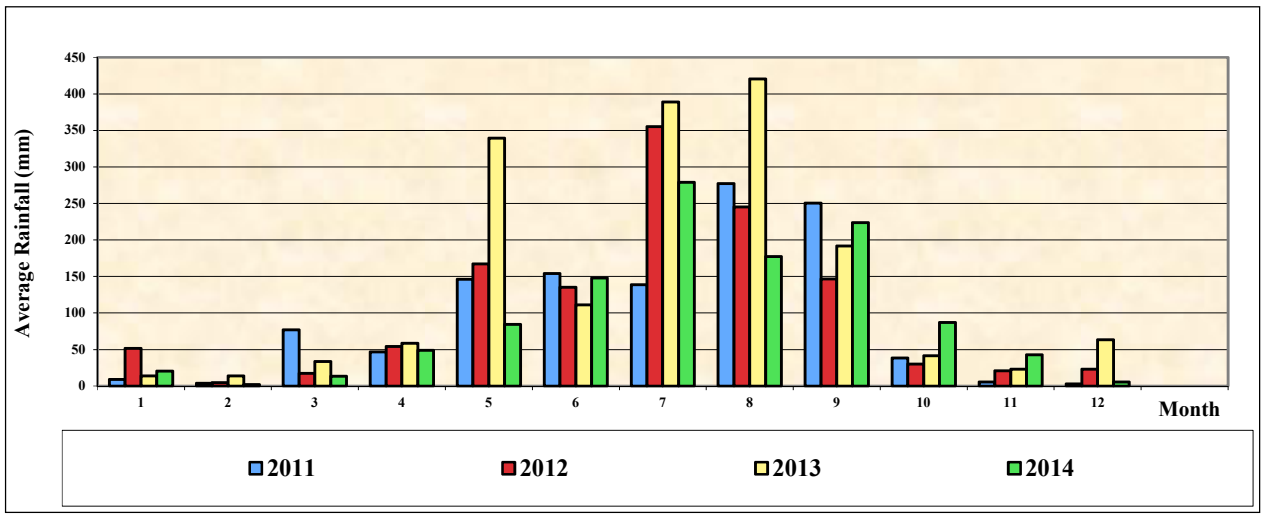


Figure 3 – Average rainfall variation of Bac Kan in 2011-2014 period

3. Hydrology

40. As a mountainous province, Bac Kan is the source of many rivers and streams forming a dense network with different directions of flow. There are 5 main river networks in Bac Kan including: Cau River, Nang River (branch of Gam River), Pho Day River, Bac Giang River and

[7] Status of Environment report (SOE) of Bac Kan province 2015 prepared by Environmental Agency of Bac Kan DONRE.

Na Ri River. The total surface water deposited is about 3.7 billion m^3 [8]. Some information on the main rivers in Bac Kan is displayed in Table 4 below.

Table 4 – Main river of Bac Kan with some brief information

No.	Name of the river	Total length (km)	Catchment (km^2)	Average flow, (m^3/s)	Flow module (l/skm^2)
1	Cau River	100	1424.9	965	18.6
2	Nang River	70	1600.5	42.1	25.6
3	Pho Day River	36	296	9.7	-
4	Bac Giang River	28.6	898	9.6	-
5	Na Ri River	55.5		24.2	-

41. The subproject road runs along two tributaries of the Nang River. These confluences of these two tributaries are near Km 8 of the subproject road. The Nang River is a branch of Gam River, the source of the Ba Be Lake, Puong cave and Dau Dang waterfall, both of which are important for tourism. The total length of Nang River is 70 km in Bac Kan and the water catchment is 1,600.5 km^2

4. Surface and ground water

Surface water resources

42. In accordance to the monitoring result of Bac Kan surface water for 2010 - 2020 period, the surface water of Bac Kan is good quality with nearly all the monitoring parameters are under the allowed level of QCVN 08MT: 2015/BTNMT - National Technical Regulation on Surface Water quality. However, some areas (not including the subproject area) in some certain periods have been polluted with organic pollutants expressed with high concentration of contaminants.[9]

Groundwater resources

43. Several studies have been conducted on groundwater quality and reserves in Bac Kan province but they are mainly in local scale and for the purpose of local water supply. Groundwater reserves are abundant and used to supply good quality water in most districts. Table 5 describes groundwater sources:

[8] Status of Environment report (SOE) of Bac Kan province 2015
[9] Status of Environment report (SOE) of Bac Kan province 2015

Table 5 – Underground water exploitation status

No	License for	Location	Water supply purpose	Total capacity (m^3/day)
01	Bac Kan Water Supply and Drainage Company	Mat Rong Well, Unit 15, Bang Lung town, Cho Don district	Domestic water supply and production water for Bang Lung town	300 m^3/day-night
02	Bac Kan One member Water Supply and Drainage Limited Company	Na Mo village, Dia Linh commune, Ba Be district	Domestic water supply and production water for Cho Ra town	800 m^3/ day-night
03	Bac Kan One member Water Supply and Drainage Limited Company	Bank of Cau River, Unit 1,2,3,7,8,9,11 under Cau River precinct, Bac Kan city	Domestic water supply and production water for local people	2,900 m^3/ day-night
Total permitted underground water supply				**4.000 m^3/day-night**

(Source: Bac Kan DONRE)

5. Air quality and noise

44. Compared to the standard QCVN[10], all the parameters of air quality and noise in Bac Kan province are well within allowed levels, according to measurements taken between 2011 to 2014. The nearest monitoring station to the subproject is the center of Pac Nam district, Boc Bo commune, the start point of the subproject road. The result of Total Suspended Particles of the main urban areas is shown in Figure 5 below

[10] QCVN 05: 2013/BTNMT National Technical Regulation on Ambient Air Quality and QCVN 26:2010/BTNMT National Technical Regulation on Noise

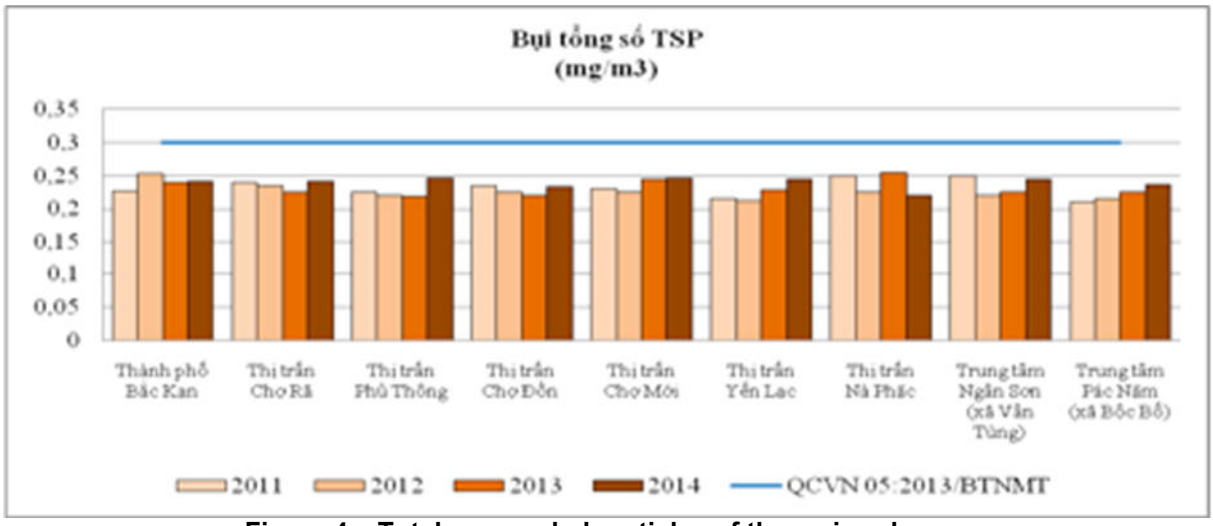


Figure 4 – Total suspended particles of the main urban areas

B. BIOLOGICAL ENVIRONMENT

1. Forestry

45. Bac Kan is one of the provinces with largest proportion of forest area in Vietnam, at 70.8% according to 2015 figures, and was observed to be increasing over the period 2011-2014. Bac Kan has 3 nature reserves and special forests, including Ba Be National Park about 15km to the South of the subproject road. However, the nearest nature reserve to the subproject road is Phia Oac Nature Reserve in Nguyen Binh district, Cao Bang province, about 8 km to the East of the subproject road. The forest cover status of the province is shown in Table 6 below.

Table 6 – Forest cover status of Bac Kan province in 2011-2014 period (ha)[11]

No	Forest type	2011	2012	2013	2014
1	Special forest	25,582	22,817.2	22,817	25,547.38
2	Protection forest	93,751.1	81,592.7	81,593	98,260.76
3	Production forest	268,401.7	229,628.3	229,628	255,607.35
	Total	**387,734.8**	**334,038.2**	**334,038**	**379,415.59**

46. The main construction work of the subproject is upgrading the road, based on the existing foundation and so the works will not encroach into forested areas. Even though forest coverage is high in the province, there is no record of fauna or flora species, which are listed in Vietnam Red Book in the subproject area in recent years[12].

[11] Figures provided by Bac Kan DONRE
[12] Information provided by staff of Bac Kan Environmental Protection Agency and via public consultation meeting in Boc Bo and Bang Thanh communes.

2. Agriculture

47. Agriculture and forestry development remains a top priority for the district's economic development. Information on planted areas and production of major crops is shown in Table 7 below.

Table 7 - Planted area and production of major crops in Pac Nam 2015

	Unit	Pac Nam District	Whole province
Gross output of agriculture at current prices	VND Mil.	327,138	3,586,571
Gross output of product per ha of cultivated land	VND Mil.	58.17	49.26
Main Agricultural products			
Cereal			
+ Planted area	ha	5,214	41,010
+ Production	Ton	20,262	185,067
+ Production of cereals per capita	kg	629.22	591.11
Paddy			
+ Planted area	ha	2,371	24,595
+ Production	Ton	10,558	117,389
Maize			
+ Planted area	ha	2,843	16,415
+ Production	Ton	9,704	67,678
Cassava			
+ Planted area	ha	0,319	3,030
+ Production	ton	3,008	32,116
Sugarcane			
+ Planted area	ha	2	127
+ Production	Ton	61	5,355
Vegetables (included soybean)			
+ Planted area	ha	201	2.912
+ Production	Ton	1,131	21,399
Oil-seed			
+ Planted area	ha	214	1.603
+ Production	Ton	307	2.434
Planted area of some perennial industrial crops	ha	436	13.526
Tea			
+ Planted area	ha	2	2.875
+ Production	Ton	7	9.024
Anise			
+ Planted area	ha	3	1.204
+ Production	Ton	6	2.172
Planted area of fruits	ha	319	6.895

Orange and mandarin			
+ Planted area	ha	14	2.439
+ Production	Ton	67	10.69
Plum			
+ Planted area	ha	8	395
+ Production	Ton	205	1.483

C. SOCIO-ECONOMIC CONDITIONS AND INFRASTRUCTURE

1. Population and Ethnic

48. The total population in the two target communes is 7,633 people in 1,675 households in 21 villages. 95.4% of households are members of ethnic minorities, but the direct beneficiaries[13] of the subproject will be 2,047 people in 8 out of the 21 villages. The estimated number of households likely to benefit is 501, around 30% of the population of these target communes. There are at least 55 female headed households (11%) who will directly benefited from the proposed subroject. 95.2% of the direct beneficiaries are members of ethnic minorities which is consistent with the overall proportion of ethnic minority households in the district. Table 8 below presents population and ethnicity composition in the subproject area.

