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VIE: Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project

Subproject: Upgrading and Improvement of Boc Bo – Bang Thanh – Son Lo Road, Pac Nam District, Bac Kan Province

Prepared by the 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)
D1.00	=	$0.000044
$1.00	=	D22,730

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 poor 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 23.1km

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: 23.1km;
- 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 500m 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 23.1km 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 Viet Nam

22. The subproject has to comply with the environmental legal framework of Viet Nam, 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 3 December 2004 by the National Assembly on forest protection and development

2. Decrees and Regulations

- Decree No. 18/2015/ND-CP dated 14 February 2015 on environmental protection planning, strategic environmental assessment, environmental impact assessment and environmental protection plans.
- Circular No. 27/2015/TT-BTNMT dated 29 May 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 No. 7/2012/QD-TTg dated 08 February 2012 of the Prime Minister promulgating some regulations on intensified enforcement of forest protection
- Decision No. 186/2006/QD-TTg dated 14 August 2006 of the Prime Minister promulgating the Regulation on forest management
- Decree No. 9/2006/ND-CP dated 16 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 3 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, 15 km 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 4 bridges and 1 spillway on this road section of which construction 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 6 m span and 6 m width, partly damaged and therefore with poor loading capacity. The spillway at Km8+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: 6.5 m;
- Road surface width: 3.5 m;
- Road shoulder: 2 x 1.5 m;
- Reinforced shoulder: 2 x 1.0 m;
- 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.

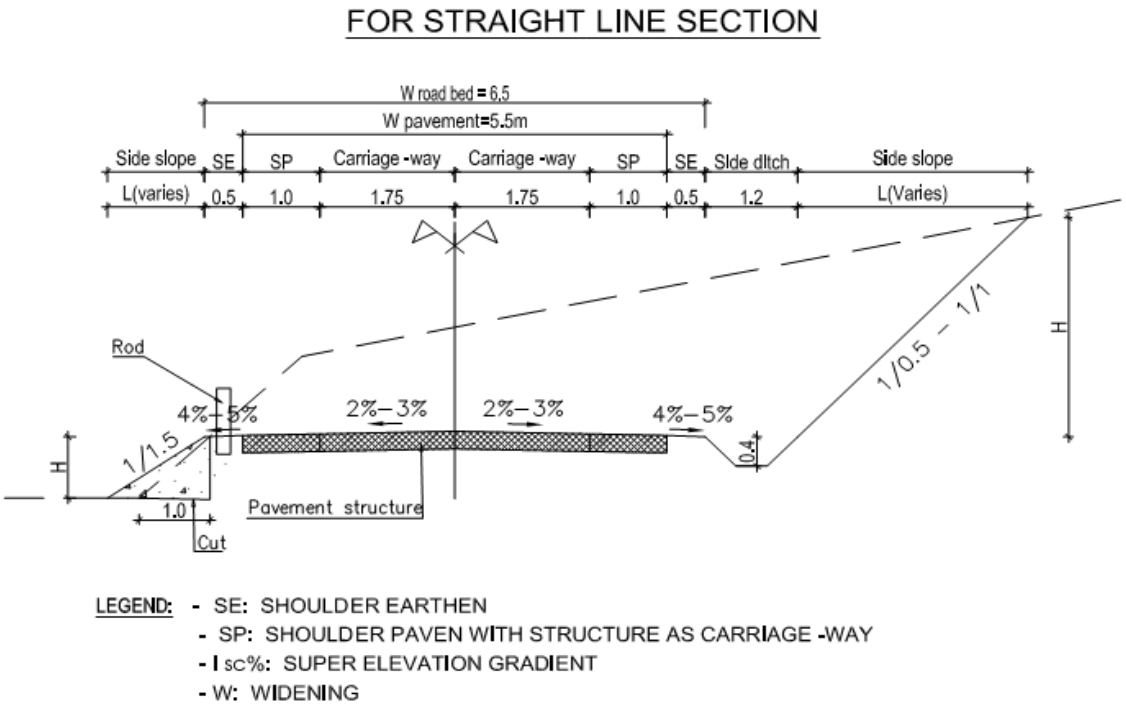
1. Hydrological investigations

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 Km4+200, 50 m 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 August 2011 are 135,000 m^3 of stone with the area of 0.8 ha. 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 28.2 km. Currently the quarry can supply many kinds of crushed stones of different sizes The estimated volume required for construction is 35,790 m^3, of which 19,792 m^3 is for base course and 15,998 m^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

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

favorable to exploit for the construction. Transport distance from the mine to the points along the route does not exceed 21 km;

(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 20 km.

(iii) Mine 03: The mine is located on the right side of the project road in Km9+200, 20 m 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 20,000 m^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 14 km;

(iv) Mine 04: Mine is located on the right side of the project road in Km12+350, 50 m 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. 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 12 km;

(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 70,000 m^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 17 km;

(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 100,000 m^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 20 km [4].

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

30. The estimated volume of filling soil (for use to form embankments) is 55,736 m^3 while the estimated volume of excavated soil is 443,957 m^3 of which 34,784 m^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 53 km 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]

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

[5] The subproject feasibility report

No.	Cost Items	Cost Norms	Before Tax Costs	VAT	After Tax Cost (VND)	After Tax Cost (USD)
-	*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
-	*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.

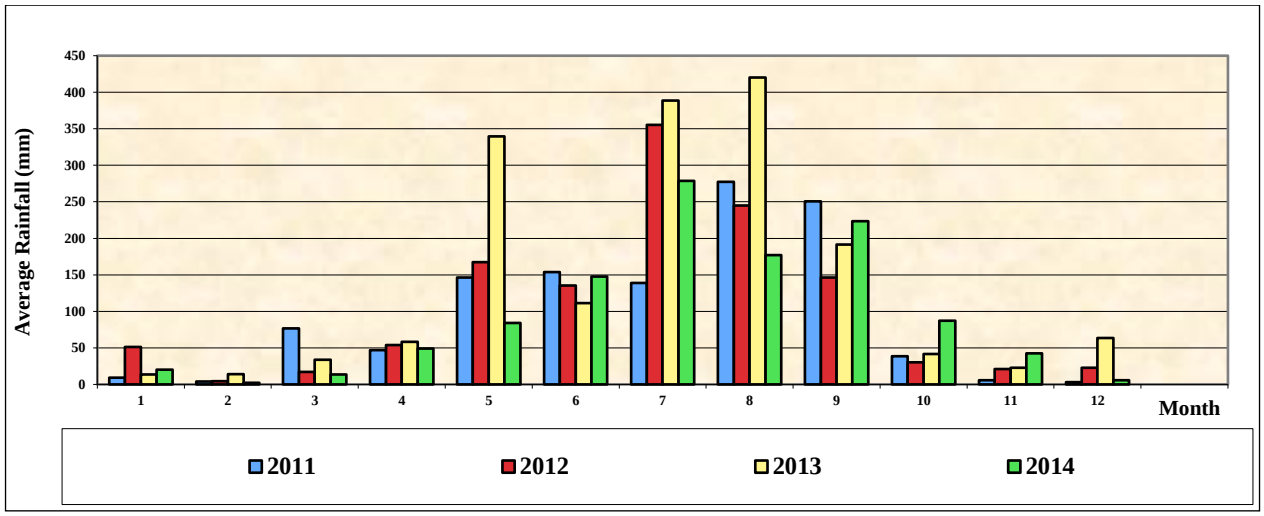
[6] Status of Environment report (SOE) of Bac Kan province 2015 prepared by Environmental Protection Agency under Bac Kan DONRE

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 1,756 mm, 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 1,800 mm-2,000 mm. 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**

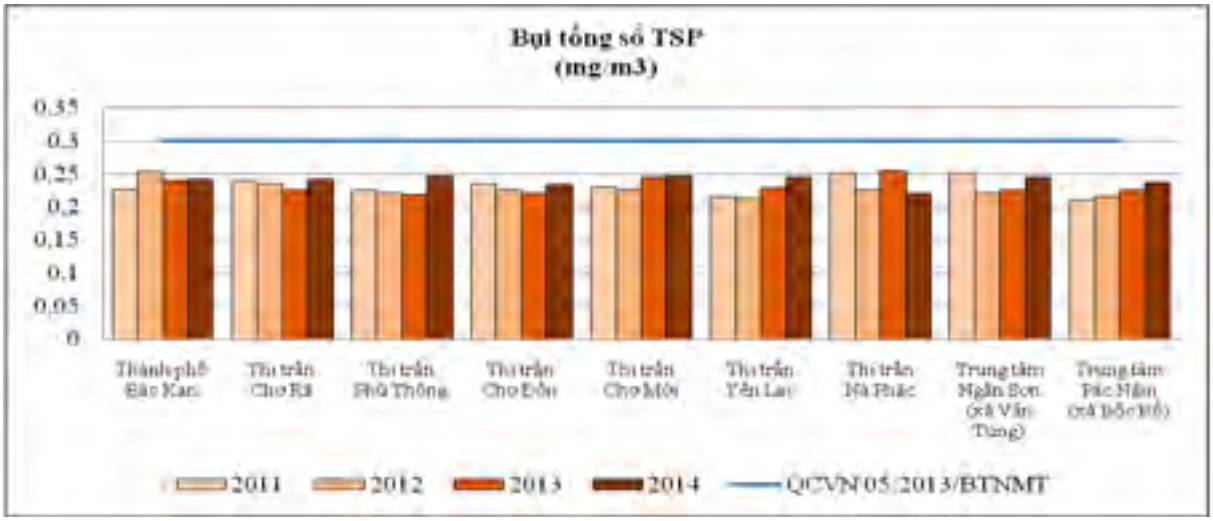
(Source: Bac Kan DONRE)

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 Viet Nam, 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 15 km 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 Viet Nam 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 Condition 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 subproject. 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
Other		1	1		1	1
Female headed household	89	58	147	39	16	55

Source: Data collection from target communes, 2016

[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

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 VND900,000-1,000,000/m^3, but only VND280,000-300,000/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 VND16.2 million and VND12.0 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 VND30 million; VND20 million for Tay ethnic minorities, San Chi people only earned about VND6.0 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
+ 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

	Unit	Pac Nam District	Whole Province
+ 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.

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 Km6 to Km8, 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

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

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 Impact 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 Km6 to Km8. 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 60,000 m^3 while the estimated volume of excavated class 3 soil (semi-solid soil that could be used for embankment) from excavation works is about 400,000 m^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 34,784.1 m^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 20 m length, height of sliding blocks of around 8 m. 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, 10 m long.
3	Km4+750	Km4+770	Shallow landslide of the surface soil on bedrock on cut slope of 15-20 m high.
4	Km7+980	Km8+010	Cut slope landslide on the left side, shallow sliding block, quite large sliding scale of 30 m long, 30 m 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 20 m long, 8 m 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, 10 m long.
7	Km9+000	Km9+010	Mild landslide on Cutting slope on the right side of 10 m long, 4 m 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 4 m long.
9	Km10+375	Km10+385	Mild landslide on cutting slope of small scale, 7 m long, 4 m high.
10	Km10+440	Km10+450	Mild landslide on cutting slope, small scale, 10 m long, 5 m high.
11	Km10+490	Km10+500	Mild landslide on cutting slope, small scale, 7 m long, 5 m high
12	Km10+590	Km11+000	Mild talus landslide, small scale, 10 m long, 7 m high
13	Km13+380	Km13+390	Mild and shallow landslide at the bottom of the Cut slope on the right side, 10 m long, 2 m high
14	Km16+950	Km16+700	Mild landslide on cutting slope, small scale 10 m long, 5 m high
15	Km17+000	Km17+100	Erosion at road edge on the downward slope, 3 m long
16	Km17+110	Km17+130	Shallow landslide on cut slope, medium scale, 20 m long, 8 m high
17	Km18+350	Km18+355	Mild and shallow landslide on cut slope, 5 m long, 3 m high
18	Km20+150	Km20+160	Mild landslide on cut slope, 10 m long, 5 m high
19	Km20+180	Km20+220	Medium landslide on cut slope, 40 m long, 10 m 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 50 m 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 50 m 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, and (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-month-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 Impact 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; and
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

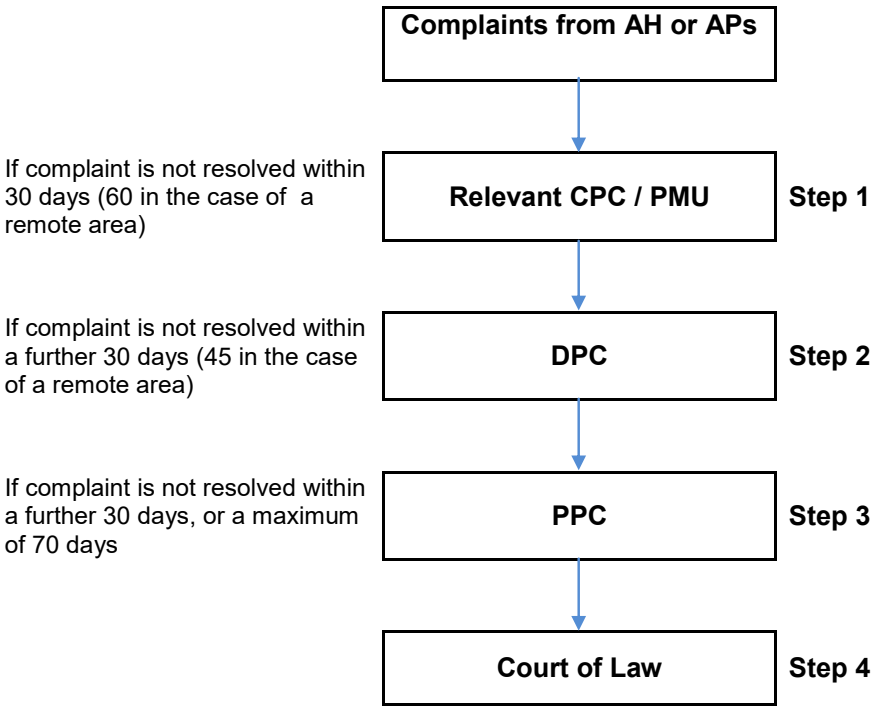
105. There are three steps to address complaints received from stakeholders:

***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.

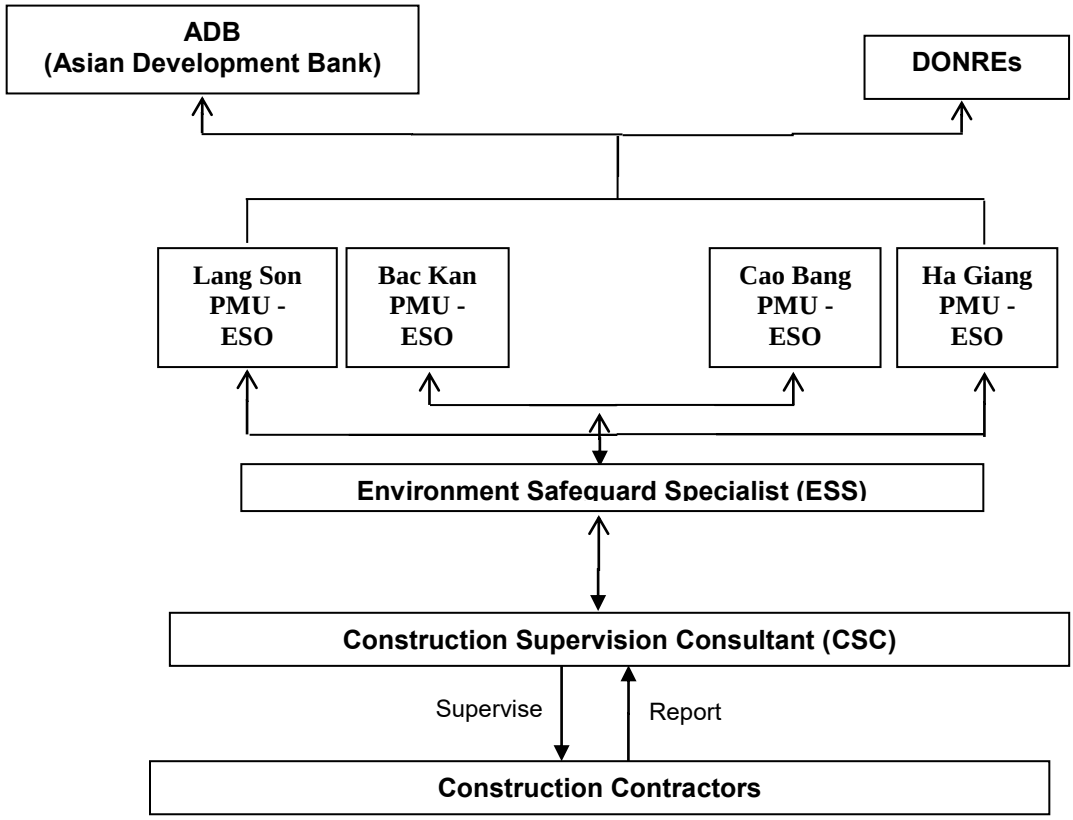
Table 16: Responsibilities for EMP Implementation

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 Km6 to Km8; 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.	Contractors	Though out construction phase	Subproject site, quarries and borrow pit areas	Included in the contract with contractors

		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	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	Contractors	Throughout construction phase	Throughout construction site	Included in the contract with contractors

		emission and noise creation standards. 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 off	Protect established facilities	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.	Contractors	Throughout construction phase	Throughout construction site and high risk slope as agreed with ESS/PMU	Included in 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.	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

		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	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.	Contractors	Throughout construction phase	Throughout construction sites and worker camps	Included in the contract with contractors

		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	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	Contractors	Throughout construction phase	Throughout construction sites	Included in the contract with contractors

		operation. 9. Ensure reversing signals are installed on all construction vehicles. 10. Designate responsibility for maintaining safety measures to a senior member of the Contractor's staff				
10. Traffic Management	Minimize disturbance of traffic	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. 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.	Contractors	Throughout construction phase	Throughout construction sites; at start and end point of the subproject road.	Included in 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-year construction time (5 times in total)	ESS	$1,800[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-year construction time (5 times in total) 1 time before construction start and annually during 2-year construction time (3 times in total)	ESS ESS	$25,000 $6,000[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/man-month	12,000
Per diem for ESS: $48 x 30 days x 6 months	8,640
Travelling cost for 2 round trips: $200 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/sample[19]	1,800
Surface water quality: 10 monitoring locations x 5 times x $500/sample[20]	5,000
Ground water quality: 5 monitoring locations x 3 times x $400/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-year 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 50 m 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 Viet Nam

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 solids (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 25 June 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 31 December 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 determining 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 25 June 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 25 October 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:
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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.
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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:
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Mr. Hà Nhân Tùng: Chuyên viên phòng TN nước
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1) Trao đổi thông tin chung về DA KfW BIIG
- I DA: Nâng cấp đg Bộc Bố - Bằng Thành - Sơn Lộ
- I DA: NSH Bộc Bố
2) Không có vùng đất ngập nước, 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.
Trước đây có DA khai thác vàng sa khoáng Bản Nghiêng - Vằng Ma, 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 2 km đi qua rừng phòng hộ thuộc quản lý của UBND xã Bằng Thành.
Hàng 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 muốn [illegible] những nếu vướng hộ rào, cây quê nào thì mong đền bù thỏa đáng
  + Trong quá trình thi công phải lg, công trình phải đảm bảo chống tham ô, tham nhũng để công trình đi lại đc lâu năm.
  + Cộng 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 dựng đập nước phải sẵn sàng để ng dân đc biết.
  + Cần phải xử lý đá vôi do nc có nhiều đá vôi;
  + Không dùng nguồn nước sông. Nặng do nước bẩn, nhiều khu trồng trọt 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 Quynh	
3	Hoàng Văn Lưu	
4	Lý Thanh Tình	
5	Hoàng Văn Chức	
6	Trương Văn Hoan	
7	Nông Văn Quân	
8	Ma Văn Vương	
9	Đinh Văn Lập	
10	Hoàng Văn Hường	
11	Nông Văn Hoà	
12	Ma Văn Khoa	
13	Hoàng Thị Gấm	
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 Hoa	Hoa
2	Lường Thị Vinh	Vinh
3	Mai Thị Lây	Mhơ
4	Dương Thị Cao	Cao
5	Hoàng Văn Bộ	Bộ
6	Đặng Văn Bảy	Bảy
7	Quách Văn Huấn	Huấn
8	Dương Hoàng Tuấn	Tuấn
9	Quách Thị Mận	Mận
10	Nông Thị Đào	Đào
11	Nông Thị Thường	Thường
12	Nguyễn Thị Thiện	Thiện
13	Hoàng Thị Tình	Tình
14	Lê Thị Mỡ	Mỡ
15	Thí Thị Nga	nga
16	Dương Văn Mai	Mai
17	Cà ngọc Lập	Lập
18		

Initial Environmental Examination

Stage of the document: Final
Project number: 49026-002
April 2017

VIE: Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project-Upgrading and Improvement of the Provincial Road 211 Tra Linh and Trung Khanh Districts, Cao Bang Province

Prepared by Planning and Investment Department of Cao Bang province for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 27 April 2017)

Currency unit	–	Viet Nam Dong (D)
D1.00	=	$0.000044
$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
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	–	Project Management Unit
PPC	–	Provincial People's Committee
PPE	–	Personal Protective Equipment
PPTA	–	Project Preparatory Technical Assistance
ROW	–	Right of Way
SPS	–	Safeguard Policy Statement
SST	–	Subproject Support Teams
The Subproject	–	Upgrading and Improving Provincial Road 211 (Tra Linh - Trung Khanh), Cao Bang Province
TTF	–	Trade and Transport Facilitation
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 (BIIG 1) will invest in the recently completed Four Northeastern Provinces (FNEP) Overall Development Plan (2015). The development plan responds to the Government of Vietnam's strategy of targeting the investment into poorer provinces and regions. The use of a sub-regional approach seeks to build the interrelationship between provinces as one of the foundations for accelerating growth in the more remote regions. As such the plan targets investment into outputs that build areas of comparative advantage in a manner that increases the competitiveness of economic activity in the sub-region. The expected impact is to improve socio-economic wellbeing of local communities through the improved financial returns and through lower costs of accessing public health services, education, water supply and markets.

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 "Upgrading and improving Provincial Road 211 (Tra Linh - Trung Khanh), Cao Bang Province" and is a representative subproject for Output 1 of BIIG 1: Improved FNEP Road Network Connectivity. The route travels through Trung Khanh and Tra Linh district, Cao Bang province with the total length of 28 km. The start point: at Km 0+00 is the junction with National Road 34 (NH34) in the vicinity of Hung Quoc town, Tra Linh district and the end point, at Km 28+00 is at the junction with Provincial Road 206 (TL206) in the vicinity of Trung Khanh town.

4. The works will bring the road to the standard of Category IV Mountain road as classified in Vietnamese national standards TCVN (Tiêu chuẩn Việt Nam) 4054. The subproject will follow the existing alignment, with the exception of a new alignment to cross a river and bypassing the village of Bac Vong and a bypass at Ban Ngan village, Quang Trung commune, Tra Linh district. The main specifications are:

- Road base width: 7.5m;
- Road surface width: 5.5m;
- Road shoulder: 2 x 1.0m;
- Hard shoulder width: 2 x 0.5m;
- Road surface structure: Bituminous concrete

5. Civil works will include a new bridge crossing over the Bac Vong River (Km16+950), in the territory of Ban Sat village, Quang Trung commune, Tra Linh district and two replacement bridges. The bridge span will be made of pre-stressed concrete, 8m in widths with a design parameters determined by the traffic loading appropriate standards[1]. The bridge will be constructed 100m downstream from the current existing crossing, a spillway to avoid a residential area.

[1] AASHTO HL-93 Loading, Live Load Model and Vietnamese Technical Standards - 272TCN-05

Table 1: Number of bridges along the subproject road

No.	Location	Bridge type	Length (m)	Width (m)	Status
1	Km1+600	Slab bridge	6.5	3.0	Built from 2002, it is now degrading but the major parts are still functioning well. The bridge is acceptable with the current road grade and the small truck traffic.
2	Km14+200	Slab bridge	5.3	5.0	Built from 2002, it is now degrading but the major parts are still functioning well. The bridge is acceptable with the current road grade and the small truck traffic.
3	Km16+950	Composite Overspill	9.4	4.0	The drift is now degrading and the surface is usually overwhelmed in the flood season

B. Environment impacts and mitigation

6. The Project is categorized as B on environmental issues during the Project Concept note, which identified few potential significantly 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. The most significant concern is the potential negative impact on the Bo That water source (Km12+8) and Bo That protection forest[2] (from Km 12+5 - Km 13) of the subproject road from encroachment during construction and effects of noise, dust and fumes on fauna in the forest. These risks will be mitigated by prohibiting construction camps, bitumen heating facilities, depots or material storage sites from being located in or near the forest, minimization of heavy machinery in the vicinity of the forest, prohibiting the use of fuel wood for construction activities or for cooking and water heating in worker's camps and prohibiting the contractor or contractor's employees from hunting or collecting fuel wood or any other forest product from the forest and from buying wood sourced from the forest. During the construction phase, construction activities and waste water from worker camps could impact on the water quality of the Bo That water source and impact on local people in Ngan village, Quang Trung commune, Tra Linh district which is 500m downstream from the water source. The completion of the road will also provide better access to Bo That protection forest; potentially creating favorable conditions for illegal wood logging, forestry product exploitation, and hunting. To minimize the impact, (i) construction activities shall be confined to the existing road foundation; (ii) worker camps are not be allowed to be located in or immediately adjacent to the forest and water source area; (iii) the contractor shall not store construction materials in or adjacent to the forest or water source area; (iv) no

[2] Bo That Protection Forest is classified as natural environmental protection forest in accordance to Decision No.17/2015/QD-TTg, issuing the Management mechanism of the Protection forest. Information provided by the Agricultural staff of Tra Linh district and Land Administrative staff of Quang Trung commune, Tra Linh district.

materials for any use whatsoever may be sourced from the forest and (iv) workers shall be prohibited from cutting trees for firewood, or from hunting or extraction of any forest products.

9. In the design and preconstruction phases, the potential issues that have been identified are (i) land acquisition and resettlement; (ii) disturbance of unexploded ordnance. To minimize the impact on income and disturbance of local people's lives, 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's Safeguard Policy has been implemented.

10. The potential negative impacts in the construction phase have been identified as (i) Impact from route selection at section through Ban Ngan village, Quang Trung commune, Tra Linh district; (ii) Encroachment of Bo That protection forest in Quang Trung commune; (iii) impact on utilities (public infrastructure); (iv) impacts of excavation and material extraction; (v) impacts from temporary materials stockpiles; (vi) generation of surplus soil; (vii) generation of construction waste and domestic waste; (viii) impact from bitumen heating and concrete mixing plant; (ix) dust, noise and vibration from construction machinery; (x) land slide, soil erosion and runoff; (xi) impact on crossing streams or bridge construction locations; (xii) social issues associated with the presence of temporary non-local workers; (xiii) safety risks to workers and also to local public; and (xiv) impact on local traffic.

11. The proposed mitigation measures for these impacts in the construction phase are: (i) Construct 400-meter bypass road to avoid the narrow road section through Ban Ngan village, Quang Trung commune, Tra Linh district; (ii) 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; (iii) contact all relevant local authorities for facilities and local people to plan any re-provisioning of power, water supply, and telecommunication systems; (iv) procure materials only from Cao Bang DONRE authorized quarries and borrow sites and update the list of quarries and borrow pits monthly and report to PMU; (v) 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; (vi) 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; (vii) areas suitable for disposal to be agreed with CPCs and Cao Bang DONRE checked and recorded by the CSC, ESS/PMU and monitored; (viii) 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; (ix) restrict works to daylight hours within 500 m of residential settlements and local clinics, (x) powered mechanical equipment and vehicle emissions to meet national TCVN/QCVN standards; (xi) establish vegetation and erosion protection immediately after completion of works in each stretch/ sector, (xii) check weather forecasts and minimize work in wet weather; (xii) 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; (xiv) 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; (xv) 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; (xvi) 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.

12. In the operation phase, the potential negative impact has been identified as relating to (i) impact from dust and noise arising from increasing of traffic density; (ii) favorable conditions for transportation of goods and people movement and also likely to increase the vehicle speeds. Project traffic will increase to moderate flows moderate and are unlikely to signiicantly worsen community safety issues. To minimize the negative impacts, Cao Bang Department of Transportation (DOT), the responsible agency for subproject management in the operation phase, will cooperate with Cao Bang DONRE, Tra Linh and Trung Khanh DPCs, 6 town and commune CPCs to maintain the road periodically and collaborate 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. A road safety and awareness campaign is required for people working and living along the road.

13. The PPTA Consultant has also identified key stakeholders and conducted public consultations from provincial to commune level with a focus on the affected people's views. The main concerns identified were (i) safety risks, and risks to public hygiene from improper handling and transportation of construction materials and of waste (ii) adequacy of construction quality and standard, as a high frequency of trucks travel on the road, (iii) road safety issues at the sections that go through residential areas, (iv) increased runoff from the road due to a wider road surface and (v) traffic jams near the town center and schools. All of these concerns are addressed in the EMP (See Table 9 – 10 for more details).

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

C. Institutional arrangements

15. Cao Bang 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 Environmental Safeguards Officer (ESO). Two staff, including the ESO, have been participating in a training course on "Fundamental Safeguard and Gender Safeguard Policy Statement (SPS) of ADB" under TA8902-VIE: Capacity Building for Project Management Unit Professionalization - organized by ADB in August 2016. The ESS will organize training for relevant PMU staff, CSC staff, communities, contractors; in EMP implementation and provide support for the establishment and operation of the subproject environment management system in the construction phase. The ESS will also support PMU's capacity building by reviewing and evaluating the capacity for environmental protection of the PMU and Cao Bang Department of Transportation (DOT) – subproject management organization in the operation phase.

16. 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

17. The IEE concludes that the feasibility study of the subproject combined with available information is sufficient to identify the scope of potential environmental impacts and formulate mitigation measures for the subproject. Providing that significant changes to the subproject description do not occur at the detailed design phase, and that new sensitive environmental, or cultural resources are not 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 detail design finalization.

II. BACKGROUND

A. Objectives of the Project

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

18. The subproject objectives will be achieved through investment in construction and improvement of basic infrastructure, including improve and expand the transport corridors among regions and sub-regions to ensure these corridors actually become the economic corridors, increase infrastructure linkage including the subproject - upgrading provincial road 211 (Tra Linh - Trung Khanh) Km 0+00 - Km 28 to IV class road for mountainous area.

19. 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

20. 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 construction of 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

21. 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 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:

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

22. 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

23. 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: 2008/BTNMT on surface water quality
  - QCVN 09: 2008/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. Subproject Location

24. The upgraded road connects two district centers of Tra Linh and Trung Khanh, both of which lie on the border with China. It connects with provincial roads TL206 and TL213 and improves access to two tourism sites, the Ban Gioc waterfall resort and the Nguom Ngao cave site. Other significant sites in the vicinity include the Gioc Dau spiritual tourism base, Ho Thang Hen tourism base (Tra Linh district), Pac Bo historical relics, the Soc Giang border gate (Ha Quang district) and Ha Giang province. The location of the subproject road is shown in Figure 1. The subproject will (i) facilitate cross-border trade through auxiliary gates, (ii) promote the development of tourism through the east west linkages of two major attractions in Cao Bang reducing travel times substantially, and (iii) assist residents and businesses along and adjacent

to the road, to participate in businesses and trade further afield (currently impeded by the standard of PR211).

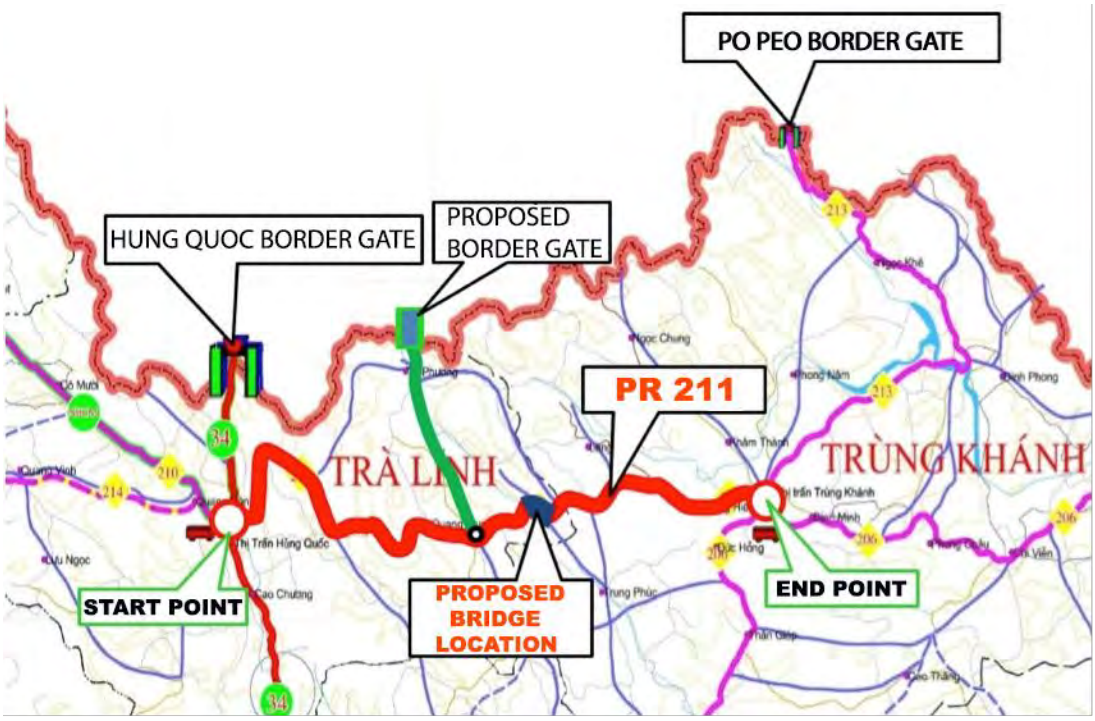


Figure 1: Map of the subproject road

Figure 2: General Map of Cao Bang and Subproject Location

Part 1


Lang Yên
Lang Yen CPC
Road to Lang Yen commune
Lang Hieu Primary School and Kindergarten
Lang Hieu Secondary School
Proposed location for borrow pits
Planned disposal site
Lang Hieu Kindergarten - underconstruction
Keo Tam Quarry - closed
Bo Gia quarry - closed
Lang Hieu Medical Clinic
Lang Hieu CPC
Ban Chien hamlet
Ban Chien Quarry
Protection forest on top of the mountain
Sac Ha village
Continous Education Center
Borrow pit
Pine forest
Trung Khanh General Hospi
Water supply plant
Phia Phu Pond
TRAN temple
Trung Khanh High School
Town Medical Clinic
Dinh Van quarry
Ecological lake - Ban D
TL 206
Road to Quang Yen Town
Image © 2016 DigitalGlobe
© 2016 Google
Image © 2016 CNES / Astrium
US Dept of State Geographer

Part 2

B. Subproject scope

25. The subproject road is situated in small karst mountain terrain. It passes scattered cultivation on flatter land while intact forest on steep land on the karst mountains. The subproject starts and ends at the crowded residential areas of Hung Quoc town, Tra Linh district and Trung Khanh town, Trung Khanh district. It also runs through some crowded residential areas of Xuan Noi, Quang Trung and Lang Hieu communes of Tra Linh and Trung Khanh districts.

26. The section between Km12+5 to Km 13 runs adjacent to the Bo That protection forest, whose function is partly to protect the Bo That water source (Km12+8) - the main water supply and irrigation sources for people in Ban Ngan village, Quang Trung commune, Tra Linh district.

27. The subproject road crosses the Bac Vong River at Km16+950. This river originates in China, running through Tri Phuong, Quang Trung communes, Tra Linh district before flow through Trung Phuc, Thong Hoe and Than Giap communes, Trung Khanh district then continuing to Ha Lang district.

28. The subproject will follow the existing alignment, with the exception of a new alignment of 200m to cross a river and bypassing the village of Bac Vong town.[3].

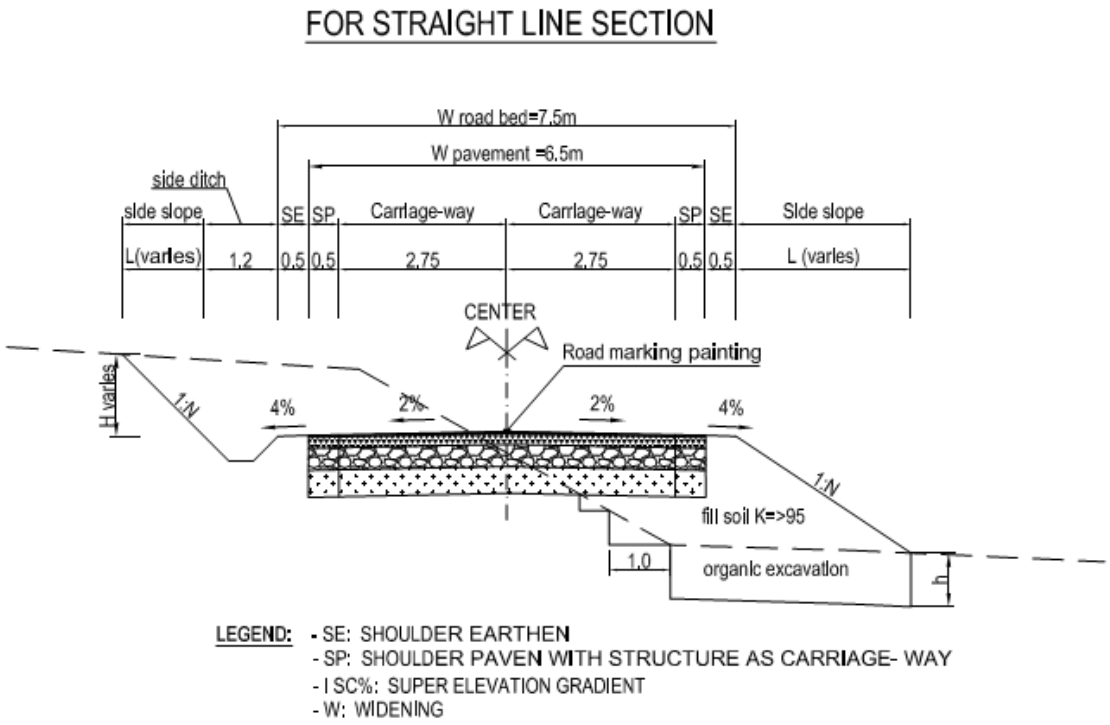
29. Construction along the alignment will require construction of a bridge over the Bac Vong River on south-western boundaries in Ban Sat village, Quang Trung commune, Tra Linh district.

- The bridge is designed with pre-stressed concrete and K=8m width, HL93 design load.

- The location of the new bridge will be 100m downstream from the spillway to enable the clearance of residential area.

[3] The total road length of 28km, including bypass road section through the village from Km11 + 850 to km12 + 250 with 400m of Ban Ngan village, Quang Trung commune, Tra Linh district. The section of the bridge head over Bac Vong bridge, not going through the old road from Km16+600 to Km16 + 800 with 200 meters long of Ban Sat village, Quang Trung commune, Tra Linh District.

Figure 3: Typical Cross Section for straight-line section design of PR211



C. Construction Material Sources

30. In accordance with the list of quarries and sand mines provided by Cao Bang MONRE, potential stone sources are (i) Lung Mo quarry, operated by Khoa Cuong private company in Cao Chuong commune, Tra Linh district about 1.6 km from the start point of the subproject. This quarry has a total capacity of 40,000m^3 and the annual exploitation capacity of 5,000m^3; (ii) Coc Cang quarry operated by Du Trong Dai One Member Limited Company in Hung Quoc town, Tra Linh district, about 500m from Km2+840 of the subproject road. The annual exploitation capacity of the quarry is 10,000m^3; (iii) Keo Thin Lan quarry and construction material operated by Dinh Van private company in Lang Hieu commune, Trung Khanh district about 300m from Km26+520 of the subproject road. The total capacity of the quarry is 105,000m^3 and the annual exploitation capacity of 15,000m^3 [4] while estimated volume of stone using for the subproject road construction is about 84,398 m^3.

31. Potential filling soil sources are (i) Sac Ha borrow pit, located near Km 16+500 in Sac Ha village, Quang Trung commune, Tra Linh district. This is the low hill areas and currently managed by Quang Trung CPC. Estimated capacity of the borrow pit is 600,000 m^3; (ii) Cho Mo town borrow pit, located near Km 13+500 to Km 13+850 in Cho Mo town, Quang Trung commune, Tra Linh district. This is the low hill areas and currently managed by Quang Trung CPC. Estimated capacity of the borrow pit is 348,000 m^3. Estimated volume of excavated soil from construction activities of the subproject is about 168,569 m^3 of which 40,344 m^3 is disable

[4] List of quarries in Tra Linh and Trung Khanh districts provided by Mineral and Mining Division, Cao Bang DONRE

soil (surplus soil) that could not be reused as filling soil. Estimated volume of filling soil for embankment is about 144,397 m^3.