49. Table 8 presents the poverty incidence in the target communes. The data indicates large disparities in poverty rates between Kinh people and ethnic minorities in each of the target communes. The poverty rate remains high and more concentrated among ethnic minority groups. Almost 100% of ethnic minority households in Boc Bo and Bang Thanh commune respectively are poor. Both communes are P135 communes in the poorest district of Bac Kan.

Table 8 – Population and ethnicity in subproject area

	Whole communes			Direct benefit area		
	Boc Bo	Bang Thanh	Total	Boc Bo	Bang Thanh	Total
Number of villages	15	16	31	5	3	8
Population	3846	3787	7633	1429	618	2047
Number of households	943	732	1675	368	133	501
By ethnicity						
Kinh	76	1	77	24	0	24
Tay	430	240	670	213	96	309
Nung	32	25	57	13	25	38
Dao	104	261	365	10	7	17
Hmong	110	179	289	1	4	5
San Chi	191	25	216	107	0	107

[13]Direct beneficiary is defined as people/households who live in the villages located along the proposed upgraded road. The indirect Project area is defined as area outside of the Project areas, but is likely to experience some improvement in their living condition as a result of the improved road, i.e. Other villages in communes may access the road through feeder road/track are defined as indirect beneficiaries

Other		1	1		1	1
Female headed household	89	58	147	39	16	55

Source: Data collection from target communes, 2016

Table 9 – Population and ethnicity in subproject area

	Poverty rate (%)		
	As whole	Kinh people	Ethnic minority
Pac Nam district	50.84	7.82	92.18
Boc Bo commune	19.1	0.1	99.9
Bang Thanh commune	57.65	0.0	100.0

Source: Data collection from target communes, 2016

2. Economic development and income

50. Land use: Although agricultural land occupies between 7.6% and 10.1% of the total land area in Boc Bo and Bang Thanh communes (see table 11), agricultural production is still the dominant income source in these communes. The main crops are paddy, maize, cassava, and soybean. Livestock is considered one of main income sources of the target communes. Forestry, largely plantation forestry, occupies over 85% of total land area in these communes but is still of minor importance economically because almost all of the forest is classified as protection forest and the poor condition of road access causes high cost for extraction. Participants in focus group discussions reported that the of acacia timber in Boc Bo (district center) can be VND 900,000- 1,000,000/m^3, but only VND 280,000 - 300,000 /m^3 at the farm gate in Bang Thanh commune. The area of plantation forest in Boc Bo comune was 17.35 ha and in Bang Thanh 62.42 ha in 2015. Table 10 illustrates the major agricultural products in two target communes in 2015.

51. Based on the new national poverty line for period 2016- 2020[14], the poverty rate for Bac Kan is 29.4% in 2016 compared to average poverty rate 9.88 % of whole country. The main characteristics of poverty in Bac Kan included (i) large disparities between urban and rural areas; (ii) persistent poverty in the remote mountainous area and (iii) a concentration of poverty in ethnic minority groups. Table 10 shows that according to new criteria of poverty ranking, the province poverty rate is 29.4% however it is 34.34% in rural area compared to 10.05% in urban, especially poverty is more concentrated in remote mountainous districts where ethnic minorities live with the poverty rate range from 43.5% to more than 50% of population. Approximately 90% ethnic minorities live under poverty line compared to 10% Kinh people.

[14] Every five years, the GoV adopts a new poverty line. In this report, poverty rate 2011, 2012, 2013, 2014 and 2015 are based on the national poverty line set by the GoV for period 2011-2015 (income- based poverty criteria). Poverty rate 2016 is based on the new national poverty line set by the GoV for period 2016- 2020 (multi-dimension poverty criteria)

Table 10 – Land use in project area, 2015 (hectares)

Type of Land	Boc Bo	Bang Thanh
Natural land area	5336.53	8609.77
Agricultural land (excluded forestry land)	406.84	873.47
Irrigated land	174.57	254.64
Planted Paddy land	174.57	218.63
Planted maize land	110.74	469.32
Planted cassava land	62	9.4
Land for other crops	26.34	35.61
Land for aquaculture	6.59	3.5
Forestry Land	4671.03	7481.33

Source: Data collection from Boc Bo and Bang Thanh communes, 2016

52. The focus group discussions indicated farming is the major livelihoods for local people. Most agriculture (80%) is for subsistence, with paddy and maize as the main crops. There is no opportunity for off-farm jobs in this area. It is reported that the average annual income per capita was VND 16.2 million and VND 12.0 million in Boc Bo and Bang Thanh communes respectively in 2015. However there is a significant disparity among ethnic groups, it was reported that while annual average income per capita of Kinh people is VND 30 million; VND 20 million for Tay ethnic minorities, San Chi people only earned about VND 6.0 million on average per person annually.

3. Employment and income

53. Pac Nam district is one of 64 poorest districts under the GoV Program of Resolution 30a/2008/NQ- CP on sustainable and rapid poverty reduction for poorest districts, and all ten communes of the district are under National Program 135 - a GoV program that supports socio-economic development in the poorest communes in the country. In 2016, according to a new poverty line based on multi-dimensional poverty criteria, 50.84% of district population is below poverty line.

Table 11 – Production value of the Pac Nam district and Bac Kan province

	Unit	Pac Nam District	Whole province
Gross output of agriculture at current prices	VND Mil.	327,138	3,586,571
Gross output of product per ha of cultivated land	VND Mil.	58.17	49.26
Main Agricultural products			
Cereal			
+ Planted area	ha	5,214	41,010
+ Production	Ton	20,262	185,067
+ Production of cereals per capita	kg	629.22	591.11
Paddy			
+ Planted area	ha	2,371	24,595
+ Production	Ton	10,558	117,389
Maize			
+ Planted area	ha	2,843	16,415

	Unit	Pac Nam District	Whole province
+ Production	Ton	9,704	67,678
Cassava			
+ Planted area	ha	0,319	3,030
+ Production	ton	3,008	32,116
Sugarcane			
+ Planted area	ha	2	127
+ Production	Ton	61	5,355
Vegetables (included soybean)			
+ Planted area	ha	201	2.912
+ Production	Ton	1,131	21,399
Oil-seed			
+ Planted area	ha	214	1.603
+ Production	Ton	307	2.434
Planted area of some perennial industrial crops	ha	436	13.526
Tea			
+ Planted area	ha	2	2.875
+ Production	Ton	7	9.024
Anise			
+ Planted area	ha	3	1.204
+ Production	Ton	6	2.172
Planted area of fruits	ha	319	6.895
Orange and mandarin			
+ Planted area	ha	14	2.439
+ Production	Ton	67	10.69
Plum			
+ Planted area	ha	8	395
+ Production	Ton	205	1.483
Livestock			
+ Number of buffaloes	head	8,565	57,145
+ Number of cow	head	7,753	22,596
+ Number of Goat	head	3,126	26,404
+ Number of pigs	head	28,890	221,111
+ Number of poultry	head	126,295	2,023,713

4. Social services

54. Each commune has a healthcare station without a doctor though one doctor from the district hospital goes to Bang Thanh commune twice a week. Because Boc Bo commune is located in the district center, most people go directly to the district hospital instead of the commune health station. The head of the commune health stations reported that in 2015 about 18% and 46% of pregnant women had given birth at home in Boc Bo and Bang Thanh commune respectively because of poor road access to the clinic or hospital. According to the commune annual report in 2015 the rate of immunized children under one year of age was 99.1% and 100% in Boc Bo and Bang Thanh commune respectively, and the rate of malnourished children under 5 years old was 18% in Bang Thanh commune.

55. Each commune has one kindergarten, one primary school and one secondary school. The subproject communes are all connected to the national grid, however the rate of households with access to electricity was 69% as whole commune of Bang Thanh while in Boc Bo, access varies from 33.5 and 85% per village.

5. Educational levels

56. According to the survey, overall 14.8% of respondents had never been to school. Amongst ethnic minority groups, a higher proportion of San Chi had never been to school (33.33%) compared to other ethnic minority groups. 31.03% poor people reported that they had never been to school. The proportion of men who had never been to school is much more higher than that of women (19.3% of men vs. 4.17% of women). 85% respondents had attained at least a primary level of education. Education levels were highest amongst the Tay people, the majority of whom had completed post-primary education, and several had gone on to vocational education. The higher the level attained, the more likely the household is to be non-poor. The highest level of education that female-headed households attained was secondary school (40%), while 20% of female household heads had never been to school. Overall, 92.5% of girls and 93.10% boys at school age attend school. The survey found no difference in attendance between girls and boys.

6. Unexploded Ordinance

57. In the farthest region of Northern Viet Nam, ordnance used by combatants during conflict that took place between 1962 and 1976, and also from border conflict with China, which went on into the 1980s. Unexploded ordnance (UXO) includes bombs dropped from aircraft, booby traps and land mines, all of which are indiscriminate and all of which result in concealment of the ordinance, defying the assessment of risks to a reliable level. Information on the extent and location of UXO is sparse at any level.

58. UXO devices are encountered when ploughing fields, searching for scrap metal and even by children playing. Within the subproject area, relatively higher risks occur at land close to the border, particularly with China. In recent years, UXO related accidents have occurred in areas near the Chinese border Information on the level of risk in any subproject area includes that available from local officials and residents, and records of incidents in the area, which are maintained by the Government agency BOMICEN, the Technology Centre for Bomb and Mine Disposal, under the Ministry of Defense. Risk assessment may also be based on the existing use of land to be used under the subproject, and the level of disturbance necessary in implementing the subproject: if land is already subject to foot and vehicle traffic, and disturbance such as plowing and excavations, is likely to be relatively safe. However UXO risks are always present to some degree when excavation is to take place.