D. Land Acquisition

32. According to Resettlement and Ethnic Minority Development Plan, there are 362 households will be affected by the implementation of the subproject of which 5 households must be relocated and number of households with affected assets are 290. In these 362 affected households, there are 7 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 34,756 m^2 of which 5,148 m^2 is production forest.

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

Table 2: Estimated budget of the subproject

No	Cost Items	Unit	Before tax costs	VAT	After tax costs (VND)	After tax costs (USD)
I	Civil Works Cost		178,769,197,674	17,876,919,767	196,646,117,441	8,798,484
2	Project Management Cost	1.30%	2,331,329,107	233,132,911	2,564,462,018	114,741
3	Construction Investment Consultancy Cost		11,749,578,242	1,174,957,824	12,924,536,066	578,279
-	*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*	*0.21%*	*379,884,545*	*37,988,455*	*417,873,000*	18,697
-	*Environmental Impact Assessment Cost*	Temporarily estimated	181,818,182	18,181,818	200,000,000	8,949
-	*Shop Drawings Design Cost*	*0.81%*	*1,447,494,194*	*144,749,419*	*1,592,243,613*	71,241
-	*Shop Drawings Design Verification Cost*	*0.06%*	*102,255,981*	*10,225,598*	*112,481,579*	5,033

No	Cost Items	Unit	Before tax costs	VAT	After tax costs (VND)	After tax costs (USD)
-	*Construction Works Cost Estimates Verification Cost*	*0.05%*	*97,607,982*	*9,760,798*	*107,368,780*	4,804
-	*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 & Prequalificati on 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*		*35,753,840*	*3,575,384*	*39,329,224*	1,760
-	*Construction Supervision Cost*	*1.12%*	*2,002,036,245*	*200,203,625*	*2,202,239,870*	98,534
4	**Other Costs**		**11,319,232,909**	**1,131,923,291**	**12,451,156,200**	**557,099**
-	General Costs		*7,150,767,907*	*715,076,791*	*7,865,844,698*	351,939
-	Design Verification Cost	*0.03%*	*49,136,781*	*4,913,678*	*54,050,459*	2,418
-	Construction Investment project appraisal cost	*0.03%*	*78,338,567*	*7,833,857*	*86,172,424*	3,856

No	Cost Items	Unit	Before tax costs	VAT	After tax costs (VND)	After tax costs (USD)
-	Construction Works Evaluation & Approval Cost	*0.31%*	*432,558,847*	43,255,885	*475,814,732*	21,289
-	Independent audit cost	*0.46%*	*1,300,842,250*	*130,084,225*	*1,430,926,475*	64,024
-	Construction insurance cost	*1.03%*	*1,841,322,736*	*184,132,274*	*2,025,455,010*	90,624
-	Project Investment supervision and evaluation Cost	*20.00%*	*466,265,821*	*46,626,582*	*512,892,403*	22,948
5	**Land Acquisition and Resettlement Costs**	**Temporarily estimated**	**16,739,507,915**	**1,673,950,792**	**18,413,458,707**	**823,868**
6	**Contingency**	**16.00%**	**35,345,415,335**	**3,534,541,534**	**38,879,956,869**	**1,739,595**
Total (1+2+3+4+5+6)					**281,879,687,300**	**12,612,067**

[a] Comprises $8,021,830 for road construction and $776,650 for construction of bridges and structures

V. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

1. Topography, Geology, and Soils

34. Cao Bang has a complex topography with an average elevation of 300m above Mean Sea Level, gradually going down from North to South and from West to East. The highest point is the summit of Phia Oac Mountain in Nguyen Binh district with a height of 1,931m above MSL. The topography of Cao Bang is divided in three main types: (i) geosynclinal depression in the central area of the province; (ii) hills formed from sedimentary deposits; and (iii) limestone karst. The karst area runs from the North, along the Vietnam - China border line to the South East part of the province. It is concentrated in Ha Quang, Tra Linh, Trung Khanh, Thong Nong, Ha Lang, Quang Uyen and Phuc Hoa districts. The subproject area is largely located inside this karst area in Trung Khanh and Tra Linh districts. Terrain in this karst area of the province is steep, with 75% on slopes steeper than 25 degrees.[5]

35. The soil of Cao Bang is divided in 3 main groups, with 24 types in total. These are group high mountain soils, found over 900m above MSL; flat-valley soils hill soils with a typical yellow-red color. The predominant type in the subproject area is the hill soils.

[5] Status of Environment report (SOE) of Cao Bang province 2015

36. The hill soil group is developed on low hill, or corrugated terrain. It features accumulated with iron and aluminum compounds which result in the typical yellow-red color. Soil derived from basic and ultrabasic igneous parent rock and makes up around 47% of the total, while that derived from metamorphic rock such as gneiss makes up around 30%. [6]

2. Weather, natural disaster and climate change

37. Cao Bang has a tropical monsoon climate with two separated seasons in the year: a hot season with plentiful rainfall lasting from April to October and a cold season with less rain from November to March. The annual average temperature varies from 19.8^0C to 21.6^0C. In the summer months, the average temperature varies from 25^0C to 28^0C while in the winter months it varies between 14^0C to 18^0C. The average number of hours of sunshine in a year is 1300 - 1400, which is not distributed evenly of the year.

38. The annual average rainfall is from 1,450 to 1,600mm. The rainfall in the rainy season (hot season) makes up 70-80% of the total for the year. The driest period is between December to March each year. Rainfall patterns vary over the province, with the highest rainfall in Ha Quang district, reaching 1,637mm per year while Thach An and Bao Lac districts have the lowest rainfall at 1,000 - 1,300mm averaged over the year. The average humidity is 84-85%, reaching 88-89% in July and 80-82% in December.

39. There are two main wind directions: Northeast winds predominate between December to April each year and a Southeast prevailing wind blows from May to November. Whirlwinds or tornados sometimes occur on a local scale.[7]

40. The average temperature of Cao Bang has a rising trend of 0.42^0C every 10 years. Summers are starting to last longer and more extreme hot days, with temperatures greater than 40^0C, are becoming more frequent. Winters are becoming shorter and later, while the extreme cold period is longer. Rain is irregular and the frequency of heavy rain is higher, concentrated in the rainy season, leading to flash flooding and landslides in mountainous area[8].

41. The main weather related risks in the project area are hail, extreme cold, drought and prolonged inundation. Periods of extreme cold impact on cultivation activities cause an increase in livestock deaths in the winter. Serious hail events were reported in Trung Khanh district in 2014. For example, more than 70% of household roofs in Lang Hieu commune were broken by hail and 100% households in Lang Yen reported that has their cultivated areas had been damaged by hail.[9]

3. Hydrology

42. Cao Bang is situated upstream of several rivers under two main river systems: the Red River and the Ta Giang River (China). There are nearly 1200 rivers or streams that are more than 2 km in length. In Cao Bang area, the total combined length of rivers and streams is 3,175 km and the density is 0.47 km/km^2. The Bac Vong is one of the main rivers flowing through the province. The rivers and streams of Cao Bang flow through steep terrain and waterfall are common, within the Quay Son and Gam River systems.

[6] Cao Bang Electronic Portal - http://dukhach.caobang.gov.vn
[7] Status of Environment (SOE) of Cao Bang province 2015
[8] Cao Bang Action Plan on Climate Change for 2011-2020 period
[9] Information provided by Deputy Chairman and Land Administrative staff of Trung Khanh, Lang Hieu and Lang Yen CPC

43. The Bac Vong River crosses the subproject road at Km16+950. The river starts in China; flows through Tra Linh and Trung Khanh and Phuc Hoa districts then back to China through Ta Lung town. The Bac Vong River has a catchment area of 815km^2. The flow yield is 23.81 l/s/km^2; water capacity is 19.41 m^3/s and total capacity (W) is 612.04*10^6 m^3 [10]

4. Surface and ground water

Surface water resources

44. The surface water quality in the rivers, streams, ponds and lakes of Cao Bang province has become degraded recently, especially at the river section in Cao Bang city or where mining of mineral ore takes place. The Total suspended solids (TSS), chemical oxygen demand (COD) and biological oxygen demand (BOD_5) parameters are all higher than the allowed levels. In the subproject area, the Bac Vong River has COD and BOD parameters higher than the levels allowed in the appropriate QCVN standards[11][12].

Groundwater resources

45. Several studies have been conducted on groundwater quality and reserves in Cao Bang province. In the subproject area, groundwater sources in Hung Quoc town and Xuan Noi commune yield up to 7,443 m^3/day and the potential exploitation capacity (ie the level at which the source can be exploited without depleting the water source) of the Bac Vong River basin is 77,998 m^3/day. Except Hung Quoc and Trung Khanh towns, stream water is still the main water source for local people in the subproject area. Hung Quoc town uses stream water for water supply while Trung Khanh town uses groundwater. According to the groundwater-monitoring program of the Environmental Monitoring Center of Cao Bang DONRE, all water quality parameters of the water supply source for Trung Khanh town, except Coliform, are within permissible levels of QCVN[13]. The coliform concentration of the sample (tested on September 9, 2014) is up to 30 while the allowed level under QCVN 09:2015 is only 3 MPN/100ml.[14]

5. Air quality and noise

46. In comparison to the QCVN standards[15], the levels of Carbon monoxide (CO), Nitrogen dioxide (NO_2), Sulfur dioxide (SO_2) and Total Suspended Particles (TSP) in town centers of the districts are nearly all within permissible limits. Their variation from 2011 to 2014 is also minor. The air quality in the province is still good. Only in Tra Linh town, the average TSP value is nearly 800 µg/m^3 while the allowed level is only 300 µg/m^3.

47. In general, noise levels within the province are within the allowed levels of QCVN[16] with noise level of production, construction, trade and service activities are not higher than 70 dBA daytime (from 6 am to 21h) and 55 dBA (from 21h to 6 am). Only in some crowed areas, along trafficed roads, noise levels sometimes reach 5-8dBA higher than the allowed level.[17]

[10] Cao Bang Action Plan on Climate Change for 2011-2020 period
[11] QCVN 08MT: 2015/BTNMT National Technical Regulation on Surface Water Quality
[12] SOE of Cao Bang province 2015
[13] QCVN 09: 2015-MT/BTNMT National Technical Regulation on Ground Water Quality
[14] SOE of Cao Bang province 2015
[15] QCVN 05: 2013/BTNMT National Technical Regulation on Ambient Air Quality
[16] QCVN 26:2010/BTNMT National Technical Regulation on Noise
[17] SOE of Cao Bang province 2015

B. Biological Environment

1. Forestry

48. Cao Bang has several natural types including closed temperate evergreen forest on high mountain areas; closed subtropical evergreen mixed broadleaf forest and coniferous forest at medium elevations; closed moist tropical evergreen broadleaf forest at low elevations and bamboo forests, Forests near the subproject area are the limestone mountain - karst type.

49. The karst ecosystem occupies a large area in Ha Lang, Trung Khanh, Quang Yen, Phuc Hoa, Tra Linh, Ha Quang and Thong Nong districts with a total area of 152,767 ha, making up 22.79% of the total forested area of Cao Bang. Surveys showed that there are 478 flora species under 72 families; 56 mammal species; 274 bird species; 48 reptile species; and 10 amphibians species[18].

50. Cao Bang has many high value plant species such as Yellow camphor (*Cinnamomum parthenoxylon*), Indian mahogany (*Chukiasia tabularis*) and Madhuca (*Madhuca pasquieri*). However, these species are mainly located in Phia Oac Natural Reserve and Cao Vit Gibbon Nature Reserve, 45 km and 6 km as the crow flies from the subproject road respectively. Despite the presence of the Bo That protection forest (a forest area designated for protection by the district administration), lies adjacent to the road for a length of 500m in Ban Ngan village, Quang Trung commune, there are no known communities of plant species listed in the Vietnam Red Book in the subproject area[19].

51. Cao Bang has 30 endangered mammal species, 11 endangered bird species and some other endangered amphibians and fish species such as the Chinese pangolin, hairy-footed flying squirrel, forest musk deer and Elongated tortoise. However no endangered species that listed in the Vietnam Redbook appear in the subproject area (karst area with low hill and mountain)[20].

2. Agriculture

52. Main agricultural crops in Tra Linh and Trung Khanh include rice, maize, cassava , fruit trees including tangerine, grapefruit; cash crops like sugarcane and star anise. Most agriculture is for subsistence, especially with wet rice and maize. Tra Linh district is known for quality of tangerine, while Trung Khanh is known for chestnut. Livestock rearing is the most important source of livelihood. Key animals are cow, buffalo, horse, goat and poultry. According to the annual report on SEDP 2015, agricultural gross output value was VND 307.3 and 346 billion, of which 80% and 90% from crops and livestocks in in Tra Linh and Trung Khanh district respectively.

[18] SOE of Cao Bang province 2015

[19] **Dang Huy Huynh, Nguyen Huu Thang**, 2013**.** Study on Diversity of Species Composition in the Protected Area Phia Oac - Phia Den, Nguyen Binh district, Cao Ban Province. The 5th National Conference on Ecology and Biological Resources

[20] Information provided by staff of Cao Bang Environmental Protection Agency and via public consultation meeting in Hung Quoc, Trung Khanh, Quang Trung, Lang Yen and Lang Hieu commune/towns.

C. Socio-economic Condition and Infrastructure

1. Population and Ethnic Composition

53. The total population in the two townships and four target communes is 15,814 people of 3,971 households in 68 villages but the direct beneficiaries[21] of the subproject only account for 35% of the total population and are estimated to be 5,433 people in 25 villages out of 68 villages within four communes and two townships. Consistent with the overall population, the representation ethnic minority account for 97.6% of direct beneficiaries. Table 3 below presents population and ethnicity composition in project area.

54. Table 4 presents the poverty incidence in the target communes/townships. The data indicates large disparities in the poverty rate between Kinh people and ethnic minorities in each of the target communes/ townships. The poverty rate remains higher and more concentrated among ethnic minority groups. One hundred percent of the poor in the five out of six target communes and townships are ethnic minorities. Three out of six communes and townships are P135 communes including Xuan Noi, Quang Trung (Tra Linh district) and Lang Yen commune of Trung Khanh district.

Table 3: Population and Ethnicity in subproject area

	Whole commune							Beneficiary area						
	Hung Quoc Town	Xuan Noi Com.	Quang Trung Com.	Lang Yen Com.	Lang Hieu Com.	Trung Khanh Town	Total	Hung Quoc Town	Xuan Noi Com.	Quang Trung Com.	Lang Yen Com.	Lang Hieu Com.	Trung Khanh Town	Total
Number of Villages	17	11	10	7	8	15	68	3	5	6	1	8	2	25
Population (person)	4554	1568	1846	1290	1951	4605	15814	1004	834	1287	127	1654	527	5433
Number of Households	1163	390	426	291	450	1251	3971	254	210	297	28	431	143	1363
By ethnic group														0
Kinh	62	0	1	0	0	63	126	20	0	1	0	0	11	32
Tay	743	253	379	78	347	925	2725	137	110	250	28	359	93	977
Nung	354	137	46	213	103	262	1115	97	100	46	0	72	39	354
Other	4					1	5	0						0

Source: Annual report of Hung Quoc and Trung Khanh Township, Xuan Noi, Quang Trung, Lang Yen and Lang Hieu commune People's Committees, 2016

Table 4: Poverty incidence in target townships/ communes, 2016

	Poverty rate (%)		
	As whole	Kinh people	Ethnic minority
Tra Linh district	*40.81*	*4.15*	*95.85*
Hung Quoc Township	20.8	0	100
Xuan Noi commune	51.16	0	100
Quang Trung commune	46.1	0	100

[21] Direct beneficiary is defined as people/households who live in the villages located along the proposed upgraded road. Other villages in communes may access the road through feeder road/track are defined as indirect beneficiaries

Trung Khanh district	*42.53*	*1.08*	*98.92*
Trung Khanh Township	4.87	6.6	93.4
Lang Hieu commune	28.77	0	100
Lang Yen commune	57.99	0	100

Source: Data collection from target communes/townships, 2016

2. Economic development and income

55. Apart from Trung Khanh Township, agricultural land occupies range 12.5% to 28% of the total land area in five communes and township, agriculture production is still the dominant income source in these communes and townships. Main crops are paddy, maize, cassava, and soybean. Livestock is considered as one of main income sources of the Target Township and commune. Forestry occupies over from 60% to 80% of total land area in these communes/townships and is still of minor importance economically because almost area is protection forest according to annual reports.

Table 5: Gross output value in subproject area (VND million)

Indicators	Unit	Trung Khanh	Tra Linh
Gross output value	VND million	939,929	362,732
From Industry	VND million	278,254	5,774
From Agriculture	VND million	409,295	351,324
From Services	VND million	252,380	5,634

3. Social services

56. There is one general hospital, three regional clinics located in each district; 10 and 20 health care stations – one in each commune of Tra Linh and Trung Khanh district respectively. In 2015 the rate of malnourished children under 5 years old in whole province was 20.4% however the situation for the two subproject districts is better than the Provincial level at 17.1% and 14.1% for Tra Linh and Trung Khanh district respectively[22].

57. According to Tra Linh Statistic Year Book 2015 and annual reports of communes/townships, each commune/ township has a healthcare station with one medicine doctor and four nurses and midwives, one kindergarten, one primary school and one secondary school. The subproject communes are all connected to the national grid although the more remote villages some households do not have access because of the distance from the grid.

4. Education and Public Health

58. Kindergarten, primary school and secondary school facilities are available at commune level but high school is only located in district centers or in inter-commune locations where students from adjacent communes can access. There are 2 and 3 high schools in Tra Linh and

[22] The rate at provincial level was in 2014 according to the Cao Bang Statistic Yearbook 2015. The rate of two districts was in 2015 according to district annual report on SEDP 2015.

Trung Khanh district respectively. Table 6 shows the school enrolment rate at age from 6 to 14 years old of two subproject districts.

Table 6: School enrolment rates, 2015 (%)

	School enrolment rate at school aged from 6 to 14 years old	
	At primary school	At secondary school
Whole province	95	93
Tra Linh district	96.2	95.8
Trung Khanh district	100	98

Source: Cao Bang Statistic Yearbook 2015 and annual reports on SEDP 2015 of Tra Linh and Trung Khanh district

5. Social indicators

59. Percentage of household access electricity and percentage of malnourished children under 5 years old are show in Table 7 below.

Table 7: Some social indicators

Indicators	**Hung Quoc Township**	**Xuan Noi commune**	**Quang Trung commune**	**Lang Yen commune**	**Lang Hieu commune**	**Trung Khanh township**
Percentage of household access electricity	100	99	100	100	100	100
Percentage of malnourished children under 5 years old	14.14	18.3	15.9	14.3	14.7	7.9

6. HIV and human trafficking

60. Overall, 93.78% of respondents (PPTA Social survey) had heard about HIV/AIDS with more women, 95.45%, as compared to 92.4% of women. For those that had some knowledge of HIV/AIDS, the main sources of information were television (92.12%) and health workers (70.54%). People had also received information from radio (34.4%), poster (21.58%) and from relatives or friends with 17.43%. Human trafficking has also not been recorded in the subproject area.

7. Unexploded Ordinance

61. 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.

62. 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, 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

63. There are several archaeological sites that have been discovered in Cao Bang province, especially artifacts from Stone Age such as the Nguom Vai archaeological site in Can Yen commune, Thong Nong district; the Nguom Boc site in Nam Tuan commune, Hoa An district; and the Nguom Cang site in Dam Thuy commune, Trung Khanh district, outside the subproject area. 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.

E. Key Environmental Features

64. ***Physical environmental features:*** The subproject route runs through narrow valleys between low hills and Karst mountains and scattered cultivated areas of rice and corn. Bo That protection forest adjoins the road from Km12+500 to Km13, also the site of an important water source for Ban Ngan village, Quang Trung commune, Tra Linh district. The road crosses the Bac Vong River at Km16+950.

65. ***Social environmental features:*** The road starts and ends at two town centers, Hung Quoc, Tra Linh district and Trung Khanh, Trung Khanh district. It goes through the residential areas of Xuan Noi, Quang Trung, Lang Yen and Lang Hieu communes, which include, schools, kindergartens and medical clinics. Quang Trung has the longest section of the road with nearly 10km running in its territory while Trung Khanh town has the shortest, of 1km. The Quang Trung market center and cattle market of Tra Linh district are also located at the roadside.

VI. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

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

67. 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.

68. 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 Hung Quoc town, Tra Linh town and Quang Trung commune.

69. 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). Where government standards or guidelines have some kind of 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. 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 Pre-Construction Phase \

1. Land acquisition and resettlement

70. **Impacts:** The impact is mainly on several residential areas along the road namely Hung Quoc town; Xuan Noi commune center; Lung Lan, Ban Ngan, Quang Trung commune center, Sac Ha villages of Quang Trung commune; Ban Chien village, Lang Yen commune; Lang Hieu commune center and Trung Khanh town. Among 362 affected households, there are 7 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 34,756 m^2 of affected land, 15,397 m^2 is public land and only 2,731 m^2 is private residential land. The area of land used for annual crop is 7,327 m^2 and for trees is 4,137 m^2.

71. **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 7 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 7 seriously affected households, as appropriate before construction starts. Arrangements will be made for regular monitoring and to record and redress grievances.

2. Disturbance of unexploded mine and bomb (UXO)

72. **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.

73. **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 Cao Bang Provincial Military Commanders to check whether the area along the subproject route has been checked for in the past. 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 Construction Phase \

1. Route selection

74. **Impacts**: The proposed subproject involves upgrading 28km of road in 6 communes/town in 2 districts. As it goes through several residential areas, especially the narrow section through Ban Ngan village, Quang Trung commune, Tra Linh district where houses were constructed close to the roadsides, the impact intensity of dust, noise, vibration and traffic safety on local people living in this area will be multiplied. The risk of traffic accidents and movement difficulties will increase for local people and other people who travel on the subproject road.

75. **Mitigation measures:** Considering the crowed situation of the residential area in Ban Ngan village, Quang Trung commune, a bypass road section through the village from Km11 + 850 to km12 + 250 with 400m of Ban Ngan village, Quang Trung commune, Tra Linh district has been put in the subproject design. This bypass section will go through an area cultivated with rice, on the right side of the existing road and close to the base of the mountain. All the affected land area has been calculated and proposed for compensation as stated in the resettlement and compensation report of the subproject. In line with ADB policy on environmentally responsible procurement, a new environmental assessment report will be undertaken for submission to ADB if there are any changes to subproject design that would result to environmental impacts or risks that are not within the scope of the current IEE.

2. Impact on flora and fauna along the road

76. **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. Workers could hunt wild animals and cut down trees in the forest for fuel wood. These risks occur particularly in the vicinity of the Bo That forest. This is a minor impact and will take place over 24 months of construction time. The number of trees that will be cut down as part of the works will be small and the area of forest adjoining the road runs for only 500m, so the impact is not large.

77. **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, the Tra Linh Forest Ranger and DARD offices of Tra Linh and Trung Khanh districts

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. Use of heavy machinery in the vicinity of the Bo That forest will be minimized. The contractor will not use or permit the use of fuel wood for construction activities or for cooking and water heating in worker's camps. The contractor 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.

3. Impact on Utilities

78. **Impacts:** Relocation of some low-voltage electricity poles, water supply pipes, wastewater pipes or signage maybe necessary and some type of signboards along the current route. 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. In accordance to the compensation and resettlement data, there are four 0.4kv electric poles must be relocated with 250m electric line will be replaced.

79. **Mitigation measures:** Provision will be made in the contract for relocation as required, and to co-ordinate the relocation of services with Trung Khanh and Tra Linh Electric Operation Stations under Cao Bang Electric Power Company. Before construction starts, the PMU will work with these companies and the 6 CPCs to develop and implement plans to relocate the utilities and other affected structures and avoid or minimize service interruptions. The relocaiton plan shall specify roles and responsibilities for relocation, the timing and relocation location sites. 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.

4. Impacts of materials excavation and extraction

80. **Impacts**. Three commercial quarries, listed as authorized by the Mineral and Mining Division, Cao Bang DONRE and two soil pits have been identified to meet the materials needs for the project. excavation works and the extraction of materials at the quarries and borrow pits may result in the release of soil and silt, which may also be released from materials stockpiles along the road, blocking nearby streams and potentially affecting water quality in the surrounding water bodies. The impact is minor as the main work is upgrading the road surface and the excavation and extraction construction material volume is not large. The estimated volume of stone using for the subproject road construction is about 84,398 m^3 and the estimated volume of filling soil for embankment is about 144,397 m^3, of which 127,813 m^3 could be reused from the excavated soil.

81. **Mitigation measures.** To prevent the release of silt into waterways, the contractors will use of silt fences around excavation sites, quarries and borrow pits; On completion of extraction work, quarries and borrow pits will be closed, rendered safe and improved as agreed with landowners as soon as possible upon exploitation complete, including landscaping and planting works as appropriate.

5. Impacts of the temporary material stockpiles

82. **Impacts.** About 7 main temporary material stockpiles will be located along 28 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.

83. **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 Km2+700; Km4+000; Km10+400; Km14+900; Km18+900 and Km20+400. 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 in section from Km12+500 to Km13 and must be covered with canvas and fenced with signboard to avoid passing people.

6. Generation of surplus soil

84. **Impacts.** Soil from excavation activities, which could not be reused as fill soil, could have significant impacts such as soil erosion when placed on slopes, as well as release of silt.

85. **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 CPCs of the 6 commune/town. 6 CPCs will organize the distribution of surplus soil for local people who wish to use it.

86. 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. The contractors should work with local authorities to identify satisfactory dumping and disposal sites before construction starts.

Table 8: List of proposed locations for surplus soil disposal[23]

No.	Location	Managed by	Estimated volume (m^3)
1	Left side Km2+700	Hung Quoc town PC, Tra Linh district	360,000
2	Left side Km4+000	Xuan Noi CPC, Tra Linh district	350,000
3	Right side Km10+400	Quang Trung CPC, Tra Linh district	60,000
4	Left side Km14+900	Quang Trung CPC, Tra Linh district	200,000

[23] This list has been discussed and initially agreed with the CPCs of Hung Quoc, Xuan Noi, Quang Trung, Lang Yen, Lang Hieu and Trung Khanh CPCs. Details are showed in Geological survey report for PR211 by the PPTA

5	Left side Km18+900	Lang Hieu CPC, Trung Khanh district	75,000
6	Left side Km20+400	Lang Hieu CPC, Trung Khanh district	49,000

7. Generation of construction waste

87. **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 28 km length of the subproject road including residential areas. At these towns there are no engineered landfill facilities and the towns have been listed as seriously polluted areas in accordance to DONRE's Pollution control report 2015. Uncontrolled waste disposal could further reduce the water, ambient air and soil quality and heavily impacts on local people in the subproject area.

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

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

89. ***Description:*** The operation of asphalt concrete mixing plant will generate noise and dust and paved works will generate gas and odor from the bitumen heating and noise from the compaction machines. Although the emissions from powered mechanical equipment and asphalt concrete mixing will be rapidly dispersed in the open terrain they will need to be sited carefully to avoid complaints. The impact will happen at the construction sites along the subproject road and affect on local people living in the surrounding areas. Bitumen heating construction could create a risk of forest fire, if fuel wood in open fires is used for bitumen heating.

90. **Mitigation measures:** To minimize the negative impact, the contractors should ensure that bitumen heating take place at least 500 m away from residential areas (namely Hung Quoc town; Xuan Noi commune center; Lung Lan, Ban Ngan, Quang Trung commune center, Sac Ha villages of Quang Trung commune; Ban Chien village, Lang Yen commune; Lang Hieu commune center and Trung Khanh town) and especially the Bo That protection forest in Quang Trung commune, PMU and CSC will responsible to monitor this mitigation measure during the 24-month of construction phase.

9. Impact from noise, dust and vibration generated by the construction activities

91. **Impacts:** Earthworks and rock crushing activities will be the main sources of dust. Construction machines and vehicles will generate gaseous emissions (NOx SOx, CO, CO_2, etc.) when they are in operation. These gaseous emissions and dust could cause health problems for residents who live near the construction site and along the transportation route, especially at the

sensitive points such as schools, kindergartens, markets, commune centers, medical clinics. Wild animals in the Bo That protection forest and some birds and reptiles in some nearby forested areas. The Karst Mountains could also be affected by noise, vibration and dust and emissions from the construction activities. The impact is considered as average as the subproject road goes through several residential areas.

92. **Mitigation measures:** Similar to the mitigation measure for impact from bitumen heating and asphalt concrete mixing plant, the contractors should not locate any noisy machines, or large materials storage sites near or within Bo That protection forest and residential areas. Depots where plant are operated should be located at least 50m away from these sensitive points. The contractors will work with 6 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.

10. Landslide, soil erosion and runoff

93. **Impacts:** Roadside erosion and runoff could happen during rain, at the roadside and at borrow areas. Erosion and runoff could impact on the small rice fields of local people along the road. Landslides could happen in sections with high slopes adjoining the road, especially when the vegetation cover is cleared likes Km13+800, near Bac Vong River; Km16+400 at Ban Chien mountain in Lang Yen commune, near the border with Quang Trung communes; Km19+900 at Keo Tam quarry, Lang Hieu commune. Landslides will damage the road and block movement and release silt into nearby water bodies.

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

11. Impact on crossing streams or bridge construction locations

95. **Impacts:** Careless construction and poor handling of materials at bridge sites can cause blockages and release of silt to rivers and streams. Runoff water during its rain could bring waste and soil into Bac Vong River, cross subproject road at Km14+200. That could lead to siltation and reduce the water quality and affect downstream user at Trung Phuc, Than Hoe and Thong Giap communes of Trung Khanh district as the local people are still using water from the river as one source of domestic water supply.

96. **Mitigation measures:** To minimize the negative impact, the contractors should transport excavated material to use as fill, distribute to local users or take to approved disposal sites immediately. Silt fences and sediment barriers or other devices will be used as appropriate at bridge construction sites.

12. Impact by the influx of construction workers

97. ***I*mpacts*:*** About 100 workers will be mobilized discontinuously in 24-month construction phase. The influx of construction workers 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.

98. **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 stkilled tasks to the extent that they are able and willing to undertake them. Local people in the residential area of the 6 subproject communes/towns will benefit from the subproject construction.

13. Safety of local people and construction workers

99. **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 Hung Quoc primary school, Hung Quoc high school and secondary school, the cattle market of Tra Linh district, Xuan Noi medical clinic, Xuan Noi secondary school, Xuan Noi primary school, Quang Trung primary and secondary school, general clinic of Tra Linh district, Quang Trung kindergarten, Quang Trung market, Lang Hieu medical clinic, Trung Khanh continuous education center, Trung Khanh kindergarten, Trung Khanh primary and secondary school.

100. **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.

14. Impact on local traffic

101. **Impacts:** Construction activities on the Subproject road are likely to cause hindrance in traffic flow if not mitigated properly especially when there is no other option for travelling. There are several schools and kindergartens located along the road. Children and pupils will have difficulty getting to schools, especially for pupils in Ban Chien village, Lang Yen commune, as they need to travel 5 km to reach their school in Quang Trung commune. The general clinic of Tra Linh district is also located in Quang Trung commune, about 14 km from the start point of the road at Hung Quoc town, the center of Tra Linh district. The cattle market of Tra Linh district is located along the subproject road, about 1 km from the start point. It will make difficulties for people to reach general clinic and cattle market during the construction phase. The road runs along the narrow valleys and there is only one junction to Tri Phuong and Trung Phuc communes. Local people and people from other areas who travel on the subproject road will be affected during 24 months construction period.

102. **Mitigation measures:** To minimize the disturbance to local people, the contractor will prepare and submit to the CSC a construction transport plan indicating the timing of vehicle journeys to avoid peak traffic hours, parking areas and any temporary access roads to be used. The contractor will also coordinate with local traffic authorities 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 point of the road, at the junction to Tri Phuong and Trung Phuc communes and at the sensitive locations likes schools, kindergartens, medical clinics and markets. 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 Operation Phase

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

103. **Impacts:** The improved road surface will create a safer running course and reduce dust emission from traffic as well as noise, though these benefits will be reduced as traffic density and driving speeds increase. Noise, dust and vibration could have negative impact on the local people living along the subproject road, especially the sensitive points such as schools, kindergartens, commune centers, markets and medical clinics. Increased driving speeds could also affect community safety issues.

104. **Mitigation measures:** The enforcement of speed limits and / loading limit 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

105. **Impacts:** The paved road will reduce journey times and vehicle operating costs. The completion of the Bac Vong bridge will enable the road to be used even during high water conditions. The road will support economic activity and enable access to markets and services for local people.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

106. 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

107. 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 PR211 included representatives from

Cao Bang DPI, DONRE, and DARD. Consultation has also been implemented with representatives from 6 CPCs in Tra Linh and Trung Khanh districts. Among 55 people have been consulted, 17 are women, make up 30.9%. Consultations took place in September 2016.

B. Information Dissemination During Public Consultation

108. 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.

109. The information disseminated during public consultation included: (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 the Results From Public Consultation

110. The results of the public consultations are recorded in Table 9 and 10 below. In general, all the relevant stakeholders are support the implementation of the subproject. As the subproject is located in a low population density and the main construction work will be to upgrade road surface based on the existing road foundation, no house needs to must be relocated and no major land acquisition will be involved, the local people is totally support the subproject.

Table 9: Main issues and information from local authorities

Main issues	Information from relevant authorities
Forest in the subproject area	Cao Bang DARD: There is no special forest in the subproject area and its vicinity. There is only some bunch of protection forest on the Karst Mountains along the road and local people have already cultivated in the area around the base of the mountain.
Biodiversity in the subproject area	Cao Bang DONRE: There are 8 nature reserve/ conservation areas in Cao Bang but they are all far from the subproject area. There is no rare or endangered fauna and flora species in the subproject area

Table 10: Main environmental concerns from public consultation

Concerns expressed	How concerns are addressed in IEE
Hygiene and safety condition in construction phase, especially cattle market area in Hung Quoc town	The ESS will conduct training for workers on safety and environmental hygiene. The Contractor will make rules for the construction camps to encourage environmental protection and avoidance of harmful social effects. All excavation sites will be fenced and sign boards installed. The CSC and PMU will be responsible for supervision activities during construction phase and will arrange timely responses to grievances from

	local people and authorities
Narrow road at section through Ban Ngan village with houses adjacent to the road.	A 400-meter bypass will be constructed to avoid the crowded residential area with houses adjacent to the road
Pollute Bo That water source at KM12+8	The contractors will store lubricants, oils, paints and other hazardous substances in designated areas with roofs and impervious floors at least 100m from water bodies. Silt fences should be installed in suitable locations to trap soil particles and prevent their entry into water bodies. Materials storage sites should also be covered carefully with canvas and located at least 100m away from water bodies, where the material contains fine particles. PMU and CSC will responsible to monitor these mitigation measures.
Inundation at the current drift in Bac Vong River makes difficulty for travelling in the flood season	A new bridge will be made over the Bac Vong River. The bridge is to be made with pre-stressed concrete, will have a 8m width, and appropriate design load

111. 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. Cao Bang PMU will responsible for IEE translation to Vietnamese and disclosure at Xuan Noi, Quang Trung, Lang Yen, Lang Hieu communes; Hung Quoc, Trung Khanh towns of Tra Linh and Trung Khanh districts.

VIII. GRIEVANCE REDRESS MECHANISM

A. Purpose of the mechanism

112. 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

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

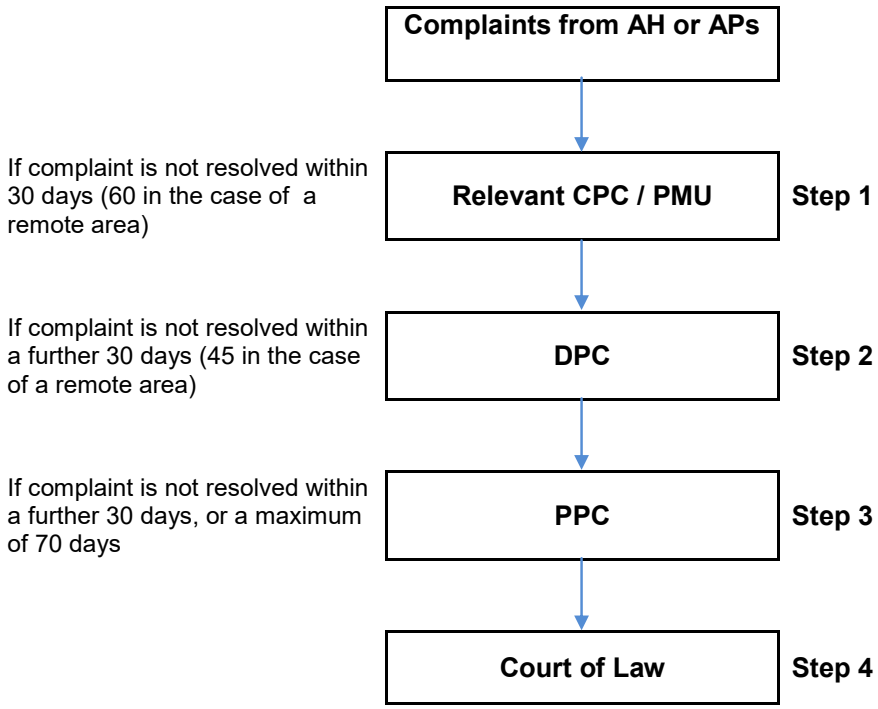
***Stage 1*:** If a household or individual has any complaint he/she can submit a complaint in written or verbal form to the representative of the CPC-community monitoring board (usually the Deputy Chairman of the commune/town). The CPC will work with PMU to solve complaints and a representative PMU 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.



IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation Arrangements

114. Cao Bang PMU will recruit one Environment Safeguard Specialist (ESS) under the Loan Implementation Consultants (LIC) to support subproject implementation in Cao Bang. 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.

115. 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.

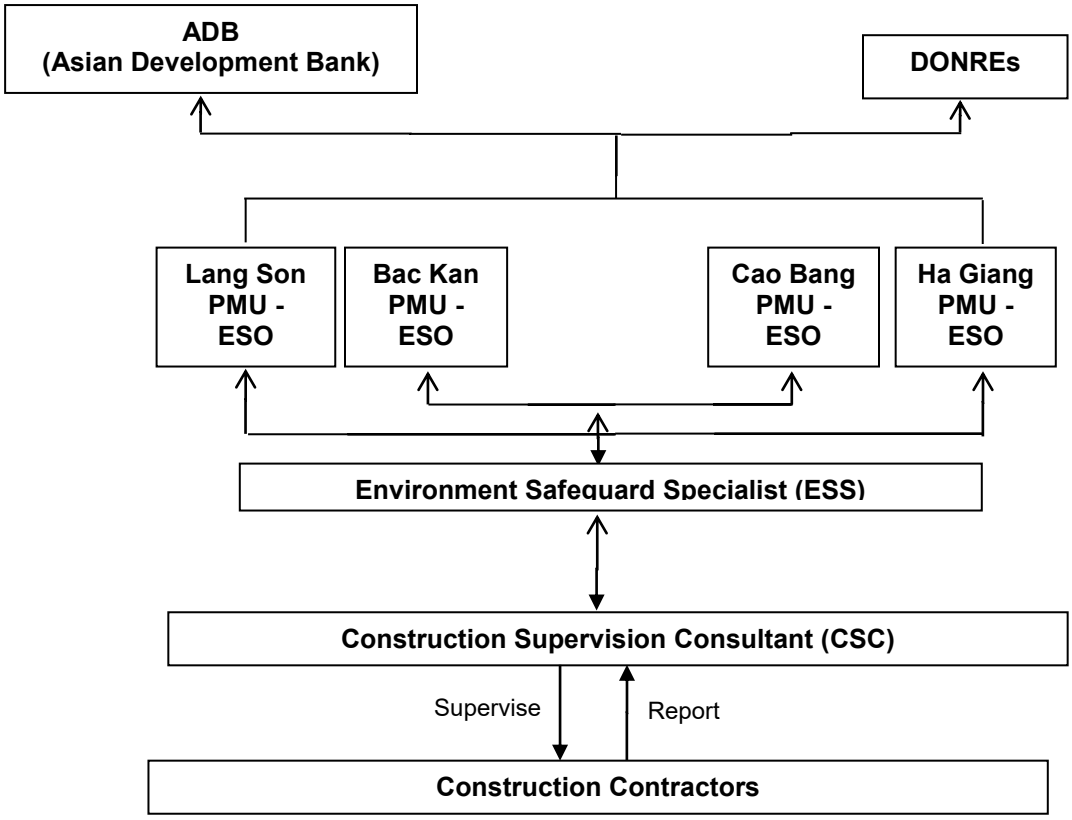
Table 11: Responsibilities for EMP implementation

Agency	Responsibilities
Cao Bang 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 ESS. - 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 ESS, 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 ESS, 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 (ESS)	- Update EMP to make it suitable with the current condition or whenever subproject scope change or any unanticipated impact rise. - Ensure that the environmental protection and mitigation measures identified in the EMP for the design stage has been incorporated in the detail design; - Assist PMU to ensure that all environmental requirements and mitigation measures from the IEE and EMP are incorporated in the bidding documents and contracts. - During detailed design phase carry out baseline data collection on air quality,

	noise and surface water quality (as specified in the EMP) - During detailed design phase, prepare method statement (Waste Management and Spoils Disposal Plan) described in the IEE/EMP. - Implement all mitigation and monitoring measures for various subproject phases specified as ESS'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 ESS'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 - Provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the EMP - Implement additional environmental mitigation measures, as necessary
Cao Bang Department of Transportation (DOT)	- Responsible for operation and maintenance of Subproject road - Implement EMP monitoring during operation
Cao Bang 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 4: EMP Implementation Organization Chart



B. Environmental Impact Mitigations

116. The anticipated environmental impacts and mitigation measures discussed in the previous section is presented in Table 12. The table also shows responsibilities and timeframe/schedule for implementation of mitigation measures and monitoring.

117. Table 12 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 12: 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
3. 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. Route selection	Avoid and minimize intensified construction impact on residential area of Ban Ngan village, Quang Trung commune, Tra Linh district	1. Construct 400-meter bypass road to avoid go through narrow section at Ban Ngan village, Quang Trung commune. 2. Apply all mitigation measures for this bypass as other sections of the subproject road.	CPCs; Contractors	Through out construction phase	At the 400m bypass section	Included in the contract with contractors
2. 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	CPCs; Contractors	Through out construction phase	Along the subproject road, especially 500 m go through Bo That protection forest; worker camps area	Included in the contract with contractors

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
		plants, material storage sites are to be located along Km12+500 to Km13 - near Bo That 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.				
3. 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 through out the construction phase	Along the subproject route	Included in the contract with contractors
4. Materials exploitation and	Minimize impacts from materials	1. Prioritize use of Lung Mo, Coc Cang, Keo Thin Lan quarries and Sac Ha, Cho Mo	Contractors	Though out construction	Subproject site, quarries	Included in the contract

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
management of quarry, borrow pits and temporary storage area	extraction, transportation and storage.	borrow pits 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.		phase	and borrow pit areas	with contractors
5. Waste and spoil disposal	Control spoils and waste disposal, lubricant and hazardous wastes.	1. Areas suitable for disposal to be agreed with CPCs and Cao Bang 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 8 of this IEE. 3. Surplus material to be distributed to local people for use in landscaping/ forming building platforms.	Contractors	Through out construction phase	Through out construction site, material storage areas, machines and vehicles maintenance area	Included in the contract with contractors

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
		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. Spoil disposal sites shall be away watercourses and shall be protected from erosion by avoiding formation of steep slopes and grassing.				
6. Bitumen heating and concrete mixing plant	Avoid air pollution, traffic obstacles and contamination	1. Locate mixing plant, bitumen heating off road and (wherever practicable) at least 500 m from nearest sensitive receivers (residential areas, schools, clinics, etc.) and streams and install and maintain dust suppression equipment. 2. Concrete mixing areas shall be protected against spills and all contaminated soil must be properly handled according to applicable national and local laws and regulation. As a minimum, these areas must be contained, such that any spills can be immediately contained and cleaned up. 3. Prevent soil contamination requiring contractors to instruct and train their workers on storage and handling of materials and chemicals that can potentially cause soil contamination. 4. Recycle debris generated by dismantling of existing pavement subject to the suitability of the material.	Contractors	Through out construction phase	Through out construction site	Included in the contract with contractors
7. Noise, dust and vibration	To minimize negative impacts from noise, dust and vibration during construction period	1. Restrict works to daylight hours within 500 m of 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	Through out construction phase	Through out construction site especially 500 m go through Bo That protection forest	Included in the contract with contractors

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
		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 behaviour.				
8. Erosion control/ run	Protect established	1. Establish vegetation and erosion protection	Contractors	Through out	Through out	Included in

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
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. 10. Payments will be linked to the completion of the works as indicated by the installation of erosion control measures to protect the works to the satisfaction of ESS/PMU.		construction phase	construction site and high risk slope as agreed with ESS/PMU	the contract with contractors
9. Streams/ Rivers protection and bridge/culvert construction	Protect Streams/ Rivers and maintain flows	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed or provided to local people and will not be left in streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a	Contractors	Through out construction phase	Bac Vong River crossing point	Included in the contract with contractors

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
		settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.				
10. Large influx of construction worker	Construction camps and worker camps not to cause any negative impact to surrounding environment (forest area, water bodies, wild animal); control of infectious diseases.	1. Construction and worker camp location and facilities located at least 500m from settlements and agreed with local communities and facilities approved by 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 WMSDP. 10. All waste materials shall be removed and disposed to disposal sites approved by local authorities	Contractors	Through out construction phase	Through out construction sites and worker camps	Included in the contract with contractors

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
		11. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned. 12. Register temporary stay for workers with police.				
11. Safety precautions for workers and public safety	Ensure worker safety	1. Provide fire extinguishers and first aid facilities at construction sites, 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.	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
		10. Designate responsibility for maintaining safety measures to a senior member of the Contractor's staff				
12. Traffic Management	Minimize disturbance of traffic	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. Coordinate with traffic police of Trung Khanh and Tra Linh districts 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 Trung Khanh and Tra Linh districts 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.	Contractors	Through out construction phase	Through out construction sites; at start and end points in Hung Quoc and Trung Khanh towns; Junctions with road to Tri Phuong and Trung Phuc communes.	Included in the contract with contractors
Operation Phase						
1. Generation of noise, vibration and road safety issues from increased traffic	To minimize, noise, 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 the impact of noise, , vibration and road safety issues.	Cao Bang DOT	Through out 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

Environment Compliance Monitoring

118. Table 13 below shows the program for monitoring the compliance on various provisions of the EMP during 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 13. During operation EMP implementation shall be the responsibility of Cao Bang DOT.

119. 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.

Environmental Effects Monitoring

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

Table 13: Environmental Monitoring Compliance

Performance and Impact Monitoring					
Environmental Concern	**Parameter to monitor**	**Location**	**Frequency & Verification**	**Responsible to Monitor**	**Monitoring Cost**
Design and Pre-construction Phase					
1. Land acquisition and resettlement	Compensation documents	N/A	Only one time before the construction commencement	Cao Bang DPI/ DONRE; PMU	Included in the operation budget of PMU
2. Unexploded Ordnance	Checking documents/ certificates	N/A	Once, before construction start	PMU	Included in the operation budget of PMU
Construction Phase					
1. Impacts on flora and fauna	Check of implementation	Along the subproject road, especially 500 m go through Bo That protection forest; worker camps area	Before construction commencement and through out 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 through out 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	Through out 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. Concrete mixing plant and bitumen heating	Check of implementation	Through out construction site	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
6. Noise, dust and vibration	Check of implementation	Through out construction site	Bi-weekly and spot checks Part of daily construction supervision	ESS/ PMU	Included in the operation budget of PMU/ ESS CSC

Performance and Impact Monitoring					
Environmental Concern	**Parameter to monitor**	**Location**	**Frequency & Verification**	**Responsible to Monitor**	**Monitoring Cost**
7. Land slide, erosion control/ run off	Check of implementation	Through out 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
8. Stream protection and bridge/culvert construction	Check of implementation	Through out construction sites, Bac Vong River, 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
9. Large influx of workers. Construction and worker camps, sanitation and diseases	Check of implementation	Through out construction sites and worker camps	Before establishment of the facilities and through out the construction phase Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
10. Safety precautions for workers and public safety	Check of implementation. Check compliance to Labor Code of Vietnam and other relevant Decision, Decree and Circular under Government requirements	Through out construction sites	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
11. Traffic Management	Check of implementation	Through out construction sites; at start and end of the road; junctions with road to Tri Phuong and Trung Phuc communes	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 Road 211. At the residential areas along the route	Semi-annual in the first two years	Cao Bang DOT	Included in operation and maintenance cost

Table 14: Environmental Affects Monitoring

Performance and Impact Monitoring					
Construction Phase					
1. Noise, dust and vibration	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…)	10 monitoring points (2 at the start and end point, 1 at each commune center and crowded residential areas)	1 time before construction start and semi-annually during 2 years construction time (5 times in total)	ESS	3000 USD[24]
2. Surface and ground water quality	Surface water quality	3 sampling points at 20m downstream of the crossing river. 1 sampling point in Bo That water source	1 time before construction start and semi-annually during 2 years construction time (5 times in total)	ESS	10,000 USD
	Ground water quality	1 sampling point in Bac Vong River, crossing road at KM16+950	1 time before construction start and semi-annually during 2 years construction time (5 times in total)	ESS	2,000 USD[25]

[24] There is no cost norm for Cao Bang province. Figures have been estimated base on environmental monitoring cost norm of Ha Giang province.
[25] There is no cost norm for Cao Bang province. Figures have been estimated base on environmental monitoring cost norm of Ha Giang.

D. Reporting

121. 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 15: 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	Daily	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.	Cao Bang DOT	Cao Bang DONRE

Table 16: Estimated cost for EMP Implementation (2-year construction/ 4-year in total)

Item	Estimated cost (US$)
Staff Costs	
1. Environment Safeguard Specialist (ESS)	***21,040***
1 National ESS - 6 man-months (intermittent in the 2 years;) – 2000 US$/ man-month	12,000
Per diem for ESS: 48 US$ x 30 days x 6 months	8640
Travelling cost for 2 round trips: 200 US$ x 2 trips	400
EMP Budget	
2. Environmental effects monitoring (implemented by ESS)	***5,500***
Ambient air quality: 10 monitoring locations x 5 times x 60 US$/sample[26]	3,000
Surface water quality: 4 monitoring locations x 5 times x 500 US$/sample[27]	2,000
Ground water quality: 1 monitoring locations x 5 times x 400 US$/sample[28]	500
3. Training/orientation, local transportation, supplies (by ESS)	***3,000***
a) Training/orientation: 1 formal training course for PMU, CSC, Contractors and Cao Bang 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)	**9,100**
5. Contingency	**455**
Total (1+2+3+4+5)	**9,555**

E. Capacity Building

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

123. The most significant challenge is the lack of human and financial resources and necessary infrastructure. To address this constraint, Cao Bang DPI/PMU will designate a full

[26] Due to there is no cost norm for Cao Bang province, figures have been estimated base on environmental monitoring cost norm of Ha Giang province.
[27] Due to there is no cost norm for Cao Bang province, figures have been estimated base on environmental monitoring cost norm of Ha Giang province.
[28] Due to there is no cost norm for Cao Bang province, figures have been estimated base on environmental monitoring cost norm of Ha Giang province.

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

Table 17: Detail capacity building program

Objective	1. Build capacity and procedures in undertaking systematic environmental assessments in accordance with Government regulations and ADB guidelines 2. Provide training on international best practice on environmental management, monitoring and reporting. 3. Provide guidance on how to effectively incorporate environmental measures into project design and how to incorporate EMP provisions into tender and contract documents.
Tasks/Scope of Work	1. Undertake training needs analyses and review prevailing government regulations and donor guidelines governing the assessment and management of environmental impacts for road development. 2. Review the skills of PMU and Cao Bang 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 Cao Bang DOT who responsible for environmental management
Staff resources	International and national environmental specialist with at least 15 years experience on environmental management of road projects and must possess relevant post-graduate degree in civil engineering, environmental management and other relevant courses. With working knowledge of safety issues and at least 3 years experience in conducting environmental management training.

X. CONCLUSIONS AND RECOMMENDATIONS

124. 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.

125. The implementation of the subproject “Upgrading and Improving Provincial Road 211 (Tra Linh - Trung Khanh), Cao Bang Province” will steadily improve the road quality; make it favorable for transportation between two districts and other area in Cao Bang province. Several actions are required during the detailed design stage to minimize impacts to acceptable levels. The negative environmental impacts from the upgrading works will mostly take place during the construction stage. All of the impacts during construction phase should be very predictable and manageable and with appropriate mitigation and few residual impacts are likely. Additional human and financial resources will be required to improve environmental capability and to progress and achieve necessary statutory compliance and environmental clearance certification for the subproject or associated activities that also require environmental permits under the environmental laws of Viet Nam – LEP 2014.

126. 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. APPENDICES

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

Starting point in Hung Quoc town, Tra Linh

End point in Trung Khanh town, Trung Khanh

Road section in Xuan Noi commune

Rice field and low karst mountain at road side

Narrow road section through Ban Ngan village

Bo That protection forest Km12+5 to Km13

Bo That water source at KM12+8

Current causeway over Bac Vong River

Landslide near the road in Quang Trung commune

Bad road surface section in Lang Yen commune

Dinh Van quarry in Lang Hieu commune

Sac Ha borrow pit, Quang Trung commune

B. Appendix 2: Source of Reference Information

1. *Cao Bang Status of Environmental Report 2015*
2. *Cao Bang Climate Change Adaptation Plan (2011-2020)*
3. *Report on Pollution control under Environmental Protection Plan in 2015 Cao Bang Environmental Agency*
4. *Environmental Impact Assessment (EIA) Report of Coc Cang Quarry, Hung Quoc town, Tra Linh district.*
5. *The subproject feasibility report*
6. *Poverty and Social assessment report of the subproject*
7. *Inventory of losses report of the subproject*
8. *Resettlement and Ethnic Minority Development Plan of the subproject*

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

1. Route selection	1. Construct 400-meter bypass road to avoid go through narrow section at Ban Ngan village, Quang Trung commune. 2. Apply all mitigation measures for this bypass as other sections of the subproject road.
2. 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 Km12+500 to Km13 - near Bo That 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.
3. 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
4. Materials exploitation and management of quarry, borrow pits and temporary storage area	1. Prioritize use of Lung Mo, Coc Cang, Keo Thin Lan quarries and Sac Ha, Cho Mo borrow pits 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.
5. Waste and spoil disposal	1. Areas suitable for disposal to be agreed with CPCs and Cao Bang 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 8 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. Spoil disposal sites shall be away watercourses and shall be protected from erosion by avoiding formation of steep slopes and grassing.
6. Bitumen heating and concrete mixing plant	1. Locate mixing plant, bitumen heating off road and (wherever practicable) at least 500 m from nearest sensitive receivers (residential areas, schools, clinics, etc.) and streams and install and maintain dust suppression equipment. 2. Concrete mixing areas shall be protected against spills and all contaminated soil must be properly handled according to applicable national and local laws and regulation. As a minimum, these areas must be contained, such that any spills can be immediately contained and cleaned up. 3. Prevent soil contamination requiring contractors to instruct and train their workers on storage and handling of materials and chemicals that can potentially cause soil contamination. 4. Recycle debris generated by dismantling of existing pavement subject to the suitability of the material.
7. Noise, dust and vibration	1. Restrict works to daylight hours within 500 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 setup warning sign, speed limit board and assigned guard staff at the site.
8. 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. 10. Payments will be linked to the completion of the works as indicated by the installation of erosion control measures to protect the works to the satisfaction of ESS/PMU.
9. Streams/ Rivers protection and bridge/culvert construction	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed or provided to local people and will not be left in streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate

	based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.
10. Large influx of construction worker	1. Construction and worker camp location and facilities located at least 500m from settlements and agreed with local communities and facilities approved by 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 WMSDP. 10. All waste materials shall be removed and disposed to disposal sites approved by local authorities 11. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned. 12. Register temporary stay for workers with police.
11. Safety precautions for workers and public safety	1. Establish 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.
12. Traffic Management	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. Coordinate with traffic police of Trung Khanh and Tra Linh districts 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 Trung Khanh and Tra Linh districts 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

No.	Parameters	Unit	Limit values
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: Public consultation - Meeting minutes and List of attendance

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 16 tháng 9 năm 2016

Tại Sở Tài nguyên và Môi trường tỉnh Cao Bằng

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/ Bà Doãn Hồng Anh - Cán bộ hỗ trợ

Đã làm việc với:

Đại diện Sở Tài nguyên và Môi trường tỉnh Cao Bằng (có danh sách kèm theo)

Nội dung trao đổi làm việc:

1) Trao đổi các thông tin chung về Dự án Hạ tầng Cơ bản PT toàn diện các tỉnh Đông Bắc

- Tiểu Dự án: Nâng cấp tỉnh lộ 211 từ tt Hùng Quốc đi tt Trùng Khánh.

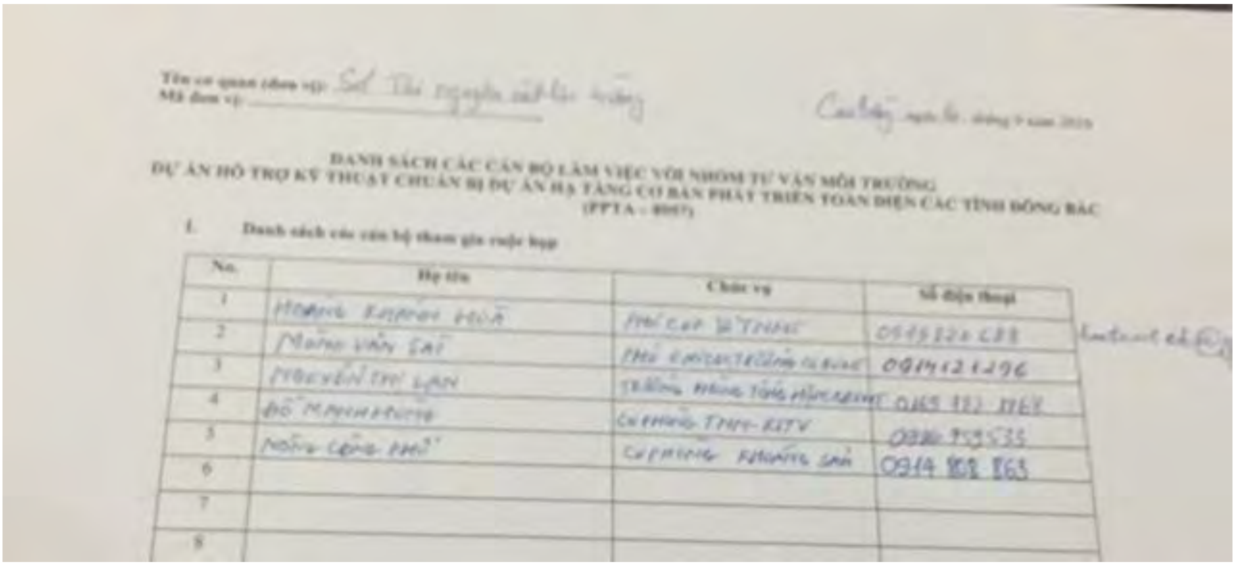
- Tiểu Dự án: Cấp nước xã Phù Ngọc và tt Xuân Hòa huyện Hà Quảng

2) Các thông tin về khu vực TDA

Rừng phòng hộ nằm ở các khu bảo tồn. Có 8 khu ở tỉnh Cao Bằng như: Phia Oắc, Vượn Cao Vít (vượn ở huyện Trùng Khánh) không cách xa điểm cuối tuyến đg (khoảng 10 km)

Có một số chòm rừng trên các đỉnh núi đá vôi dọc theo tuyến đường. (Không [illegible] phòng hộ Bế Kết - [illegible])

- Có danh sách các mỏ vật liệu được cấp phép đến 2050



Tên cơ quan (đơn vị): [illegible]
Mã đơn vị:

[illegible], ngày [illegible], tháng [illegible] năm [illegible]

DANH SÁCH CÁC CÁN BỘ LÀM VIỆC VỚI NHÓM TƯ VẤN MÔI TRƯỜNG
DỰ ÁN HỖ TRỢ KỸ THUẬT CHUẨN BỊ DỰ ÁN HẠ TẦNG CƠ BẢN PHÁT TRIỂN TOÀN DIỆN CÁC TỈNH ĐÔNG BẮC
(PPTA - [illegible])

I. Danh sách các cán bộ tham gia cuộc họp

No.	Họ tên	Chức vụ	Số điện thoại
1	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	0914121296
3	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]
6			
7			
8			

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 16 tháng 9 năm 2016
Tại Nông nghiệp và Phát triển Nông thôn tỉnh Cao Bằng

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/ Bà Doãn Hồng Anh - Cán bộ hỗ trợ

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

Nội dung trao đổi làm việc:

1) Trao đổi các thông tin chung về DA Hạ tầng Cơ bản PT Toàn diện các tỉnh Đông Bắc
- TDA: Nâng cấp tỉnh lộ 211 Trà Lĩnh - Trùng Khánh
- TDA NSH thị trấn Xuân Hòa + xã Phù Ngọc, Hà Quảng
2) Thông tin chung khu vực TDA:
Rừng Cao Bằng phân 3 loại theo QĐịnh 445 của UBND tỉnh Cao Bằng
TT Hùng Quốc: 13378.8 ha; huyện Trùng Khánh: 25546.1 ha; Huyện Hà Quảng: 27034.5 ha, khu Pác Bó: 1385 ha. Ko có diện tích rừng phòng hộ tại khu vực 2 TDA. Rừng chủ yếu phân kết về cho người dân quản lý.
Các huyện có Ban chỉ đạo Quản Bvệ và PT rừng bao gồm cả kiểm lâm và các cán bộ ở xã.
Có file pdf diện tích rừng phòng hộ của 3 huyện.

Tên cơ quan (đơn vị): Sở NN& PTNT
Mã đơn vị: .....

Cao Bằng, ngày 16 tháng 9 năm 2016

DANH SÁCH CÁC CÁN BỘ LÀM VIỆC VỚI NHÓM TƯ VẤN MÔI TRƯỜNG
DỰ ÁN HỖ TRỢ KỸ THUẬT CHUẨN BỊ DỰ ÁN HẠ TẦNG CƠ BẢN PHÁT TRIỂN TOÀN DIỆN CÁC TỈNH ĐÔNG BẮC (PPTA – 8957)

I. **Danh sách các cán bộ tham gia cuộc họp**

No.	Họ tên	Chức vụ	Số điện thoại
1	Trần Minh Hoàng	Chuyên Viên SNN	0912423683
2	Vi Văn Chường	Kiểm Lâm viên	0913.566.433
3	Lã ái Lê	Chi cục Lâm Nghiệp	0914247188
4	Hứa Mỹ Ngọc	Chi cục Thuỷ lợi	0948 922 955
5			
6			

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 7 tháng 9 năm 2016
Tại xã TT Hùng Quốc; xã Quang Trung huyện Trà Lĩnh tỉnh Cao Bằng
Lăng Yên .. Trùng Khánh

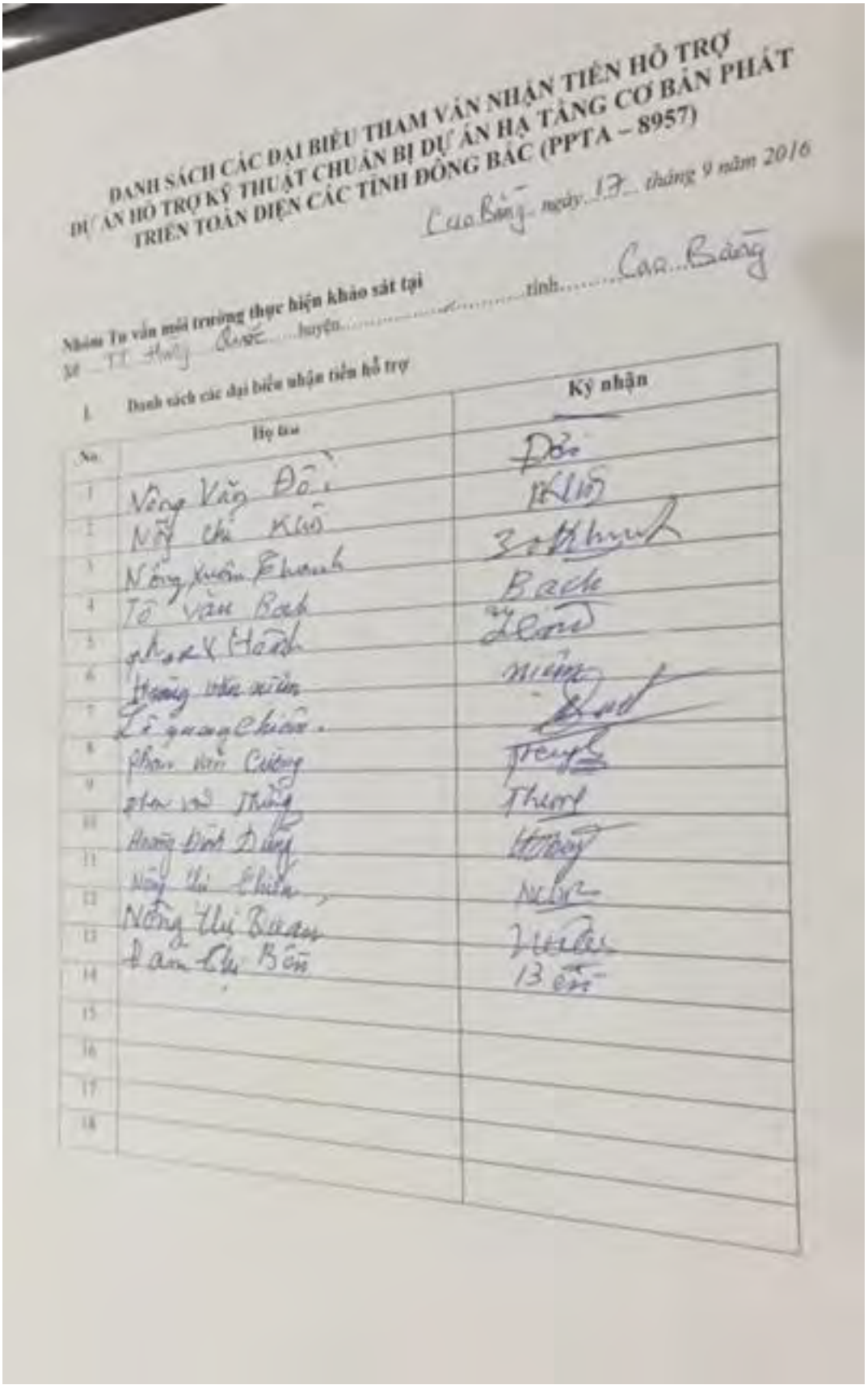
Đại diện nhóm khảo sát điều tra mối trường - Dự án Hạ tầng Cơ bảnPhát triển Toàn diện các tỉnh Đông Bắc

1/ Ông Nguyễn Thanh Dương - Trưởng nhóm
2/ Bà Doãn Hồng Anh - Cán bộ hỗ trợ

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

Nội dung trao đổi làm việc:

- TT Hùng Quốc: cần quan tâm đến chợ thi công, cống qua đường. Đa số người dân [illegible] giếng khoan
Nhà máy cấp nước quanh [illegible] TT [illegible]
Nguồn nước lấy ở suối
Y/c: Đảm bảo vệ sinh đất đá khi thi công con đg
Đặc biệt khi chợ gia súc đi vào hoạt động (dự kiến đầu năm 2017.
- Xã Quang Trung:
Muốn tăng độ xa cánh đồng, tránh các khu đông dân cư, đặc biệt khu bản Ngần
- Tránh ảnh hưởng đến nguồn nước, bể Thất bản Lũng Nặm ngay khu rừng phòng hộ Bó Thất, cách UBND xã kh 1 km
Khu vực qua sông Bắc Vọng hay bị ngập lụt (khu Bản Sác, Hà) Đg khu này làm [illegible] thoát [illegible]
- Xã Lăng Yên (Trùng Khánh)
- 2 trường Lũng Gia và Bản Chuẩn: học sinh phải sang Lăng Hiếu và Quang Trung học
Cần lưu ý đến bồi thường tăng cho bà con



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)

Cao Bằng, ngày 17 tháng 9 năm 2016

Nhóm Tư vấn môi trường thực hiện khảo sát tại Xã TT Hùng Quốc huyện ..... tỉnh Cao Bằng

I. Danh sách các đại biểu nhận tiền hỗ trợ

No.	Họ tên	Ký nhận
1	Vàng Văn Đô	Đô
2	Nông Thị Khiêu	Khiêu
3	Nông Xuân Thanh	Thanh
4	Tô Văn Bách	Bách
5	Phạm Văn Hành	Hành
6	Hoàng Văn Viễn	Viễn
7	Lê Quang Chiến	Chiến
8	Phan Văn Cường	Cường
9	Phan Văn Thắng	Thắng
10	Hoàng Đình Dũng	Dũng
11	Nông Thị Thiều	Thiều
12	Nông Thị Bưởi	Bưởi
13	Đàm Thị Bến	Bến
14		
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16		
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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)

............, ngày........ tháng 9 năm 2016

Nhóm Tư vấn môi trường thực hiện khảo sát tại
Xã....... Quang Trung ....huyện..... Trà Lĩnh ......tỉnh...... Cao Bằng

I. Danh sách các đại biểu nhận tiền hỗ trợ

No.	Họ tên	Ký nhận
1	Nông Cường Quyết	30.000đ
2	Dương Văn Hoà	
3	Bế Văn Niên	
4	Nông Văn Chế	
5	Nông Văn Lợi	
6	Triệu Thị Nguyệt	
7	Vương Thị Vững	
8	Đàm Văn Điềm	
9	Đàm Văn Hưng	
10	Đàm thị Việt	
11	Đàm Văn Ếnh	
12	Võ quang Dương	
13	Dương Hoàng Đăng	
14	Đàm Văn Tuấn	
15	Đàm Văn Tô	
16		
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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 17 tháng 9 năm 2016
Tại xã Lăng Hiếu, tt Trùng Khánh huyện Trùng Khánh tỉnh Cao Bằng

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/ Bà Doãn Hồng Anh - Cán bộ hỗ trợ

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

Nội dung trao đổi làm việc:

1) xã Lăng Hiếu: Đg đi bụi nhiều, hỏng nhanh. Mong làm chắc, bền, đẹp
Đg nâng lên, nhà dân thấp đi → cần hỗ trợ dân
Hay bị tắc đg khu vực trường tiểu học tt Trùng khánh và TTGD thg xuyên huyện Trùng khánh,
Mong muốn làm đg rộng, tiến độ thi công nhanh và đạt chất lg

2) UBND thị trấn Trùng khánh
- Con đg mong mỏi 20 năm nay rồi, Cống cần phải bố trí sửa đg
Chỉ mong nhanh chóng thi công và đảm bảo chất lg
Bà con đều ủng hộ nhiệt liệt

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)

ngày ..... tháng 9 năm 2016

Nhóm Tư vấn môi trường thực hiện khảo sát tại
Xã ..... huyện ..... tỉnh .....

1. **Danh sách các đại biểu nhận tiền hỗ trợ**

No.	Họ tên	Ký nhận
1	Hoàng Thị Tuấn	Tuấn
2	Nông Thị Bến	Bến
3	Lương Thị	Hồn
4	Sầm Thị Phấn	Phấn
5	Lã Văn Bằng	Bằng
6	Hoàng Văn Lực	Lực
7	Chu Văn Tiệp	Tiệp
8	Bế Văn Minh	Minh
9	Hứa Văn Chung	Chung
10	Hoàng Văn Cường	Cường
11	Nông Đức Tuấn	Tuấn
12		
13		
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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)

............, ngày........ tháng 9 năm 2016

Nhóm Tư vấn môi trường thực hiện khảo sát tại
xã TT Trùng Khánh huyện..tỉnh Cao Bằng

I. **Danh sách các đại biểu nhận tiền hỗ trợ**

No.	Họ tên	Ký nhận
1	Lý Thế Cường	
2	Lý Văn Sơn	
3	La Thị Thảo	
4	Ngọc Thị Lan	
5	Lại Thu Thủy	
6	Trần Thị Quý	
7	Ngô Thị Phương	
8	Hoàng Thị Trường	
9	Hoàng Thị Nền	
10	Đoàn Văn Chững	
11	Hà Huy Quân	
12	Chu Văn Nam	
13	Hoàng Văn On	
14	Hà - Chưi	
15	Nông Minh Hoàng	
16		
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18		

Initial Environmental Examination

Stage of the document: Final
Project number: 49026-002
April 2017

VIE: Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project

Sub-project: Upgrading and Improvement of Provincial Road 184, Dong Tam Commune, Bac Quang District to Ngoc Linh Commune, Vi Xuyen District, Ha Giang Province

Prepared by Planning and Investment Department of Ha Giang province for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 27 April 2017)

Currency unit	–	Viet Nam Dong (D)
D1.00	=	$0.000044
$1.00	=	D22,730

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
MPI	–	Ministry of Planning and Investment
MPN	–	Most Probable Number of viable cells of a pathogen - a measure of water quality
PPC	–	Provincial People's Committee
PPE	–	Personal Protective Equipment
PPMU	–	Provincial Project Management Unit
PPTA	–	Project Preparatory Technical Assistant
ROW	–	Right of Way
SPS	–	Safeguard Policy Statement
PPTA	–	The Project Preparatory Technical Assistant Consultants

Project	–	Basic Infrastructure for Inclusive Growth Project in Northeast Provinces
Subproject	–	Upgrading and Improvement of the Road 184 from Dong Tam Commune, Bac Quang District to Ngoc Linh Commune, Vi Xuyen District, Ha Giang Province
UXO	–	Unexploded ordnance

WEIGHTS AND MEASURES

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

Note:

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 (BIIG 1) will invest in the recently completed Four Northeastern Provinces (FNEP) Overall Development Plan (2015). The development plan responds to the Government of Vietnam's strategy of targeting the investment into poorer provinces and regions. The use of a sub-regional approach seeks to build the interrelationship between provinces as one of the foundations for accelerating growth in the more remote regions. As such the plan targets investment into outputs that build areas of comparative advantage in a manner that increases the competitiveness of economic activity in the sub-region. The expected impact is to improve socio-economic wellbeing of local communities through the improved financial returns and through lower costs of accessing public health services, education, water supply and markets.

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 "Upgrading and Improvement of Provincial Road 184 (PR184) from Dong Tam Commune, Bac Quang to Ngoc Linh Commune, Vi Xuyen, Ha Giang Province" and is a representative subproject for Output 1 of BIIG 1: Improved Road Network Connectivity. The route travels through Bac Quang and Vi Xuyen district, Ha Giang province with the total length of 25.1 km and divided into two sections:

- Section 1: From Dong Tam T-junction, Bac Quang district to the junction with the earth road in Ngoc Ha village, Ngoc Linh commune, Vi Xuyen district with total length of 20.4 km. The main road alignment follows the existing route (upgrading provincial road No.184)
- Section 2: From the end point of Section 1, end of paved road and begin of earth road in Ngoc Ha village, Ngoc Linh commune to the junction with paved road to Binh Vang Industrial Zone and National Road No.2 in Ngoc Linh commune, Vi Xuyen district with the total length of 4.7 km, mainly follows the existing road alignment.

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

- Road base width: 7.5m;
- Road surface width: 5.5m;
- Road shoulder: 2 x 1.0m;
- Reinforced shoulder: 2 x 0.5m;
- Road surface structure: Bitumen

5. Civil works will include 14 bridges to replace existing bridges with weight limits below the requirement specified for Category IV Mountain Roads. The bridges construction standards are listed in the table below.

Table 1 – Current status of bridges along the subproject road

No.	**Bridge Name _ Chainage**	**Beam / L bridge (m)**	**Width (m)**	**Notes**
1	Beam bridge Km0+607	2I24 / 60.55	9.0 (8 + 2x0.5)	Design the new bridge to replace the old bridge, the new bridge location is 30 meters from the old one.
2	Slab bridge Km1+680	6 / 7.0	8.0 (7 + 2x0.5)	Design the new bridge to replace the old bridge, the new bridge location is in the same location of the old one.
3	Beam bridge Km4+153	I12 / 20.1	8.0 (7.5 + 2x0.25)	Design the new bridge to replace the old bridge, the new bridge location is in the same location of the old one.
4	Beam bridge Km4+513	I12 / 20.1	8.0 (7.5 + 2x0.25)	Design the new bridge to replace the old bridge, the new bridge location is in the same location of the old one.
5	Beam bridge Km6+980	I12 / 20.1	8.0 (7.5 + 2x0.25)	Design the new bridge to replace the old bridge, the new bridge location is in the same location of the old one.
6	Slab bridge K7+317	6 / 7.0	8.0 (7 + 2x0.5)	Design the new bridge to replace the old bridge, the new bridge location is in the same location of the old one.
7	Beam bridge Km7+907	I12 / 20.1	8.0 (7.5 + 2x0.25)	Design the new bridge to replace the old bridge, the new bridge location is in the same location of the old one.
8	Beam bridge Km9+201	I12 / 20.1	8.0 (7.5 + 2x0.25)	Design the new bridge to replace the old bridge, the new bridge location is in the same location of the old one.
9	Slab bridge K11+810	6 / 7.0	8.0 (7 + 2x0.5)	Design the new bridge to replace the old bridge, the new bridge location is in the same location of the old one.
10	Beam bridge Km12+650	I15 / 23.1	8.0 (7.5 + 2x0.25)	Design the new bridge to replace the old bridge, the new bridge location is in the same location of the old one.
11	Beam bridge Km14+847	I12 / 20.1	8.0 (7.5 + 2x0.25)	Design the new bridge to replace the old bridge, the new bridge location is in the same location of the old one.
12	Slab bridge Km17+621	6 / 7.0	8.0 (7 + 2x0.5)	Design the new bridge to replace the old bridge, the new bridge location is in the same location of the old one.
13	Beam bridge Km^{2}1+960	I33 / 46.0	9.0 (8 + 2x0.5)	Design the new bridge design to replace the residential suspension bridge, which is seriously damaged, the position of the new bridge is

No.	Bridge Name _ Chainage	Beam / L bridge (m)	Width (m)	Notes
				near the residential suspension bridge.
14	Beam bridge Km24+920	I33 / 46.0	9.0 (8 + 2x0.5)	Design the new bridge design to replace the residential suspension bridge, which is seriously damaged, the position of the new bridge is near the residential suspension bridge.

B. Environment impacts and mitigation

6. The subproject is categorized as B on environmental issues during the Project Concept note, which identified few significant adverse impacts, of which none are considered 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. The most significant concern are the potential negative impacts to rivers and streams at the 14 bridge-construction locations, especially Nam Dau stream at Km24+920 in Nam Dau village, Ngoc Linh commune, Vi Xuyen district and Na Tang small reservoir at Km0+607 in Na Tang village, Dong Tam commune, Bac Quang district. To minimize the impact, the contractor will use cofferdams, silt fences, sediment barriers or other devices as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams.

9. In the design and preconstruction phases, the potential issues that have been identified are (i) land acquisition and resettlement, including (ii) relocation of the public facilities especially Section 2 where the subproject with extend the current road width to a 5.5m road surface from the existing earth road with house and assets of local people for a distance of 4.7km, and (iii) the disturbance of UXO. To minimize the impact on income and disturbance of local people's lives, 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 that ADB's Safeguard Policy has been 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.

10. 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 local public utilities (iii) Silt release from excavation works and material extraction; (iv) The impact of temporary material stockpiles along the road; (v) impact of generated surplus soil; (vi) The impact of generated construction waste and domestic waste from workers; (vii) Impact from bitumen heating and road compaction activities; (viii) Dust, noise and vibration from construction machinery; (ix) irisk of landslide, soil erosion and runoff; (x) impact on crossing streams or bridge construction locations; (xi) social issues associated with the presence of temporary non-local workers; (xii)

safety risks to workers and also to local public; (xiii) impact on local traffic, and (xiv) Potential cumulative impacts arising from construction activities on the Dong Tam - Dong Tien Inter-commune road.

11. 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 Ha Giang 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 CPCs and Ha Giang DONRE checked and recorded by the CSC, ESS/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; (viii) 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; (ix) establish vegetation and erosion protection immediately after completion of works in each stretch/ sector, check weather forecasts and minimize work in wet weather; (x) 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; (xi) 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; (xii) 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; (xiii) 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; (xiv) work with Dong Tam CPC, Bac Quang DPC and contractor of Dong Tam - Dong Tien Inter-commune road project to find out the suitable worker and machine mobilization schedules of the two projects, avoid concentration of machines and workers at the same time. The contractor will inform construction schedule and scope to local authorities in advance as well as investigate the capacity of mines, quarries and temporary dumping sites to see whether they are suitable for both projects.

12. In the operation phase, the potential negative impacts include dust, noise and vibration impacts arising form increasing of traffic density and higher risk of traffic accidents as a result of better driving conditions combined with expected traffic increases. To minimize the negative impacts, Ha Giang Department of Transportation (DOT), the responsible agency for subproject management in the operation phase, will maintain the road periodically and collaborate with traffic police to enforce speed limits, and vehicle loading. A road safety and awareness campaign is required for people working and living along the road.

13. The PPTA Consultant identified key stakeholders and conducted public consultations from provincial to commune level. The main concerns identified were (i) increasing ore exploitation activities as the consequence of improved driving condition. (ii) cumulative impact of

the subproject implementation and the construction of Dong Tam - Dong Tien inter-commune road in Dong Tam commune, Bac Quang district. (iii) road safety issues at the sections go through high residential areas. (iv) traffic jams at the section passes through Dong Tam market. All of these concerns are addressed in the EMP (See Table 12 – 13 for more details).