D. Archaeological, Historical and Cultural Treasures

59. There are several archaeological sites that have been discovered in the subproject area including remains of ancient habitation along the Nang River at Dai Khao village, Cao Tri commune, Ba Be district, about 17 km to the South of the subproject road. Other locations have also been found in this area. Specialists from the Vietnam Historical Museum report that the area of Cao Tri commune, Ba Be district was occupied by people of the Old Stone Age - about 20,000 to 10,000 BC[15]. There are no known archaeological sites in Boc Bo and Bang Thanh communes. In case excavations lead to the discovery of artifacts, procedures for addressing chance finds of antiques and artifacts will be set up for the construction phase.

[15] http://www.vista.net.vn/bao-tang-diem-den-khac/bao-tang-tinh-bac-kan.html

E. Key Environmental Features

60. ***Physical environmental features:*** The subproject road is located along two tributaries of Nang River with large cultivation area of water rice. There are 10 river or stream crossings over and 5 bridges will be constructed. About 2 km of the subproject road runs close to protection forest - from Km 6 to Km 8, however, the road and the protection forest is separated by Nang River.

61. ***Social environmental features:*** The road goes through several crowded residential areas of Boc Bo and Bang Thanh communes, Pac Nam. The start point of the subproject road is located in the center area of Pac Nam district in Boc Bo commune. There are schools, kindergartens, cultural places and medical clinics along the road and roadside markets.

VI. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

62. This section discusses the potential environmental impacts of the subproject and identifies mitigation measures to minimize the impacts in the design, construction and operation phases of the subproject.

63. Activities during the construction phase will be mainly confined to the existing road footprint. The main physical issues relate to impacts such as vegetation clearance, earthworks, erosion control, obtaining rock based construction materials, spoil disposal, and disposal of other waste. The effects of these activities are examined.

64. Subproject implementation will impact on the lives of local people, especially those who live along the subproject road. There are several crowded residential areas along the subproject road, namely Pac Nam district center, Bang Thanh commune center.

65. The potential environmental impacts as well as the mitigation measures associated with the pre-construction, construction and operational phases are assessed below. The criteria for assessment are in line with ADB's Safeguard Policy Statement 2009 and the Government of Viet Nam standards based on the Environmental Protection Law (2014) and the ADB SPS. The EMP is presented providing mitigation measures and a monitoring plan. Where government standards or guidelines conflict with the ADB SPS, the 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. Land acquisition and resettlement

66. **Impacts:** The impact is mainly on several residential areas along the road namely Pac Nam district center; Bang Thanh commune center. Among 157 affected households, there are 6 seriously affected households (households that lost more than 10% of the total area of cultivated land or whose homes will be demolished or moved). In total there will be 67,089 m^2 of affected land, 285 m^2 of public land and 3,180 m^2 of private residential land. The area of land used for annual crops is 8,043 m^2 and for perennial crops such as trees is 1,108 m^2.

67. **Mitigation measures:** During the feasibility study phase, resettlement and land acquisition impacts have been identified and a Resettlement and Ethnic Minority Development Plan has been prepared. As there is only 6 households adversely affected by construction of the subproject, the REMDP will be updated and validated, and will provide for compensation and support of affected households, especially the 6 seriously affected households, as appropriate before construction starts. PMU will also inform Boc Bo, Bang Thanh CPCs and local people of the two communes all information related to the road construction in advance. Arrangements will be made for regular monitoring and to record and redress grievances.

2. Disturbance of unexploded mine and bomb (UXO)

68. **Impacts:** Along the subproject road, there is some possibility that UXO remains from previous conflict. The risk should be verified by consultations with local residents to find out if there is knowledge of fighting in the area in recent decades.

69. **Mitigation measures**: The PMU will conduct consultations with roadside residents to determine any history of conflict in the area that may have resulted in items UXO being left in the area. The PMU will also verify with the Bac Kan Provincial Military Commanders to check whether the area along the subproject route has been checked for in the past. If it is not, and if a risk is identified following consultation, an authorized UXO clearing contractor will be engaged to undertake UXO detection and clearing along the subproject road. The PMU must ensure that the construction contractors shall only commence site works after the UXO clearing contractor has certified that the subproject areas as safe.

B. POTENTIAL IMPACTS AND MITIGATION MEASURES IN THE CONSTRUCTION PHASE

1. Impact on flora and fauna along the road

70. **Impacts:** Construction work will involve some removal of trees along the route, mainly fruit trees and other small trees cultivated by people who live along the road. The construction activities will create noise, vibration that may disturb wild animals living in the forest area next to the road, especially the protection forest along the subproject road from Km 6 to Km 8. Workers could hunt wild animals and cut down trees in the forest for fuel wood. This is a minor impact and will take place over 24 months of construction time. The number of trees being cut down will be small and the Nang River separates the protection forest and the road so the impact including the risk to the protection forest is not large. In accordance to information from responsible staff of Bac Kan DONRE, the protection forest is not natural forest, and is managed by Bang Thanh CPC.

71. **Mitigation measures:** Trees cultivated by local residents that will be removed, will be compensated under the provisions of the REMDP. To reduce the impact on further trees and vegetation, Bang Thanh CPC and DARD office of Pac Nam district will be informed about the construction time and schedule, scope of works as well as location of worker camps and material storage sites. No construction camps, bitumen heating facilities, depots or material storage sites will to be located in or near forested areas. The contractors will prohibit staff from hunting or collecting fuel wood or any other forest product from nearby forests and will not buy or use wood from illegal sources. The PMU assisted by the ESS and CSC will strictly supervise and monitor the protection of trees and other vegetation.

2. Impact on Utilities

72. **Impacts:** Construction activities could impact electrical power supplies and drainage systems and other utilities along the subproject road. The potential impact is minor as it is only likely to occur at sites where minor realignment is to be done. Impacts will be brief, and will occur only over the 24-month construction period.

73. **Mitigation measures:** To minimize the impact, the contractors will provide advance information of the construction schedule to the relevant utility operators such as Pac Nam Electric Power company and co-ordinate with them to ensure prompt relocation and reconnection. If any facilities are accidentally damaged during construction period, the damage should be reported to CSC and PMU as well as the owner of the facilities before repair at the contractor's expense.

3. Impacts of materials excavation and extraction

74. **Impacts:** One limestone quarry (the Keo Put quarry) and six soil pits have been identified to meet the materials needs for the project, over and above excavated cut material that can be used as fill. The Keo Put quarry is operated by Nam Hai ltd, which is licensed to do so by the Bac Kan Provincial People's Committee. Both excavation works and the extraction of materials may result in the release of soil and silt, which may also be released from materials stockpiles along the road, affecting streams and potentially, cultivated areas,. The impact is minor as the main work is upgrading the road surface will be confined to the existing right of way, but some earthworks and excavations will be necessary.

75. **Mitigation measures:** To prevent the release of silt into waterways, the contractors will also use of silt fences around excavation sites and stockpiles; On completion of extraction work borrow pits will be closed, rendered safe and improved, as agreed with landowners. Such improvement works may include landscaping and planting works as appropriate. The estimated soil volume for back filling during the subproject road construction is nearly 60,000m^3 while the estimated volume of excavated class 3 soil (semi-solid soil that could be used for embankment) from excavation works is about 400,000m^3

4. Impacts of the temporary material stockpiles

76. **Impacts:** About 6 main temporary material stockpiles will be located along 23.1 km road construction site. Fine material like sand and soil could generate dust in the dry conditions; and the material could be discharged into surrounding water bodies in wet conditions. Stockpiles placed at the roadside could make impede movement along the road and cause danger by constricting the road width and reducing visibility.

77. **Mitigation measures:** To minimize the impact, the contractor will work with local authorities in advance to identify acceptable locations for the temporary stockpiles. The proposed locations are around the proposed area for surplus soil dumping at Km3+500; Km9+200; Km12+500; Km16+300; Km19+200 and Km21+935. Stockpiles of material prone to dust generation (fine material like sand) will not be located within 50m of schools, medical clinics or other public infrastructures such as pumps and wells and should be covered with tarpaulin when not in use and at the end of the working day to enclose dust. In the case of large stockpiles (more than 25 m^3) of crushed materials, they should be enclosed with side barriers and also cover with tarpaulin when not in use. Especially, temporary storage areas must not be located on Nang River bank and must be and fenced and, in the case of fine materials, covered with a suitable material and marked with a signboard.

5. Generation of surplus soil

78. **Impacts:** Soil from excavation activities, which could not be reused as fill soil (about 34,784.1m^3), could have significant impacts such as soil erosion when placed on slopes, as well as release of silt.

79. **Mitigation measures:** Where surplus material is acceptable for use as fill, it will be graded and placed in fill sites for construction. Other surplus material will be made available to local people for uses such as the construction of level areas for recreation or building platforms. The CPCs will organize the distribution of surplus soil. Any remaining surplus material could be deposited at locations agreed with Boc Bo and Bang Thanh CPCs. The two CPCs will organize the distribution of surplus soil for local people who wish to use it.

80. For any remaining surplus material not used as fill or distributed to local people, the following list of potential disposal sites is presented to guide Contractors. Local authorities and owners of these sites have allowed the dumping of waste during the construction. Details are listed in Table 12 below. The contractors should work with local authorities to identify satisfactory dumping and disposal sites before construction starts.

Table 12 – List of proposed location for surplus soil dumping[16]

No.	Location	Managed by	Estimated volume (m^3)
1	20m right side from Km3+500	Uncultivated land of Mr. Dang Van Trong, Khuoi Be village, Boc Bo commune	120,000
2	5m right side from Km9+200	Uncultivated land of Mr. Long Van Truong, Khuoi Linh village, Bang Thanh commune	120,000
3	5m right side from Km10+000	Uncultivated land of Mr. Long Van Huan; Long Van Thang, Khuoi Linh village, Bang Thanh commune	120,000
4	20m left side from Km12+500	Uncultivated land of Mr. Dang Van Tong, Ban Khua village, Bang Thanh commune	40,000
5	Left side of Km13+450	Uncultivated land of Mr. Hoang Van Viet, Ban Khua village, Bang Thanh commune	60,000
6	Left side of Km16+300	Uncultivated land of Mr. Luc Tien Trung, Na Vai village, Bang Thanh commune	120,000
7	Right side of Km19+200	Uncultivated land of Mr. Luc Van Ly, Na Vai village, Bang Thanh commune	80,000

[16] This list has been discussed and initially agreed with the CPCs of Boc Bo and Bang Thanh CPCs. Details are shown in Geological survey report for the subproject road by the PPTA

8	Right side of Km21+935	Uncultivated land of Mr. Be Van Tien, Ban Man village, Bang Thanh commune	60,000

6. Generation of construction waste and domestic waste from workers

81. **Impacts:** Solid waste that will be generated from construction mainly includes waste from workers' camps, debris and packaging of materials and equipment including bitumen drums, oil containers, crates and cardboard. Some may be contaminated with hazardous or semi hazardous substances. Domestic waste from workers camps may include organic waste, as well as plastic and other packaging and semi toxic items such as used batteries. Other waste will be generated at workshops, storage sites, refueling sites and depots. This is an average impact, as the construction sites, workshops and depots will be at various locations along the 23.1 km of the subproject road, especially along Nang River. Uncontrolled waste disposal could further reduce the water quality of Nang River as well as ambient air and soil quality and heavily impacts on local people in the subproject area and downstream users in An Thang and Banh Trach communes.

82. **Mitigation measures:** Contractors will be required to (i) reuse construction waste such as cement bag covers, metal tools where possible and (ii) install rubbish bins at work sites and in worker's camps to allow efficient collection of waste and (iii) transport the solid waste to a disposal site approved by the CSC.

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

83. **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, especially the bitumen heating activities. 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 the sensitive points like schools, kindergartens, markets, commune centers, medical clinics.

84. **Mitigation measures:** The contractors should not locate any noisy machines, or large material storage site near the protection forest along Km6 - Km8 of the road and residential areas of Boc Bo and Bang Thanh communes. The large storage sites should be located at least 50m away from these sensitive points. The contractors will work with 2 CPCs, with the representative of ESS and PMU, to identify areas for depots will also include a materials transportation plan in the Contractors Environmental Management Plan. PMU and CSC will responsible to monitor these mitigation measures.

8. Landslide, soil erosion and runoff

85. **Impacts:** Roadside erosion and runoff could happen during rain, especially at the roadside and at borrow areas. Erosion and runoff could impact on the cultivated areas of local people. Landslides could happen in sections with high slopes adjoining the road, especially when the vegetation cover is cleared. Landslides will damage the road and block movement and release silt into waterways. The locations of cutting slope landslides and downward slope erosion along the subproject road are showed in the table below

Table 13 – Locations of potential landslides and soil erosion along the road

No	Chainage		Description
	From	To	
1	Km2+170	Km2+190	Cut slope landslide on the left side, medium volume of sliding blocks, sliding scale of 20m length, height of sliding blocks of around 8m. Soil from the slope fills the ditch but does not affect the pavement.
2	Km2+700	Km2+750	Erosion at road edge on downward slope on the right side, 10m long.
3	Km4+750	Km4+770	Shallow landslide of the surface soil on bedrock on cut slope of 15-20m high.
4	Km7+980	Km8+010	Cut slope landslide on the left side, shallow sliding block, quite large sliding scale of 30m long, 30m high. Soil from the slope fills the whole side ditch but does not affect the pavement.
5	Km8+830	Km8+850	Cut slope landslide on the right side, medium volume of 20m long, 8m high. Sliding soil fills the side ditch but does not affect the pavement
6	Km8+820	Km8+830	Erosion at road edge on downward slope, 10m long.
7	Km9+000	Km9+010	Mild landslide on Cutting slope on the right side of 10m long, 4m high. Sliding soil fills the side ditch.
8	Km9+100	Km9+104	Erosion at road edge on downward slope on the left side at Km9+100 of 4m long.
9	Km10+375	Km10+385	Mild landslide on cutting slope of small scale, 7m long, 4m high.
10	Km10+440	Km10+450	Mild landslide on cutting slope, small scale, 10m long, 5m high.
11	Km10+490	Km10+500	Mild landslide on cutting slope, small scale, 7m long, 5m high
12	Km10+590	Km11+000	Mild talus landslide, small scale, 10m long, 7m high
13	Km13+380	Km13+390	Mild and shallow landslide at the bottom of the Cut slope on the right side, 10m long, 2m high
14	Km16+950	Km16+700	Mild landslide on cutting slope, small scale 10m long, 5m high
15	Km17+000	Km17+100	Erosion at road edge on the downward slope, 3m long

16	Km17+110	Km17+130	Shallow landslide on cut slope, medium scale, 20m long, 8m high
17	Km18+350	Km18+355	Mild and shallow landslide on cut slope, 5m long, 3m high
18	Km20+150	Km20+160	Mild landslide on cut slope, 10 long, 5m high
19	Km20+180	Km20+220	Medium landslide on cut slope, 40m long, 10m high, occurring at position of less sticky cover soil on bedrock surface. Sliding soil fills the side ditch but does not affect the pavement.

86. **Mitigation measures:** To minimize the negative impacts during the 24-month construction period, , contractors will confine activity at hazard prone sites including the above to the dry season and take all reasonable precautions to minimize exacerbating slope stability and the release of silt into the ream, and avoid release of any chemical or human waste contaminants into the water.

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

87. **Impacts:** The drainage system, irrigation and water resources on surrounding lands may be affected by construction activities as follows: (i) surface water in the streams crossings and Nang River may be contaminated by fuel and chemicals used in construction, or by solid waste and effluent generated by the kitchens and toilets at construction campsites; (ii) the natural flow of the Nang River may be impaired by release of silt from borrow materials piled near the construction area. (iii) Water in streams, canal could be temporary blocked during construction period at the crossing positions.. The impact will mainly on 10 streams cross the road, especially the large streams cross the road at Km8+150; Km16+200; Km22+230; Km22+650, the Nang River along the subproject road and worker camps area.

88. **Mitigation measures:** In order to minimize this negative impact, the contractor will (i) provide an alternative source of clean water for worker's camps, (ii) provide adequate drainage facilities at construction sites and worker camps, ensuring no discharge into streams or the river; (iii) store lubricants, oils, paints and other hazardous materials in designated roofed areas with impervious floors at least 50m from water bodies, controlled by authorized personnel only, (v) place sediment ditches or silt fences in suitable locations to avoid runoff, erosion and siltation in to the water bodies and (v) provide silt fences and, for fine material, covers on materials stockpiles and locate them at least 50m away from water bodies. The Contractor will detail proposed measures in the Contractor's Environmental Management Plan (CEMP). The PMU and CSC will be responsible to check the adequacy of the CEMP to provide the required mitigation monitor the implementation of the mitigation measures.

10. Impact by the influx of construction workers

89. ***Impacts:*** About 100 workers will be mobilized discontinuously in 24-month construction phase. The influx of construction worker can cause (i) a burden on local public services like electricity and water supply (ii) risk of transmission of diseases to the subproject area (iii) conditions for great spread of diseases such as sore eyes, cholera, flu and respiratory problems (iv) risk of social problems such as gambling, drug addiction, prostitution, and violence. The impacts would be on both workers and on the communities near the construction sites in residential.

90. ***Mitigation measures:*** (i) Careful siting of workers' camps and facilities as agreed by local communities and approved by the PMU that the camps should be located in areas with sufficient drainage to avoid water logging and formation of breeding sites for mosquitoes and flies (ii) Registration of workers with local police while resident in the subproject area (iii) workers' camps and other depots should be maintained to ensure that site drainage continues to be effective (iv) workers should have health checks before start work in the subproject and should be trained for living and working behavior before joining the sites (v) engaging local people including for unskilled or semi skilled tasks to the extent that they are able and willing to undertake them. Local people in the residential area of the 2 subproject communes will benefit from the subproject construction.

11. Safety risks to local people and construction workers

91. **Impacts:** Works and the public are at risk of accidents associated with construction, particularly excavations, and operations involving heavy machinery. Material transport and construction activities on the existing road may create the risk of traffic safety and affect houses and other structures on roadsides, particularly on the sensitive receivers such as Boc Bo primary school - Na Lay branch, Pac Nam primary school, Pac Nam market, Bang Thanh kindergarten and primary school, Bang Thanh medical clinic, Bang Thanh secondary school, kindergarten of Khuoi Lan hamlet.

92. **Mitigation measures:** The contractors will (i) conduct training for workers on safety, including roles and responsibilities, safe site practices and environmental hygiene (ii) institute site and camp rules such as wearing proper safety apparel such as safety boots, helmets, protective clothes, gloves and ear protection, (iii) ensure vehicle and plant operators are trained and licensed (iv) ensure all excavation sites are fenced with sign boards and perimeter markers and (v) allocate responsibility to supervisor staff to ensure that all safety rules are followed by all staff at all times. The project will take note of opinions and complaints from local people and authorities on safety.

12. Impacts on local traffic

93. **Impacts:** Construction activities on the Subproject road will traffic flows. The road runs along Nang River and there is only one-way road. There are several schools and kindergartens and their branches located along the road. Children and pupils will have difficulty getting to schools. Pac Nam market is also located roadside. The construction activities may make difficulties for people to reach the market during the construction phase. Local people and people from other areas who travel on the subproject road will be affected during 24 months construction period.

94. **Mitigation measures:** To minimize the disturbance to local people, the contractor will include in the CEMP, submitted to the CSC, a construction traffic plan indicating the timing of vehicle journeys to avoid peak traffic hours, when people get to work, pupil goes to school and back home or peak tourist season. The contractor will also coordinate with traffic police of Pac Nam district to implement appropriate traffic diversion schemes to avoid inconvenience due to subproject operations to road users and schedule transport of material to avoid congestion, setup clear traffic signal boards and traffic advisory signs at the start and end points of the road. The contractor will also install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. A traffic officer will be designated for each construction site.

C. POTENTIAL IMPACTS AND MITIGATION MEASURES IN THE OPERATION PHASE

1. Impact from noise arising from increasing traffic density and traffic safety

95. **Impacts:** The improved road surface will create a safer running course and reduce dust emission from traffic, though these benefits will be reduced as traffic density and driving speeds increase. Noise and vibration could have negative impacts on local people living along the subproject road, especially at sensitive points such as schools, kindergartens, commune centers, markets and medical clinics. The driving speeds increase could also create community safety issues. Road safety will be impaired by removal or loss of road signage, development of potholes and other defects unless the routine and periodic maintenance is carried out promptly and thoroughly, and unless problems such removal of soil and rock deposited on the road is promptly removed to safe deposition sites.

96. **Mitigation measures:** The enforcement of speed limits and loading limits by police and DOT help reduce safety risks and noise nuisance. Installation of traffic calming measures such as speed humps in high risk areas. Regular maintenance will be necessary to ensure that the pavement, road markings and road signage does not deteriorate.