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

C. Institutional arrangements

15. Ha Giang 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 Environmental Safeguards Officer (ESO). Three staff, including the ESO, have been participating in a training course on "Fundamental Safeguard and Gender Safeguard Policy Statement (SPS) of ADB" under TA8902-Vie Capacity Building for Project Management Unit Professionalization - organized by ADB in August 2016. Environmental specialist (ESS) for subproject implementation will organize a formal training course and on-the-job training for relevant PMU staff, CSC, communities, contractors; and support for establishment and operation of the subproject environment management system in construction phase. ESS will also support PMU's capacity building by reviewing and evaluating the capacity for environmental protection of the PMU and Ha Giang Department of Transportation (DOT) – subproject management organization in the operation phase.

16. 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

17. The IEE concludes that the feasibility study of the subproject combined with available information is sufficient to identify the scope of potential environmental impacts and formulate mitigation measures for the subproject. Providing that significant changes to the subproject description do not occur at the detailed design phase, and that new sensitive environmental, or cultural resources are not 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

18. 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 - upgrading provincial road 184 (Bac Quang - Vi Xuyen) Km 0+00 - Km 25.1 to IV class road for mountainous area.

19. 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

20. 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 construction of bridges and spillways that will be constructed or upgraded by the subproject are all in small scale and will not be required for separate environmental impact assessment (less than 500m in length).

A. ADB SPS Requirements

21. 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 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:

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

22. For environmental safeguards, the Subproject is initially categorized as 'B'. A subproject that is classified as category A on environmental safeguards would be inegible as a BIIG I subproject.

B. Legal and Administrative Framework for Environmental Protection in Vietnam

23. 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. Subproject Location

24. The proposed subproject upgrades Road 184 from Dong Tam commune, Bac Quang district to Ngoc Linh commune, Vi Xuyen district creating a shorter connection between PR279 (to/from Tuyen Quang) and the Binh Vang Industrial Estate that runs parallel to NH2. BIIG1 investment is also sought for the section from Ha Giang City to Binh Vang Industrial Estate as an additional subproject that will complete the parallel route within the proposed north south transport corridor.

25. The road subproject contributes the next stage of development of the parallel network where NH2 to the west of the Lo River will carry passengers and freight mostly from China and from Vietnam south of Ha Giang while Road 184 will provide an alternate route for truck traffic which is forecast to grow rapidly due to expansion of the Binh Vang industrial zone. The reduced transport costs will support the ongoing development and promotion of the industrial zone with expected increased investment linked to growth in local employment opportunities. Furthermore, the resultant improved road will provide better accessibility for people living in the vicinity of the road.

26. Currently NH2 is approaching full capacity due to the increase in truck movements to and from China (in 2016, 1 truck is processed every 4 to 5 minutes at the border from 7am to 7pm compared to more than 15 minutes in 2014.) In addition, NH 2 provides a major entry point for rapidly growing tourism arrivals linked to the UNESCO Dong Van Geological Park. During 2015 an estimated 700,000 visitor arrivals into Ha Giang saw approximately 500,000 enter and depart Ha Giang using NH2 – most of these visitors are in smaller passenger vehicles due to the limitation of larger buses within the road network of Dong Vang.

27. The road runs through Dong Tam commune, Bac Quang district, to Ngoc Linh and Trung Thanh communes, Vi Xuyen district, Ha Giang. The road is a section of Provincial Road 184 (PR184) from Dong Tam commune, Bac Quang district to Ngoc Linh commune, Vi Xuyen district. PR 184 runs from Kim Ngọc in the south to Ha Giang city in the north and is a priority within the Transport Master Plan of Ha Giang province to 2020 and orientation to 2030.

28. To the south PR 184 connects into NH 279 (currently being upgraded), to NH2 at Vi Xuyen small town1 and to the north into the Binh Vang industrial park. The road connects the production zones and the raw materials produced to the processing sector located in the Binh Vang Industrial estate. These production areas are significant and include production forest of over 450,000 ha, tea - over 20,000 ha, orange over 2,000 ha, passion fruit, etc. and serve the processing sector in Binh Vang industrial park. The park has an area of 300ha and currently includes medium density fiberboard processing (MDF) with production capacity of 150,000m^3/year, mineral (iron, lead, zinc, etc.) factories, tea, fruit processing factories.

29. The subproject represents the next stage (following the upgrading of PR279) of establishing the parallel route with NH2 as part of the North South transport corridor designed to

[1] This subproject road will offer a shorter connection between PR279 (to/from Tuyen Quang) and NH2 (to/from Ha Giang City). As such it will also provide an alternative to NH2, reducing traffic pressure on Ha Giang's primary traffic artery. Furthermore, it will provide direct access to Binh Vang Industrial Zone.

support both the international trade and passenger services via NH2 and the provincial industrial output centered on the Binh Vang Industrial Estate via PR184.

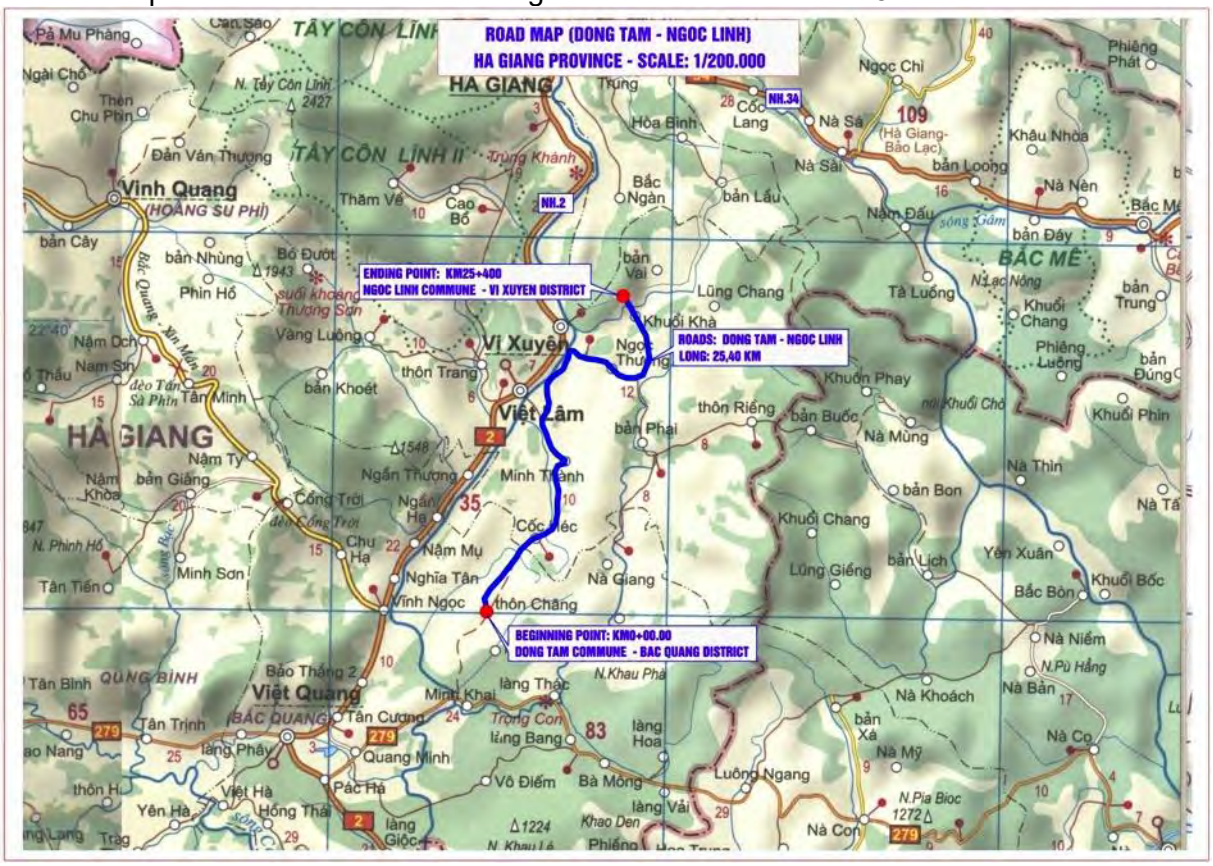


Figure 1: Map of the subproject road 184

30. In summary, industrial development, trade and tourism development are priorities in the future economic development of Ha Giang and are seen as the main contributors to poverty alleviation in Ha Giang Province. The subproject provides support to these in the development of the eastern branch of the planned north – south corridor, with the eastern branch providing services for mostly truck based freight in and out of the Province.

31. The route from Dong Tam Commune, Bac Quang to Ngoc Linh commune, Vi Xuyen district, Ha Giang province under the provincial road 184 (Kim Ngoc -Ha Giang city) includes Ha Giang's 2020-2030 Transport Development Masterplan. Supporting the transport link between Tuyen Quang and Ha Giang province (through NH279), to reduce the traffic load on Highway 2 as well as connecting Bac Quang district with Vi Xuyen district.

Table 2: Road Subproject Summary

Name Representative	Upgrading and Improvement of the Road 184 from Dong Tam commune, Bac Quang District to Ngoc Linh Commune, Vi Xuyen District, Ha Giang province
Length Representative (km)	25.1
District – Representative	Bac Quang and Vi Xuyen
Total Number Districts	2
Total Number Communes	3
Beneficiaries	12,850
Investment Representative $mill	**13,697,627**
Investment per km (USD/km)	545,722

Figure 2 – General Map of Ha Giang and Subproject Area

B. Subproject Scope

32. The upgrading and improvement of PR184 from Dong Tam commune, Bac Quang district to Ngoc Linh commune, Vi Xuyen district, and Ha Giang province. The total length of the road section is 25.1 km that uses the existing centerline. Some sections need centerline adjustments to adhere to the design specifications for upgrading the road to of a Category IV mountain road.

33. The subproject comprises 2 sections as follows:

(i) Section 1: From Dong Tam T-junction, Bac Quang district to the ending point of the bituminous road crossing with the earth road in Ngoc Ha village, Ngoc Linh commune, Vi Xuyen district, with the total length of 20.4km, the alignment basically follows the existing PR184.

(ii) Section 2: from the ending point of the bituminous road and the starting point of the earth road in Ngoc Ha village, Ngoc Linh commune to the intersection with the bituminous road in Ngoc Linh commune (road to Binh Vang industrial zone and NH2), with the total length of 4.7km, the alignment basically follows the existing road.

34. The technical specifications apply the standard TCVN4054 - 05 as follows:

(i) Width of subgrade: 7.5m
(ii) Width of pavement: 5.5m
(iii) Width of road shoulder: 2 x 1.0 m
(iv) Width of lined road shoulders: 2 x 0.5 m

35. The current status of the road is asphalted with grade VI mountain roads. The road from Dong Tam crossroad, Bac Quang district to Ngoc Linh commune, Vi Xuyen district can be divided into two sections with features and status as follows:

(i) Section 1: from Dong Tam crossroad, Bac Quang district to Ngoc Ha village, Ngoc Linh commune, Vi Xuyen district with total of 20.4km length. Currently, this section is a Grade 4 asphalt road constructed in the period of 2007-2009. The quality of the road is on average assessed as moderately good, some parts have good quality. The road section runs through three communes including Ngoc Linh and Trung Thanh, Vi Xuyen district and Dong Tam commune, Bac Quang district. There are 11 bridges on this road section in which 10 bridges are reinforced concrete with the 6m width, the quality is currently good, 01 bridge is two-span (L=2x9m), reinforced concrete type with 3.5m width, the bridge is downgraded and unable to meet travel demand due to small width.

(ii) Section 2: this section runs from the end point of the asphalt road and start point of earth road in Ngoc Ha village, Ngoc Linh commune, continue to the crossing point with the asphalt road in Ngoc Linh commune (the way to Binh Vang industrial area and km00 to QL2) with the length of 4.7km. It is currently an earth road with bad quality and is impassable in places. This road section is in the territory of Ngoc Linh commune; this section includes two suspension bridges, Ngoc Linh and Ngoc Ha which are downgraded and bad in quality. These two bridges only support non-motorized vehicle.

36. According to survey results the first section with a total length of 20.45km has a bituminous surface with an average width of 3.5m and is in good condition. The remaining

section of 4.7km is an earth road, with a width of 2-4m and its conditions makes it difficult for travelling.

37. The first bituminous road section passes through mountainous areas with changes in slope, small to medium slope, some local sections with quite high slope of 10-11%. The earth road section has some points with the slope of 15%, remaining sections have the medium slope. A summary of slopes on the existing road is found in the field survey report.

38. Slopes of the PR184 from section Km0+00- Km20+400 are from 0m-5m high and these slopes are relatively stable and fully covered by green grass, no signs of landslides. The general geological character of the section is brown-yellow clay with gravel in semi-hard to hard state, weathered semi-hard state of shale. The rest section from Km20+400- km25+176 has brown-yellow clay shale slope in medium hard state with stable slopes.

1. Construction Material Sources

39. The proposed material quarries include 3 rock quarries, 2 soil quarries that meet the required capacity for the construction subproject and acceptable transport distance. These quarries are under the list of authorized quarries and sand mines provided by Ha Giang MONRE. The estimated volume required for construction is 68,978m^3, of which 27,397m^3 is for base course and 41,581m^3 for sub-base course.[2]

1. Rock quarry:

   (i) The rock quarry is located in Pha Village, Dong Tam Commune, Bac Quang District, at Km Km2+100, 4,5km away from the road with capacity of 300.000 m^3, area of 1,5 ha. Entrance road to the quarry is asphalt concrete road which is in quite good condition.
   (ii) Trung Son Village rock quarry in Trung Thanh Commune, Vi Xuyen District at Km 17+00, 1km away from the road with capacity of 733.968 m^3, area: 3.5 ha, aggregate entrance road
   (iii) Lung Loet limestone quarry in Nong Village 2, Phu Linh Commune, Vi Xuyen district with quarry area of 2.83 ha, capacity of 1.815.308 m^3, exploitation capacity of 50.000 m^3/ year. The quarry is located at the end of the road, near bituminous treatment surface pavement section, Lam Thanh Cooperative granted the business certificate for the quarry on Oct 20th, 2015 by Ha Giang Provincial Peoples' Committee.

2. Soil borrow pit:

   (i) Borrow pit in Dong Tam Commune, Bac Quang district, 2 hills at the beginning point of the road at the Dong Tam junction with capacity of 900.000 m^3. This borrow pit is right beside the road which is very convenient for material transport. Observation at the borrow pit shows that the soil composition here is brown yellow- clay with gravel in the semi-hard state. Quality of soil of the borrow pit is qualified for roadbed filling.
   (ii) Borrow pit in Minh Thanh Village, Trung Thanh Commune, Vi Xuyen district, at Km 12+00, located right beside of the road, with capacity of 500.000 m^3.

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

Observation at the borrow pit shows that the soil composition here is brown yellow- clay with gravel in the semi-hard state. Quality of soil of the borrow pit is qualified for roadbed filling.

40. The estimated volume of filling soil (for embankment) is 166,967m^3 while the estimated volume of excavation soil is 200,651m^3 of which 18,889m^3 is unsuitable for re-use as back fill.

41. Mine investigation: Working with the local authorities and people (district, commune) the survey team collected information on potential sites and then conduct an investigation of these sites near the project road and nearby areas which meet requirements in terms of transport distance, dumping site capacity for the construction project and get confirmation from the local authorities.

C. Land Acquisition

42. According to Resettlement and Ethnic Minority Development Plan there are 472 households will be affected by the implementation of the subproject of which 6 households must be relocated and number of households with affected assets are 238. In these 472 affected households, there are 21 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 90,918 m^2 of which 169,200 m^2 is production forest.

43. In the plan, the subproject will be constructed in 24 months with the estimated budget in Table 5 below:

Table 3 – Estimated budget of the subproject[3]

No	Cost Items	Unit	before tax costs	VAT	After tax costs (VND)	After tax costs (USD)[4]
I	**Civil Works Cost**		**187,756,162,727**	**18,775,616,273**	**206,531,779,000**	**9,240,795**
2	**Project Management Cost**	1.30%	**2,432,944,357**	**243,294,436**	**2,676,238,793**	**119,742**
3	**Construction Investment Consultancy Cost**		**11,846,536,315**	**1,184,653,632**	**13,031,189,947**	**583,051**
-	*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*	*0.20%*	*383,961,353*	*38,396,135*	*422,357,488*	*18,897*
-	*Environmental Impact Assessment Cost*	*Temporarily estimated*	*181,818,182*	*18,181,818*	*200,000,000*	*8,949*
-	*Shop Drawings Design Cost*	*0.80%*	*1,496,041,105*	*149,604,111*	*1,645,645,216*	*73,631*
-	*Shop Drawings Design Verification Cost*	*0.06%*	*104,767,939*	*10,476,794*	*115,244,733*	*5,156*
-	*Construction Works Cost Estimates Verification Cost*	*0.05%*	*99,510,766*	*9,951,077*	*109,461,843*	*4,898*
-	*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*		*37,551,233*	*3,755,123*	*41,306,356*	*1,848*
-	*Construction Supervision Cost*	*1.09%*	*2,040,158,464*	*204,015,846*	*2,244,174,310*	*100,410*
4	**Other Costs**		**11,865,013,434**	**1,186,501,343**	**13,051,514,777**	**583,960**
-	*General Costs*		*7,510,246,509*	*751,024,651*	*8,261,271,160*	*369,632*
-	*Design Verification Cost*	*0.03%*	*49,276,373*	*4,927,637*	*54,204,010*	*2,425*
-	*Construction Investment project appraisal cost*	*0.03%*	*92,885,125*	*9,288,513*	*102,173,638*	*4,572*
-	*Construction Works Evaluation & Approval Cost*	*0.30%*	*447,929,714*	*44,792,971*	*492,722,685*	*22,046*
-	*Independent audit cost*	*0.45%*	*1,344,198,365*	*134,419,837*	*1,478,618,202*	*66,157*

[3] Data provided by the Design Consultant of the PPTA team
[4] US$ 1 = VND 22,350

No	Cost Items	Unit	before tax costs	VAT	After tax costs	After tax costs
-	*Construction insurance cost*	*1.03%*	*1,933,888,476*	*193,388,848*	*2,127,277,324*	*95,180*
-	*Project Investment supervision and evaluation Cost*	*20.00%*	*486,588,871*	*48,658,887*	*535,247,758*	*23,948*
5	**Land Acquisition and Resettlement Costs**	Temporarily estimated	**26,098,991,823**	**2,609,899,182**	**28,708,891,005**	**1,284,514**
6	**Contingency**	16.00%	**38,311,231,177**	**3,831,123,118**	**42,142,354,295**	**1,885,564**
Total (1+2+3+4+5+6)					**306,141,967,816**	**13,697,627**

V. DESCRIPTION OF THE ENVIRONMENT

A. Physica Environment

1. Topography, Geology, and Soils

44. Ha Giang has a complex topography with large altitude variation. The average elevation of Ha Giang is 800m - 1200m above sea level (asl) with 5 mountains with the height varied from 2,000m to 2,500m. The subproject topography is described as part of the low mountains covering the administrative areas of Bac Me, Vi Xuyen, Bac Quang districts and Ha Giang city. The mother rock is mainly metamorphic rock with feralit topsoil, from red to light yellow, grey yellow with a soil thickness ranging from 0.8m to 2m. The dominant topography of the area is low slope mountain; create large cultivation area above 50ha. This are is also has some dense forest strip in the flat and narrow valley along rivers and streams.[5]

2. Weather, natural disaster and climate change

45. Ha Giang usually received deflect cold movement from the plain area and the Northeast mountainous area so there is no extreme cold condition period like in the Northeast mountainous area. Only in some high area, near the peak of the mountain like in Pho Bang area - 1,400m MASL, where the lowest temperature could fall down to 5.6^0C.

46. The topographical conditions of Viet Bac Mountainous area and Hoang Lien Son Range where Ha Giang is lying on has support the Province a high humidity conditions. The average humidity ranges from 80 to 87%.

47. The annual rainfall differs across the various topographic regions from 1,031mm in Meo Vac district to 4,721mm in the subproject district of Bac Quang and 4,846 in Quang Ngan commune, Vi Xuyen district. In the subproject area of Bac Quang and Vi Xuyen districts, the rainy season lasts 6 - 7 months from April to October during which time 83-91% of the total annual rainfall. December and January are the driest months of the year with 50 - 70mm of rainfall. The maximum daily rain record is 427mm in Bac Quang district with a total of 210 rain days per year.

48. The climate in Ha Giang is diversified not only based on the elevation but also the direction of mountain range. Ha Giang does not usually experience tropical depressions but does have frequent thunderstorm (90 - 100 days per year), hail and hoar fog[6].

3. Hydrology

49. Ha Giang is situated within the upper basins of the Lo, Gam and Chay rivers. The , Lo River is the biggest river in Ha Giang province with the source being in Yunnan province in China, flowing south through Vi Xuyen and Bac Quang district into Tuyen Quang province. The

[5] Status of Environment report (SOE) of Ha Giang province 2015 prepared by Environment Analysing and Technique Joint Stock Company under the Assignment of Ha Giang DONRE 07/2015

[6] Status of Environment report (SOE) of Ha Giang province 2015 prepared by Environment Analysing and Technique Joint Stock Company under the Assignment of Ha Giang DONRE 07/2015. SOE has analyzed hydrological data of 35-50 years from 5 hydrological stations and 32 rainfall stations in Ha Giang.

total length of Lo River in Ha Giang is 97 km and the river basin in Ha Giang is about 2,104 km^2 [7].

50. There are several small streams originated from the mountain range, eastward of the subproject road, flow cross the road then discharge into Lo River.

4. Surface and ground water

Surface water resources

51. Surface water is relatively abundant. Ha Giang DONRE, surface water quality tests indicate little if any pollution. A monitoring program for surface water quality from 2011 to 2015 with 16 sampling location in Lo River and its tributes. The monitoring frequency is two times per year in May and September however these effectively exclude the dry season. There are six monitoring locations in the subproject area including:

i. Sampling point at Sao stream, Bach Ngoc commune, Vi Xuyen district - about 8km from the end point of the subproject road;
ii. 2 sampling points in Sao streams, Ngoc Minh commune, Vi Xuyen district (downstream of Tan Binh Manganese Ore Mine and downstream of wastewater discharged of Ban Sam 2 Manganese Ore Mine) - about 9km from the subproject road;
iii. Sampling point at a small stream in Linh Ho commune, Vi Xuyen district - about 10 km from the subproject road;
iv. Sampling point at the stream in Ngoc Linh commune, Vi Xuyen district, near the Nam Nhung Manganese Ore Mine of Ban Mai Co. Ltd;
v. Sampling point at the stream in Dong Tam commune, Bac Quang district, near Lung Quang Manganese Ore Mine of Pha Lai Co. Ltd.[8]

Groundwater resources

52. Several studies have been conducted on groundwater quality and reserves in Ha Giang province. Underground water reserve in Ha Giang province is assessed to be abundant and could be used as the water sources for domestic water supply as well as industrial water supply.

53. Ha Giang DONRE has implemented a monitoring program to evaluate the underground water quality in 2014 with some parameters like Lead, Arsenic, Mercury, Cadmium, Iron, Ammonia, Coliform... at several locations in Ha Giang city, Bac Quang, Bac Me and Vi Xuyen district. The result has showed up all the parameters are still in the allowed level of QCVN 09:2015/BTNMT[9], except the Coliform parameter. The coliform concentration of the two samples in Bac Quang and Vi Xuyen districts are 16 and 12 MPN respectively while the allowed level under QCVN 09:2015 is only 3 MPN/100ml[10].

[7] Status of Environment report (SOE) of Ha Giang province 2015
[8] Status of Environment report (SOE) of Ha Giang province 2015
[9] QCVN 09:2015-MT/BTNMT National Technical Regulation on Ground Water Quality - replace QCVN 09:2008/BTNMT.
[10] Status of Environment report (SOE) of Ha Giang province 2015

5. Air quality and noise

54. Compare to the QCVN[11], all the parameters of air quality and noise at 45 monitoring locations in Ha Giang province are far under the allowed level. The monitoring period is 5 years from 2011 to 2015. The nearest location to the subproject is near the center market of Vi Xuyen district - about 7 km from the subproject road.

B. Biological Environment

1. Forestry

55. The total forestry area of Ha Giang in 2013 is 437,227.7 ha and the forestry coverage ratio is 54.3%. However, the forest quality has reduced recently. The separated forest and forest encroachment create a risk to the biodiversity condition of the province. Ha Giang have 6 nature reserves and special forests. The nearest nature reserve to the subproject road is Bac Me Nature Reserve in Bac Me district, Ha Giang province, about 13 km from the end point of the subproject road. The forest cover status of the subproject area is show in Table 6 below.

Table 4 – Forest cover status of the subproject area in 2015 (ha)[12]

No.	Subproject commune/ district	Total area	Forest area	Natural forest area
1.	Ngoc Linh - Vi Xuyen	4847	2656	2117.2
2.	Viet Lam town - Vi Xuyen	1289	636.9	355.8
3.	Trung Thanh - Vi Xuyen	6303	3381.3	2297.4
4.	Dong Tam - Bac Quang	6783	4504.6	3250.6

Source: Forest Ranger Division Ha Giang DARD

56. The main construction work of the subproject is upgrading the road based on the existing foundation. With forest coverage of more than 50% of the natural area, there is no fauna or flora species listed in Vietnam Red Book in the subproject area in the recent years[13].

2. Agriculture

57. Agricultural land accounts for 86% of total land area, however the agricultural land area available for plantation of annual crops and perennial plants is accounts for only 16% to 25% in Vi Xuyen and Bac Quang respectively. The remaining land classified as agricultural land is used for plantation forestry.

Table 5 - Land use in project district, 2015

Type of land		Bac Quang District	Vi Xuyen District
Total land area	ha	110,564	147,841
Agricultural Land	ha	94,940	26,506
Agricultural production land	ha	23,793	23,024

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

[12] Figures provided by Forestry Division of Ha Giang DARD

[13] Information provided by staff of Ha Giang Environmental Protection Agency and via public consultation meeting in Bac Quang, Ngoc Linh and Dong Tam commune/towns.

land for annual crops	ha	11,183	17,061
Paddy land	ha	5,105	6,571
Land for other crops	ha	5,741	10,489
Land for perennial plant	ha	12,610	5,963
Forestry land	ha	70,368	102,900
Aquaculture land	ha	778	517
Other agricultural land	ha	n/a	65
Non- agricultural land	ha	5,893	7,228

C. Socio-Economic Condition and Infrustructure

1. Population and Ethnic

58. The total population in the three target communes is 15,854 people of 3,591 households but the main beneficiaries of the subproject will be 6,122 people in 14 villages out of 37 villages. The estimated number of households likely to benefit is 1,428, this presents 40% of the population of the three target communes. There are at least 150 households (10%) with female headed directly benefited from the proposed Project. Almost beneficiaries are ethnic minorities with 80%. Table 8 below present population and ethnicity composition of target communes.

Table 6 – Population and Ethnicity in target area

	Whole commune			Beneficiary area			
	Ngoc Linh	Trung Thanh	Dong Tam	Ngoc Linh	Trung Thanh	Dong Tam	Total
Number of Villages	16	12	9	6	5	3	14
Population (person)	4821	6121	4881	1559	2555	2008	6122
Gender							
Women	2288	2435	2436	779	1431	1003	3213
Men	2533	2603	2455	780	1124	1005	2909
Number of Households	1130	1405	1056	417	579	432	1428
Female headed households	149	125	40	75	66	na	na
By ethnic group							
Kinh	300	282	124	166	124	22	312
Tay	223	483	208	69	191	93	353
Nung	96	474	210	16	237	104	357
Dao	236	18	390	44	8	173	225
Hoa (Chinese)	121	94	14	68	5	0	73
Hmong	130	32	109	42	9	40	91
Others	24	22	3	12	2	0	14

2. Living Standards and housing

59. Table 9 presents the poverty incidence in the target communes. The average poverty rate of Dong Tam commune is 28.4%, with the rate for the 3 benefitting villages ranging from 10 to 27 percent. For Ngoc Linh and Trung Thanh communes 20% and 14.2% of inhabitants fall below the poverty line.

Table 7 – Number of poor households in the subproject area

Commune	Village	Number of HH	Poor household	
			No of HH	% HH
Dong Tam commune		1056	300	28
	Tuoc	107	7	7
	Ban Buot	81	16	19.8
	Chang	133	23	17
	Kthuoi	43	25	58
	Nha	114	50	44
	Lam	241	65	27
	Pha	146	80	55
	Chaang	107	11	10
	Thuong	84	23	27
Ngoc Linh commune		1130	225	20
	Lung Loet	62	5	8
	Tan Lap	64	7	11
	Nam Thanh	46	0	0
	Nam Dau	57	4	7
	Khuoi Vai	107	13	12
	Na Qua	92	17	18
	Tan Phong	62	14	23
	Khuoi Kha	59	23	39
	Nam Dam	109	24	22
	Lang Mu	30	12	40
	Coc Tho	63	11	17
	Ngoc Thuong	92	21	23
	Ngoc Quang	39	16	41
	Nam Nhung	60	26	43
	Ngoc Ha	79	13	17
	Village No 5	109	19	17
Trung Thanh commune		1405	200	14
	Trung Son	160	8	5
	Ban Tan	166	17	10
	Dong	117	17	15
	Trang	159	9	6

	Minh Thanh	99	8	8
	Cuom	96	15	16
	Tang	69	12	17
	Coc Hec	121	38	31
	Thuy Lam	104	12	12
	Khuoi Lac	107	30	28
	Hai Luong	155	29	19
	Khuoi Khai	52	5	10

3. Employment and income

60. Agriculture production is the dominant income source in the three communes. Agricultural contributes 80% of the commune's GRDP. The main crops are paddy, maize, soybean and groundnut with oranges and tea. Livestock is a major source of income in these communes.

Table 8 – Main agricultural products in target communes, 2015

Indicators		Dong Tam commune	Ngoc Linh commune	Trung Thanh commune
Total production of cereals	Ton	3323	2950	na
Income per capita	VNDmil./year	18	13	19.1
Main agricultural products				
Paddy				
+ Planted Areas	ha	452	275	334
+ Production	Ton	2570	1520	1937
Maize				
+ Planted Areas	ha	179	325	247
+ Production	Ton	680	1430	1000
Soy bean				
+ Planted Areas	ha	51	13	24
+ Production	Ton	71.5	12	26.4
Groundnut				
+ Planted Areas	ha	117	40	280
+ Production	Ton	304	70	585
Perennial plants				
Tea	ha			
+ Planted Areas	ha	75	98	190
+ Production	ton	247	441	na
Oranges	ha	236		110
Passion fruit	ha			3.75
Livestock				
Buffaloes	head	1639	2235	2358

Cow	head	16	36	41
Goat	head	625	457	680
Pig	head	4259	3685	7029
Poultry	head	24500	21275	40685

Source: Annual report of Dong Tam, Ngoc Linh and Trung Thanh People's Committee, 2016

4. Education and Public Health

61. In Bac Quang district there is one hospital, two regional general clinics and 21 health care stations – one in each commune. Vi Xuyen district has one hospital, one regional policlinic and 23 commune health care stations. During 2015 the rate of malnourished children under 5 years old in whole province was 22% however the situation for the two subproject districts is better than the Provincial level at 19% and 12% for Vi Xuyen and Bac Quang district respectively[14].

62. According to Ha Giang Statistic Year Book 2015, 100% commune health care stations in both Bac Quang and Vi Xuyen Districts have midwives, but the rate of commune health care station which has doctor is 65% in Bac Quang compared to 25% in Vi Xuyen. in 2015 the rate of malnourished children under 5 years old is 15.5% in Dong Tam commune, 20% in Ngoc Linh commune and Trung Thanh commune is with rate of 18% (commune annual reports).

63. Primary school and secondary school facilities are available at commune level but high school is only located in district centers or in inter-commune locations where students from adjacent communes gain access. For the subproject area a total of 6 and 2 high schools in Bac Quang and Vi Xuyen district respectively. Enrolment rates for school age children in all three communes exceed 96%.

5. HIV and human trafficking

64. Overall, 56% of respondents (PPTA Social survey) had heard about HIV/AIDS with more men, 61.9%, as compared to only 50% of women. For those that had some knowledge of HIV/AIDS, the main sources of information were television (57.14%) and health workers (29.76%). People had also received information from relatives or friends (19.35%) and 10% from community posters. Human trafficking has also not been recorded in the subproject area.

6. Infrastructure

65. All communes have asphalt roads district commune center roads. The rate of concreted road in Bac Quang (43%) and Vi Xuyen district (34%). However, 17% and 21% of roads still have travel restrictions during the rainy / flooding season in Bac Quang and Vi Xuyen district respectively (See Table 11). All the communes have telephone lines to commune people's committee offices. Broadcasting and television have been fully covered all communes. All the communes have post offices.

Table 9 – Current situation of the road in subproject districts (km)

	Bac Quang	Vi Xuyen
Total length of road	1,277	1014

[14] Ha Giang Statistic Year Book, 2015

Urban road	36	345
Rural road	965	669
Type of road		
Asphalt/ concrete road	550	354
Bituminous macadam/gravel road	14	120
Soil/ earthern surface road	713	540
Traveling level		
Traveling around year	564	473
Very difficult traveling in rainy/ flooding season	499	324
Cannot traveling in rainy/flooding season	214	216

66. The subproject communes are all connected to the national grid although the more remote villages some households do not have access because of the distance from the grid. Overall the percentage of households with grid connections ranges from 92 to 98%.

67. In summary the target beneficiaries have better than average social and economic infrastructure reflecting the nature of the subproject road as being a strategic road for the movement of industrial freight and raw materials. The improved road is expected to support investment into Binh Vang industrial Estate, which in turn will create additional employment opportunities.

7. Unexploded Ordinance

68. 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.

69. UXO devices are encountered when ploughing fields, searching for scrap metal and even by children playing. Within the SRIDP 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, 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

70. There are several archaeological sites that have been discovered in Ha Giang province, especially artifacts from Stone Age such as working tools in Pac Ta cave, Lung Thieng village, Minh Tan commune, Vi Xuyen district - about 30km from the subproject road and Quang Tien village, Vinh Quang town, Hoang Su Phi district have been discovered in the beginning of 2015[15]. Nam Dau Pagoda, located 500m far from the end point of the subproject road, has been certified as National Historical Site by the Decision No. 4197 QD/BVHTTDL dated 16 November 2009. The Pagoda has remained architecture from Tran Dynasty at the end of XIII Century and beginning of XIV Century[16]. 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.

E. Key Environmental Features

71. ***Physical environmental features:*** The subproject road is located in the narrow valleys, along Lo River with large cultivation area of rice and corn. There are 14 stream/streamlet crossing position along the subproject road. There is also small Na Tang Reservoir at the beginning section of the subproject road in Dong Tam commune, Bac Quang district.

72. ***Social environmental features:*** The road goes through several crowded residential areas of Dong Tam commune, Bac Quang district and Trung Thanh, Ngoc Linh commune, Vi Xuyen district, especially 1.4 km goes through Viet Lam town, Vi Xuyen district. There are schools, kindergartens, cultural places and medical clinics along the road. Trung Thanh and Dong Tam markets are also located roadside.

[15] http://www.baohagiang.vn/van-hoa/201502/phat-hien-nhieu-di-chi-khao-co-hoc-tai-huyen-vi-xuyen-va-hoang-su-phi-569243/
[16] http://ditichlichsuvanhoa.com/dttc/DI-TICH-KHAO-CO-CHUA-NAM-DAU-a636.html

VI. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

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

74. 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.

75. 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 Viet Lam town, Dong Tam and Trung Thanh commune centers.

76. 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). Where government standards or guidelines have some kind of 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. Potetioal Impact and Mittigation Measures in Pre-construction Phase

1. Land acquisition and resettlement

77. **Impacts:** The impact is on several residential areas along the road including: Viet Lam town; Nam Dau village, Ngoc Linh commune; Trung Thanh commune center; Dong Tam commune center. Among 472 affected households, there are 21 seriously affected households (households that lost more than 10% of their total area of cultivated land or whose homes will be demolished or moved). In total there will be 90,918m^2 of affected lands, 2,590 m^2 is the public land and only 7,058 m^2 is the private residential land. The area of land use for annual crop is 54,571 m^2 and for trees land is 39,047 m^2.

78. **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 are 21 households adversely affected by constructio of the subproject, the REMDP will be updated and validated, and will provide for compensation and support of affected households, especially the 21 seriously affected households, as appropriate. PMU will also inform Ngoc Linh, Trung Thanh, Dong Tam, Viet Lam CPCs and local people of the four communes all information related to the road construction in advance Arrangements will be made for regular monitoring and to record and redress grievances.

2. Relocation of Services

79. **Impacts:** The road will be mainly constructed on the same road alignment and the main construction activity will be upgrading the road surface with some small realignments. Relocation of some low-voltage electricity poles, water supply pipes, wastewater pipes or signage maybe necessary and some type of signboards along the current route. In accordance to the compensation and resettlement data, there are 44 0.4kv electric poles and telephone line poles must be relocated with 2,480m electric line will be replaced. There is also one transformer and 286 m^2 of concrete culvert will be replaced

80. **Mitigation measures:** Provision will be made in the contract for relocation as required, and to co-ordinate the relocation of services with Ha Giang Electric Power Company, Bac Quang and Vi Xuyen Branches. Before construction starts, the PMU will work with these branches and the 4 CPCs to develop and implement plans to relocate the utilities and other affected structures and avoids or minimizes service interruptions. The relocation plan shall specify roles and responsibilities for relocation, the timing and relocation location sites.

3. Disturbance of unexploded mine and bomb (UXO)

81. **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.

82. **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 Ha Giang Provincial Military Commanders to check whether the area along the subproject route has been checked for in the past. 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 Mittigation Measures in the Construction Phase

1. Impact on flora and fauna along the road

83. **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, especially in Section 2. The construction activities will create noise, vibration that may disturb wild animals living in the forest area next to the road. Workers could hunt wild animals and cut down trees in the forest for fuel wood. This is a minor impact and will take place over 24 months of construction time. The number of trees will be cut down will be small and the nearest protection forest is about 1 km away around Km20 of the subproject road, so the impact is not large.

84. **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, Forest Ranger and DARD offices of Vi Xuyen and Bac Quang districts 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 not use or permit the use of fuel wood for construction activities or for cooking and water heating in worker's camps. The contractors should 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

85. **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.

86. **Mitigation measures:** To minimize the impact, the contractors will provide advance information of the construction schedule to the relevant utility operators such as Ha Giang Electric Power Company, Bac Quang and Vi Xuyen Branches and co-ordinate with them to ensure prompt relocation and reconnection. If any facilities are accidentally damaged during construction period, they should be reported to CSC and PMU as well as the owner to the facilities before repair at the contractor’s expense.

3. Impacts of materials excavation and extraction

87. **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. Three quarries and two 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. Both excavation works and the extraction of materials at the quarries and borrow pits may result in the release of soil and silt, which may also be released from materials stockpiles along the road, blocking nearby streams and potentially affecting cultivated areas. Areas at risk include quarries; borrow pits and materials stockpiles along the subproject

road. 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. Estimated soil volume for back filling during the subproject road construction is nearly 167,000m^3 while estimated volume of excavated class 3 soil (semi-solid soil that could be use for embankment) is nearly 182,000m^3

88. **Mitigation measures:** To prevent the release of silt into waterways, the contractors will use silt fences around excavation sites and stockpiles. On completion of extraction work, quarries and borrow pits will be closed, rendered safe and improved as agreed with landowners. Such improvement works may include landscaping and planting works as appropriate.

4. Impacts of the temporary material stockpiles

89. **Impacts:** About 7 main temporary material stockpiles will be located along 25.1 km road construction site. Fine material like sand and soil could generate dust in 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.

90. **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 Km1+400; Km3+400; and Km11+000. Stockpiles of material prone to dust generation (fine material like sand) should 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 at the distance of less than 50m to Na Tang Reservoir.

5. Generation of surplus soil

91. **Impacts:** Soil from excavation activities, which could not be reused as filling soil (about 18,900m^3), could have significant impacts and environmental degradation such as soil erosion when placed on slopes, near the water bodies, as well as release of silt.

92. **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 CPCs of the 4 commune/town. 4 CPCs will organize the distribution of surplus soil for local people who wish to use it.

93. 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. The contractors should work with local authorities to identify satisfactory dumping and disposal sites before construction starts. Construction waste dumping sites: having interviewed the local authority, some suitable waste dumping sites are proposed.

(i) Dumpsite at swampy site in Thuong village, Dong Tam Commune, Bac Quang district at Km1+400, located 50m away from the road with capacity of 120,000 m^3

(ii) Dumpsite at the abandoned area in Lam village, Dong Tam Commune, Bac Quang District at Km3+400, located right beside the road with capacity of 40,000 m^3.

(iii) Dumpsite at the abandoned area in Minh Thanh village, Trung Thanh Commune, Vi Xuyen district at Km11+000, located 200m away from the road with capacity of 180,000 m^3.[17]

6. Generation of construction waste and domestic waste from workers

94. **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 25.1 km length of the subproject road including residential areas, especially Viet Lam town. Uncontrolled waste disposal could further reduce the water, ambient air and soil quality and heavily impacts on local people in the subproject area.