2. Favorable conditions for transportation of goods and people movement

97. **Impacts:** The paved road will make travel on the road for the whole route, from Pac Nam district center (Boc Bo commune) to Son Lo commune, Bao Lac district, Cao Bang province. The completion of the road will support the transportation of local people in Bang Thanh commune to the district center in all kind of weather. The road will support economic activity and enable access to markets and services for local people.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

98. The objectives of the stakeholder consultation process that took place during subproject preparation 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

99. Stakeholders are people, groups, or institutions that may be affected by, can significantly influence, or are important to the achievement of the stated purpose of a proposed intervention. The stakeholders consulted for the construction of the subproject road included representatives from Bac Kan DPI, DONRE, and DARD. Consultation has also been implemented with representatives from Boc Bo, Bang Thanh communes in Pac Nam district. Among 28 people have been consulted, 11 are women, make up 39%. Consultations took place in September 2016.

B. INFORMATION DISSEMINATION DURING PUBLIC CONSULTATION

100. 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.

101. 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 and management; (iii) potential impacts during subproject implementation and mitigation measures; and (iv) the grievance redress mechanism.

C. USE OF RESULTS FROM PUBLIC CONSULTATION

102. The results of the public consultations are recorded in Table 14 and 15 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 to upgrade road surface based on the existing road foundation, no house needs to be relocated and no major land acquisition will be involved, the local people is totally support the subproject.

Table 14 – Main issues and information from local authorities

Main issues	Information from relevant authorities
Forest in the subproject area	Bac Kan DONRE: There is about 2 km of the subproject running near the protection forest. This is the planted protection forest to reserve water for Nang River and managed by Bang Thanh CPC.
Biodiversity in the subproject area	Bac Kan DONRE: There are three nature reserves / conservation areas in Bac Kan but they are all far from the subproject area. There is no rare or endangered fauna and flora species in the subproject area

Table 15 – Main environmental concerns from public consultation

Concerns expressed	How concerns are addressed in IEE
Bad quality of the construction due to corruption lead to reduce the operation time of the road	Arrangements will be made for regular monitoring and to record any complaints from affected households and local people before and a grievance redress mechanism.
Inadequate compensation will bring negative impacts to local people's lives	During the feasibility study phase, resettlement and land acquisition impacts are being prepared and a Resettlement and Ethnic Minority Development Plan prepared. Before construction starts, the REMDP will be updated and validated, and will provide for compensation and support of affected households as appropriate
Improper construction supervision process	The contractors will work with the two CPCs, with the representative of ESS and PMU, to identify the issues and suitable mitigation measures. PMU and CSC will responsible to monitor these mitigation measures.

103. The environmental assessment process under the SPS 2009 requires the disclosure of the IEE. The IEE, including the EMP will be displayed at the PPC Headquarters and on the ADB website. Bac Kan PMU will responsible for IEE translation to Vietnamese and disclose at Boc Bo, Bang Thanh communes, Pac Nam district.

VIII. GRIEVANCE REDRESS MECHANISM

A. Purpose of the mechanism

104. During the preparation of the subproject, information is disseminated to local people on the scope of the subproject; environmental, social impacts and the grievance redress mechanism. Negative impacts of an environmental or social nature, or resettlement impacts, may occur during the construction and operational phases. Any comments/ suggestions of local people will be solved quickly, transparently in accordance with protected the law, particularly for people affected by the subproject. This grievance redress mechanism is classified by level and responsibilities of involved parties. The GRM will be disclosed with the IEE and other safeguard documents to ensure that potentially affected persons are aware of it and their entitlement to raise complaints. During construction, the Contractor will appoint a member of his staff to act as the focal point, who will liaise with the Community Supervision Board and, if appropriate, the complainant(s) to address and seek solutions to any grievance that relates to the Contractor's actions.

B. Grievance redress process

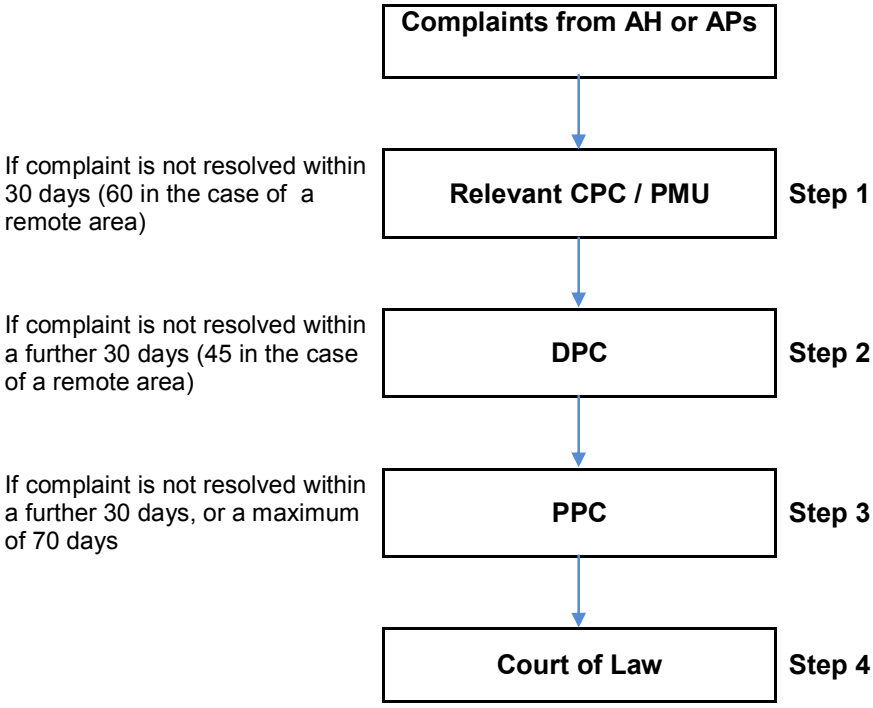
105. There are three steps to address complaints received from stakeholders:

***Stage 1*:** If a household or individual has any complaint he/she can submit a complaint in written or verbal form to the representative of the CPC-community monitoring board (usually the Deputy Chairman of the commune/town). The CPC will work with PMU to solve complaints and a representative PMU will respond in written form to the complainant. The CPC, as a whole body will meet personally with the aggrieved affected household and will have 30 days and a maximum of 60 days after the lodging of the complaint to resolve the complaint, however, depending upon whether it is a complicated case or case comes from a remote area. The CPC secretariat is responsible for documenting and keeping file of all complaints that it handles.

Stage 2: If after 30 days or 45 days (in remote areas) the aggrieved affected household does not hear from the CPC, or if the affected household is not satisfied with the decision taken on his/her complaint, the affected household may bring the case, either in writing, to any member of the DPC. The DPC in turn will have 30 days or a maximum of 70 days after the lodging of the complaint to resolve the case, however, depending on whether the case is complicated or in remote area. The DPC is responsible for documenting and keeping file of all complaints that it handles and will inform the District Resettlement Committee (DRC) of any decision made and the DRC is responsible for supporting DPC to resolve AH's complaint. The DPC must ensure that the complainant is notified of the decision made

Stage 3: If after 30 days or 45 days (in remote area) the aggrieved affected household does not hear from the DPC, or if the affected household is not satisfied with the decision made on his/her complaint, the affected household may bring the case, either in writing, to any member of the PPC. The PPC has 30 days or a maximum of 70 days to resolve the complaint to the satisfaction of all concerned. However, depending if the case is complicated or from a remote area The PPC is responsible for maintaining records of complaints received, action taken and outcomes.

Stage 4: If efforts to resolve disputes using the grievance procedures remain unresolved or unsatisfactory, after a period of thirty days, complainants have the right to bring the case to a Court of law for adjudication. The decision of the Court is binding on all parties.:


Complaints from AH or APs
If complaint is not resolved within 30 days (60 in the case of a remote area)
Relevant CPC / PMU
Step 1
If complaint is not resolved within a further 30 days (45 in the case of a remote area)
DPC
Step 2
If complaint is not resolved within a further 30 days, or a maximum of 70 days
PPC
Step 3
Court of Law
Step 4

IX. ENVIRONMENTAL MANAGEMENT PLAN

A. IMPLEMENTATION ARRANGEMENTS

106. Bac Kan PMU will recruit one Environment Safeguard Specialist (ESP) under the Loan Implementation Consultants (LIC) to support subproject implementation in Bac Kan. The ESS will support the PMU to update the EMP and as well as monitor the compliance of the contractors during construction phase. The ESS will also be responsible for training and capacity building on the implementation of the EMP.

107. The PMU will engage a 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.

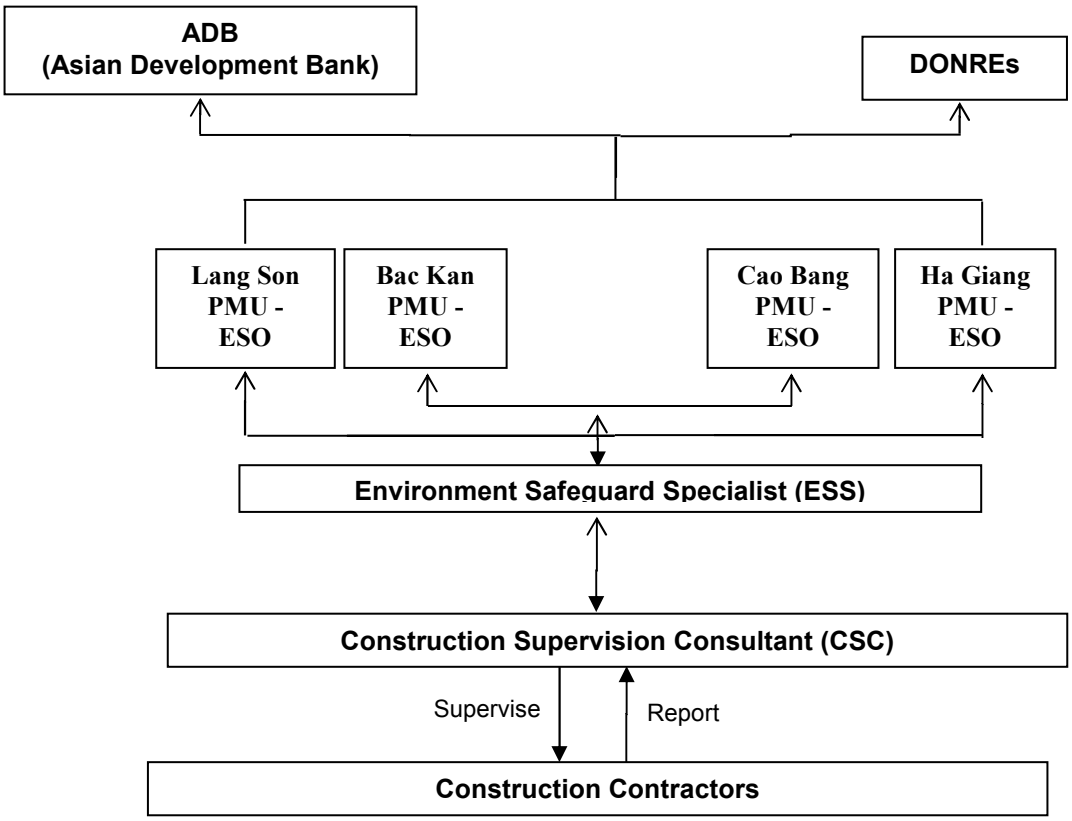
Table 16 – Responsibilities for EMP implementation

Agency	Responsibilities
Bac Kan 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 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 ESS 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) - 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 ESS 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 ESS 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. - During detailed design phase, prepare method statement (Waste Management and Spoils Disposal Plan) described in the IEE/EMP. - Ensure full understanding of the EMP and resources require for its implementation when preparing the bid for the work. - Implement additional environmental mitigation measures, as necessary
Bac Kan Department of Transportation (DOT)	- Responsible for operation and maintenance of Subproject road - Implement EMP monitoring during operation
Bac Kan 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 5 – EMP implementation organization chart



B. ENVIRONMENTAL MITIGATION

108. The anticipated environmental impacts and mitigation measures discussed in the previous section is presented in Table 17. The table also shows responsibilities and timeframe/schedule for implementation of mitigation measures and monitoring.

109. Table 17 shows that most mitigation activities during pre-construction are to be implemented by the ESS while during construction, measures shall be primarily implemented by the contractors. During the 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 17 - Detailed Environmental Mitigation Plan

		Impact Mitigation				
Environmental Concern	Objective	Proposed Mitigation Measures	Responsible to Implement	Timing	Locations	Mitigation Cost
Design and Pre-construction Phase						
1. 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	ESS	Before construction	N/A	Included in the contract with ESS
2. 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, 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.	ESS	Before bidding	N/A	Included in the contract with ESS
Construction Phase						
1. Impacts to flora and fauna	Avoid and minimize impact to flora and fauna in the subproject area	1. Minimized vegetation covers clearances. 2. All replanting works to utilize locally available non-invasive species. 3. 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. 4. Contractors shall not buy or use wood from the illegal sources (that come from the illegal logging) 5. No construction camps, concrete mixing plants, material storage sites are to be located along Km6 to Km8 - near the protection forest. 6. 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	CPCs; Contractors	Throughout construction phase	Along the subproject road, especially 2 km along protection forest from Km 6 to Km 8; worker camps area	Included in the contract with contractors

		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 construction materials and other project-related activities shall be reinstated upon completion of construction works at each section	Contractors	Before construction start and Throughout the construction phase	Along the subproject route	Included in the contract with contractors
3. Materials exploitation and management of quarry, borrow pits and temporary storage area	Minimize impacts from materials extraction, transportation and storage.	1. Prioritize use of Keo Put Quarry, the 6 listed potential borrow pits as mentioned in Section 2 - Construction Material Sources above and update the list of quarries and borrow pits monthly and report to PMU and minimize impacts on other local resources. 2. Reestablish vegetation cover and trim slopes to an even profile at any closed quarries and borrow pits 3. 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. 4. During quarry/borrow site operation,	Contractors	Though out construction phase	Subproject site, quarries and borrow pit areas	Included in the contract with contractors

		provide adequate drainage to avoid accumulation of stagnant water. 5. Ensure borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of water bodies favorable for mosquito breeding. 6. 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. 7. To avoid drowning when pits become water filled, measures such as fencing, providing flotation devices such as a buoy tied to a rope, etc. shall be implemented.				
4. Waste and spoil disposal	Control spoils and waste disposal, lubricant and hazardous wastes.	1. Areas suitable for disposal to be agreed with CPCs and Bac Kan DONRE checked and recorded by the CSC, ESS/PMU and monitored 2. Spoil and waste will not be disposed of in streams or other surrounding water bodies, shall only be disposed to areas approved by local authorities as listed in Table 12 of this IEE. 3. Surplus material to be distributed to local people for use in landscaping/ forming building platforms. 4. Spoil disposals shall not cause sedimentation and obstruction of flow of watercourses, damage to agricultural land and densely vegetated areas. 5. Under no circumstances will spoils be dumped into watercourses (rivers, streams, drainage, irrigation canals, etc.) 6. Spoils disposal sites shall be away from surface watercourses and shall be protected from erosion by avoiding formation of steep slopes and grassing.	Contractors	Throughout construction phase	Throughout construction site, material storage areas, machines and vehicles maintenance area	Included in the contract with contractors
5. Noise, dust and vibration	To minimize negative impacts from noise, dust and vibration during construction period	1. Restrict works to daylight hours within 200 m of residential settlements and local clinics. 2. 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.	Contractors	Throughout construction phase	Throughout construction site	Included in the contract with contractors

		3. Monitor and investigate complaints follow the Grievance Redress Mechanism of the project. 4. Keep material storage site moist 5. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emission. 6. On rainless days 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. 7. Clean up road surfaces after work. 8. To protect buildings and structures from vibration, non-vibrating roller shall be used in construction sites near buildings and structures. 9. Structures, which are damaged due to vibration caused by the construction activities, shall be repaired at the cost of the contractor. 10. Machinery shall be turned off when not in use. 11. Pile driving during to be schedule for daytime if construction site is near sensitive points or approved by DONRE, CPCs and ESS/PMU. 12. Impose speed limits on construction machines and vehicles to minimize dust emission along areas where sensitive pints are located (houses, schools, clinics, pagodas etc.). Speed limits to be imposed by setting up warning signs, instructions to drivers, and monitoring of driver behavior 13. Locate bitumen heating off road and (wherever practicable) at least 50 m from nearest sensitive receivers (residential areas, schools, clinics, etc.) and streams and install and maintain dust suppression equipment.				
6. Erosion control/ run	Protect established	1. Establish vegetation and erosion protection	Contractors	Throughout	Throughout	Included in

off	facilities	immediately after completion of works in each stretch / sector. 2. Stockpile topsoil for immediate replanting after cutting. 3. Minimize damage and excavation of surrounding vegetation during slope formation. 4. Protect the cut slope with planted vegetation, bioengineering or conventional civil engineering structures as soon as practicable after excavation. 5. Include and implement appropriate measures for slope protection, i.e. vegetation cover and stone pitching, as required in the detailed construction drawings. 6. Prevent erosion and protect the excavated slope with temporary or permanent drainage as soon as practicable after cutting. 7. If new erosion occurs accidentally, back fill immediately to restore original contours. 8. Low embankments will be protected from erosion by seeding and planting indigenous grasses that can flourish under local conditions.		construction phase	construction site and high risk slope as agreed with ESS/PMU	the contract with contractors
7. Drainage, hydrology, water resources and water quality	To minimize impact from wastewater drainage and prevent potential impact on water quality due to subproject activities	1. Province adequate drainage facilities at construction sites and worker camps to avoid stagnant water. 2. Implement agreed designs for bridges/ culverts sufficient to control flooding as designed. 3. Store lubricants, fuels and wastes in dedicated enclosures at least 50 m from water bodies on high and impervious ground with top cover 4. Solid waste from construction activities and workers camps will not be thrown in streams and other water bodies (drainage, lake, pond, etc.) 5. Construction storage/stockpiles shall be provided with bunds to prevent silted run-off. 6. Stockpiled materials will be covered to reduce silted run-off. 7. No stockpiling or borrow sites at Nang River bank. 8. Work in streams at bridge repair sites will	Contractors	Throughout construction phase	Throughout construction sites; 10 stream/ river crossing positions, material storage sites, temporary waste disposal area	Included in the contract with contractors

		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 2 CPCs and Pac Nam DPC in advance construction schedule and scope. 11. Work with relevant Division of Pac Nam DPC to find out suitable water block/ water cut schedule, avoid impact to downstream users of An Thang and Banh Trach communes				
8. 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 50m from settlements and agreed with local communities and facilities approved by ESS 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 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 current Government regulations. 10. All waste materials shall be removed and disposed to disposal sites approved by local	Contractors	Throughout construction phase	Throughout construction sites and worker camps	Included in the contract with contractors

		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.				
9. Safety precautions for workers and public safety	Ensure worker safety	1. Provide fire extinguishers and first aid facilities at construction sites, and workers' camps and ensure these are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, earplugs, gloves, etc. at no cost to the employee. 5. Where worker exposure to traffic cannot be completely eliminated, protective barriers shall be provided to shield workers from traffic vehicles. 6. Workers shall be provided with reliable supply of potable water. 7. Construction camps shall be provided with adequate drainage to avoid accumulation of stagnant water. 8. Construction camps shall be provided with toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained to allow effective operation. 9. Ensure reversing signals are installed on all construction vehicles. 10. Designate responsbility for maintaining safety measures to a senior member of the Contractor's staff	Contractors	Throughout construction phase	Throughout construction sites	Included in the contract with contractors
10. Traffic	Minimize	1. Communicate to the public through local	Contractors	Throughout	Throughout	Included in

Management	disturbance of traffic	officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. Coordinate with traffic police of Pac Nam district to 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. Coordinate with traffic police of Pac Nam district to 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.		construction phase	construction sites; at start and end point of the subproject road.	the contract with contractors
Operation Phase						
1. Generation of, noise, vibration and road safety issues from increased traffic	To minimize, noise and vibration and road safety risk	1. Install sign boards, speed limit/ loading limit to prevent dust, noise, vibration and road safety issues from faster vehicles 2. Install traffic calming measures such as speed humps at residential and other areas where there are high risks of accidents to reduce safety risks and impacts of noise, vibration	Bac Kan DOT	Throughout operation phase	At the start and end point of the road. At the residential areas along the road	Included in operation and maintenance cost

C. Environmental monitoring

1. Compliance Monitoring

110. Table 18 below shows the program for monitoring the compliance on various provisions of the EMP during pre-construction, construction and operation phases. ESS 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 ESS shall monitor their environmental performance, in terms of implementation of such measures. The timing or frequency of monitoring is also specified in Table 20. During operation EMP implementation shall be the responsibility of Bac Kan DOT.

111. 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 ESS and this, along with implementation of EMP provisions, shall be audited by ADB as part of the loan conditions.