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

7. Impact from bitumen heating and road compaction activities

96. ***Description:*** The operation of road compaction machines will generate noise and dust and bitumen heating will generate gas and odor. Although the emissions from powered mechanical equipment will be rapidly dispersed in the open terrain they will need to be sited carefully to avoid complaints. The impact will happen at the construction sites along the subproject road and affect on local people living in the surrounding areas. However, the affected level is insignificant because the small construction activities and the surface of the road are only 5.5m. On the other hand, bitumen heating could create a risk of fire, if fuel wood in open fires is used for bitumen heating.

97. **Mitigation measures:** To minimize the negative impact, the contractors should ensures that activities with loud noise and vibration or bitumen heating machine take place at least 50 m away from sensitive areas such as Viet Lam town; Trung Thanh and Dong Tam commune centers; Nam Dau village, Ngoc Linh commune, Vi Xuyen district. PMU and CSC will responsible to monitor this mitigation measure during 24-month of construction phase.

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

98. **Impacts:** Earthworks and rock crushing activities will be the main sources of dust. Construction machines and vehicles will generate gaseous emissions (NOx SOx, CO, CO_2, etc.) when they are in operation. These gaseous emissions and dust could cause health problems for residents who live near the construction site and along the transportation route, especially at

[17] This list has been discussed and initially agreed with the CPCs of Dong Tam, Ngoc Linh andTrung Thanh CPCs. Details are showed in Geological survey report for the subproject road by the PPTA

sensitive points such as schools, kindergartens, markets, commune centers and medical clinics. The impact is considered as average as the subproject road goes through several residential areas of three communes in 2 districts, especially Viet Lam town.

99. **Mitigation measures:** Similar to the mitigation measure for impact from bitumen heating and compaction activities, the contractors should not located any noisy machines or large material storage site near or within protection forest and residential areas of Viet Lam town; Ngoc Linh, Trung Thanh and Dong Tam communes. The contractors will work with 3 CPCs of Ngoc Linh, Trung Thanh and Dong Tam, 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.

9. Landslide, soil erosion and runoff

100. **Impacts:** Roadside erosion and runoff could happen during rain, especially at the roadside and at borrow areas. Erosion and runoff could impact on the cultivation areas and contaminate waterways. Landslides could happen in sections with high slopes adjoining the road, especially when the vegetation cover is cleared. Landslide will damage the road and block movement and release silt into waterways.

101. **Mitigation measures:** There is no sign of landslide and soil erosion along the subproject road as all the slopes are stable and covered with vegetation covers. However, to minimize the possible impact of soil erosion and runoff at the stream crossing points, the contractors should limit to store material near streams and Na Tang Reservoirs, install silt fences around excavated areas (including borrow areas) and around piled material. Where slope cutting takes place, slopes should be left with clear and even profile. The contractors will also follow weather forecasts and avoid operations such as excavation and slope trimming on heavy rain days.

10. Impact on crossing streams or bridge construction locations

102. **Impacts:** Careless construction and poor handling of materials at bridge sites can cause blockages and release of silt to streams/ streamlets. Runoff water during its rain could bring waste and soil into streams at 14 crossing positions then to Lo River. That could lead to siltation and reduce the water quality and affect stream water user, as stream is the main domestic water supply source of local people in the subproject area.

103. **Mitigation measures:** To minimize the negative impact, the contractors should transport excavated material to use as fill, distribute to local users or take to approved disposal sites immediately. Silt fences and sediment barriers or other devices will be used as appropriate at bridge construction sites. The contractors should limit the main construction activities of the 14 bridges to the dry season.

11. Impact by the large influx of construction worker

104. ***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 electric 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, violence.

The impacts would be on both workers and on the communities near the construction sites in residential.

105. ***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 cleaned 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 3 subproject communes and Viet Lam town will benefit from the subproject construction.

12. Safety risks to local people and construction workers

106. **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 two branches of Ngoc Linh primary school, Trung Thanh kindergarten, Trung Thanh primary and secondary school, Trung Thanh market, Trung Thanh medical clinic, Cuom and Coc Hec branches of Trung Thanh primary school, Dong Tam market, Dong Tam kindergarten and primary school.

107. **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.

13. Impact on the local traffic

108. **Impacts:** Construction activities on the Subproject road are likely to cause hindrance in traffic flow if not mitigated properly especially when there is no other option for travelling. There are several schools and kindergartens and their branches located along the road. Children and pupils will have difficulty getting to schools. Trung Thanh and Dong Tam markets are also located roadside. It will make difficulties for people to reach these markets during the construction phase, especially during the market session every Saturday morning. The road runs along the narrow valleys and there is only one-way road. Local people and people from other areas who travel on the subproject road will be affected during 24 months construction period.

109. **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 Bac Quang and Vi Xuyen districts 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, at the junction to Viet Lam town and Tan Quang T-junction and at the sensitive locations likes schools, kindergartens, medical clinics and markets. 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. Material transportation will be minimized in Saturday morning during the market session.

14. Cumulative impacts from the subproject and Dong Tam - Dong Tien Inter-commune road

110. ***Impacts:*** The start point of Dong Tam - Dong Tien Inter-commune road is about 500m from Km0+500 of the subproject road. This project upgrading 9 km road connects to Dong Tien commune center. The construction activities of the two projects at the same time will create a heavy burden to the local infrastructures and services like water supply, electricity, road network, and waste treatment system. The impact will mainly take place in Dong Tam commune and impact directly to commune's infrastructure and service and local people. However, the impact is not large as Dong Tam - Dong Tien Inter-commune project is nearly complete at the moment and it will be put in operation in 2017.

111. ***Mitigation measures***: PMU and EPS will work with Dong Tam CPC and the contractor of Dong Tam - Dong Tien Inter-commune road to find out a suitable construction schedule, machine and worker mobilization plan avoid concentrate construction works at the same time. The contractor will inform Dong Tam CPC the construction schedule and scope in advance. The selection of material mines, borrow pit and dumping site for the subproject will also consider the demands from Dong Tam - Dong Tien Inter-commune road project.

C. Potential Imacts and Mittigation Measures in the Operation Phase

1. Driving conditions, community safety and impact from, noise, vibration arising from increasing traffic density

112. The upgrading and construction of the road is likely to increase the vehicle speeds on the road. Projected future traffic flows indicate moderate flows which are unlikely to significantly worsen community safety issues. Increases in traffic flow will possiblly create traffic jam conditions, especially at the market area in Dong Tam commune at the market session every Saturday morning. On the other hand, the condition of the road facilities will be enhanced and driving conditions should improve. The beneficiaries of the subproject are local people in Bac Quang and Vi Xuyen districts and people who travel on the subproject road. This is an average impact as the subproject road will be upgraded to Grade IV - Moutain road and creates favorable travel condition for people of the two districts. However the increasing traffic density could also increase, noise and vibration and have negative impacts to the hearing and respiratory system of local people living along the subproject road.

113. **Mitigation measures:** Ha Giang DOT will install speed limit board and traffic calming measures such as speed humps at residential areas and some other sensitive points. Hazard warning signboards will be installed at junctions with National Road No.2 (Viet Lam and Tan Quang T-junctions) and the start and end point of the two sections. The Ha Giang DOT will cooperate with local traffic police to navigate the transportation at the section pass through Dong Tam market, especially on Saturday Morning - the market session day.

2. Favorable conditions for transportation of goods and people movement

114. **Impacts:** The paved road will reduce journey times and vehicle operating costs. The completion of section 2 will connect the network, reduce the croweded situation of NH 2. The road will support stable transportation from Binh Vang Industrial Zone to the border area around the year. It will also support transportation of goods, especially agricultural product, save time and increase the profit for local people. The completion of the road will favor people in the 4 commune/ town of Vi Xuyen and Bac Quang districts and surrounding residential areas as well as people who doing business in these two districts.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

115. 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

116. 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 Ha Giang DPI, DONRE, and DARD. Consultation has also been implemented with representatives from Ngoc Linh, Trung Thanh and Dong Tam communes in Vi Xuyen and Bac Quang districts. Among 65 people have been consulted, 16 are women, make up 25%. Consultations took place in September 2016.

B. Informaton Dessimination During Public Consultation

117. 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.

118. The information disseminated during public consultation included: (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 the Results of Public Consultation

119. The results of the public consultations are recorded in Table 12 and 13 below. In general, all the relevant stakeholders are support the implementation of the subproject. As the subproject located in the low population density and the main construction work will be upgrade road surface based on the existing road foundation, no house must be relocated and no major land acquisition will be taken, the local people is totally support the subproject implementation.

Table 10 – Main issues and information from local authorities

Main issues	Information from relevant authorities
Forest in the subproject area	Ha Giang DARD: There is no special forest in the subproject area and its vicinity. Protection forest is on the top of some mountains along the subproject road and at a distance of about 1 km. The forest is managed by The Management Board under Program 611 and will be changed after forest delivering program to local people complete.
Biodiversity in the subproject area	Ha Giang DONRE: There are 6 nature reserve/ conservation areas in Ha Giang but they are all far from the subproject area. There is no rare or endangered fauna and flora species in the subproject area

Table 11 – Main environmental concerns from public consultation

Concerns expressed	How concerns are addressed in IEE
Increasing ore exploitation activities as the consequence of improved driving condition	Ha Giang DOT will install speed limit board and road hump at the residential areas and some other sensitive points. Danger cross signboard will be installed at the cross points of road to National Road No.2 (Viet Lam and Tan Quang T-junctions) and the start and end point of the two sections.
Cumulative impact of the subproject implementation and the construction of Dong Tam - Dong Tien inter-commune road in Dong Tam commune, Bac Quang district	PMU and EPS will work with Dong Tam CPC and the contractor of Dong Tam - Dong Tien Inter-commune road to find out a suitable construction schedule, machine and worker mobilization plan avoid concentrate construction works at the same time. The contractor will inform Dong Tam CPC the construction schedule and scope in advance. The selection of material mines, borrow pit and dumping site for the subproject will also consider the demands from Dong Tam - Dong Tien Inter-commune road project.
Road safety issues at the sections go through high residential areas	Speed limit/ loading limit will be installed at the start and end points of both sections and the 2 junctions to Viet Lam town center and Tan Quang commune, National Road No.2. Road humps will be installed when the road goes through the sensitive areas such as residential areas of Viet Lam town; Dong Tam and Trung Thanh commune centers, Na Dam village, Ngoc Linh commune, Vi Xuyen district. Road hump and side board should also be installed at the areas of school at different level, kindergarten, market, commune center and medical clinic
Traffic jams at the section passes through Dong Tam market	Ha Giang DOT will cooperate with local traffic police to navigate the transportation at the section pass through Dong Tam market, especially on Saturday Morning - the market session day

120. 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. Ha Giang PMU will responsible for IEE translation to Vietnamese and disclose at Ngoc Linh, Trung Thanh, Dong Tam communes; Viet Lam town of Vi Xuyen and Bac Quang districts.

VIII. GRIEVANCE REDRESS MECHANISM

A. Purpose of the mechanism

121. 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

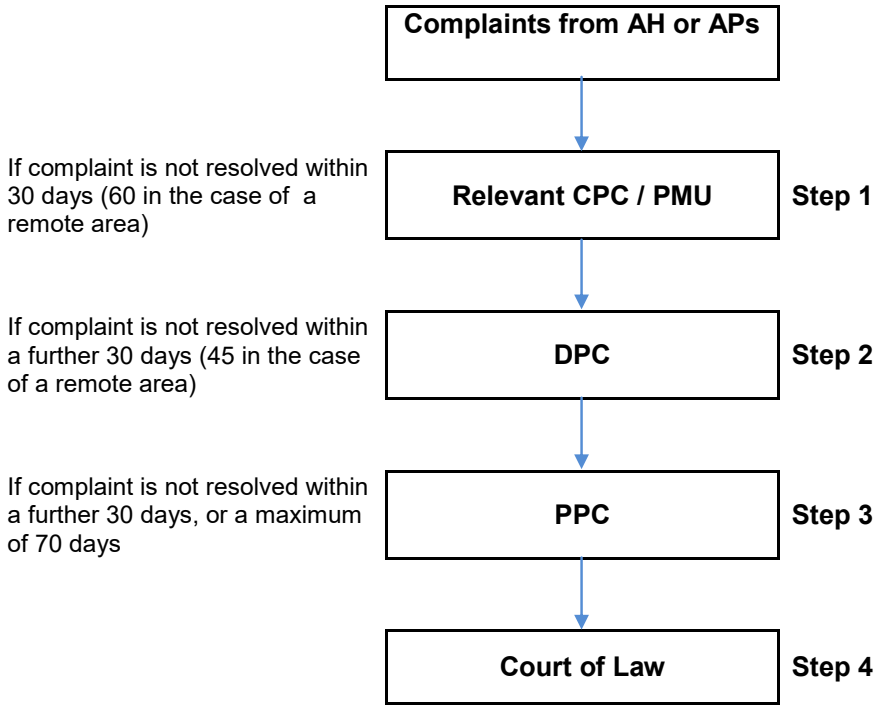
122. There are three steps to address complaints received from stakeholders:

***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

123. Ha Giang PMU will recruit one Environment Safeguard Specialist (ESS) under the Loan Implementation Consultants (LIC) to support subproject implementation in Ha Giang. 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.

124. 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. The CSC will ensure that the contractors implement the provisions of the subproject EMP.

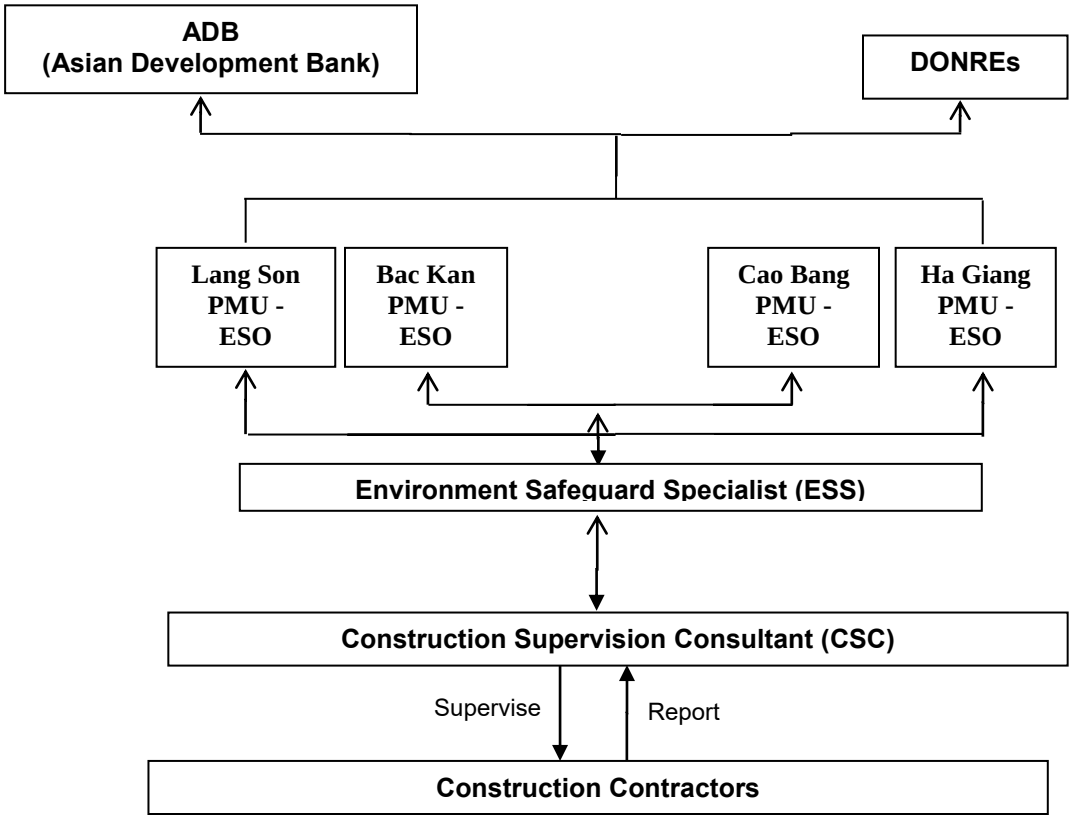
Table 12 – Responsibilities for EMP implementation

Agency	Responsibilities
Ha Giang 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 ESS. - 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 ESS, 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 ESS, 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 (ESS)	- Update EMP to make it suitable with the current condition or whenever subproject scope change or any unanticipated impact rise. - Ensure that the environmental protection and mitigation measures identified in the EMP for the design stage has been incorporated in the detail design; - Assist PMU to ensure that all environmental requirements and mitigation measures from the IEE and EMP are incorporated in the bidding documents and contracts. - During detailed design phase carry out baseline data collection on air quality, noise and surface water quality (as specified in the EMP) - During detailed design phase, prepare method statement (Waste Management

	and Spoils Disposal Plan) described in the IEE/EMP. - Implement all mitigation and monitoring measures for various subproject phases specified as ESS'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 ESS'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 - Provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the EMP - Implement additional environmental mitigation measures, as necessary
Ha Giang Department of Transportation (DOT)	- Responsible for operation and maintenance of Subproject road - Implement EMP monitoring during operation
Ha Giang Department of Natural Resources and Environment (DONRE)	Review and approve environmental assessment reports required by the Government. - Undertake monitoring of the subproject's environmental performance based on their mandate

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

Figure 3 – EMP Implementation Organization Chart



B. ENVIRONMENTAL MITIGATION

125. The anticipated environmental impacts and mitigation measures discussed in the previous section is presented in Table 15. The table also shows responsibilities and timeframe/schedule for implementation of mitigation measures and monitoring.

126. Table 15 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 13 - 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 on 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 will 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 in the forest area near Km20 of the subproject road. 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	Through out construction phase	Along the subproject road; 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 through out 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 Pha Village, Trung Son Village, Lung Loet quarries; borrow pits at Dong Tam T-junction, borrow pits in Minh Thanh village 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 borrow 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 Ha Giang 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 and will be disposed only to areas approved by local authorities as listed in Paragraph 108 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. The spoils disposal site shall be located away from watercourses and shall be protected from erosion by avoiding formation of steep slopes and grassing.	Contractors	Through out construction phase	Through out construction site, material storage areas, machines and vehicles maintenance area	Included in the contract with contractors
5. Bitumen heating and compaction activities	Avoid air pollution, traffic obstacles and contamination	1. Locate, bitumen heating off road and (wherever practicable) far from sensitive receivers (residential areas, schools, clinics, etc.) and streams and install and maintain dust suppression equipment. 2. No open fuel wood burning for bitumen heating 3. Prevent soil contamination requiring	Contractors	Through out construction phase	Through out construction site	Included in the contract with contractors

		contractors to instruct and train their workers on storage and handling of materials and chemicals that can potentially cause soil contamination. 4. Recycle debris generated by dismantling of existing pavement subject to the suitability of the material.				
6. Noise, dust and vibration	To minimize negative impacts from noise, dust and vibration during construction period	1. Restrict works to daylight hours within 500 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 project. 4. Keep material storage site moist for the fine material like sand. 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 immediately as directed by ESS/PMU. 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	Contractors	Through out construction phase	Through out construction site	Included in the contract with contractors

		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 behaviour.				
7. Erosion control/ run off	Protect established facilities	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.	Contractors	Through out construction phase	Through out construction site and high risk slope as agreed with ESS/PMU	Included in the contract with contractors
8. Streams/ Rivers protection and bridge/culvert construction	Protect Streams/ Rivers and maintain flows	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed not to block streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent	Contractors	Through out construction phase	14 stream crossing points	Included in the contract with contractors

		siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.				
9. Large influx of construction worker	Construction camps and worker camps not to cause any negative impact to surrounding environment (forest area, water bodies, wild animal); control of infectious diseases.	1. Construction and worker camp location and facilities located at least 500m from settlements and agreed with local communities and facilities approved by 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 waste management plan. 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	Contractors	Through out construction phase	Through out construction sites and worker camps	Included in the contract with contractors

		practicable after it is vacated and cleaned. 12. Register temporary stay for workers with police.				
10. 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 responsibility for maintaining safety measures to a senior member of the Contractor's staff	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors
11. Traffic Management	Minimize disturbance of traffic	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. Coordinate with traffic police of Vi Xuyen	Contractors	Through out construction phase	Through out construction sites; at start and end points in two sections;	Included in the contract with contractors

		and Bac Quang districts 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 Vi Xuyen and Bac Quang districts 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. 8. Avoid material transportation on Saturday morning, during the market session.			Junctions with road to National Road No.2 - Viet Lam town center and Tan Quang.	
12. Cumulative impact	Minimize the intensify impacts of two subproject construction at the same time	1. Inform construction schedule and scope to Dong Tam CPC in advance 2. Work with the contractor of Dong Tam - Dong Tien Inter-commune road Project to find out suitable construction, material transportation time. 3. Consider the capacity of material mines, borrow pits and disposal sites for both project.	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors
Operation Phase						
1. Generation of noise, vibration; road safety issues	To minimize noise, vibration and road accident	1. Undertake road safety awareness campaigns for local residents and other road users of provincial road No184. 2. Install and maintain road warning signs and markings. 3. Monitor road accidents and implement necessary preventive measures (awareness campaigns, provision of appropriate road furniture to enhance road safety and control traffic).	Ha Giang DOT	Through out operation phase	Along the proposed road	Included in operation and maintenance cost

C. Environmental monitoring

Environment Compliance Monitoring

127. Table 16 below shows the program for monitoring the compliance on various provisions of the EMP during 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 16. During operation EMP implementation shall be the responsibility of Ha Giang DOT.

128. 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.

Environmental Effects Monitoring

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

Table 14 - 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	Ha Giang DPI/ DONRE; PMU	Included in the operation budget of PMU
2. Unexploded Ordnance	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; worker camps area	Before construction commencement and through out 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 through out 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	Through out 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. Compaction activities and bitumen heating	Check of implementation	Through out construction site	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
6. Noise, dust and vibration	Check of implementation	Through out construction site	Bi-weekly and spot checks Part of daily construction supervision	ESS/ PMU	Included in the operation budget of PMU/ ESS CSC
7. Land slide, erosion	Check of implementation	Through out	Bi-weekly	ESS/ PMU	Included in the

control/ run off		construction site and high risk slope as agreed with ESS/PMU (	Part of daily construction supervision	CSC	operation budget of PMU/ ESS/ CSC
8. Stream protection and bridge/culvert construction	Check of implementation	Through out construction sites, 14 stream cross the road, 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
9. Large influx of workers. Construction and worker camps, sanitation and diseases	Check of implementation	Through out construction sites and worker camps	Before establishment of the facilities and through out the construction phase Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
10. Safety precautions for workers and public safety	Check of implementation. Check compliance to Labor Code of Vietnam and other relevant Decision, Decree and Circular under Government requirements	Through out construction sites	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
11. Traffic Management	Check of implementation	Through out construction sites; at start and end of the road; junctions with road to National Road No.2	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
12. Collaborate with Dong Tam - Dong Tien Inter-commune road Project	Check of implementation, checking documents	Construction sites in Dong Tam commune; material transportation road, borrow pit, mines and dumping site	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
Operation Phase					
1. Road safety	Check of implementation	Along the route	Semi-annual	Ha Giang DOT	Included in the operation budget of DOT

Table 15 - Environmental Effects Monitoring

Construction Phase					
1. Noise, dust and vibration	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…)	9 monitoring points. 2 points at start and end point of the subproject; 4 points at residential areas of Ngoc Linh (Nam Dau village), Dong Tam, Trung Thanh communes and Viet Lam town. 1 point at Bac Quang T-junction in Trung Thanh commune; 1 point at Na Tang reservoir and 1 point at Dong Tam market	1 time before construction start and semi-annually during 2 years construction time (5 times in total	ESS	2700 USD[18]
2. Water quality	Surface water quality	14 sampling points at 20m downstream of the crossing streams. 01 sampling point in Na Tang Reservoir (15 in total)_	1 time before construction start and semi-annually during 2 years construction time (5 times in total)	ESS	37,500 USD
	Ground water quality	14 sampling points in 14 stream crossing points (from nearby drilled well)	1 time before construction start and annually during 2 years construction time (3 times in total)	ESS	16,800 USD[19]

[18] Figures have been estimated base on environmental monitoring cost norm of Ha Giang province.
[19] Figures have been estimated base on environmental monitoring cost norm of Ha Giang province.

D. Reporting

130. PMU will submit the following reports to ADB:

(i) *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.

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

Table 16 – Reporting procedures

Project Phase	Type Of Report	Frequency	Responsibility	Submitted To Whom
Construction	**Environmental Performance Report** indicating compliance with EMP and monitoring results at the contractor site	Daily	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.	Ha Giang DOT	Ha Giang DONRE

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

Item	Estimated cost (US$)
1. Environment Safeguard Specialist (ESS)	***21,040***
1 National ESS - 06 man-months (intermittent in the first 2 years;) – 2,000 US$/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
2. Environmental effects monitoring (implemented by ESS)	***57,000***
Ambient air quality: 9 monitoring locations x 5 times x 60 US$/sample[20]	2,700
Ground water quality: 14 monitoring locations x 3 times x 400 US$/sample[21]	16,800
Surface water quality: 15 monitoring locations x 5 times x 500 US$/sample[22]	37,500
3. Training/orientation, local transportation, supplies (by ESS)	***3,000***
a) Training/orientation: 1 formal training course for PMU, CSC, Contractors and DOT office of Bac Quang and Vi Xuyen districts 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 (1+2+3+4)	**81,640**
5. Contingency	**6,360**
Total (1+2+3+4+5)	**88,000**

E. Capacity Building

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

132. The most significant challenge is the lack of human and financial resources and necessary infrastructure. To address this constraint, Ha Giang 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 by the Environment Safeguard Specialist (ESS) during subproject implementation as "on the job" training or by formal training courses.

[20] Figures have been estimated base on environmental monitoring cost norm of Ha Giang province.
[21] Figures have been estimated base on environmental monitoring cost norm of Ha Giang province.
[22] Figures have been estimated base on environmental monitoring cost norm of Ha Giang province.

Table 18 – Detail capacity building program

Objective	1. Build capacity and procedures in undertaking systematic environmental assessments in accordance with Government regulations and ADB guidelines 2. Provide training on international best practice on environmental management, monitoring and reporting. 3. Provide guidance on how to effectively incorporate environmental measures into project design and how to incorporate EMP provisions into tender and contract documents.
Tasks/Scope of Work	1. Undertake training needs analyses and review prevailing government regulations and donor guidelines governing the assessment and management of environmental impacts for road development. 2. Review the skills of PMU and Ha Giang 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 Ha Giang DOT who responsible for environmental management
Staff resources	International and national environmental specialist with at least 15 years experience on environmental management of road projects and must possess relevant post-graduate degree in civil engineering, environmental management and other relevant courses. With working knowledge of safety issues and at least 3 years experience in conducting environmental management training.

X. CONCLUSIONS AND RECOMMENDATIONS

133. 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.

134. The implementation of the subproject “Upgrading and Improvement of PR184 from Dong Tam Commune, Bac Quang District to Ngoc Linh Commune, Vi Xuyen District, Ha Giang” will steadily improve the road quality; make it favorable for transportation, support goods transfer to and from Binh Vang Industrial Zone and reduce the traffic pressure for National Road No.2. Several actions are required during the detailed design stage to minimize impacts to acceptable levels. The negative environmental impacts from the upgrading works will mostly take place during the construction stage. All of the impacts during construction phase should be very predictable and manageable and with appropriate mitigation and few residual impacts are likely. Additional human and financial resources will be required to improve environmental capability and to progress and achieve necessary statutory compliance and environmental clearance certification for the subproject or associated activities that also require environmental permits under the environmental laws of Viet Nam – LEP 2014.

135. 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 Dong Tam commune, Bac Quang

End point in Ngoc Linh commune, Vi Xuyen

Road section in Dong Tam commune

Dong Tam Market

Existing trail - Section 2 in Ngoc Linh commune

Nam Dau Pagoda

Na Tang Reservoir

Current suspension bridge over Ngoc Ha stream

B. Appendix 2: Source of Reference Information

1. *Ha Giang Status of Environmental Report 2015*
2. *Ha Giang Climate Change Adaptation Plan (2011-2020)*
3. *Report on Pollution control under Environmental Protection Plan in 2015 Ha Giang Environmental Agency*
4. *The subproject Feasibility Report*
5. *Poverty and Social Assessment Report of the subproject*
6. *Inventory of losses report of the subproject*

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

1. Impacts on 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 will 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 in the forest area near Km20 of the subproject road. 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 Pha Village, Trung Son Village, Lung Loet quarries; borrow pits at Dong Tam T-junction, borrow pits in Minh Thanh village 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 borrow 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 Ha Giang 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 and will be disposed only to areas approved by local authorities as listed in Paragraph 108 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. The spoils disposal site shall be located away from watercourses and shall be protected from erosion by avoiding formation of steep slopes and grassing.
5. Bitumen heating and compaction	1. Locate, bitumen heating off road and (wherever practicable) far from sensitive receivers (residential areas, schools, clinics, etc.) and streams and install and maintain dust suppression

activities	equipment. 2. No open fuel wood burning for bitumen heating 3. Prevent soil contamination requiring contractors to instruct and train their workers on storage and handling of materials and chemicals that can potentially cause soil contamination. 4. Recycle debris generated by dismantling of existing pavement subject to the suitability of the material.
6. Noise, dust and vibration	1. Restrict works to daylight hours within 500 m of 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 for the fine material like sand. 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 immediately as directed by ESS/PMU. 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.).
7. 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.
8. Streams/ Rivers protection and bridge/culvert construction	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed not to block streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.
9. Large influx of construction worker	1. Construction and worker camp location and facilities located at least 500m from settlements and agreed with local communities and facilities approved by 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 waste management plan. 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.
10. 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.
11. Traffic Management	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. Coordinate with traffic police of Vi Xuyen and Bac Quang districts 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 Vi Xuyen and Bac Quang districts 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. 8. Avoid material transportation on Saturday morning, during the market session.
12. Cumulative impact	1. Inform construction schedule and scope to Dong Tam CPC in advance 2. Work with the contractor of Dong Tam - Dong Tien Inter-commune road Project to find out suitable construction, material transportation time. 3. Consider the capacity of material mines, borrow pits and disposal sites for both project.

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	Chloride (Cl^-)	mg/l	250	400	600	-
8	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	Cyanide (CN-)	mg/l	0,005	0,01	0,02	0,02
13	Arsenic (As)	mg/l	0,01	0,02	0,05	0,1
14	Cadmium (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	Phenol (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 list of attendance for public consultation

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 21 tháng 9 năm 2016
Tại Sở Tài nguyên và Môi trường tỉnh Hà Giang

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/ Bà Doãn Hồng Anh - Cán bộ hỗ trợ

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

Nội dung trao đổi làm việc:

1) Trao đổi các thông tin chung về DA Hạ tầng Cơ bản PT Toàn diện các tỉnh Đông Bắc
- TDA: Nâng cấp tỉnh lộ 184 từ Đồng Tâm đi Ngọc Linh
- TDA: NSH thị Vinh Quang và xã Bản Nhùng, Hoàng Su Phì

2) Các thông tin về khu vực TDA:
Hà Giang có 6 khu bảo tồn, khu đa dạng sinh học quyết nhưng không nằm trong khu vực 2 TDA này.
NSH ở thị trấn Vinh Quang hiện công suất 500 m3/ngày đêm vận hành từ 21/10/2011 nhưng do tiền điện quá cao nên [illegible].
Hoàng Su Phì hay bị mưa bão, lũ quét, sạt lở. Các huyện thị đều đã có bãi rác tập trung.
Có nhu cầu đào tạo về Giám sát, quan trắc, bảo vệ theo quy định của ADB.

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 21 tháng 9 năm 2016

Tại Nông nghiệp và Phát triển Nông thôn tỉnh Hà Giang

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/ Bà Doãn Hồng Anh - Cán bộ hỗ trợ

Đã làm việc với:

Đại diện Sở Nông nghiệp và Phát triển Nông thôn tỉnh Hà Giang (có danh sách kèm theo)

Nội dung trao đổi làm việc:

1) Trao đổi thông tin chung về DA BIIG và 2 TDA

2) Các thông tin về khu vực TDA

- Cả 3 huyện Bắc Quang, Vị Xuyên và Hoàng Su Phì đều ko có diện tích rừng đặc dụng.

Hiện Hà Giang chưa giao rừng phòng hộ. Rừng sx giao cho các cơ quan như hộ nhà nước nhà UBND xã. Rừng phòng hộ giao cho BQL Bảo vệ PT rừng.

BQL BVPT rừng huyện Vị Xuyên

BQL BVPT rừng huyện Bắc Quang (Ban 611)

Ở Vị Xuyên trên danh nghĩa rừng do UBND xã q/lý nhưng trên thực tế ng dân đang sử dụng.

Kiến nghị: Ngành NN ủng hộ. Cần khảo sát bồi thường thoả đáng diện tích đất NN của dân bị a/h.

- Tả Sử Choóng có các ctrình thủy lợi nhỏ tưới diện tích 10-15 ha. Xem chắn dòng suối có a/h đến các ctrình này không.

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 22 tháng 9 năm 2016
Tại xã Ngọc Linh, Trung Thành, Đồng Tâm huyện Vị Xuyên, Bắc Quang tỉnh Hà Giang

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/ Bà Doãn Hồng Anh - Cán bộ hỗ trợ

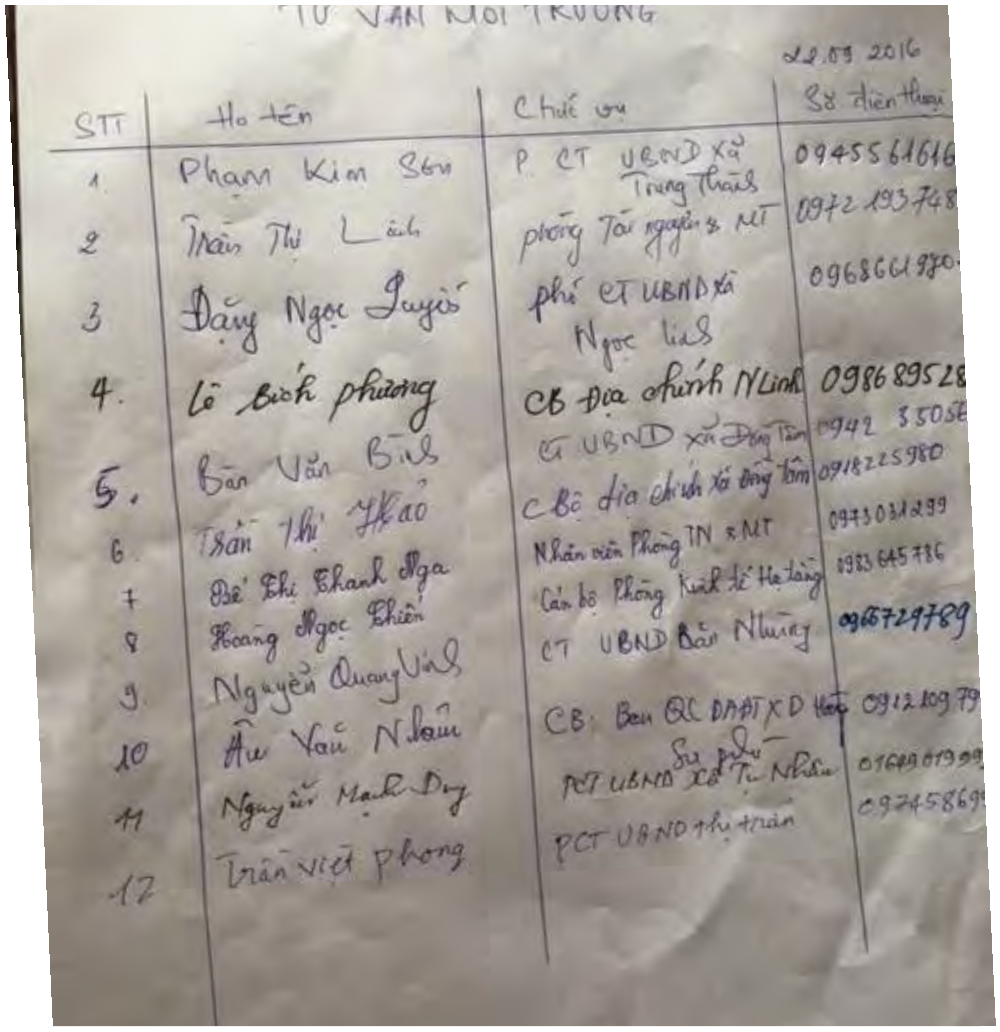
Đã làm việc với:
Đại diện chính quyền xã (có danh sách kèm theo)

Nội dung trao đổi làm việc:

Tại UBND xã Trung Thành: Nếu mở rộng đg từ 5.5m thì ảnh hưởng đến một số nhà dân. Cần lưu ý mức chênh lệch đền bù giữa nông thôn và thành phố. Lộ giới đg đã có, cần đền bù theo hành lang. Xã, dân đều đồng tình. Có bị ảnh hưởng nhưng ng dân chấp nhận được.
- PCT xã: Cần lưu ý an toàn khi thi công đoạn đoạn đg nhỏ hẹp; có 1 số xưởng cưa dọc theo đg. Có đi qua 1 đoạn Đ tt Việt Lâm.

UBND xã Ngọc Linh.
- Các khu trung tâm xã Ngọc Linh kéo dài đến tuyến đg. 2 mỏ quặng lớn đã hết giấy phép khai thác, đang trong t/g hoàn thổ. Liên quan phần diện tích mỏ lớn, đều hài lòng cho ng dân.

UBND xã Đồng Tâm
Thay đổi xác định tuyến đg, bà con trong quá trình thi công chỉ là tạm thời, tất cả đều ủng hộ.
Ông Bình: Chủ tịch, lưu ý tác động làm việc cho xã sáng T7 do họp phiên.
Hiện xe chở quặng, k nhiều nhưng có xe chở vật liệu xây dựng thi công đg liên xã Đồng Yên - Đồng Tâm. Đg tốt có thể tăng cg việc khai thác mỏ.



TƯ VẤN MÔI TRƯỜNG

22.09 2016

STT	Họ tên	Chức vụ	Số điện thoại
1.	Phạm Kim Sơn	P. CT UBND xã Trung Thành	0945561616
2	Trần Thị Lành	phòng Tài nguyên & MT	0972 193748
3	Đặng Ngọc Quyến	phó CT UBND xã Ngọc Liên	0968611980
4.	Lê Bích phương	CB Địa chính NLinh	0986895 28
5.	Bàn Văn Bình	C UBND xã Đồng Tâm	0942 350 5
6.	Trần Thị Thảo	CBộ địa chính xã Đồng Tâm	0918225980
7	Đỗ Thị Thanh Nga	Nhân viên Phòng TN & MT	0973031299
8	Hoàng Ngọc Thiên	Cán bộ Phòng Kinh tế Hạ tầng	0983 645 786
9.	Nguyễn Quang Vinh	CT UBND Bắc Nhung	0966729789
10	Hứa Văn Nhân	CB: Ban QL ĐẦU TƯ XD Huyện	0912 109 79
11	Nguyễn Mạnh Dũng	PCT UBND xã Tu Nhiên	0169 019 99
12	Trần Việt Phong	PCT UBND thị trấn	0974586 9

TRIỂN TOÀN DIỆN CÁC TỈNH ĐÔNG BẮC (PPTA – 8957)

..... ngày..... tháng 9 năm 2016

Nhóm Tư vấn môi trường thực hiện khảo sát tại
Xã...Đoàng Trần.....huyện...Bắc Quang.....tỉnh...Hà Giang.....