112. Prior to implementation of the subproject the IEE and EMP will be updated and amended, as necessary, by ESS 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 18 - Environmental Compliance Monitoring

Performance and Impact Monitoring					
Environmental Concern	Parameter to monitor	Location	Frequency & Verification	Responsible to Monitor	Monitoring Cost
Design and Pre-construction Phase					
1. Land acquisition and resettlement	Compensation documents	N/A	Only one time before the construction commencement	Bac Kan DPI/ DONRE; PMU	Included in the operation budget of PMU
2. Unexploded Ordinance	Checking documents/ certificates	N/A	Once, before construction start	PMU	Included in the operation budget of PMU
Construction Phase					
1. Loss of trees and impacts to fauna	Check of implementation	Along the subproject road, especially 2 km along protection forest; worker camps area	Before construction commencement and Throughout construction phase. Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
2. Local facilities	Check of implementation	Along the road, near the residential areas	Before construction commencement and Throughout construction phase. Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
3. Materials exploitation and management of quarry and borrow pits	Check of implementation	Subproject site, quarries and borrow pit areas	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
4. Waste and spoil disposal	Check of implementation	Throughout construction site, material storage areas, machines and vehicles maintenance area	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
5. Noise, dust and vibration	Check of implementation	Throughout construction site	Bi-weekly and spot checks Part of daily construction supervision	ESS/ PMU	Included in the operation budget of PMU/ ESS 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…)	6 monitoring points (2 at start and end points; 1 at Na Lay village, 1 at protection forest area, 1 at Pac Nam market, 1 at Bang Thanh commune center	1 time before construction start and semi-annually during 2 years construction time (5 times in total)	ESS	1,800 USD[17]
6. Land slide, erosion control/ run off	Check of implementation	Throughout construction site and high risk slope as agreed with ESS/PMU (	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
7. Drainage, hydrology, water resources and water quality	Check of implementation	Throughout construction sites, 10 stream/river crossing positions, material storage sites, temporary waste disposal areas	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
	Surface water quality Ground water quality	10 sampling points at 20m downstream of the crossing stream/Nang River sections. 5 sampling points in 5 bridges construction sites	1 time before construction start and semi-annually during 2 years construction time (5 times in total) 1 time before construction start and annually during 2 years construction time (3 times in total)	ESS ESS	25,000 USD 6,000 USD[18]
8. Large influx of workers. Construction and worker camps, sanitation and diseases	Check of implementation	Throughout construction sites and worker camps	Before establishment of the facilities and Throughout the construction phase Part of daily construction	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC

[17] There is no cost norm for Bac Kan province. Figures have been estimated base on environmental monitoring cost norm of Ha Giang province.
[18] There is no cost norm for Bac Kan province. Figures have been estimated base on environmental monitoring cost norm of Ha Giang province.

			supervision		
9. Safety precautions for workers and public safety	Check of implementation. Check compliance to Labor Code of Vietnam and other relevant Decision, Decree and Circular under Government requirements	Throughout construction sites	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
10. Traffic Management	Check of implementation	Throughout construction sites; at start and end of the road;	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
Operation Phase					
1. Dust, noise, vibration	Check of implementation; Ambient air environment, noise level at the road and in the areas which are adjacent to road	At the start and end point of the road. At the residential areas along the route	Semi-annual in the first two years	Bac Kan DOT	Included in operation and maintenance cost

D. REPORTING

113. PMU will submit the following reports to ADB:

- *Monitoring report for baseline environment:* this report shows the result of baseline environment as implemented by ESS 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 19 – 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	ESS/ 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.	Bac Kan DOT	Bac Kan DONRE

Table 20 – Estimated cost for EMP Implementation (2-year construction/ 4-year in total)

Item	Estimated cost (US$)
Staff Costs	
1. Environment Safeguard Specialist (ESS)	***21,040***
1 National ESS - 6 man-months (intermittent in the first 2 years;) – 2,000 US$/ man-month	12,000
Per diem for ESS: 48 US$ x 30 days x 6 months	8,640
Travelling cost for 2 round trips: 200 US$ x 2 trips	400
EMP Budget	
2. Environmental effects monitoring (implemented by ESS)	***8,300***
Ambient air quality: 6 monitoring locations x 5 times x 60 US$/sample[19]	1,800
Surface water quality: 10 monitoring locations x 5 times x 500 US$/sample[20]	5,000
Ground water quality: 5 monitoring locations x 3 times x 400 US$/sample[21]	1,500
3. Training/orientation, local transportation, supplies (by ESS)	***3,000***
a) Training/orientation: 1 formal training course for PMU, CSC, Contractors and Bac Kan DOT and other "on the job" training	2,000
b) Local transportation and supplies	1,000
4. Printing Environmental monitoring report by ESS (4 reports)	***600***
Subtotal (2+3+4)	**11,900**
5. Contingency	**595**
Total (2+3+4+5)	**12,495**

E. CAPACITY BUILDING

114. 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 are usually responsible for many different tasks and do not have a good background on safeguards issues. Usually, the engineer will also be in charge of 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 Bac Kan DPI with one staff has been assigned as ESO.

115. The most significant challenge is the lack of human and financial resources and necessary infrastructure. To address this constraint, Bac Kan DPI/PMU will designate a full time staff as environmental safeguards officer (ESO) to handle the environmental aspects of the subproject during implementation stage. The ESO and other relevant staff of PMU will be trained

[19] There is no cost norm for Bac Kan province. Figures have been estimated base on environmental monitoring cost norm of Ha Giang province.
[20] There is no cost norm for Bac Kan province. Figures have been estimated base on environmental monitoring cost norm of Ha Giang province.
[21] There is no cost norm for Bac Kan province. Figures have been estimated base on environmental monitoring cost norm of Ha Giang province.

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

Table 21 – Detailed 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 Bac Kan 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 Bac Kan DOT who responsible for environmental management
Staff resources	National environmental specialist with at least 10 years experience on environmental management of road projects and must possess relevant graduate degree in civil engineering, environmental management and other relevant courses.

X. CONCLUSIONS AND RECOMMENDATIONS

116. 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.

117. The implementation of the subproject “Construction and Upgrading of Boc Bo - Bang Thanh - Son Lo Road, Pac Nam District, Bac Kan Province” will steadily improve the road quality; make it favorable for transportation, support goods transfer to and from Bang Thanh commune all the year in all kind of weather and connect to Son Lo commune, Bao Lac district, Cao Bang province. 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.

118. No further or additional impact assessment is considered necessary at this stage. At the implementation stage, PMU through ESS 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

Starting point in Boc Bo commune, Pac Nam center

End point in the border of Bang Thanh - Son Lo

Under construction bridge in Na Lay village

Current suspension bridge over Nang River

Road section along Nang River in Bang Thanh

Road section along protection forest (other side of Nang River)

Down grade road section in Bang Thanh

Khuoi Man concrete causeway Km22+230

Intersection with Nang River at Km22+650

Wood gathered roadside in Bang Thanh commune

Keo Put quarry in Nhan Mon

Dumping site of Pac Nam district

B. Appendix 2: Source of Reference Information

1. *Bac Kan Status of Environmental Report 2015*
2. *Bac Kan Climate Change Adaptation Plan (2011-2020)*
3. *The Project Inception Report*
4. *Project Outlines of Bac Kan province.*
5. *The subproject feasibility study report*
6. *The subproject Poverty and Social Analysis report*

C. Appendix 3: Environmental Mitigation Measures to Include into Bidding Documents

1. Impacts to flora and fauna	1. Minimized vegetation covers clearances. 2. All replanting works to utilize locally available non-invasive species. 3. 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. 4. Contractors shall not buy or use wood from the illegal sources (that come from the illegal logging) 5. No construction camps, concrete mixing plants, material storage sites are to be located along Km6 to Km8 - near the protection forest. 6. Contractors will take all precautions necessary to ensure that damage to vegetation is avoided due to fires resulting from execution of the works. The Contractors will immediately suppress the fire, if it occurs, and shall undertake replanting to replace damaged vegetation.
2. Local facilities	1. Reconfirm power, water supply, and telecommunications likely to be interrupted by the works. 2. Contact all relevant local authorities for facilities and local people to plan re-provisioning of power, water supply, and telecommunication systems. 3. Facilities shall be relocated and reconnected well ahead of commencement of construction works and contractors shall coordinate with facility company for relocation and reconnection well before works commence. 4. Affected communities shall be properly informed in advance. 5. Reconnection of facilities shall be done at the shortest practicable time before construction commences. 6. Facilities damaged during construction shall be reported to the CSC, PMU and facility authority and repairs arranged immediately. 7. Access roads, agricultural land and other properties damaged during transport of construction materials and other project-related activities shall be reinstated upon completion of construction works at each section
3. Materials exploitation and management of quarry, borrow pits and temporary storage area	1. Prioritize use of Keo Put Quarry, 6-listed potential borrow pits as mentioned in Section 2 - Construction Material Sources above and update the list of quarries and borrow pits monthly and report to PMU and minimize impacts on other local resources. 2. Reestablish vegetation cover and trim slopes to an even profile at any closed quarries and borrow pits 3. 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. 4. During quarry/borrow site operation, provide adequate drainage to avoid accumulation of stagnant water. 5. Ensure borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of water bodies favorable for mosquito breeding. 6. 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. 7. 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. Areas suitable for disposal to be agreed with CPCs and Bac Kan DONRE checked and recorded by the CSC, ESS/PMU and monitored 2. Spoil and waste will not be disposed of in streams or other surrounding water bodies, shall only be disposed to areas approved by local authorities as listed in Table 12 of this IEE. 3. Surplus material to be distributed to local people for use in landscaping/ forming building platforms. 4. Spoil disposals shall not cause sedimentation and obstruction of flow of watercourses, damage to agricultural land and densely vegetated areas. 5. Under no circumstances will spoils be dumped into watercourses (rivers, streams, drainage, irrigation canals, etc.) 6. Spoils disposal sites shall be away from surface watercourses and shall be protected from erosion by avoiding formation of steep slopes and grassing.
5. Noise, dust and vibration	1. Restrict works to daylight hours within 200 m of residential settlements and local clinics. 2. 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. 3. Monitor and investigate complaints follow the Grievance Redress Mechanism of the subproject. 4. Keep material storage site moist 5. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emission. 6. On rainless days 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. 7. Clean up road surfaces after work. 8. To protect buildings and structures from vibration, non-vibrating roller shall be used in construction sites near buildings and structures. 9. Structures, which are damaged due to vibration caused by the construction activities, shall be repaired at the cost of the contractor. 10. Machinery shall be turned off when not in use. 11. Pile driving during to be schedule for daytime if construction site is near sensitive points or approved by DONRE, CPCs and ESS/PMU. 12. 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.) by set up warning sign, speed limit board and assigned guard staff at the site 13. Locate bitumen heating off road and (wherever practicable) at least 50 m from nearest sensitive receivers (residential areas, schools, clinics, etc.) and streams and install and maintain dust suppression equipment.
6. Erosion control/ run off	1. Establish vegetation and erosion protection immediately after completion of works in each stretch / sector. 2. Stockpile topsoil for immediate replanting after cutting. 3. Minimize damage and excavation of surrounding vegetation during slope formation. 4. Protect the cut slope with planted vegetation, bioengineering or conventional civil engineering structures as soon as practicable after excavation. 5. Include and implement appropriate measures for slope protection, i.e. vegetation cover and stone pitching, as required in the detailed construction drawings. 6. Prevent erosion and protect the excavated slope with temporary or permanent drainage as soon as practicable after cutting. 7. If new erosion occurs accidentally, back fill immediately to restore original contours. 8. Low embankments will be protected from erosion by seeding and planting indigenous grasses that can flourish under local conditions.
7. 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 Nang River bank. 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 2 CPCs and Pac Nam DPC in advance construction schedule and scope. 11. Work with relevant Division of Pac Nam DPC to find out suitable water block/ water cut schedule, avoid impact to downstream users of An Thang and Banh Trach communes
8. Influx of construction worker	1. Construction and worker camp location and facilities located at least 50m from settlements and agreed with local communities and facilities approved by ESS 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 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 current Government regulations. 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.
9. Safety precautions for workers and public safety	1. Establish fire prevention tools at the construction site, worker camps and provide first aid facilities that are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, earplugs, gloves, etc. at no cost to the employee. 5. Where worker exposure to traffic cannot be completely eliminated, protective barriers shall be provided to shield workers from traffic vehicles. 6. Workers shall be provided with reliable supply of potable water. 7. Construction camps shall be provided with adequate drainage to avoid accumulation of stagnant water. 8. Construction camps shall be provided with toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained to allow effective operation. 9. Ensure reversing signals are installed on all construction vehicles.
10. 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. Coordinate with traffic police of Pac Nam district to 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. Coordinate with traffic police of Pac Nam district to 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.