I. Danh sách các đại biểu nhận tiền hỗ trợ

No.	Họ tên	Ký nhận
1	Phạm Văn Dưỡng	
2	Sùng Đức Giống	
3	Sìn Sáo Hường	
4	Sùng Văn Nùng	
5	Sùng Sáo Tồn	
6	Nguyễn Văn Định	
7	Vũ Văn Sang	
8	Đỗ Văn Vũ	
9	Mai Đức Chương	
10	Mai Thanh Tâm	
11		
12		
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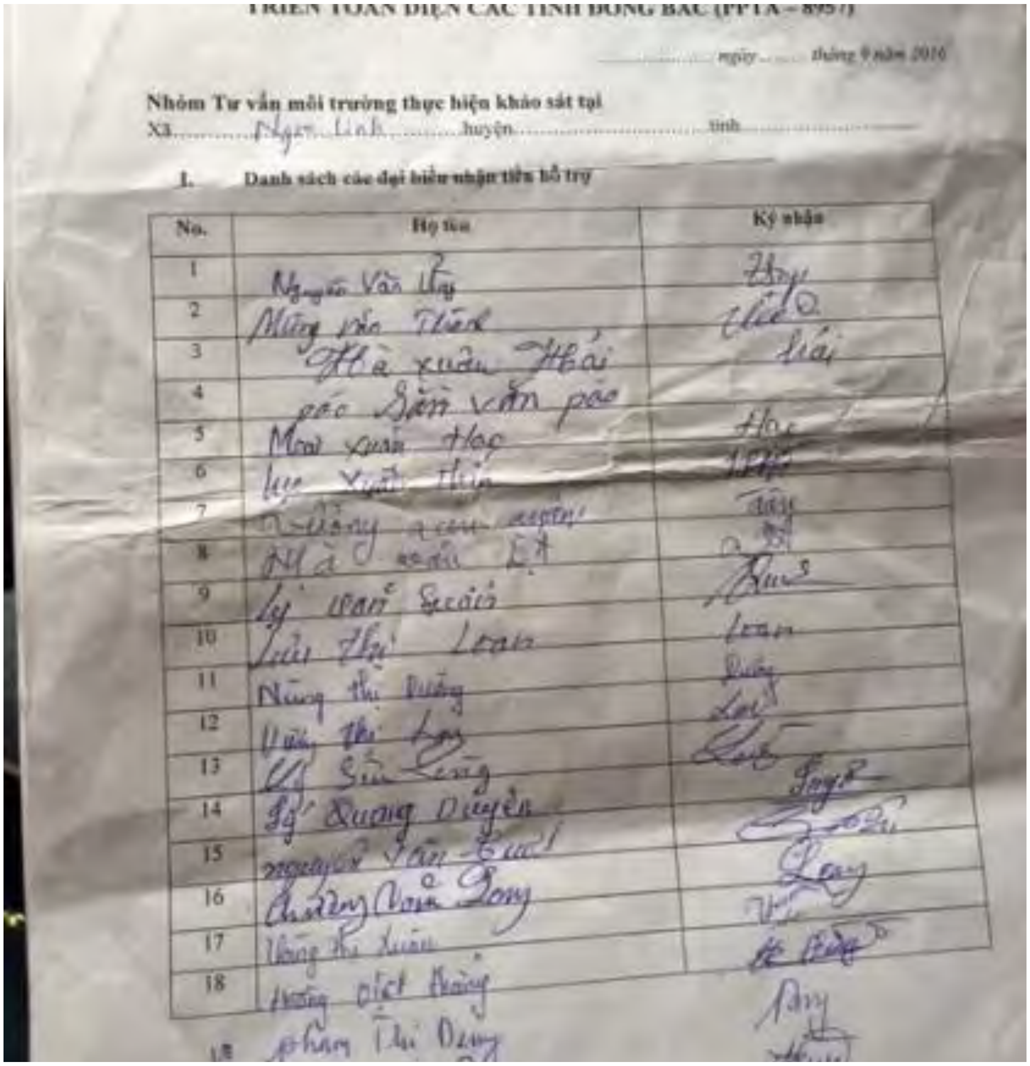
18		



TRIỂN TOÀN DIỆN CÁC TỈNH ĐÔNG BẮC (PPTA – 8957)

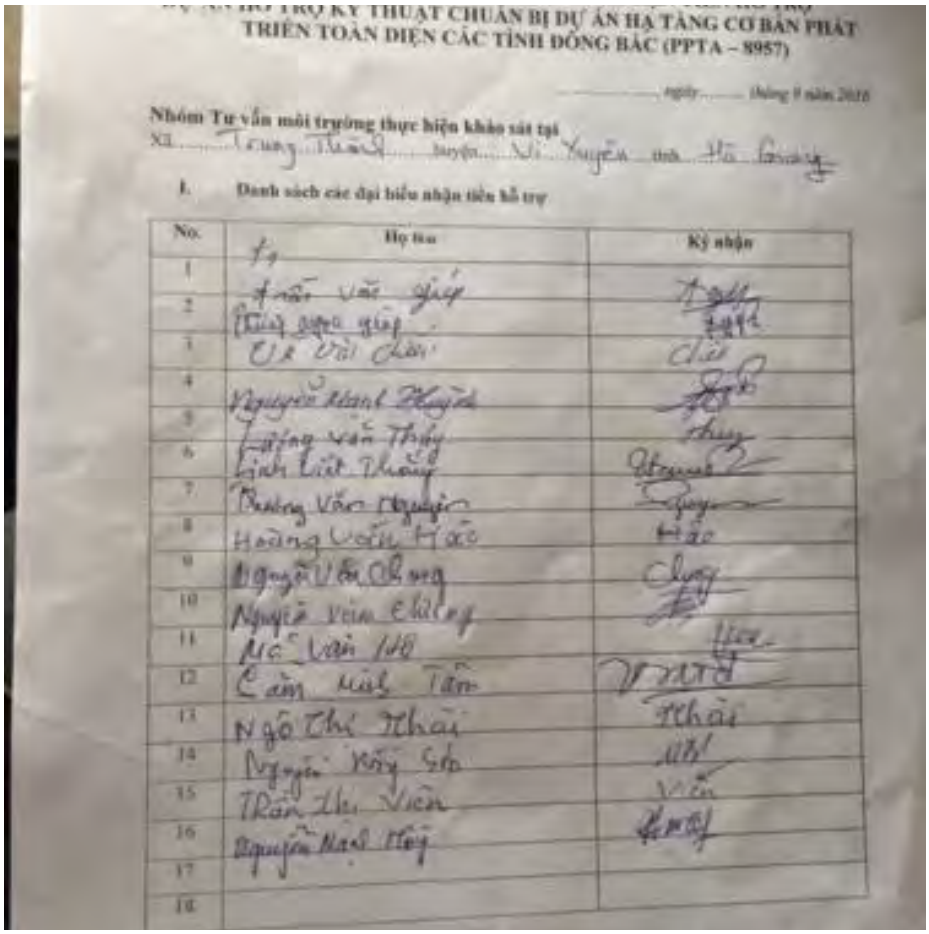
……… ngày …… tháng 9 năm 2016

Nhóm Tư vấn môi trường thực hiện khảo sát tại

Xã ……… Ngọc Linh ……… huyện ……… tỉnh ………

I. Danh sách các đại biểu nhận tiền hỗ trợ

No.	Họ tên	Ký nhận
1	Nguyễn Văn Hảy	Hảy
2	Nông Văn Thảo	Thảo
3	Hà xuân Hải	Hải
4	Sầm văn pảo	
5	Mai xuân Hạc	Hạc
6	Lục Xuân [illegible]	[illegible]
7	[illegible]	[illegible]
8	Hà [illegible]	[illegible]
9	Lý Văn [illegible]	[illegible]
10	Lưu Thị Loan	Loan
11	Nông thị [illegible]	[illegible]
12	[illegible] thị [illegible]	[illegible]
13	[illegible] Sìn [illegible]	[illegible]
14	Lý Quang Duyên	[illegible]
15	Nguyễn Văn [illegible]	[illegible]
16	[illegible] Văn Long	Long
17	[illegible] thị Xuân	[illegible]
18	[illegible] Việt [illegible]	[illegible]
19	Phạm Thị Dung	[illegible]



TRIỂN TOÀN DIỆN CÁC TỈNH ĐÔNG BẮC (PPTA – 8957)

ngày ... tháng 9 năm 2018

Nhóm Tư vấn môi trường thực hiện khảo sát tại
Xã Trung Thành huyện Võ Nhai tỉnh Thái Nguyên

I. Danh sách các đại biểu nhận tiền hỗ trợ

No.	Họ tên	Ký nhận
1	[illegible]	
2	[illegible]	
3	[illegible]	
4	[illegible]	
5	[illegible]	
6	[illegible]	
7	[illegible]	
8	[illegible]	
9	[illegible]	
10	[illegible]	
11	[illegible]	
12	[illegible]	
13	[illegible]	
14	[illegible]	
15	[illegible]	
16	[illegible]	
17		
18		

Initial Environmental Examination

Stage of the document: Final
Project number: 49026-002
April 2017

VIE: Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project-

Subproject: Construction and Upgrade of Hoa Tham – Quy Hoa – Vinh Yen Road in Binh Gia District, Lang Son Province

Prepared by Planning and Investment Department of Lang Son province for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 27 April 2017)

Currency unit	–	Viet Nam Dong (D)
D1.00	=	$0.000044
$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
PMU	–	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 Assistance Consultants

The Project	–	Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project
The Subproject	–	Construction and Upgrade of Hoa Tham - Quy Hoa - Vinh Yen Road in Binh Gia District, Lang Son 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 Provincial 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 entitled "Construction and Upgrade of Hoa Tham - Quy Hoa - Vinh Yen Road in Binh Gia District, Lang Son Province" and is an Output 1 - Improved Road Network Connectivity - representative subproject of BIIG 1. The route travels through Hoa Tham, Quy Hoa and Vinh Yen communes, Binh Gia district, Lang Son province with the total length of 22.95 km.

4. The road will be upgraded to Category V Mountain Road as classified in Vietnamese national standards TCVN (Tieu Chuan Viet Nam) 4054:2005 from its current Rural B classification. The current road has a narrow carriageway (3.5-4.0m base width), is of very poor quality and on the Consultants’ site visit was impassable even with a 4X4 vehicle. The section over the Bac Giang River at Km14+300m has no bridge, with locals relying on rafts to cross. Rains make the road very muddy and increase risks of landslides. Connectivity is often severed. The main specifications are:

- Design velocity: 30 km/h
- Min radius: 30m
- Road base width: 6.5m;
- Road surface width: 5.5m;
- Earth shoulders: 2 x 0.5m;
- Design load capacity for the road, culvert (bridge): H30-BX80 (HL93)
- Design frequency for road, culvert, small bridge: 4%
- Design frequency for medium bridges and large bridges: 1%
- Road structure: Cement concrete

5. Based on the FS report there are three small slab bridges in which one bridge crosses the Bac Giang river. It consists of a composite spillway bridge at Km 0 + 272.57 and is currently degraded, particularly in the rainy season when it floods regularly from 1 - 2m. Therefore it is necessary to build new bridge to ensure year round access. The bridge is to be a prestressed reinforced concrete girder bridge L = 33m. Bridge width fits category V mountainous road. Further bridges included in the subproject are shown in Table 1:

Table 1 – Number of bridges along the subproject road

No.	Location	Name + Bridge type	Width (m)	Length (m)	Replacement
1	Km0+272.57	Composite spillway	6	12	Beam bridge of length 33m
2	Km6+636.99	Slab bridge	4.6	5	Slab bridge of length 6m
3	Vang Man; Km14+754.13	No existing bridge			Beam bridge of comprising 3 x 33m
4	Km21+282.64	Composite spillway	7	12	Modified approach only

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 considered 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 pre-construction; construction and operation phases, and to set out institutional arrangements to ensure that the subproject EMP will be implemented.

8. The proposed subproject will significantly improve living conditions and access of the target communities to markets and services, and will also address deterioration of the existing road and inadequate river crossings. Negative impacts are mainly associated with the construction phase, are temporary and can be mitigated by applying measures detailed in the subproject EMP.

9. In the design and preconstruction phases, the potential issues that have been identified are (i) land acquisition and resettlement as the road goes through some residential areas near the start point - at Hoa Tham commune center, especially at the General Clinic of Van Minh Area, Hoa Tham market; (ii) potential disturbance of unexploded ordnance.

10. Potential negative impacts in the construction phase have been identified as (i) loss of some trees and possible impact on fauna (ii) impacts on utilities; (iii) impacts of materials excavation and extraction; (iv) impacts from temporary materials stockpiles; (v) generation of surplus soil; (vi) generation of construction waste; (vii) impacts from the operation of concrete mixing plant; (viii) dust, noise and vibration from construction machinery; (ix) risks of landslide, soil erosion, runoff and minor slope failure; (x) impacts on crossing streams at bridge construction locations; (xi) social issues associated with the presence of temporary non-local workers; (xii) safety risks to workers and also to local public; (xiii) impact on local traffic flow and (xiv) cumulative impacts from the subproject and the Bac Giang Hydropower I Plant.

11. The proposed mitigation measures for these impacts in the construction phase are (i) to 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 Lang Son 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 Hoa Tham, Quy Hoa and Vinh Yen CPCs and Lang Son DONRE checked and recorded by the CSC, ESS/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; (viii) 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; (ix) establish vegetation and erosion protection immediately after completion of works in each stretch/ sector, check weather forecasts and minimize work in wet weather; (x) 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; (xi) 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; (xii) 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; (xiii) 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; (xiv) work with Hoa Tham and Quy Hoa CPCs, Binh Gia DPC and contractor of Bac Giang 1 Hydropower plant project to find out the suitable worker and machine mobilization schedules of the two projects, avoid concentration of machines and workers at the same time. The contractor will inform construction schedule and scope to local authorities in advance as well as investigate the capacity of mines, quarries and temporary dumping sites to see whether they are suitable for both projects.

12. In the operation phase, the potential negative impacts include impacts of increased noise and on safety from increasing of traffic density and faster driving speeds. To minimize the negative impacts, the Lang Son Department of Transportation (DOT), the responsible agency for subproject management in the operation phase, will cooperate with Lang Son DONRE in Binh Gia district, Vinh Yen, Hoa Tham and Quy Hoa CPCs to maintain the road periodically and collaborate with traffic police to control speeds and vehicle loads on the road, especially at sensitive areas along the road such as kindergartens, medical clinics and residential areas etc.

13. The PPTA Consultant has also identified key stakeholders and conducted public consultations from provincial to commune level with a focus on the affected people's views. The main concerns are (i) potential for bad construction practices to cause flooding of cultivated areas. (ii) the risk that increased traffic due to improved road conditions may support mining activity from Na Ri district, Bac Kan province. All of these concerns are addressed in the EMP (See Table 12 – 13 for more details).

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

C. Institutional arrangements

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

16. 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

17. The IEE concludes that the feasibility study of the subproject combined with available information is sufficient to identify the scope of potential environmental impacts and formulate mitigation measures for the subproject. Providing that significant changes to the subproject description do not occur at the detailed design phase, and that new sensitive environmental, or cultural resources are not 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

18. The subproject objectives will be achieved through investment in construction and improvement of basic infrastructure, including improve and expand the transport corridors among regions and sub-regions to ensure these corridors actually become the economic corridors, increase infrastructure linkage including the subproject - construction and upgrade of the road from Hoa Tham - Quy Hoa - Vinh Yen with the total length of 22.95 km to the standard of a road level V Mountain road as classified in Vietnamese national standards TCVN (Tieu chuan Viet Nam) standard 4054:2005.

19. 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

20. 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 projects such as quarry operations, extraction of gravel, etc., will also require permission from the relevant provincial level authorities. The construction of bridges and spillways, which will be constructed or upgraded by the subproject are all in small scale and will not be required separate environmental impact assessment.

A. ADB SPS Requirements

21. 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

22. 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

23. The subproject must 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. The need for subproject

24. The representative road sub-project will improve and upgrade the Hoa Tham – Quy Hoa – Vinh Yen Road with the length of 22.95km passes through Hoa Tham, Quy Hoa and Vinh Yen communes, Binh Gia district, Lang Son province. The start point meets with provincial road 231 at km42+750 in Hoa Tham commune, it finishes at Khuoi Man village, Vinh Yen commune. This is district road 61 of Lang Son province connecting Binh Gia district (Lang Son province) with Na Ri district (Bac Kan province). The Na Ri connection is with a Bac Kan Provincial Basic Infrastructure for Inclusive Growth subproject road.

25. Hoa Tham – Quy Hoa - Vinh Yen road, Binh Gia district, Lang Son province is located in the area with incomplete connectivity. This road, when built, will help to connect the project area to That Khe and Binh Gia small town of Lang Son province via provincial road 226, then connect to national road QL3B and QL4A (at That Khe) to Lang Son city, Binh Nghi border gate (Lang Son), Cao Bang and Bac Kan provinces; connect to national road QL1B, QL279 at Binh Gia small town to Thai Nguyen and Na Ri small town of Bac Kan province.

26. The existing road is prone to landslides, has steep gradients, a narrow right-of-way, requires rafts to cross the Bac Giang River (KM14+300m) and in the wet season is very muddy and often impassable. As such, upgrading the road would in effect complete the road, providing reliable, year-round connectivity:

(i) Between Binh Gia District (Lang Son) and Na Ri District (Bac Kan Province)
(ii) Provide local residents with accessibility to other communes and towns in Binh Gia and Na Ri, thus enabling reliable access to healthcare, education, markets and employment opportunities, as described in more detail below.

27. Based on the PPTA Consultant's field survey results, this is grade-B rural road with the width of 3.5 - 4.0m; the road surface is soil and seriously downgraded with a lot of wheel tracks, potholes. The longitudinal water culverts are now being filled with soil and rocks due to landslide that prevent the drainage of the road surface. In rainy season, the road surface is flooded, slippery and difficult for vehicle to travel.

28. This road sub network creates the socio-economic connection between the center of the provinces and districts within the province and neighbor provinces in the Northeast region, enhances commerce, tourism and domestic and foreign goods import-export. It contributes to maintain the traffic connection with national roads, provincial roads in the province, therefore, the investment for the road construction is necessary and compatible to the planning of transport development of Lang Son province to 2020 and orientation to 2030.

29. The key themes underscoring the case for upgrading this road cover both network connectivity and poverty alleviation criteria, as follows:

(i) Providing connectivity between the communes of Hoa Tham, Quy Hoa, Vinh Yen and the rest of Binh Gia District and beyond
(ii) Connectivity between Binh Gia District (Lang Son) and Na Ri District (Bac Kan), to foster inter-district and inter-provincial transport linkages, in accordance with Provincial and Regional Master Plans
(iii) Improving access to markets for farmers. Due to current inaccessibility (high transport costs), farmers can currently only obtain steeply discounted prices for

produce from merchants. Improving the road would reduce transport costs, enabling farmers to receive more money for their produce and provide incentives to expand production where this is possible.

(iv) Improving access to healthcare and schooling, both of which are severely impeded or prevented by the current state of the road

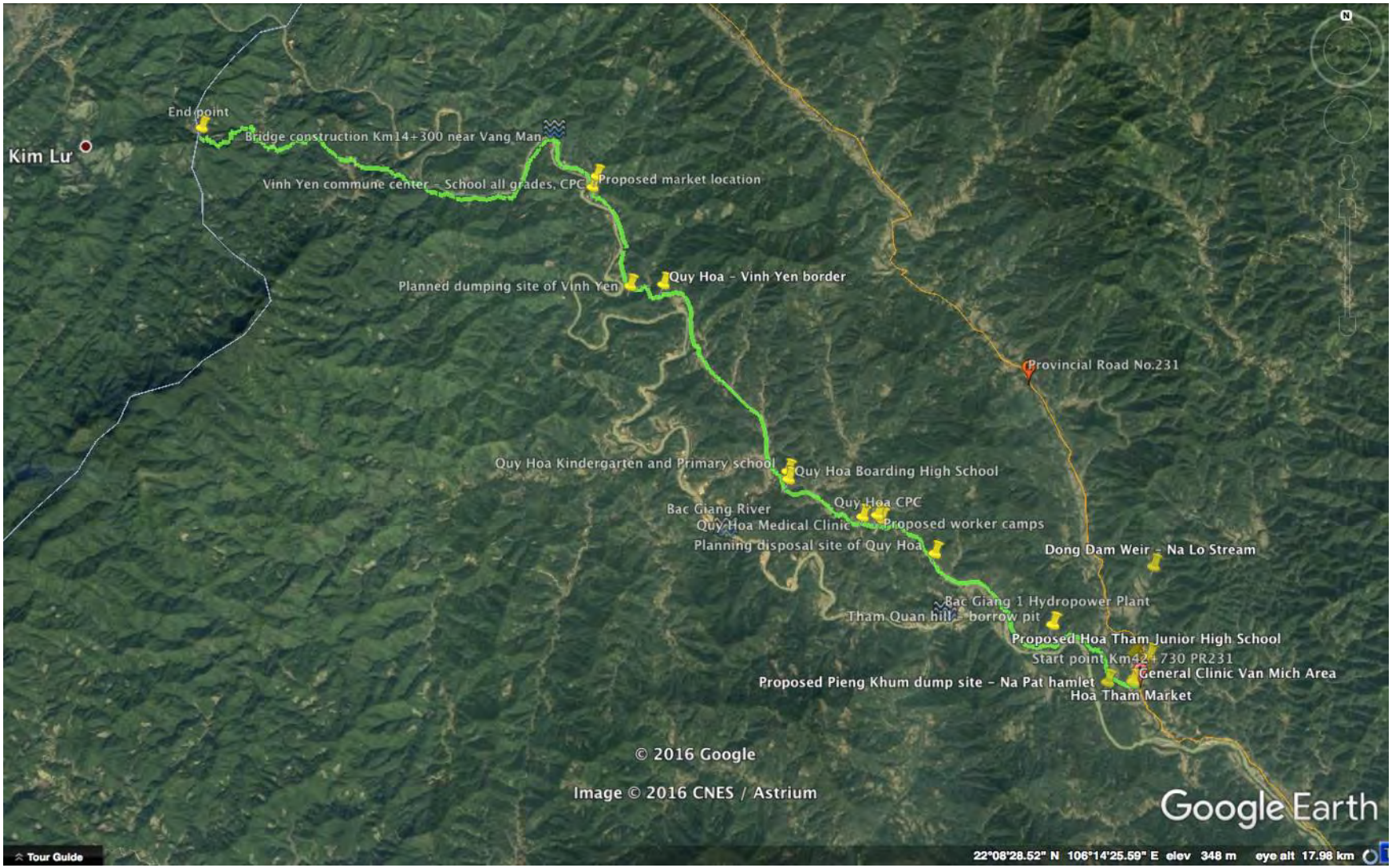
(v) Enabling access to outside employment opportunities.[1]

Table 2 – Road subproject summary

Name Representative	Construct and Upgrade Hoa Tham – Quy Hoa – Vinh Yen - Road 61
Length Representative (km)	22.95
Total Number of Districts	Binh Gia
Total Number of Communes	Hoa Tham, Quy Hoa, Vinh Yen
Beneficiaries	6,376
Investment Representative $mill	**15,606,264**
Investment $ per km	680,011

[1] The Subproject Feasibility Study

Figure 1 – General map of Lang Son and subproject area



B. Location and scope

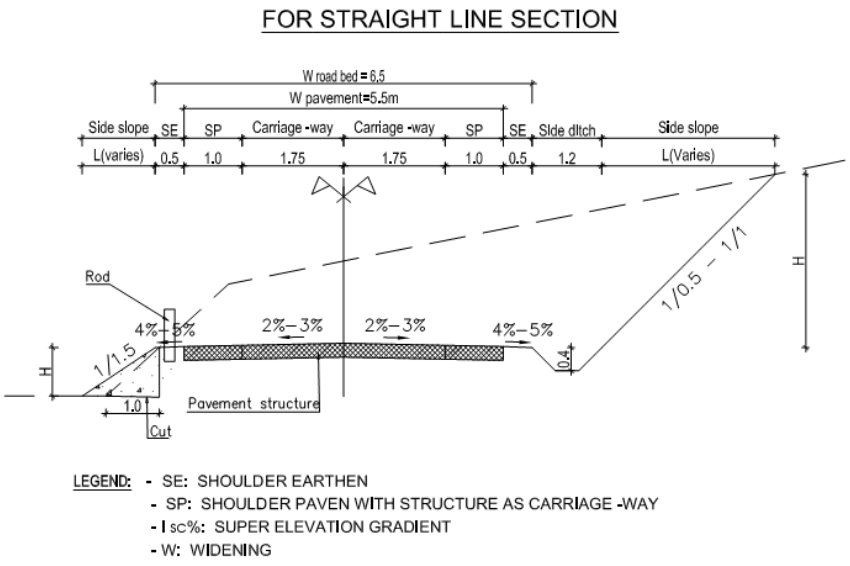
30. The representative road subproject for Lang Son is construction and upgrading of the road from Hoa Tham - Quy Hoa - Vinh Yen with total length of 22.95km passes through Hoa Tham, Quy Hoa and Vinh Yen communes, Binh Gia district, Lang Son province. The start point meets with provincial road No.231 at Km42+750 in Hoa Tham commune, it finishes at Khuoi Man village, Vinh Yen commune. This is district road 61 of Lang Son province connecting Binh Gia district (Lang Son province) with Na Ri district (Bac Kan province). The Na Ri connection is with a Bac Kan Provincial Basic Infrastructure for Inclusive Growth subproject road.

31. The road subproject will follow the existing alignment to minimize the affected land area of local people and to reduce construction volume; improve some curved sections, which have tight turn, to ensure specifications of a Cat-V mountainous road (TCVN 4054-05 Standard). Utilize some cement concrete section, which was newly built in 2015 and 2016 (meet Cat VI mountainous road standard under TCVN 4054-05 Standard with the road width of 6.0m, cement concrete road surface of 3.5m width) to reduce the investment cost.

32. The road subproject will be upgraded to Cat V mountainous road (Standard TCVN4054-05) with main specifications as follows:

(i)	Design velocity:	30 km/h
(ii)	Min radius:	30 m
(iii)	Road base width:	6,5m
(iv)	Road surface width:	5,5m
(v)	Earth shoulders:	2 x 0,5m.
(vi)	Design load capacity for the road, culvert (bridge):	H30-BX80. (HL93).
(vii)	Design frequency for road, culvert, small bridge:	4%.
(viii)	Design frequency for medium bridges and large bridges:	1%.
(ix)	Road structure:	Cement concrete

Figure 2 – Typical cross section for straight-line section



C. Construction Material Sources

33. The estimated rock volume for construction is 44,113.5 m^3; of which 24,061.9 m^3 is sub-base course and 20,051.6 m^3 is base course. The potential quarries for the subproject construction are:

(i) Hong Phong 4 rock quarry is located at Rung Thong village, To Hieu commune, Binh Gia, Lang Son, with reserves of approximately 7.585.264 m^3, mining capacity of 150.000 m^3 / year (the mining time of 30 years and starting on the May 2009 to the May, 2039). The rock quarry is located near the NH 1B, with the distance around 0.5km away macadam road width 5.0m to Km57+800 NH1B. Total transport distance from the quarry to the first line of the road is 29km. Transportation condition of materials from the quarry to road site is convenient.

(ii) Na Deng rock quarry is located at Hoang Van Thu commune, Binh Gia, Lang Son, with reserves of approximately 135,000 m^3, mining capacity of 9,000 m^3 / year (the mining time of 15.5 years and starting on the May 9, 2013). The rock quarry is located near the NH 1B, with the distance around 0.7km, in which has 0.5 km macadam road with the wide of 5.0 meters and 0.2 km asphalted macadam road with the wide of about 5.0 m to Km62 + 200 NH1B. Total transport distance from the quarry to the first line of the road is 29km. Transportation condition of materials from the quarry to road site is convenient. [2]

34. Sand and soil sources:

(i) A sand pit is located at Km1+700, Khuoi Nganh village, Quy Hoa commune, Binh Gia, Lang Son, near the left side at Km1 + 700 in the survey road. The capacity of the sand pit is about 40m^3/day.

(ii) A sand pit at Km 3+300: The sand pit is located at Khuoi Nganh village, Quy Hoa commune, Binh Gia, Lang Son. The distance from the sand pit to Km 3+300 of the survey road is about 1km away crushed stone graded road 3.5 - 5.0 m width. Sandpits located near the survey road should facilitate the road transportation. [3]

(iii) A soil borrow pit at Khuoi Nganh village, Quy Hoa commune, Binh Gia, Lang Son, with the reserves of 320,000 m^3 while the estimated volume of soil that needed for embankment is 191,764.5 m^3. The soil borrow pit is located near the Right side at Km3+450 in the survey road, so facilitates transport by road [4].

35. The estimated soil volume for back filling during the subproject road construction is 55,736m^3 while the estimated volume of excavated class-3 soil (semi-solid soil that could be use for embankment) is 40,9173m^3. The estimated surplus soil volume (soil that could not be reused for backfilling) is 34,784m^3.

36. The estimated soil excavation volume is 1,083,777.3 m^3, of which 122,067.6 m^3 is soft soil that cannot be reused for filling purposed.

37. Mine investigation: Working with the local authorities and people (district, commune) the survey team collected information on potential sites and then investigate of these sites near the

[2] The subproject Feasibility Report
[3] The subproject Feasibility Report
[4] Geological survey report for the subproject road by the PPTA

project road and nearby areas which meet requirements in terms of transport distance, dumping site capacity for the construction project and get confirmation from the local authorities.

D. Land Acquisition

38. According to Resettlement and Ethnic Minority Development Plan, there are 178 households will be affected by the implementation of the subproject of which 12 households must be relocated and number of households with affected assets are 107. In these 178 affected households, there are 19 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 120,074 m^2 of which 88,236 m^2 is production forest.[5]

39. In the plan, the subproject will be constructed in 24 months with the estimated budget in Table 3 below:

[5] The subproject Inventory of losses report

Table 3 – Estimated budget of the subproject[6]

No	Cost Items	Cost Norms	Before tax costs	VAT	After tax costs (VND)	After tax costs (USD)[7]
I	**Civil Works Cost**		**226,361,750,909**	**22,636,175,091**	**248,997,926,000**	**11,140,847**
2	**Project Management Cost**	**1.27%**	**2,876,378,769**	**287,637,877**	**3,164,016,646**	**141,567**
3	**Construction Investment Consultancy Cost**		**12,451,723,928**	**1,245,172,393**	**13,696,896,321**	**612,837**
-	*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*	*0.19%*	*430,313,688*	*43,031,369*	*473,345,057*	21,179
-	*Environmental Impact Assessment Cost*	Temporarily Estimated	181,818,182	18,181,818	200,000,000	8,949
-	*Shop Drawings Design Cost*	*0.77%*	*1,741,853,673*	*174,185,367*	*1,916,039,040*	85,729
-	*Shop Drawings Design Verification Cost*	*0.05%*	*119,745,366*	*11,974,537*	*131,719,903*	5,894
-	*Construction Works Cost Estimates Verification Cost*	*0.05%*	*112,954,514*	*11,295,451*	*124,249,965*	5,559
-	*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

[6] Data provided by the Design Consultant of the PPTA team

[7] US$ 1 = VND 22,350

No	Cost Items	Cost Norms	Before tax costs	VAT	After tax costs (VND)	After tax costs (USD)[7]
-	*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*		*45,272,350*	*4,527,235*	*49,799,585*	2,228
-	*Construction Supervision Cost*	*1.02%*	*2,317,038,882*	*231,703,888*	*2,548,742,770*	114,038
4	**Other Costs**		14,172,737,949	1,417,273,795	15,590,011,744	697,540
-	*General Costs*		*9,054,470,036*	*905,447,004*	*9,959,917,040*	445,634
-	*Design Verification Cost*	*0.03%*	*57,660,597*	*5,766,060*	*63,426,657*	2,838
-	*Construction Investment project appraisal cost*	*0.05%*	*163,555,892*	*16,355,589*	*179,911,481*	8,050
-	*Construction Works Evaluation & Approval Cost*	*0.28%*	*501,085,047*	50108504.7	*551,193,552*	24,662
-	*Independent audit cost*	*0.41%*	*1,489,164,588*	*148,916,459*	*1,638,081,047*	73,292
-	*Construction insurance cost*	*1.03%*	*2,331,526,034*	*233,152,603*	*2,564,678,637*	114,751
-	*Project Investment supervision and evaluation Cost*	*20.00%*	*575,275,754*	*57,527,575*	*632,803,329*	28,313
5	**Land Acquisition and Resettlement Costs**		**17,739,857,450**	**1,773,985,745**	**19,513,843,195**	**873,103**
6	**Contingency**	**16.00%**	**43,488,469,644**	**4,348,846,964**	**47,837,316,608**	**2,140,372**
Total					**348,800,010,514**	**15,606,264**

V. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

1. Topography, Geology, and Soils

40. Lang Son has a complex topography including a high mountain area; low mountain area; limestone mountain area; and cultivated valleys. In the Northeast of the province are continuous mountain ranges along the border with China. The Southwest side is the limestone mountain area with steep slopes and a large cave system. In the Southeast side is a hilly area mainly in Loc Binh and Dinh Lap districts.

41. The subproject is located in Binh Gia district, close to the border with Na Ri district, Bac Kan province to the west and the border with Trang Dinh district to the north; Van Lang and Van Quan district to the east and with Bac Son district, Vo Nhai district, Thai Nguyen province to the south. The subproject road runs parallel to the Bac Giang River and in the middle of the valley between medium and low mountain.

42. In general, soil in Lang Son includes those that have originated from metamorphic parent rock such as limestone, clay schist and conglomerate.[8] Soils in the project area are predominantly clay/gravel soils, with lower horizons derived from incompletely weathered shale.

2. Weather, natural disaster and climate change

43. The climate is classified as warm temperate, with wet winters and hot summers[9]. Rainfall is influenced mainly by the southern monsoon, when south-to-south easterly winds carrying moist air result in higher rainfall, peaking in July to August. A north monsoon also occurs between October and April, bringing cloud, light rain and cooler air. Average rainfall during July is 226, and remains above 120, between May and September, accounting for 70% to 80% of annual precipitation. In December and January, the rainfall drops to 33mm on average. The dry season, when rainfall is below 40, lasts from November to February. Total rainfall is generally within the range of 1,200mm to 1,400mm but rainfall in any one year can be considerably outside this range. The occurrence of very dry, or wet years is well known and pre-dates the emergence of the concept of climate change. Climate change may result in greater frequency and intensity of droughts, or of high precipitation. Similarly, the catchment is vulnerable to typhoons, which can be catastrophic (local residents report that severe typhoons took place in 2003) and the occurrence of typhoons may be influenced by climate change.

44. Temperature averages 22.4^{o}C over the year, with lowest temperatures of around 13.8^{o}C occurring in January, and reaching 27.1^{o}C in July.

3. Hydrology

45. Lang Son has a dense river and stream network, with a density ratio varying from 0.6 km to 1.2 km of waterway per square kilometer. The province has four main rivers; they are Ky Cung, Thuong River, Luc Nam and Dong Quy.

[8] Status of Environment report (SOE) of Lang Son province 2015 prepared by Lang Son DONRE

[9] Kottek, M., J. Grieser, C. Beck, B. Rudolf, and F. Rubel, 2006: World Map of the Köppen-Geiger climate classification updated. *Meteorol*. Z., 15, 259-263

46. The Ky Cung River, of which the Bac Giang is a tributary, belongs to the Tay Giang River system originating from mountainous area of Bac Xa (Dinh Lap), flowing from Southeast to the West. The Ky Cung River has total of 77 tributaries with an average river density of 0.88 km/km^2, including 26 primary river branches, 34 secondary river branches; 16 tertiary river branches and 1 quaternary river branch. This is the biggest river in Lang Son with total length of 243 km, total catchment area of 6,660 km^2. Annual average flow capacity is 2,300 m^3/s, flow module of 17.5 liter/s/km^2. The Bac Giang River, flow along the subproject road is the biggest primary tributary of Ky Cung River with a total length of 114 km and the total catchment area of 2,670 km^2. The Bac Giang River starts from Deo Gio hill, at an elevation of 1,180 m in the Northwestern side of the river catchment. The river flows in a Northwest - Southeast direction and flows into the Ky Cung River at the left river bank in Soc Giang, 46 km from the main river mouth in Trang Dinh district.[10] The main characteristic of Bac Giang River are as follows[11]:

Length (km):	114
River catchment (km^2):	2,670
Average elevation (m):	465
Slope ratio (%):	23.5
Average basin width (km):	29

4. Surface and ground water

Surface water resources

47. Lang Son is a mountainous province with a dense river, stream, lake and pond network. There are 271 reservoirs and 639 rolling weirs. Lang Son DONRE has implemented a monitoring program for surface water quality with 31 monitoring locations in all 11 district towns / cities of Lang Son over the 2011-2015 period. Water in each location has been sampled 2 times per year in dry and rainy season. The main monitoring parameters are pH; Dissolved Oxygen (DO); NH_4^+; NO_2^-; COD; BOD_5; Fe; Zn; Oil and grease and coliform bacteria. Two of the monitoring stations are in Binh Gia district. The first one is in Phai Danh Reservoir, about 16km to the South of the subproject road and the second on the Bac Giang River in Hoa Tham commune, near the start point of the subproject road. Results show that water quality of both Phai Danh Reservoir and Bac Giang River is good, within all the monitoring parameters are under the allowed level of QCVN 08MT:2015/BTNMT - National Technical Regulation on Surface Water quality.[12]

Groundwater resources

48. Groundwater in the region occurs in fissures in limestone rock, and in sandstone and clay stone deposits. Owing to the complexity and fragmented nature of the aquifers, groundwater yields are usually small and better suited to domestic use. Sources within Lang Son are monitored by DONRE which has established 32 monitoring stations around the province. In the subproject area. This has shown that coliform bacteria and some chemical contaminants exceed the appropriate standard (QCVN 09:2015/BTNMT).[13]

[10] Status of Environment report (SOE) of Lang Son province 2015
[11] Climate and hydrology of Lang Son Province, Lang Son Hydro-meteorological Center, 1989
[12] Status of Environment report (SOE) of Lang Son province 2015
[13] Status of Environment report (SOE) of Lang Son province 2015

5. Air quality and noise

49. In comparison to QCVN standards[14], all the parameters of air quality and noise in Lang Son province and in particular Binh Gia district are within the allowed levels, according to monitoring data obtained between 2011 and mid 2015. The monitoring locations in Binh Gia district are the market area in Binh Gia town, and a road intersection outside the town. Both locations are about 20 km to the South of the subproject road.

B. Biological Environment

1. Forestry

50. The total forest area of Lang Son in 2010 was 401,616ha, or 48.27% of the total area of the province. Fifty-five percent of the forested area, 223,269ha, was natural forest, the balance being plantation forest (178,347ha), following a trend of increasing forest cover, primarily due to the establishment of plantation forest. The forest cover status of the province is shown in Table 4 below.

Table 4 – Forest cover status of Lang Son province in 1998 - 2013 period (ha)[15]

Year	Forest area (ha)	Natural forest (ha)	Plantation forest (ha)
1998	248,913	184,077	64,836
1999	243,331	184,017	59,314
2000	259,160	185,000	74,160
2001	264,000	185,000	79,000
2002	288,587	185,457	103,130
2003	322,820	185,457	137,363
2004	336,149	185,457	150,674
2005	346,799	185,457	161,324
2006	357,660	214,716	142,944
2007	368,676	220,249	148,427
2008	383,787	217,699	166,088
2009	400,026	218,052	181,974
2010	408,698	219,069	189,629
2011	414,524	222,863	191,688
2012	435,117	252,521	182,596
2013	446,658	257,646	189,012

Source: Statistical Yearbook 2000-2014 period

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

[15] Figures provided by Lang Son DONRE

51. The main construction work of the subproject is upgrading the road based on the existing foundation. Despite the high level of forest coverage, there are no fauna or flora species listed in the Vietnam Red Book that have been found in the subproject area in the recent years[16]. The nearest protected area is the Kim Hy Nature Reserve in Bac Kan province, about 14 km to the west from the end point of the subproject road. The potential for plantation forestry to enhance the local economy is constrained by poor access to markets and processing facilities.

2. Agriculture and land use

52. Agricultural land occupies a smaller proportion of the land area, largely due to the steep terrain. Coverage is 2.4% in Hoa Tham, 4.3% in Quy Hoa communes and 1.6% in Vinh Yen commune (see table 6), although agricultural production is still the dominant income source in these communes. Main crops are paddy, maize, cassava, and soybean. Livestock is considered as one of main income sources of the target communes. Information related to land use in the subproject area could be found in Table 6 below.

Table 5 - Land use in the subproject area 2015

	Hoa Tham commune		Quy Hoa commune		Vinh Yen commune	
Type of land	Area (Ha)	%	Area (Ha)	%	Area (Ha)	%
Total of land	11,300	100.0%	7990.7	100.0%	5,014.80	100.0%
Agricultural land	266	2.4%	345.1	4.3%	77.8	1.6%
Forestry land	7,800	69.0%	5,887.7	73.7%	2,601.5	51.9%

C. Socio-economic Condition and Infrastructure

1. Population and Ethnicity

53. The total population in the three target communes is 6,517 people in 1,476 households, in 23 villages. Ethnic minorities account for 99.25% total population in the project area, primarily the Tay ethnic group (28.6%), Nung (55.3%) and Dao (15.3%), see table 7.

54. All three communes are primarily poor under according to the government classification of Program 135 - a program for the most difficulty communes of the Government. Table 8 presents the poverty incidence in the target communes.

[16] Information provided by staff of Lang Son Environmental Protection Agency and via public consultation meeting in Hoa Tham, Quy Hoa and Vinh Yen communes.

Table 6 – Composition of population in target commune, 2015

	Hoa Tham commune	Quy Hoa commune	Vinh Yen commune	Total
Number of Villages	13	5	5	23
Population (person)	3514	1994	1009	6517
By sex				
Women	1748	656	508	2912
Men	1766	1338	501	3605
Number of Households	821	427	228	1476
By ethnic group				
Kinh	10	1	0	11
Tay	422	0	1	423
Nung	383	426	7	816
Dao	6	0	220	226
Others	0	0	0	0
Female headed households	68	13	19	100
Number of poor household	469	290	155	914

Source: Data collection from Hoa Tham, Quy Hoa and Vinh Yen communes, 2016

Table 7 – Poverty incidence in target commune, 2016

	Poverty rate (%)		
	As whole	Kinh people	Ethnic minority
Binh Gia district	46.4	1	99
Hoa Tham commune	57.12	0	100
Quy Hoa commune	67.9	0	100
Vinh Yen commune	68.0	0	100

Source: Data collection from target communes, 201

2. Economic development and income

55. Agriculture remains dominant economic activity in the district. According to the district annual report 2015, the economic growth rate of district was 10.26%. Growth rates for agriculture and services were 7.83% and 14.14% respectively. The shares of the agricultural sector in the district GRDP are 43.86%, almost equivalent to the service sector (43.29%). The industry sector contributes 13.85%. Income per capita in 2015 reached VND 17.6 million.

56. The contribution of agricultural production to gross output in the district is shown in Table 9. The main agricultural crops in the district are rice, maize, cassava, soybean, groundnut and cash crops such as tobacco, sugarcane and star anise. Livestock rearing and poultry raising are important.

Table 8 – Gross output in project district, 2014-2015 (VND million)

Indicators	2014	2015
Gross output value	429,297	544,153
From Industry	114,428	129,971
From Agriculture	153,604	165,186
From Services	224,256	248,996

Source: Annual report 2015 of Binh Gia district People's Committee

3. Social services

57. According to the annual reports of the three communes, each commune has a healthcare station with one doctor and four nurses and midwives, one kindergarten, one primary school and one secondary school. The proportion of households with access to mains electricity varies from 57% in Quy Hoa commune, to 76% in Hoa Tham commune and 95.46% in Vinh Yen commune.

4. Education levels

58. Tables 9 and 10 present the education level of respondents to the survey conducted by the PPTA as well as school attendance of their children. Survey results showed that overall, 4% respondents had never been to school. Amongst ethnic minority groups, a higher proportion of Dao people had never been to school (11.54%) compared to those of other ethnic minority groups. The proportion of poor people who had never been to school was 8.75 %. A greater proportion of women (4.7%) than men (3.7%) had never been to school. Ninety-two percent of respondents had attained at least a primary level of education. Education levels were highest amongst the Tay people, the majority of whom had completed high school 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 attained by members of female-headed households was primary school (100%).

Table 9 – Education by economic status, ethnicity and sex disaggregation

Level of education	% Survey respondents									
	By poverty classes			By Ethnic group			By Sex		Female headed HH	Total
	Poor	Near poor	Non-poor	Tay	Nung	Dao	Women	Men		
Never been to school	8.57	0.00	0.00	0.00	0.00	11.54	4.76	3.70	0.00	4.00
Primary school	40.00	36.36	20.69	17.65	21.88	53.85	42.86	27.78	100.00	32.00
Secondary school	37.14	54.55	44.83	41.18	56.25	26.92	23.81	50.00	0.00	42.67
High school	14.29	9.09	24.14	35.29	18.75	3.85	23.81	14.81	0.00	17.33
Vocational training	0.00	0.00	10.34	5.88	3.13	3.85	4.76	3.70	0.00	4.00
University	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: PPTA Consultants- BIIG socio- economic baseline household survey 2016

59. According to the survey, one hundred percent respondent's children at school age are attended school. The survey found no difference in attendance between girls and boys.

Participants at focus group discussion expressed that there is no disparity nowadays between boy and girl in the families, parents always encourage both their children go to school. According to annual report of these commune the rate of school enrolment was 100% in three target communes

Table 10 – School attendance of girls and boys age 6 to 15 year by ethnicity and economic status

Survey respondents	Girls 6 to 15	Boys 6 to 15	Girls in School	Boys in School	% school attendance	
					Girls	Boys
Total survey	**40**	**29**	**37**	**27**	**92.50%**	**93.10%**
By economic status						
Poor	20	7	18	6	90.00%	85.71%
Near poor	5	8	5	7	100.00%	87.50%
Non poor	15	14	14	14	93.33%	100.00%
By ethnicity						
Tay	20	15	20	13	100.00%	86.67%
Nung	2	1	2	1	100.00%	100.00%
San Chi	18	13	15	13	83.33%	100.00%

Source: PPTA Consultants- BIIG socio- economic baseline household survey 2016

5. Unexploded Ordinance

60. 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 a, 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.

61. UXO devices are encountered when ploughing fields, searching for scrap metal and even by children playing. 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

62. There are several sites of archaeological significance in Lang Son province, including the Pac Day archaeological site in Vac hamlet, Trung Quan commune, Van Lang district and the Tham Khuyen and Tham Hai caves in Tan Van commune, Binh Gia district - about 21 km to the south of the subproject road. The main artifacts found in these sites are fossilized bones and teeth of ancient people and the remains of ancient mammals dating to some 180,000-250,000

years ago. These two caves have been explored since 1965 and form one of the most important sites for fossil vertebrates in East Asia[17]. 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.

E. Key Environmental Features

63. ***Physical environmental features:*** The subproject road is located in the Northwest area of Lang Son, running parallel to the Bac Giang river along the valley floor, where much irrigated rice is cultivated. There are 4 river/stream crossing positions along the subproject road, over three of which, bridges will be constructed. There is neither special forest nor protection forest in the subproject area.

64. ***Social environmental features:*** The road goes through several residential areas of Hoa Tham, Quy Hoa and Vinh Yen communes, Binh Gia district. There are schools, kindergartens, commune center and medical clinics along the road. Bac Giang 1 Hydro Power Plant, located on Bac Giang River is about 800m from the subproject road in Quy Hoa commune. The road will play an important part in improving access to markets, particularly for forest products, and for services.

[17] http://minhquan-lichsu.blogspot.com/2012/07/lang-son-vung-at-cua-nhung-dau-tich-co.html

VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

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

66. 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.

67. 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 Hoa Tham, Quy Hoa and Vinh Yen commune centers.

68. 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). Where government standards or guidelines have some kinds of conflict with the ADB SPS, the ADB SPS will be applied as the policy for 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

69. **Impacts:** The impact is mainly on several residential areas along the road namely Hoa Tham, Quy Hoa and Vinh Yen commune centers. Among 178 affected households, there are 19 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 120,074 m^2 of affected lands, of which only 2,398 m^2 is private residential land. The area of land use for annual cropland is 19,488 m^2 and for trees is 2,842 m^2.

70. **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 are 19 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 19 seriously affected households, as appropriate before construction start. PMU will also inform Hoa Tham, Quy Hoa and Vinh Yen 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 grievance.

2. Disturbance of unexploded mine and bomb (UXO)

71. **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.

72. **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 Lang Son 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

73. **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. There is a total of 2,036 m^2 of crops that will be affected and 5,872 trees of all kinds affected by the works. The construction activities will create noise, vibration that may disturb wild animals living in the natural forest area next to the road. 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 the 24 - month construction period. The number of trees that will be cut down as part of the works will be small and the natural forest have been allocated to local people for plantation so the impact is not large. In accordance with information from responsible staff of Lang Son DONRE, the use and management of all forest areas in Binh Gia district have been allocated either to local groups or the relevant CPC in accordance to Decision No. 1295 dated August 19, 2014 of Lang Son PPC on allocation of forest and protection forest area.

74. **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, Hoa Tham, Quy Hoa, Vinh Yen CPCs and DARD office of Binh Gia 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

75. **Impacts:** The road will be mainly constructed on the same road alignment and the main construction activity is upgrading the road surface with some small bend correction. Relocation of some low-voltage electricity poles, water supply pipes, wastewater pipes or signage maybe necessary and some type of signboards along the current route. In accordance to the compensation and resettlement data, there are 17 0.4kv electric poles must be relocated with 950m electric line will be replaced. 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.

76. **Mitigation measures:** To minimize the impact, provision will be made in the contract for relocation as required, and to co-ordinate the relocation of services with local authorities such as Binh Gia Electric Power Company. Before construction starts, the PMU will work with Hoa Tham, Quy Hoa and Vinh Yen CPCs, Binh Gia electric power company to develop and implement plans to relocate 17 electric poles and 950m electric line and avoid or minimize service interruptions. The relocation plan shall specify roles and responsibilities for relocation, the timing and relocation location sites. 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

77. **Impacts:** Two commercial quarries and three soil pits have been identified to meet the materials needs for the project. 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, the Bac Giang River and potentially cultivated areas. Areas at risk of causing this impact include quarries; borrow pits and materials stockpiles along the subproject road. 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.

78. **Mitigation measures:** To prevent the release of silt into waterways, the contractors will use of silt fences around excavation sites and stockpiles; On completion of extraction work quarries and 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 55,736m^3 while the estimated volume of excavated class-3 soil (semi-solid soil that could be used for embankment) is 409,173m^3.

4. Impacts of the temporary material stockpiles

79. **Impacts:** About 6 main temporary material stockpiles will be located along 22.95 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.

80. **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 Km5+250 to Km5+400 and Km6+900 to Km7+050. 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 Bac Giang River bank and fine material stockpiles must be covered with tarpaulin and fenced with signboard to avoid passing people.

5. Generation of surplus soil

81. **Impacts:** Soil from excavation activities, which could not be reused as fill soil (about 125,000m^3), could have significant impacts such as soil erosion when placed on slopes, as well as release of silt.

82. **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 Hoa Tham, Quy Hoa and Vinh Yen CPCs. 3 CPCs will organize the distribution of surplus soil for local people who wish to use it.

83. 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 is provided. According to the geotechnical survey of the PPTA, there are two disposal sites identified as suitable. The contractors should work with local authorities to identify satisfactory disposal sites before construction starts.

Table 11 – List of proposed location for surplus soil disposal[18]

No.	Location and dimension (Length-Width-Depth)	Managed by	Square (m^2) - Estimated volume (m^3)
1	Right side from Km5+250 - Km5+400; (150 m - 50 m - 6 m)	Uncultivated land of Ly Van Family, Van Cheo commune	7,500 - 45,000
2	Right side from Km6+900 - Km7+50; (150 m - 60 m - 5 m)	Uncultivated land of Ly Quy Hoa Family, Van Cheo commune	9,000 - 45,000

6. Generation of construction waste and domestic waste from workers

84. **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 22.95 km length of the subproject road and especially along Bac Giang River. Uncontrolled waste disposal could reduce the water quality of Bac Giang River as well as ambient air and soil quality and heavily impacts on local people in the subproject area and downstream users in Tan Lap and Van Mich communes.

85. **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 concrete mixing plant

86. ***Description:*** The operation of concrete mixing plant will generate noise and dust and paved works will generate gas and odor and noise from the compaction machine. Although the emissions from powered mechanical equipment and asphalt concrete mixing will be rapidly dispersed in the open terrain they will need to be sited carefully to avoid complaints. The impact will happen at the construction sites along the subproject road and effect on local people living in the surrounding areas. However, the affected level is insignificant because the small construction activities and the surface of the road are only 5.5m.

87. **Mitigation measures:** To minimize the negative impact, the contractors should arrange activities with loud noise and vibration such as the concrete mixing plant at least 500 m away from sensitive receivers namely General Medical Clinic of Van Mich area, Quy Hoa Medical Clinic, Hoa Tham, Quy Hoa and Vinh Yen commune centers, schools at all grade and kindergartens of the three communes. PMU and CSC will responsible to monitor this mitigation measure during the 24-month of construction phase.

[18] This list has been discussed and initially agreed with the CPCs of Hoa Tham, Quy Hoa and Vinh Yen CPCs. Details are showed in Geological survey report for the subproject road by the PPTA

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

88. **Impacts:** Earthworks and rock crushing activities will be the main sources of dust. Construction machines and vehicles will generate gaseous emissions (NOx SOx, CO, CO_2, etc.) when they are in operation. These gaseous emissions and dust could cause health problems to the residents who live near the construction site and along the transportation route, especially the sensitive points like schools, kindergartens, markets, commune centers, medical clinics. Wild animal in the forest along the road and some birds and reptiles could also be affected from noise, vibration and dust from construction activities. The impact is considered as minor due to the small scale of the subproject and the low population density of the subproject area.

89. **Mitigation measures:** Similar to the mitigation measure for impact from concrete mixing plant, the contractors should not be located any noisy machines, large material storage site near the forest and residential areas of Hoa Tham, Quy Hoa and Vinh Yen communes. Depots where plant are operated should be located at least 50m away from these sensitive points. The contractors will work with 3 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.

9. Landslide, soil erosion and runoff

90. **Impacts:** Roadside erosion and runoff could happen during rain, at the roadside and at borrow areas. Erosion and runoff could impact on the cultivation 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 objects of the impact are Bac Giang River running along the subproject road and local people who has cultivated land in the subproject area and people living along the subproject road. The areas that could be impacted are Km14+754 at the proposed construction site for Vang Man Bridge and Km21+283.

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

10. Impact on crossing streams or bridge construction locations

92. **Impacts:** Careless construction and poor handling of materials at bridge sites can cause blockage and release of silt to rivers and streams. Runoff water during its rain could bring waste and soil into streams and Bac Giang River as the subproject road is running parallel with Bac Giang River. A 33m bridge will be constructed at Km14+300 near Vang Man cross Bac Giang River. Careless construction material management at the site could lead material fall to the River and lead to siltation and reduce the water quality.

93. **Mitigation measures:** To minimize the negative impact, the contractors should transport excavated material to use as fill, distribute to local users or take to approved disposal sites immediately. Silt fences and sediment barriers or other devices will be used as appropriate at Vang Man bridge construction site. The contractors should limit the main construction activities of the bridge to the dry season.

11. Impact by the influx of construction workers

94. ***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

95. ***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) the workers' camps should be located in areas with sufficient drainage to avoid water logging and formation of breeding sites for mosquitoes and flies, (iv) workers' camps and other depots should be maintained to ensure that site drainage continues to be effective (v) workers should have health checks before start work in the subproject and should be trained for living and working behavior before joining the sites (vi) 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 Hoa Tham, Quy Hoa and Vinh Yen communes will benefit from the subproject construction.

12. Safety of local people or construction workers

96. **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 affects on traffic safety and houses structure on roadsides. The excavation of the trenches for side drain construction can threaten public safety, particularly of pedestrians and children. Waste and wastewater from construction activities and worker camps could also create a favorable environment for the outbreak of some respiratory diseases of local people as well as workers. Accidents may occur if during the construction, workers are not provided with safety equipment and follow construction regulations.

97. **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.

13. Impact on local traffic

98. **Impacts:** Construction activities on the Subproject road are likely to cause hindrance in traffic flow if not mitigated properly especially when there is no other option for travelling. Children and pupils will have difficulty getting to schools. Hoa Tham, Vinh Yen markets and General clinic of Van Mich area are also located roadside. It will make difficulties for people to reach these markets and the general clinic during the construction phase. The road runs along

Bac Giang River and there is only one way road. It also plays a vital transportation role for Na Ri district, Bac Kan province. Local people and people from Na Ri district who travel on the subproject road will be affected during 24 - months construction period. However, this is a minor impact due to low traffic density of the subproject road.

99. **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, and at the sensitive locations likes schools, kindergartens, medical clinics and markets, especially at the residential area at the start point with Van Mich General Clinic. 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

14. Cumulative impact from the subproject and Bac Giang 1 Hydropower Plant

100. ***Impacts:*** The future Bac Giang 1 Hydropower Plant is located on the Bac Giang River, about 800m from the subproject road in Quy Hoa commune. According to the Deputy Chairman of Quy Hoa CPC, the construction of the hydropower station has stopped due to a lack of funds. Construction is planned to resume again in 2017. The construction activities of the two projects at the same time will increase the level of impact on local infrastructure and services such as water supply, electricity, road access, and waste disposal. The impacts will mainly take place in Quy Hoa commune and impact directly to commune's infrastructure and service and local people. However, earthworks and other major works for the hydropower site are complete, and the cumulative impact will not be large. The remaining works left are only auxiliary works.

101. ***Mitigation measures***: PMU and EPS will work with Quy Hoa CPC and the contractor of Bac Giang Hydropower Plant to find out a suitable construction schedule, machine and worker mobilization plan avoid problems associated with construction works taking place at the same time. The contractor will inform Quy Hoa CPC of the construction schedule and scope in advance. The selection of material mines, borrow pits and dumping sites for the subproject will also consider the demands of the Bac Giang 1 Hydropower Plant project.

C. Potential Impacts and Mitigation measures in the Operation phase

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

102. **Impacts:** The improved road surface will create a safer running course and reduce dust emission from traffic as well as noise, though these benefits will be reduced as traffic density and driving speeds increase. Noise, dust and vibration could have negative impact on the local people living along the subproject road, especially the sensitive points like 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.

103. **Mitigation measures:** The enforcement of speed limits and / loading limit by police and Lang Son 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 pavement, road markings and road signage does not deteriorate.

2. Favorable conditions for transportation of goods and people movement

104. **Impacts:** The concreted road will make travel on the road for the whole route, from Hoa Tham commune center (junction with Pr.231) to Na Ri district, Bac Kan province. The completion of the road will support the transportation of local people in Hoa Tham, Quy Hoa and Vinh Yen communes to the district center in all kind of weather. It will also support transportation of goods, especially agricultural product, save time and increase the profit for local people. The completion of the road will favor Na Ri district, Bac Kan province and surrounding residential areas as well as people who doing business in these two districts.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

105. 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

106. 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 Lang Son DPI, DONRE, and DARD. Consultation has also been implemented with representatives from Hoa Tham, Quy Hoa and Vinh Yen communes in Binh Gia district. Among 22 people have been consulted, 8 are women, make up 36%. Consultations took place in September 2016.

B. Information Dissemination During Public Consultation

107. 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.

108. The information disseminated during public consultation included: (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 Public Consultation Results

109. The results of the public consultations are recorded in Table 12 and 13 below. In general, all the relevant stakeholders are support the implementation of the subproject. As the subproject is located in a low population density and the main construction work will be to upgrade road surface based on the existing road foundation, no house needs to relocated and no major land acquisition will be involved, the local people is totally support the subproject.

Table 12 – Main issues and information from local authorities

Main issues	Information from relevant authorities
Forest in the subproject area	Lang Son DARD: The natural forest along the road is allocated to local people or under the management of relevant CPC.
Biodiversity in the subproject area	Lang Son DONRE: There are 5 nature reserves/ conservation areas in Lang Son but they are all far from the subproject area. There are no communities of rare or endangered fauna and flora species in the subproject area.

Table 13 – Main environmental concerns from public consultation

Concerns expressed	How concerns are addressed in IEE
Construction activities could impact on the river, stream and flood cultivation areas	Contractors will provide advance information on the construction schedule and scope to the 3 CPCs and Binh Gia DPC. The contractors will store lubricants, oils, paints and other hazardous chemicals in designated, roofed areas with an impermeable floor at least 50m from water bodies. Sediment ditches and silt fences should be installed around excavation sites and materials stockpiles to avoid runoff, erosion and siltation in to the water bodies. Materials storage sites with a fine material content should also be covered carefully with tarpaulins and located at least 50m away from Bac Giang River and streams. The PMU and CSC will responsible to monitor the consistent implementation these mitigation measures.
Increase traffic as better road condition will support ore exploitation activities from Na Ri district, Bac Kan province	The Lang Son DOT will install speed limit signs and road humps at the residential areas and selected sensitive points. Danger warnings will be installed at the start and end point of the subproject road. The Lang Son DOT will cooperate with Bac the Kan DOT and local traffic police to navigate the transportation, especially at the section in Hoa Tham commune center.

110. 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. Lang Son PMU will responsible for IEE translation to Vietnamese and disclosure at Hoa Tham, Quy Hoa and Vinh Yen communes, Binh Gia district.

VIII. GRIEVANCE REDRESS MECHANISM

A. Purpose of the mechanism

111. 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

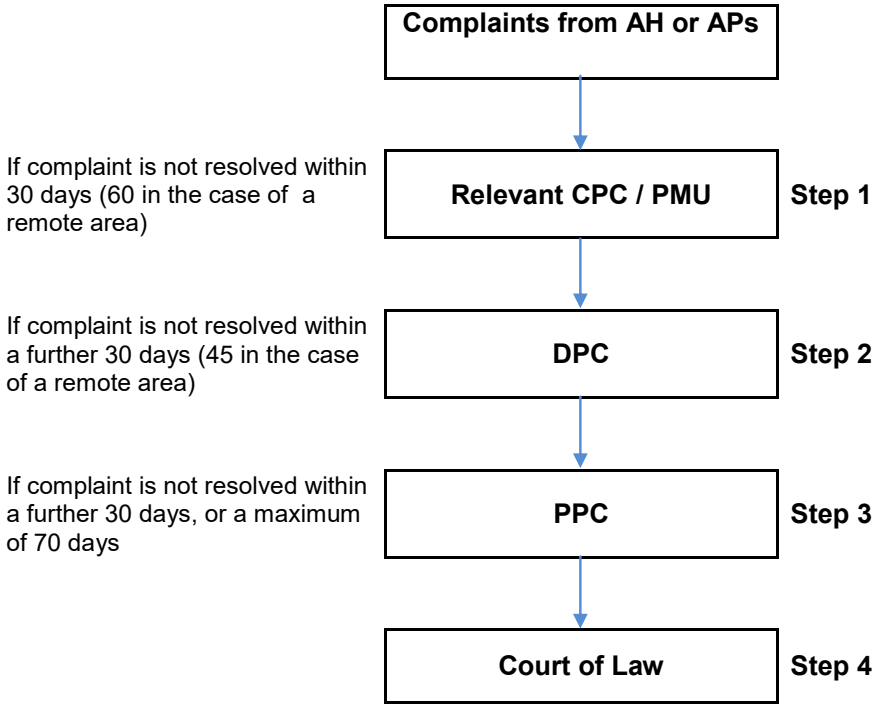
112. There are three steps to address complaints received from stakeholders:

***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.



IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation Arrangement

113. Lang Son PMU will recruit one Environment Safeguard Specialist (ESS) under the Loan Implementation Consultants (LIC) to support subproject implementation in Lang Son. 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.

114. 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.

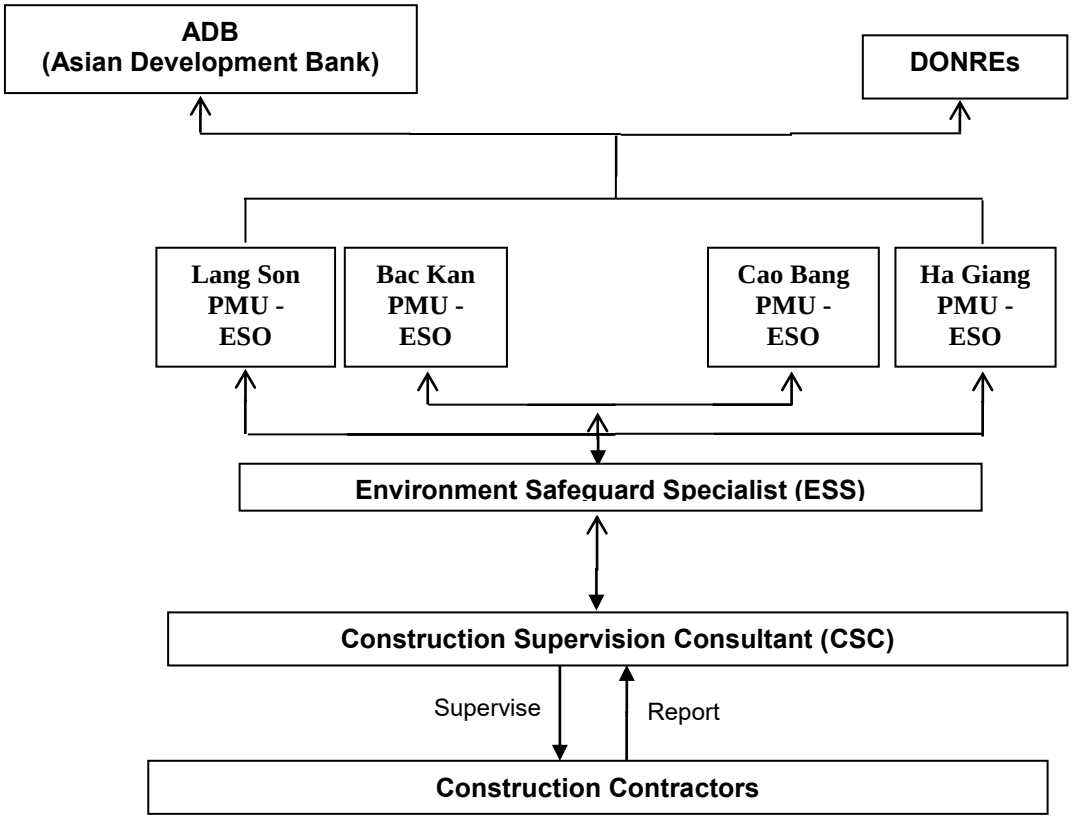
Table 14 – Responsibilities for EMP implementation

Agency	Responsibilities
Lang Son 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 ESS. - 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 ESS, 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 ESS, 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 (ESS)	- 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.

Agency	Responsibilities
	- During detailed design phase carry out baseline data collection on air quality, noise and surface water quality (as specified in the EMP) - During detailed design phase, prepare method statement (Waste Management and Spoils Disposal Plan) described in the IEE/EMP. - Implement all mitigation and monitoring measures for various subproject phases specified as ESS'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 ESS'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 - Provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the EMP - Implement additional environmental mitigation measures, as necessary
Lang Son Department of Transportation (DOT)	- Responsible for operation and maintenance of Subproject road - Implement EMP monitoring during operation
Lang Son Department of Natural Resources and Environment (DONRE)	Review and approve environmental assessment reports required by the Government. - Undertake monitoring of the subproject's environmental performance based on their mandate

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

Figure 3 – EMP Implementation organization chart



B. Environment Impact Mitigation

115. The anticipated environmental impacts and mitigation measures discussed in the previous section is presented in Table 15. The table also shows responsibilities and timeframe/schedule for implementation of mitigation measures and monitoring.

116. Table 15 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 15 - Detail Environmental Mitigation Plan

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
Design and Pre-construction Phase						
1. 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
3. 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 will 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 in the forest area. 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, worker camps area	Included in the contract with contractors

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
		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 through out 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 Hong Phong 4, Na Deng quarries and borrow pits, sand pits in Khuoi Nganh village, Quy Hoa commune, Binh Gia district. 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	Contractors	Though out construction phase	Subproject site, quarries and borrow pit areas	Included in the contract with contractors

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
		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	Control spoils and waste disposal, lubricant and hazardous wastes.	1. Areas suitable for disposal to be agreed with CPCs and Lang Son 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 and will only be disposed to areas approved by local authorities as listed in Table 11 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. The spoils disposal site shall be away located at least 50 m 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

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
5. Concrete mixing plant	Avoid air pollution, traffic obstacles and contamination	1. Locate mixing plant off road and (wherever practicable) at least 500 m from nearest sensitive receivers (residential areas, schools, clinics, etc.) and streams and install and maintain dust suppression equipment. 2. Concrete mixing areas shall be protected against spills and all contaminated soil must be properly handled according to applicable national and local laws and regulation. As a minimum, these areas must be contained, such that any spills can be immediately contained and cleaned up. 3. Prevent soil contamination requiring contractors to instruct and train their workers on storage and handling of materials and chemicals that can potentially cause soil contamination. 4. Recycle debris generated by dismantling of existing pavement subject to the suitability of the material.	Contractors	Throughout construction phase	Throughout construction site	Included in the contract with contractors
6. Noise, dust and vibration	To minimize negative impacts from noise, dust and vibration during construction period	1. Restrict works to daylight hours within 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 project. 4. Keep material storage site moist for the fine material like sand. 5. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emission. 6. On rainless day undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials storage sites, construction sites, access roads, quarry	Contractors	Throughout construction phase	Throughout construction site	Included in the contract with contractors

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
		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, will 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, market etc.) Speed limits to be imposed by setting up warning signs, instructions to drivers, and monitoring of driver behavior.				
7. Erosion control/ run off	Protect established facilities	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	Contractors	Throughout construction phase	Throughout construction site and high risk slope as agreed with ESS/PMU	Included in the contract with contractors

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
		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.				
8. Streams/ Rivers protection and bridge/culvert construction	Protect Streams/ Bac Giang River and maintain flows	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed or provided to local people and will not be left in streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.	Contractors	Throughout construction phase	4 streams/ Bac Giang River crossing points	Included in the contract with contractors
9. 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 200m 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	Contractors	Through out construction phase	Through out construction sites and worker camps	Included in the contract with contractors

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
		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. All waste materials shall be removed and disposed to disposal sites approved by local authorities 10. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned. 11. Register temporary stay for workers with police.				
10. 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	Contractors	Through out construction phase	Through out construction sites	Included in the contract with contractors

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
		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 responsibility for maintaining safety measures to a senior member of the Contractor's staff				
11. Traffic Management	Minimize disturbance of traffic	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. Coordinate with traffic police of Binh Gia 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 Binh Gia 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	Contractors	Throughout construction phase	Throughout construction sites; at start and end points of the subproject road.	Included in the contract with contractors

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
		access around construction areas. 5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. 6. Provide sufficient lighting at night within and in the vicinity of construction sites. 7. Designate traffic officers in construction sites.				
12. Cumulative impact	Minimize the intensify impacts of two subproject construction at the same time	1. Inform construction schedule and scope to Quy Hoa CPC in advance 2. Work with the contractor of Bac Giang 1 Hydropower Plant Project to find out suitable construction, material transportation time. 3. Consider the capacity of material mines, borrow pits and disposal sites for both project.	Contractors	Throughout construction phase	Throughout construction sites	Included in the contract with contractors
Operation Phase						
1. Generation of noise, vibration; road safety issues	To minimize noise, 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 the residential and other areas where there are high risks of accidents to reduce safety risks and impacts of noise, vibration.	Lang Son 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. Environment Compliance Monitoring

117. Table 16 below shows the program for monitoring the compliance on various provisions of the EMP during pre-construction, construction and operation phases. The 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 16. During operation EMP implementation shall be the responsibility of Lang Son DOT.

118. At design phase, the 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.

119. 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.

2. Environmental Effects Monitoring

120. Table 17 below shows the sampling program for environment affect monitoring. ESS undertakes baseline environmental monitoring for air quality, noise and surface water quality. Sampling will be conducted prior to start of site works at the specified locations. During construction, ESS shall undertake quarterly monitoring of surface water quality and air quality and noise in the same locations sampled during pre-construction. Additional sampling occasions shall be carried out and additional parameters shall be analyzed (as necessary) to validate complaints and/or investigate pollution events caused by the subproject.

Table 16 - 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	Lang Son DPI/ DONRE; PMU	Included in the operation budget of PMU
2. Unexploded Ordnance	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; 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. Concrete mixing plant and bitumen heating	Check of implementation	Throughout construction site	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
6. 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
7. Land slide, erosion	Check of implementation	Throughout	Bi-weekly	ESS/ PMU	Included in the

Performance and Impact Monitoring					
Environmental Concern	**Parameter to monitor**	**Location**	**Frequency & Verification**	**Responsible to Monitor**	**Monitoring Cost**
control/ run off		construction site and high risk slope as agreed with ESS/PMU	Part of daily construction supervision	CSC	operation budget of PMU/ ESS/ CSC
8. Stream protection and bridge/culvert construction	Check of implementation	Throughout construction sites, 4 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
9. 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 supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
10. Safety precautions for workers and public safety	Check of implementation. Check compliance to Labor Code of Vietnam and other relevant Decision, Decree and Circular under Government requirements	Throughout construction sites	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
11. 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	Lang Son DOT	Included in operation and maintenance cost

Table 17 - Environmental Effect Monitoring

Construction Phase					
1. Noise, dust and vibration	Ambient air quality (temperature, moisture, wind direction and speed, PM10, PM2.5, PB, NO_2, SO_2…); Noise level (average noise level, maximum noise level, vehicles frequency…)	8 monitoring points (2 at start and end points; 3 points near Hoa Tham, Quy Hoa and Vinh Yen commune centers; 1 point at the access road to Bac Giang 1 Hydro Power Plant; 1 near Quy Hoa Kindergarten and primary school; 1 near Vang Man bridge construction site.	1 time before construction start and semi-annually during 2 - year construction time (5 times in total)	ESS	2,400 USD[19]
2. Water quality	Surface water quality	4 sampling points at 20m downstream of the crossing stream/Bac Giang River sections.	1 time before construction start and every semi-annually during 2 - year construction time (5 times in total)	ESS	10,000 USD
	Ground water quality	3 sampling points in 3 bridges construction sites	1 time before construction start and semi-annually during 2 - year construction time (5 times in total)	ESS	6,000 USD[20]

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

D. Reporting

121. 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 18 – 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	Daily	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.	Lang Son DOT	Lang Son DONRE

Table 19 – Estimated cost for EMP Implementation (2-year construction/ 4-year in total)

Item	Estimated cost (US$)
1. Environment Safeguard Specialist (ESS)	***21,040***
1 National ESS - 6 man-months (intermittent in the first 2 years;) – 2,000 US$/ 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
2. Environmental effects monitoring (implemented by ESS)	***5,900***
Ambient air quality: 8monitoring locations x 5 times x 60 US$/sample[21]	2,400
Ground water quality: 3 monitoring locations x 5 times x 400 US$/sample[22]	1,500
Surface water quality: 4 monitoring locations x 5 times x 500 US$/sample[23]	2,000
3. Training/orientation, local transportation, supplies (by ESS)	***3,000***
a) Training/orientation: 1 formal training course for PMU, CSC, Contractors and Lang Son 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)	***400***
Subtotal (1+2+3+4)	**9,300**
5. Contingency	**495**
Total (1+2+3+4+5)	**9,765**

E. Capacity Building

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

123. The most significant challenge is the lack of human and financial resources and necessary infrastructure. To address this constraint, Lang Son 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

[21] There is no cost norm for Lang Son province. Figures have been estimated base on environmental monitoring cost norm of Ha Giang province.
[22] There is no cost norm for Lang Son province. Figures have been estimated base on environmental monitoring cost norm of Ha Giang province.
[23] There is no cost norm for Lang Son 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 20 – 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 Lang Son 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 Lang Son DOT who responsible for environmental management
Staff resources	International and national environmental specialist with at least 15 year - experience on environmental management of road projects and must possess relevant post-graduate degree in civil engineering, environmental management and other relevant courses. With working knowledge of safety issues and at least 3 - year experience in conducting environmental management training.

X. CONCLUSIONS AND RECOMMENDATIONS

124. 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.

125. The implementation of the subproject “Construct and Upgrade Road No 61 Hoa Tham, Quy Hoa, Vinh Yen Communes, Binh Gia District, Lang Son Province” will steadily improve the road quality; make it favorable for transportation, support goods transfer to and from Hoa Tham, Quy Hoa and Vinh Yen communes all the year in all kind of weather and connect to Na Ri district, Bac Kan 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.

126. 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. APPENDIXES

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

Starting point in Hoa Tham commune

End point in Vinh Yen commune

Illegal gold exploitation activities in Bac Giang River

View from the road to Bac Giang River and Bac Giang 1 Hydro Power Plant

Road section in Vinh Yen commune

Local transport in Quy Hoa road section

Road section cross Bac Giang River in Vang Man

Road section in Quy Hoa commune with large rice field and electric line 0.4kV

Good road section near Quy Hoa CPC

The local well near road side in Hoa Tham commune

B. Appendix 2: Sources of Reference Information

1. *Lang Son Status of Environmental Report 2015*
2. *Lang Son Climate Change Adaptation Plan (2011-2020)*
3. *The Project Inception Report*
4. *Project Detail Outlines of Lang Son province.*
5. *The subproject road Feasibility Study*
6. *Annual report 2015 of Binh Gia district People's Committee*
7. *The subproject Poverty and Social Assessment report*
8. *Resettlement and Ethnic Minority Development Plan of the subproject*

C. Appendix 3: Source of Reference Information 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 will 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 in the forest area. 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 Hong Phong 4, Na Deng quarries and borrow pits, sand pits in Khuoi Nganh village, Quy Hoa commune, Binh Gia district. 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 Lang Son 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 and will only be disposed to areas approved by local authorities as listed in Table 11 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. The spoils disposal site shall be away located at least 50 m from surface watercourses and shall be protected from erosion by avoiding formation of steep slopes and grassing.
5. Concrete mixing plant	1. Locate mixing plant off road and (wherever practicable) at least 500 m from nearest sensitive receivers (residential areas, schools, clinics, etc.) and streams and install and maintain dust

	suppression equipment. 2. Concrete mixing areas shall be protected against spills and all contaminated soil must be properly handled according to applicable national and local laws and regulation. As a minimum, these areas must be contained, such that any spills can be immediately contained and cleaned up. 3. Prevent soil contamination requiring contractors to instruct and train their workers on storage and handling of materials and chemicals that can potentially cause soil contamination. 4. Recycle debris generated by dismantling of existing pavement subject to the suitability of the material.
6. Noise, dust and vibration	1. Restrict works to daylight hours within 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 for the fine material like sand. 5. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emission. 6. On rainless day undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials storage sites, construction sites, access roads, quarry areas, borrow sites and other subproject areas where residential sites and other sensitive points such as schools, clinics… are located nearby. 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, will 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, market etc.).
7. 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.
8. Streams/ Rivers protection and bridge/culvert construction	In sections along and near streams and water bodies: 1. Rocks and stones will be disposed or provided to local people and will not be left in streams. 2. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to prevent migration of silt during excavation and boring operations within streams. If cofferdams are used, these will be dewatered and cleaned to prevent siltation by pumping from cofferdams to a settling basin or a containment unit. 3. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.
9. Influx of construction worker	1. Construction and worker camp location and facilities located at least 200m 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. All waste materials shall be removed and disposed to disposal sites approved by local authorities 10. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned. 11. Register temporary stay for workers with police.
10. 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.
11. Traffic Management	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. Coordinate with traffic police of Binh Gia 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 Binh Gia 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.
12. Cumulative impact	1. Inform construction schedule and scope to Quy Hoa CPC in advance 2. Work with the contractor of Bac Giang 1 Hydropower Plant Project to find out suitable construction, material transportation time. 3. Consider the capacity of material mines, borrow pits and disposal sites for both project.

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

No.	Parameters	Unit	Limit values			
			A		B	
			A1	A2	B1	B2
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

No.	Parameters	Unit	Limit values
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 list of attendance in public consultation

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 8 tháng 9 năm 2016
Tại Nông nghiệp và Phát triển Nông thôn tỉnh Lạng Sơn

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 Lạng Sơn (có danh sách kèm theo)

Nội dung trao đổi làm việc

Ms. Lý Việt Hưng: PGĐ Sở NN&PTNT
Ms. Cao Xuân Lượng: Trg phòng KL BV rừng và BTTN. Tel: 0949217596
Ms. Sầm Đình Chiến: Chuyên viên Chi cục Thủy lợi. Tel: 01634963176

1) Trao đổi thông tin chung về DA BIIG và 2 TDA
- TDA đg Hoa Thám - Quý Hòa - Vĩnh Yên
- TDA Cấp nước khuổi Rười xã Tô Hiệu, Tân Văn.
2) Huyện Bình Gia có 80.387 ha rừng. Quy hoạch rừng phòng hộ phòng tập trung Chủ yếu rừng phòng hộ đầu nguồn để bảo vệ nguồn nước.
Rừng phòng hộ do người dân quản lý hoặc UBND xã trực tiếp quản lý và lên kế hoạch để giao cho người dân (Quyết định số 1295 ngày 13/8/2014 của UBND tỉnh Lạng Sơn về việc giao ~~đất~~ rừng phòng hộ chưa giao chưa cho thuê cho UBND xã quản lý)
Quyết định 17/2015 của thủ tướng CP 9/6/2015 về ban hành quy chế quản lý rừng phòng hộ. Được phép khai thác, tỉa thưa bằng theo dân (không quá 20% diện tích)
Nếu giữ nguyên đg theo hiện tại thì không vi phạm vào diện tích rừng.

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 8 tháng 9 năm 2016
Tại Sở Tài nguyên và Môi trường tỉnh Lạng Sơn

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 Lạng Sơn (có danh sách kèm theo)

Nội dung trao đổi làm việc: Ms. Lê Thị Hường Mai - Ng phòng kiểm soát ô nhiễm
Ms. Nguyễn Hoài Thương - Ng phòng tổng hợp ĐTM

1) Trao đổi thông tin chung về DA BIIG và 2 TDA mẫu
2) Toàn tỉnh có 5 khu bảo tồn: Khu rừng 2 TDA ko nằm gần khu Bảo tồn, rừng, VQG nào.
Trong khu vực huyện Bình Gia ko có loài Động thực vật đặc hữu trong sách đỏ, cần bảo tồn
Huyện có mỏ đá Na Rèng đang hoạt động nhưng phục vụ thủy điện Bắc Giang.
Toàn tỉnh có 719 bãi rác lớn đang vận hành
Rác thải ở Bình Gia một phần sẽ chuyển đến huyện Văn Lãng và một phần sang Bắc Sơn

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 9 tháng 9 năm 2016
Tại xã Hoa Thám; Quý Hòa; Vĩnh Yên huyện Bình Gia tỉnh Lạng Sơn.

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 Hoa Thám: Xã có 3 công trình nước sạch 3 thôn. Nguồn nước lấy từ suối. Hiện nay vẫn còn tình trạng khai thác cát ở sông Bắc Giang. Không làm vào sản lượng mía. Rừng dọc theo tuyến đường đã phân chia về cho người dân ủng hộ TDA, không có ý kiến gì.