D. Appendix 4: 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 average 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					

E. Appendix 5: Meeting minutes and public consultation attendance list

Dự án Hạ tầng Cơ bản Phát triển Toàn diện các tỉnh Đông Bắc

CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

PHIẾU ĐIỀU TRA KHẢO SÁT MÔI TRƯỜNG

Ngày 12 tháng 9 năm 2016
Tại Nông nghiệp và Phát triển Nông thôn tỉnh Bắc Kạn

Đại diện nhóm khảo sát điều tra môi trường - Dự án Hạ tầng Cơ bảnPhát triển Toàn diện các tỉnh Đông Bắc
1/ Ông Nguyễn Thanh Dương - Trưởng nhóm
2/ Ông Nguyễn Huy - Cán bộ hỗ trợ

Đã làm việc với:
Đại diện Sở Nông nghiệp và Phát triển Nông thôn tỉnh Bắc Kạn (có danh sách kèm theo)

Nội dung trao đổi làm việc: Mr. Ngô Mạ Hải - Trưởng phòng Kế hoạch Tài chính. Tel: 0912 912311
Mr. Nguyễn Văn Kiên - Cán bộ Phòng QL BV rừng. Tel: 0966400320
Ms. Nguyễn Thị Lê - Chi cục Thủy lợi. Tel: 0977528883

1) Trao đổi thông tin về DA BIIG và 2 TDA.
2) Các thông tin chung khu vực DA.
Tỉnh đang có kế hoạch quy hoạch lại 3 loại rừng. Điều chỉnh quy hoạch những khu diện tích rừng đặc dụng là có thay đổi.
Thiên tai chủ yếu là mưa lớn, hay gặp sạt lở đất và sụt lún.
Bằng Thành nhiều suối ngang đường, đi lại khó khăn, cô lập vào mùa lũ nên hết sức ủng hộ DA này.

Dự án Hạ tầng Cơ bản Phát triển Toàn diện các tỉnh Đông Bắc

CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

PHIẾU ĐIỀU TRA KHẢO SÁT MÔI TRƯỜNG

Ngày 12 tháng 9 năm 2016
Tại Sở Tài nguyên và Môi trường tỉnh Bắc Kạn

Đại diện nhóm khảo sát điều tra môi trường - Dự án Hạ tầng Cơ bản Phát triển Toàn diện các tỉnh Đông Bắc
1/ Ông Nguyễn Thanh Dương - Trưởng nhóm
2/ Ông Nguyễn Huy - Cán bộ hỗ trợ

Đã làm việc với:
Đại diện Sở Tài nguyên và Môi trường tỉnh Bắc Kạn (có danh sách kèm theo)

Mr. Trần Nguyên: PGĐ sở TNMT tỉnh Bắc Kạn
Nội dung trao đổi làm việc: Mr. Vũ Thanh Hải: Phó trg phòng phụ trách P tích mẫu
ĐT: 01688433688
Ms. Hà Thị Nhường: Chuyên viên Chi cục BVMT
ĐT: 0972825605
Mr. Hà Nhân Tùng: Chuyên viên phòng TN nước
ĐT: 0974178688

1) Trao đổi thông tin chung về DA Kla BIIG
- IDA: Nâng cấp đg Bộc Bố - Bằng Thành - Sơn Lộ
- IDA: NSH Bộc Bố

2) Không có rừng đặc dụng, VQG, khu bảo tồn trong khu vực DA. Khu bảo tồn loài và sinh cảnh Nam Xuân Lạc, khu BTTN Kim Hỷ và VQG Ba Bể đều xa. Gần nhất là Kim Hỷ cũng lớn hơn 10 km.
Trc đây có DA khai thác vàng sa khoáng Bản Nghiềng - Vằng Mu, xã An Thắng, Pác Nặm nhưng đã đóng cửa mỏ từ năm 2014.
Bằng Thành chủ yếu rừng trồng của ng dân.
Bộc Bố có 1329 ha rừng phòng hộ. Bằng Thành: 1856.9 ha
Tuyến đg có hơn 2km đi qua rừng phòng hộ thuộc quản lý của UBND xã Bằng Thành.
Hằng năm khoán bảo vệ rừng 200k/năm.
Ng dân đc phép khai thác 20%/1 năm trên diện tích này do là rừng dân trồng.

Dự án Hạ tầng Cơ bản Phát triển Toàn diện các tỉnh Đông Bắc - PPTA 8957

CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

PHIẾU ĐIỀU TRA KHẢO SÁT MÔI TRƯỜNG

Ngày 13 tháng 9 năm 2016
Tại xã Bằng Thành, Bộc Bố huyện Pác Nặm tỉnh Bắc Kạn.

Đại diện nhóm khảo sát điều tra môi trường - Dự án Hạ tầng Cơ bảnPhát triển Toàn diện các tỉnh Đông Bắc
1/ Ông Nguyễn Thanh Dương - Trưởng nhóm
2/ Ông Nguyễn Huy - Cán bộ hỗ trợ

Đã làm việc với:
Đại diện chính quyền xã (có danh sách kèm theo)

Nội dung trao đổi làm việc:

- UBND xã Bằng Thành:
  + Bà con hưởng ứng, mong mỏi từ lâu nhưng nếu vướng hàng rào, cây quế nào thì mong đền bù thỏa đáng
  + Trong quá trình thi công, phải lq, công trình phải đảm bảo chống tham ô, tham nhũng để con đg đi lại đc lâu năm.
  + Cộng đồng kiểm tra giám sát hay k? Phải giám sát chặt chẽ.
- UBND xã Bộc Bố:
  + Vấn đề tiền nước. Cần công bố thông tin liên quan đến tiền sử dụng nc khi thực hiện TDA NSH.
  + Quy mô xây đập lấy nước phải rõ ràng để ng dân đc biết.
  + Cần phải xử lý đá vôi do nc có nhiều đá vôi;
  + không dùng nguồn nước sông Năng do nước bẩn, nhiều khu tăng thợt ven sông.

DANH SÁCH CÁC ĐẠI BIỂU THAM VẤN NHẬN TIỀN HỖ TRỢ
DỰ ÁN HỖ TRỢ KỸ THUẬT CHUẨN BỊ DỰ ÁN HẠ TẦNG CƠ BẢN PHÁT TRIỂN TOÀN DIỆN CÁC TỈNH ĐÔNG BẮC (PPTA – 8957)

Bằng Thành ngày 13 tháng 9 năm 2016

Nhóm Tư vấn môi trường thực hiện khảo sát tại
Xã Bằng Thành huyện Pác Nặm tỉnh Bắc Kạn

I. Danh sách các đại biểu nhận tiền hỗ trợ

No.	Họ tên	Ký nhận
1	Sầm Văn Bằng	
2	Đàm Văn Quỳnh	
3	Hoàng Văn Lưu	
4	Lý Thanh Tích	
5	Hoàng Văn Chúc	
6	Tương Văn Hoan	
7	Nông Văn Quân	
8	Ma Văn Hường	
9	Đinh Văn Lập	
10	Hoàng Văn Hưng	
11	Nông Văn Hoà	
12	Ma Văn Khoa	
13	Hoàng Thị Giới	
14		
15		
16		
17		
18		

DANH SÁCH CÁC ĐẠI BIỂU THAM VẤN NHẬN TIỀN HỖ TRỢ
DỰ ÁN HỖ TRỢ KỸ THUẬT CHUẨN BỊ DỰ ÁN HẠ TẦNG CƠ BẢN PHÁT TRIỂN TOÀN DIỆN CÁC TỈNH ĐÔNG BẮC (PPTA – 8957)

Bắc Kạn..., ngày..14.. tháng 9 năm 2016

Nhóm Tư vấn môi trường thực hiện khảo sát tại
Xã...Bộc Bố.......................huyện..Pác Nặm...........tỉnh...Bắc Kạn.........

I. Danh sách các đại biểu nhận tiền hỗ trợ

No.	Họ tên	Ký nhận
1	Quan Thị Hoài	Hoà
2	Lường Thị Vinh	Vinh
3	Ma Thị Lầy	[illegible]
4	Dương Thị Cao	Cao
5	Hoàng Trùng Bồ	Bồ
6	Đặng Văn Bẩy	Bẩy
7	Quan Văn Huấn	[illegible]
8	Dương Hoàng Tuấn	[illegible]
9	Quan Thị Mận	Mận
10	Nông Thị Đào	Đào
11	Nông Thị Thương	Thương
12	Nguyễn Thị Thiềm	Thiềm
13	Hoàng Thị Tìng	[illegible]
14	Lê Thị Mỡ	[illegible]
15	Phí Thị Nga	Nga
16	Dương Văn Mai	Mai
17	Cà Ngọc Lệp	Lệp
18		