UBND xã Vĩnh Yên: Diện tích rừng phân cho người dân trồng Mỡ và Quế mới được khoảng 2 năm trở lại đây. Người dân vẫn sử dụng nước suối để SH. Có 7 công trình NSH nhỏ cho 5 thôn. Cán bộ trí lập trại công nhân hợp lý khoảng 4 điểm dọc theo hướng đi qua xã. Rác thải theo sông Bắc Giang như cũ. Biết là bởi hoạt động khai thác vàng của huyện Na Rì. Lo ngại dự án tốt sẽ làm tăng hoạt động khai thác.

UBND xã Quý Hòa:
Người dân chưa yêu cầu sử dụng nước suối. Hiện đã có một công trình NSH phục vụ cho trụ sở UBND xã. Cần lưu ý giữ gìn nước suối và sông do người dân SH bằng nguồn nước suối, sông.
Diện tích trồng rừng là lớn nhất. Xã có ít quế, chỉ có Mỡ và keo, Bạch đàn.

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)

Vĩnh Yên, ngày 9 tháng 9 năm 2016

Nhóm Tư vấn môi trường thực hiện khảo sát tại
Xã Vĩ Thượng huyện Bắc Hà tỉnh Lào Cai

I. Danh sách các đại biểu nhận tiền hỗ trợ

No.	Họ tên	Ký nhận
1	Triệu Văn Thanh	
2	Triệu Văn Phương	
3	Triệu Văn Thắng	
4	Đồng Thị Khế	
5	Bàn Minh Quyền	
6	Triệu Thị Phạm	
7	Triệu Thị Chúa	
8	Đồng Thị Nhất	
9		
10		
11		
12		
13		
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)

Quý Hoà, ngày 2 tháng 9 năm 2016

Nhóm Tư vấn môi trường thực hiện khảo sát tại
Xã Quý Hoà huyện Bình Gia tỉnh Lạng Sơn

I. Danh sách các đại biểu nhận tiền hỗ trợ

No.	Họ tên	Ký nhận
1	Lâm Thị Ón	
2	Lương Chí Dũng	
3	Lý Văn Luyến	
4	Hoàng Thị Mích	
5	Hoàng Thị Phương	
6	Nông Văn Trò	
7	Hoàng Văn Xuân	
8	Hoàng Văn Liên	
9	Lý Văn Et	
10	Lý Văn Hường	
11	Lý Văn Ngày	
12	Hứa Văn Sơn	
13	Lò Thị Điền	
14	Lý Văn Bế	
15		
16		
17		
18		

Initial Environmental Examination

Stage of the document: Final
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VIE: Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project

Subproject: Construction of Water Supply System in Boc Bo Commune, 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)
D1.00	=	$0.000044
$1.00	=	D22,730

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 in the Northeastern Provinces Sector Project
The Subproject	–	Construction of a Water Supply System for Boc Bo Commune, 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:

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 (BIIG 1) will invest in the recently completed Four Northeastern Provinces (FNEP) Overall Development Plan (2015). The development plan responds to the Government of Vietnam's strategy of targeting the investment into poorer provinces and regions. The use of a sub-regional approach seeks to build the interrelationship between provinces as one of the foundations for accelerating growth in the more remote regions. As such the plan targets investment into outputs that build areas of comparative advantage in a manner that increases the competitiveness of economic activity in the sub-region. The expected impact is to improve socio-economic wellbeing of local communities through the improved financial returns and through lower costs of accessing public health services, education, water supply and markets.

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 of a Water Supply System for Boc Bo Commune, Pac Nam District, Bac Kan Province" and is a representative subproject for Output 2 of BIIG 1: Improved Rural Water Supply. The subproject has a design target of 1,300 m^3/day to supply 1,081 households, government institutions and business. In all, a total of 4,791 residents (beneficiaries) in Boc Bo commune, Pac Nam district center will be served by 2030. Its objectives are to improve public hygiene, improve the landscape and appearance of the rural area, and to improve the health status and living conditions of people living in the commune.

4. The proposed representative subproject is the water supply for Boc Bo commune, through the delivery of water taken from west tributary of Nang River. Of the fifteen villages in Boc Bo commune (2010 statistic) six are located in lowland and nine in highland. For the nine highland villages, the Subproject can only supply five being: Phieng Lung, Na Phan, Khau Dang, Khuoi Be, and Na Lay village due to terrain and distance constraints. The proposed subproject, including a Water Treatment Plant (WTP), will be constructed with the following design information:

Table 1: Water Supply System Boc Bo Commune, Pac Nam District

Representative Subproject	Vinh Quang Town Hoang Su Pi
Project Daily Water Capacity (m^3 per day)	1,300
Number of households supplied	1,081
Total Population supplied	4,791
Dam Height (m)	Utilize existing Vang My Weir
Supply Area	Boc Bo commune
Number of admin units	1
Name of Operating unit	Market Management Board (MMB)
Total Investment (USD mill)	$1,191,000
Invest $/hh	$1,102

5. The project, classified as Environment Category B, is judged to have limited potential adverse environmental impacts, particularly in relation to pipeline construction, access road

construction activities and, to a lesser degree, the disposal of sludge from the water treatment plant (WTP). The unavoidable construction impacts are temporary and can be mitigated, whereas adverse impacts related to incorporating grey water in the design of the WTP has minimized the discharge.

6. This Initial Environmental Assessment complies with the laws, decrees and circulars, the national technical standards and national technical standards of Viet Nam and the Asian Development Bank (ADB) policy.

B. Environment Impacts and Mitigation

7. The project has very limited impacts on the natural environment, ecological resources and cultural assets. Most of the likely impacts are common for construction activities such as dust, noise, traffic disruptions, and waste can be prevented or minimized by standard mitigation measures.

8. During operation of the WTP, it is necessary to ensure that the management of chemical treatment process and new sludge tanks under the design meet the GOV discharge standards and water source protection management, hygiene condition of the WTP in accordance to Circular No. 50/2015/TT-BYT[1]

9. In some proposed areas, the project may increase the volume of grey water that needs to be treated and released safely to the environment. It is recommended that before installing the new water connection in each subproject area, construction supervision consultants, PMU, and representatives of local sewerage unit make a general inspection to confirm that there is a combination of drainage system and grey water in the central area of Pac Nam district, Boc Bo commune to be able to handle the increased wastewater load. On the other hand, they will identify additional works to be carried out by the drainage system and / or the local community before the new connection is made.

10. The EMP for the subproject includes mitigation measures and monitoring processes to manage and assess the expected and unexpected impacts of this project. The EMP also specifies responsibilities for implementation, and capacity development and training requirements of Market Management Board (MMB) - response for subproject management in the operation phase and the appointed PMU to monitor the implementation of the EMP. The implementation of the EMP will require assistance from an environmental specialist (ESS), and a construction supervision consultant (CSC) to take part in the audit work of the EMP.

C. Information Disclosure, Public Consultation, and Grievance Redress

11. According to Vietnamese law, for a water supply facility with a capacity less than 50,000 m^3/day, it is not necessary to prepare an Environmental Impact Assessment Report (EIA) including public consultation but in accordance with the ADB Safeguard Policy Statement, for category B subprojects, it is necessary to conduct public consultation. As such, consultation on option of construction of WTP, technology processes, water supply alternatives, etc. is essential as a part of actual survey in project preparation. Public information and consultation activities were carried out as part of a baseline survey of local environmental conditions along the

[1] Circular No.50/2015/TT-BYT dated 11 December 2015 of the Ministry of Health, providing for the inspection of drinking water and domestic water's sanitation and quality

projects sites. Meeting with local authorities took place on 12 September 2016. Public meeting was held in Boc Bo CPC on 14 September 2016.

12. During the consultation on environmental matters, local leaders and members of some households were given an introduction to the project, anticipated environmental impacts and mitigation measurements, the project implementation schedule and relevant environmental issues. Overall, there was no opposition raised with respect to the proposed subproject.

13. A three-step grievance redress mechanism will be established for the subproject, common to social as well as environmental safeguards to handle environmental impacts and land occupation. As a guideline, any complaints about any subproject's activity will be solved through negotiation to get agreement. Complaints will be submitted toward 3 levels of entities: First through CPC, then the DPC and finally through PPC. If an agreement was not reach, then they will be law court as the final method. MMB will bear all administrative and legal cost arising in such complaint solving processes in the operation phase.

D. Institutional Arrangement

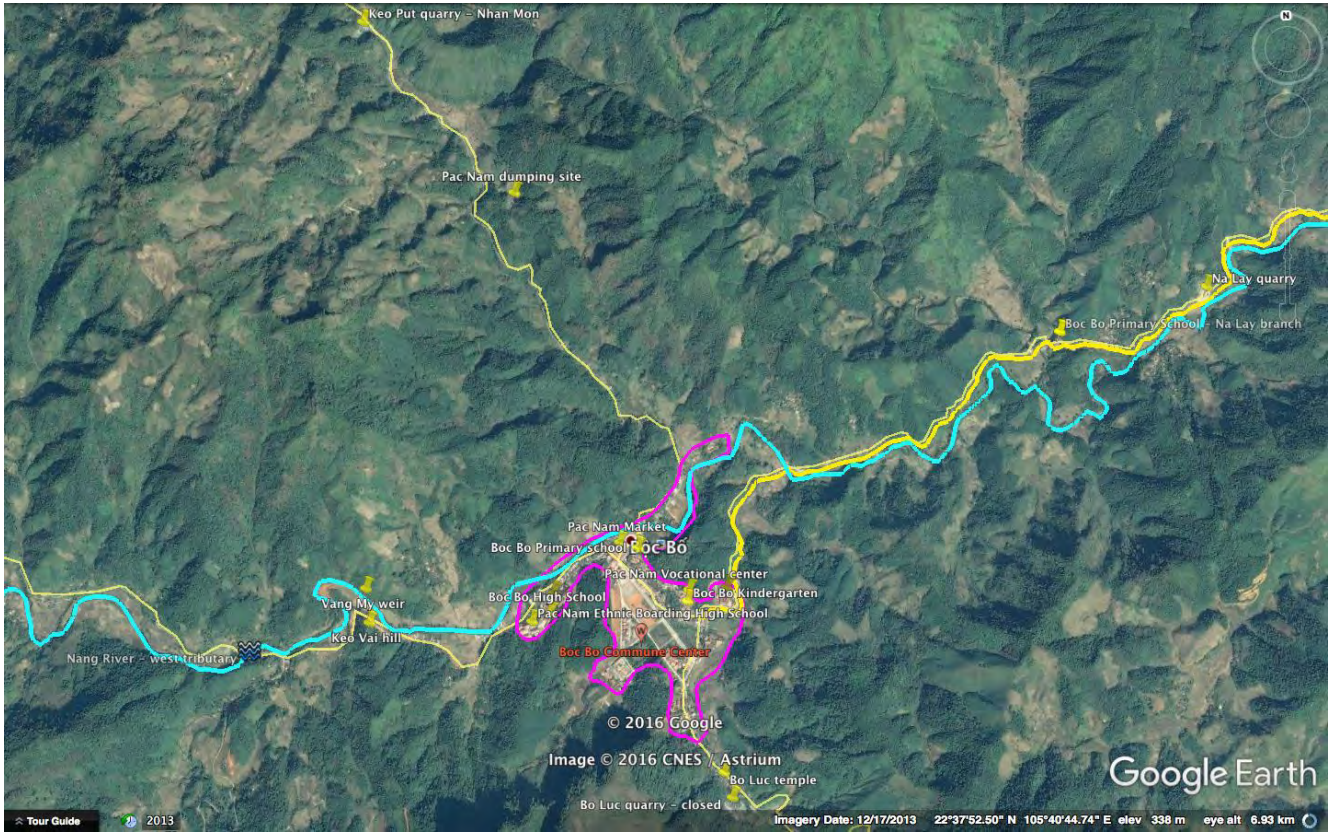
14. Bac Kan DPI will establish an Official Development Assistance (ODA) Project Management Unit (PMU) and assigned relevant staff to support the preparation of the subproject in the PPTA period. One member of the PMU has been assigned as the Environmental Safeguards Officer (ESO). The assigned ESO, has been participating in a training course on "Fundamental Safeguard and Gender Safeguard Policy Statement (SPS) of ADB" under TA8902-Vie Capacity Building for Project Management Unit Professionalization - organized by ADB in August 2016. Environmental specialist (ESS) for subproject implementation will organize a formal training course and on-the-job training for relevant PMU staff, Construction Supervision (CSC), communities, contractors; and support for establishment and operation of the subproject environment management system in construction phase. The ESS will also support PMU's capacity building by reviewing and evaluating the capacity for environmental protection of the PMU and MMB – 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.

E. 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 detail design finalization.

Figure 1: General Map of Pac Nam District Center and Subproject Area



II. BACKGROUND

A. Objectives of the Subproject

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

17. The subproject objectives will be achieved through construction of the water supply system, providing greater access to clean water, especially for people in the mountainous areas, including poor households. Specifically, including Water supply system for Boc Bo commune, Pac Nam district.

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 water supply system subproject; (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 environmental protection 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.

A. ADB SPS Requirements

20. The ADB safeguard policy statement (SPS) 2009 imposes safeguard requirements for all 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 1 subproject.

B. Legal and Administrative Framework for Environmental Protection in Viet Nam

22. The subproject has to comply with the environmental legal framework of Viet Nam, 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

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.50/2015/TT-BYT dated 11 December 2015 of the Ministry of Health, providing for the inspection of drinking water and domestic water's sanitation and quality
- National Technical Regulations on air and noise quality

  - QCVN 05: 2013/BTNMT on ambient air quality

  - QCVN 26: 2010/BTNMT on noise

  - QCVN 27: 2010/BTNMT on vibration
- National Technical Regulations on water quality

  - QCVN 01: 2009/BYT on drinking water quality

  - QCVN 02: 2009/BYT on domestic water quality

  - QCVN 08: 2008/BTNMT on surface water quality

  - QCVN 09: 2008/BTNMT on underground water quality

  - QCVN 14: 2008/BTNMT on domestic wastewater

3. Other legislation applicable to the subproject are the following

- 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 3 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. PROJECT DESCRIPTION

A. The Need for Subproject

23. The proposed water supply scheme is the water supply system for Boc Bo commune to deliver 1,300 m^3/day to supply 1,081 households[2]. The scheme will construct a new water supply system with the distribution network.

24. Boc Bo town is partially served by a piped network supplied by a single pumping station located at the entrance to Bo La cave, Na Coc village with the capacity of approximately 55 m^3/day. This only supplies 88 households and 16 government agencies located in the centre of Boc Bo commune. Constructed in 2001, the system has failed to deliver sufficient quantities of water and supply can be intermittent. There is no filtration and untreated water is delivered to households and there are complaints from local people relating to hard water. The scheme was constructed in 2003 and water losses are estimated at 40%. A survey of the existing water source concludes there is a complicated geological labyrinth with a catchment area of 5 km^2. The existing scheme was operated by the DPC until 2010, when it transferred to the Marketing Management Board (MMB). The existing groundwater source has low turbidity however it is not able to supply the projected increase in demand. The expansion of the scheme will necessitate the use of surface water, which has higher levels of contaminants and suspended solids and will necessitate the installation of a water treatment plant.

25. The existing water supply network is composed of high-density poly-ethylene (HPDE) pipe of total length 3,037, with diameters ranging from 75 mm to 34 mm. The scheme O&M is undertaken by the MMB and water charges are levied against individually metered household connections. Within the service area are a number of small household operated schemes using springs feeding tanks that suffice during rainy season but dry up or become polluted in the dry season.

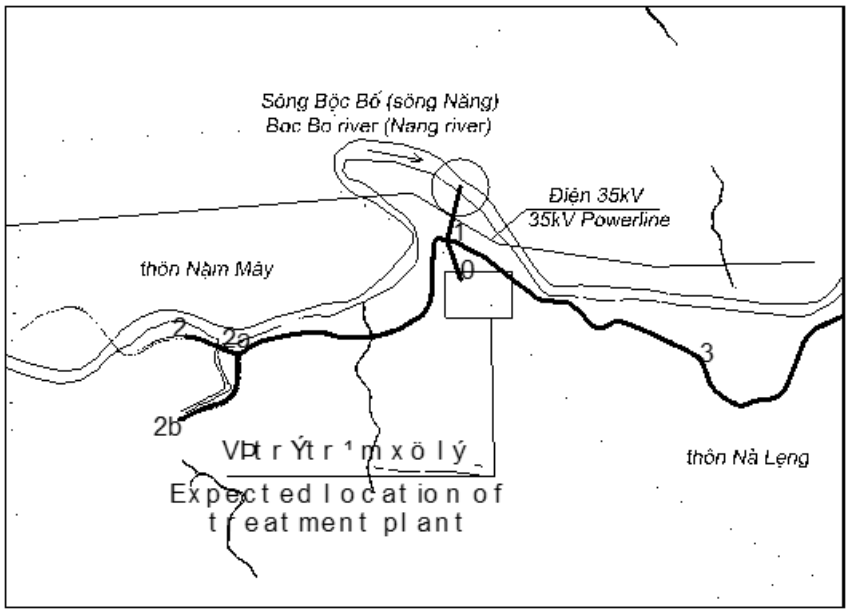
26. Investment in construction of water supply systems is now an urgent need, in order to solve the shortage of clean water for people living in remote communes as well as local agencies, offices and schools; to ensure all-year-round water for households in the town center and neighboring communes; to solve drinking water shortages that lasted for years; to improve sanitation and health by providing clean water for households, offices, schools and health clinics in Pac Nam district center. The subproject will invest in construction of water supply systems and WTP in Pac Nam district.

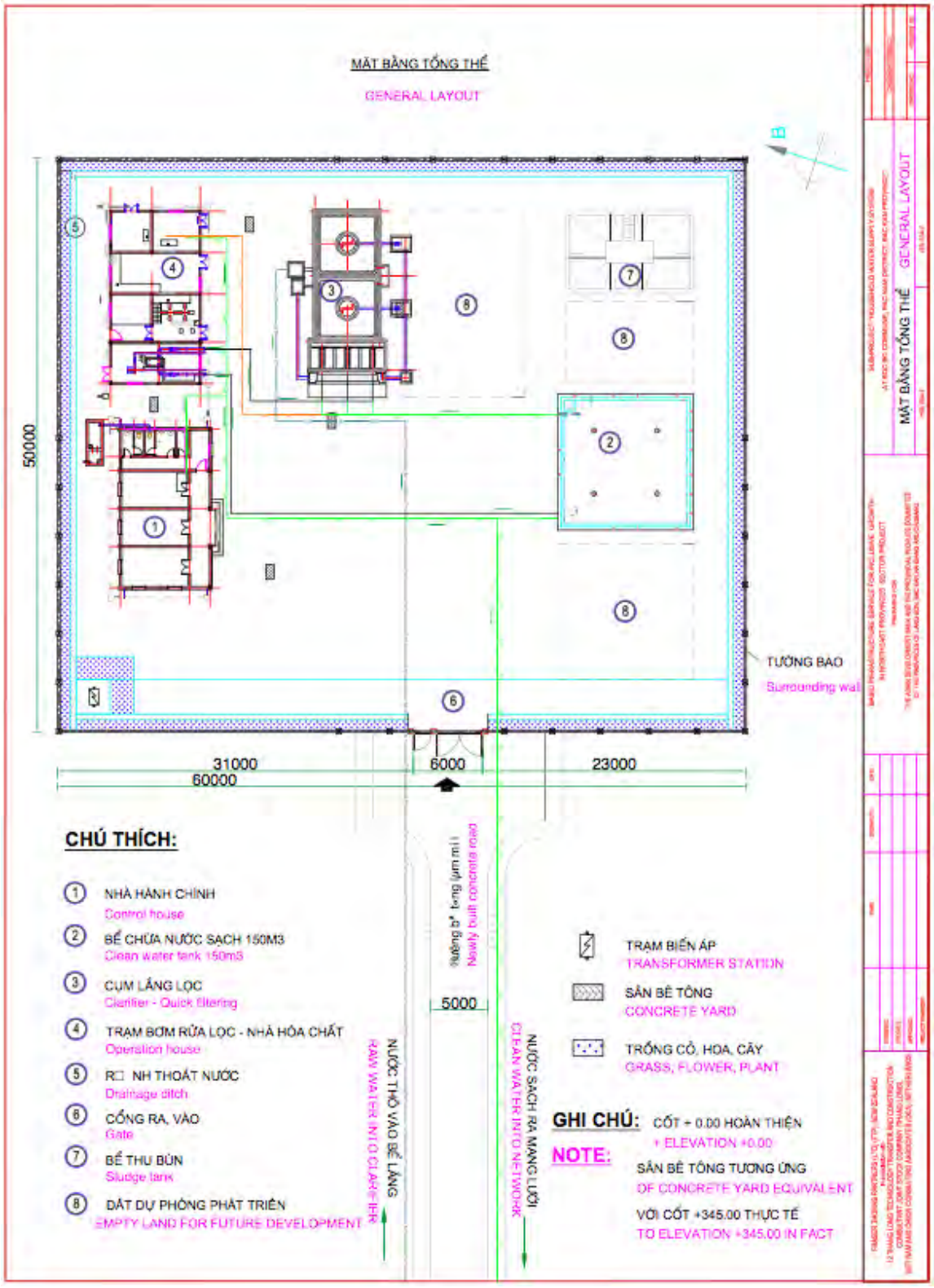
The proposed subproject: Construction of a Water supply system for Boc Bo commune, Pac Nam district. Upon completion, the system will provide water for about 4,791 local people and staff in offices, schools, and health centers, even in dry seasons. The general location of the proposed Water Treatment Plant (WTP) is shown in

[2] Subproject Feasibility Study Main Report

27. Figure 2.

Figure 2: Proposed Layout Plan




MẶT BẰNG TỔNG THỂ
GENERAL LAYOUT
50000
TƯỜNG BAO
Surrounding wall
31000
60000
6000
23000
5000
CHÚ THÍCH:
1 NHÀ HÀNH CHÍNH
Control house
2 BỂ CHỨA NƯỚC SẠCH 150M3
Clean water tank 150m3
3 CỤM LẮNG LỌC
Clarifier - Quick filtering
4 TRẠM BƠM RỬA LỌC - NHÀ HÓA CHẤT
Operation house
5 RÃNH THOÁT NƯỚC
Drainage ditch
6 CỔNG RA, VÀO
Gate
7 BỂ THU BÙN
Sludge tank
8 ĐẤT DỰ PHÒNG PHÁT TRIỂN
EMPTY LAND FOR FUTURE DEVELOPMENT
Đường bê tông (Newly built concrete road)
NƯỚC THÔ VÀO BỂ LẮNG
RAW WATER INTO CLARIFIER
NƯỚC SẠCH RA MẠNG LƯỚI
CLEAN WATER INTO NETWORK
TRẠM BIẾN ÁP
TRANSFORMER STATION
SÂN BÊ TÔNG
CONCRETE YARD
TRỒNG CỎ, HOA, CÂY
GRASS, FLOWER, PLANT
GHI CHÚ:
NOTE:
CỐT ± 0.00 HOÀN THIỆN
± ELEVATION ±0.00
SÂN BÊ TÔNG TƯƠNG ỨNG
OF CONCRETE YARD EQUIVALENT
VỚI CỐT +345.00 THỰC TẾ
TO ELEVATION +345.00 IN FACT
MẶT BẰNG TỔNG THỂ GENERAL LAYOUT

B. Location and Scope

28. The design and construction of new infrastructure works to address this challenge forms the basis of the Subproject. The existing pumping station is beyond rehabilitation and will be disbanded while the existing distribution pipelines shall amalgamate into the new water supply system. A layout plan of the proposed works, including the WTP is illustrated in Figure 2 above.

29. The new water supply scheme will be served from the Boc Bo river from a site selected just upstream of an existing 12.2 m wide reinforced concrete spillway (Vang My) in Nam May hamlet. A pumping station and intake structure will be constructed immediately upstream of the weir to take advantage of the heightened river level. The riverbank is stable and rock is close to the surface allowing the structure to be located on a sound foundation. It will extract and pump water via a rising main to a new water treatment plant (WTP), which is proposed to construct on top of Keo Vai hill, on the other side of PR 258B. This will involve construction of an access road which will follow an existing forestry track on a steep alignment (See Figure 5 below for more information). Raw water pipes are made of black steel with diameter of 250 mm, length of about 200 m. The velocity in the pipe is estimated to be 0.334 m/s.

30. The treatment plant is to include vertical sedimentation tank, rapid filtration capacity of 1,300 m^3/day, a clean water tank of 250 m^3 capacity, a single story operation house, a single story management house, sludge tank and other auxiliary works such as landscaping, a gate, surrounding wall. See Table 2 below for specific parameters:

31. After treatment, water from the clean water tank will be distributed by 2 km gravity main alongside PR 258B to Boc Bo commune. The pipe network is about 25,000 m, including the main and service pipelines to service the six villages at Boc Bo town, Boc Bo commune.

32. Other engineering construction issues include testing and confirmation of material sources identified during the field investigations, and sites for dumping waste material including excavated soil and waste e.g., concrete detritus from road crossings.

33. Water distribution pipelines will run alongside existing roads to minimize disruption and avoid costly compensation. They will transition down from large to small diameters and ultimately provide a metered house connection to each household. Valves and controls along the pipeline will control flows, quantify losses, and allow sections of the network to be isolated when a breakage or essential maintenance work is required. Where the pipeline crosses bridges or similar structures the pipeline will be in galvanized steel. Other than in situations where pipeline safety is threatened the pipe material will be HDPE[3].

[3] The subproject Feasibility Report

Table 2: Summary of Technical Information

Items	Technical Solution
Location of water collector system	Boc Bo river in Nam May village, Boc Bo commune, Pac Nam district, Bac Kan province
Location of treatment plant	Nam May village, Boc Bo commune, Pac Nam district, Bac Kan province, on Keo Vai hill, on the other side of PR 258B from the water source
Water supply process summary	Water source → Intake → Coagulants (alum) → Mixing Equipment → Clarifier combined with reaction dividing wall → Sand filter → Chlorine disinfection → Clean water tank → Transmission and distribution network → Consumption.
Water collector	Water is collected through two DN250 pipes to the water collecting chamber of the raw water station, then pumped to the WTP
Clarifier	One unit consisting of two reactors combined with two vertical clarifiers, reinforced concrete structure, of dimensions 5.34 x 5.34 x 7.35 m. 3 Quick filter reinforced concrete tanks of dimensions 2.3 x 2.0 x 5.67 m. Filter capacity 1,300 m^3/day.
Clean water tank	Tank capacity W = 250 m^3, by reinforced concrete with dimensions of 11 x 11 x 2.00 m.
Operation house	Size: (15 x 7.8) m mortar (75) and brick structure with reinforced concrete roof (M200) 10 cm thick, painted walls with one white layer and two yellow layers Washing filter pump: Q = 300 m^3/h, H = 15 m, N = 20 kW
Management house	Single storey brickwork building, 13.8 m x 7.8 m with reinforced concrete roof and foundation,
Sludge tank	Stone masonry (M100), 2 m deep tank fitted with a sewage pump to pump sludge to tanker vehicles. Pump specification: Q = 20 m^3/h, H = 7÷10 m, P = 1 kW
Additional items	Items such as drains, perimeter walls, gate, landscaping, fully designed in compliance with current standards.
Transmission and distribution pipeline network	Pipe for distribution network is HDPE-PN10 with diameter from DN200 to DN63
Service pipeline network	HDPE-PN10 pipe with diameters D32-D40-D50 for service network.
Household meter connections	673 households

C. Cost Estimate

34. A construction cost estimate has been prepared based on the feasibility study outline designs and a bill of quantities (BOQ). The unit costs are the current rates published by the province. Detail information is listed in Table 2 below.

Table 3: Subproject Cost Estimate

Summary of Boc Bo Subproject Costs ex Tax			
No.		**VND mil**	**$'000**
1	**Construction costs**		
	Materials	10,076	451
	Labor	4,548	203
	Equipment	2,282	102
	Subtotal	**16,907**	**756**
2	Equipment costs	326	15
3	Management costs	328	15
4	Consultancy	1,848	83
5a	General costs and training	674	30
5b	Contract Management	174	8
6	Peripheral electricity costs	909	41
7	Land compensation	88	4
8	Contingency cost	2,208	99
	Tax (10%)	2,425	109
	Total	**26,620**	**1,191**

35. For the civil engineering, treatment plant, and distribution works the composition of the bill items, taking-off of quantities, and setting of the unit rates are in line with provincial procedures. The determination of bill items 5, which cover construction management and other costs, are expressed in accordance with standard procedures as a percentage of the civil engineering construction works. A contingency sum of 9% has been included.

V. DESCRIPTION OF THE ENVIRONMENT

A. Natural Conditions

1. Topography, Geology, and Soils

36. Bac Kan has a complex topography with large altitudinal variation and different topography types including valleys, high hills, low mountains and lime stone mountains. The topography of Bac Kan could be divided into 4 main areas: the high mountain area; low mountain area; limestone mountain area; and valley.

37. The subproject is location, in Pac Nam district towards the northwest of the province is in the high mountain area with mountain ranges lying in a Northwest - Southeast direction.

38. 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.[4]

39. The subproject area includes Pac Nam district center and Boc Bo commune, Pac Nam district, shown in Figure 1Figure 3 below. The location is described as follows:

(i) Bordering with Nhan Mon, Bang Thanh communes, Pac Nam district to the North

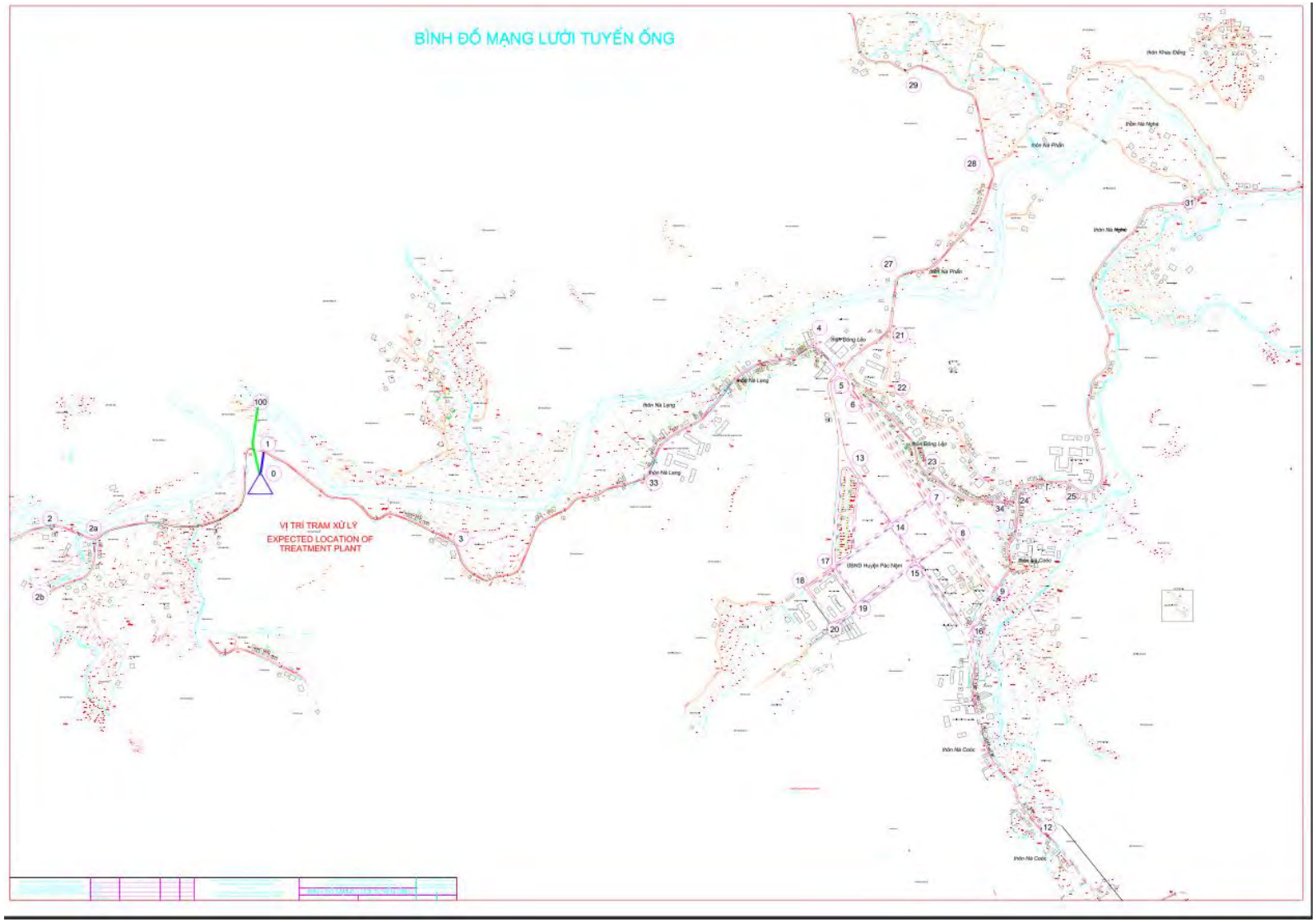
(ii) Nguyen Binh district, Cao Bang province to the East

(iii) An Thang, Xuan La, Co Linh communes, Pac Nam district to the South

(iv) Cong Bang, Giao Hieu communes, Pac Nam district to the West

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

Figure 3: Subproject Location



2. Weather, natural disaster and climate change

40. 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.

41. 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 2 below.

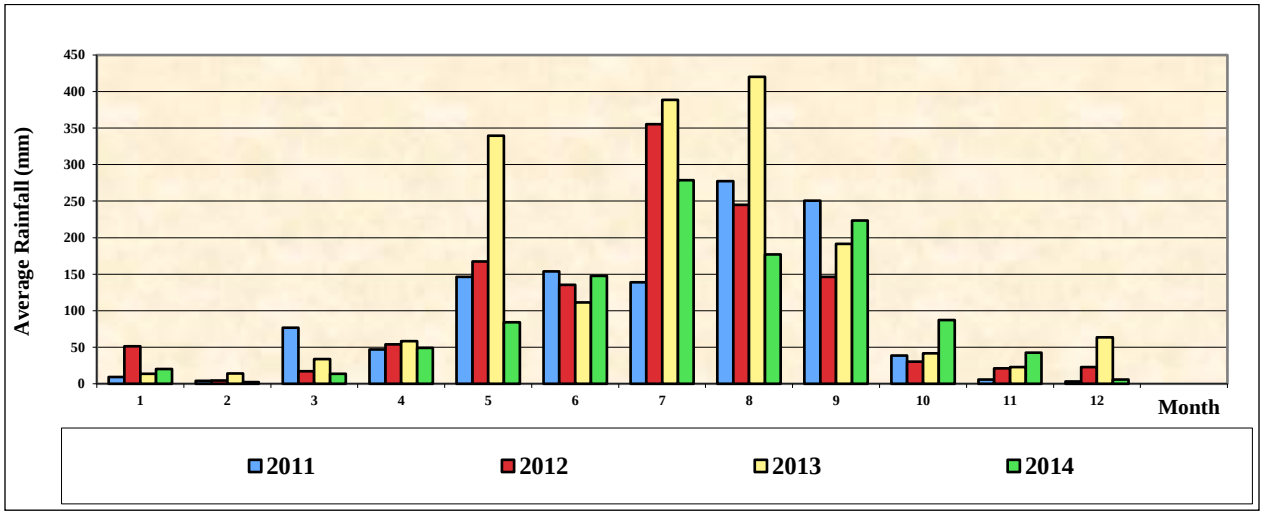
Table 4: Average Annual Temperature in 2011-2014 Period

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**

42. The annual average rainfall is about 1,756 mm, distributed according to the topography and the seasons. The rainfall reduces from the West to the East of the province and from high to lower areas. The area with the highest rainfall area of the province is Cho Don district with an average annual rainfall of 1,800 mm – 2,000 mm. Rain falling between April to October makes up 85% - 90% of the total rainfall of the year. The rainfall of the province in the 2011-2014 periods is shown in Figure 4.[5]

[5] Status of Environment report (SOE) of Bac Kan province 2015.

Figure 4: Average Rainfall Variation of Bac Kan in 2011-2014 period



3. Hydrology

43. 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 Na Ri River. The total surface water deposited is about 3.7 billion cubic meters[6]. Some information on the main rivers in Bac Kan is displayed in the Table below.

Table 5: Main Rivers 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	-

44. The Nang River is a branch of the Gam River, which is near famous tourism sites such as Ba Be lake, Puong cave and Dau Dang waterfall. The total length of Nang River is 70 km in Bac Kan and the water catchment is 1,600.5 km^2 in extent.

45. The main sources of water considered as a supply for the Subproject are as follows:

(i) Bo Luc stream: Originates from the Gia Ve waterfall and flows from south to north with a minimum discharge of 4 to 6 l/s. At the commune center the stream has an average width of about 2 m, and a depth of 0.2 m, as measured in September 2016 during the field investigations;
(ii) Choc Mac, Khuoi De, and Bo Luc streams: These join the Thom Moong stream in the southeast of the commune and flow to Boc Bo River just downstream of Na Nghe bridge; and,
(iii) Boc Bo River: One branch of the Nang river and fed by the Nan Sai and Ta Cap streams in Cong Bang commune. In the dry season near Na Nghe bridge the river is 8 m to 10 m wide

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

and the water level is 0.5 m, as measured in September 2016 during the field investigations.[7]

4. Seismicity

46. Viet Nam has been classified as a low seismicity region although earthquakes of up to degree VI on the Modified Mercali Scale have occurred in much of the northern mountain region, including Bac Kan province[8]. Ninety percent of the earthquakes that have occurred in Vietnam have taken place in the Northwestern Provinces. However, there is no remarkable earthquakes has been recognized in Bac Kan province.

B. Econogical Environment

38. Irrigated rice fields and dense shrub vegetation line the banks of Nang river, where the proposed pumping station for water intake will be located, while vegetation on the hill where the water treatment plant (WTP) is located is dense growth of shrubs and young trees, generally re-growth following previous clearance of the original tree cover of the area for cultivation. The dense, uncultivated vegetation by the stream (left bank) and on the Keo Vai hill comprises species that have regenerated naturally, including shrubs and some emergent trees. These species are well represented in wooded areas, strips of riparian vegetation and forests in the area and as such do not present a unique habitat. The right bank of the river bears mainly cultivated vegetation and grassed areas, which are grazed. No patches of tall or undisturbed forest occur in the immediate project area where the facilities will be built.

Figure 5: Location of Proposed Pumping Station and WTP

Location of proposed pumping station-Vang My weir

Proposed WTP location - top of Keo Vai hill

C. Social-Economic Context

1. Administration areas and population

47. The 2010 population of Boc Bo commune was 3,616 with 799 households. The average population density was 67.76 persons/km^2. By 2016, the population was 3,846 people with 943 households and a growth rate of 1.3% per annum comprising 1.1% natural and 0.2% from in-

[7] Subproject Feasibility Report

[8] UN Office of the Coordination of Humanitarian Affairs (OCHA) Viet Nam: Natural Hazard Risks issued March 2011. http://www.preventionweb.net/files/23469_ochavnmhazardv3110606.pdf

migration. For subproject design a 20% demand factor is included to cater for population increases up until 2030 (15 years).

48. The commune includes fifteen villages; the largest, Na Cooc village, is the commune center. Na Hoi village is the smallest and has only seventeen households. On average each household has 4.53 persons. The inhabitants of the Subproject area belong to six distinct ethnic groups being the Kinh, Tay, Nung, Dao, San Chi, and H'Mong groups. The Tay group accounts for the majority of people.

Table 6: Population and Ethnicity in the Subproject Area

	Whole Commune	Beneficiary Area
Number of villages	15	7
Population	3846	2158
Number of households	943	560
By ethnicity		
Kinh	76	56
Tay	430	348
Nung	32	32
Dao	104	25
H'Mong	110	2
San Chi	191	97
Female headed household	89	62
Number of poor HH	180	49

Source: Data collection from target communes, 2016

2. Economic development and income

49. Land use: Although agricultural land occupies range 7.6% the total land area in Boc Bo commune (See Table 6), agriculture production is still the dominant income source in the commune. Main crops are paddy, maize, cassava, and soybean. Livestock is considered as one of main income sources of the target commune. Forestry occupies over from 85% of total land area in the commune and is still of minor importance economically because (i) almost area is protection forest; (ii) there are some area of forest which can be cut down but because of poor road condition, it could be not sold. Participants in FGDs reported that the price per cubic meter of acacia timber in Boc Bo commune center can be at D900,000-D1,000,000/m^3, but it reduces to D280,000-D300,000 per cubic meter at farm gate far from commune center 8 km. According to annual report 2015, the plantation forest area was 17.35 hectares in Boc Bo commune. Table 6 illustrates major agricultural products in target commune in 2015

Table 7: Land Use in Subproject Area, 2015 (Hectare)

Type of Land	Boc Bo
Natural land area	5336.53
Agricultural land (excluded forestry land)	406.84
Irrigated land	174.57
Planted Paddy land	174.57

Type of Land	Boc Bo
Planted maize land	110.74
Planted cassava land	62
Land for other crops	26.34
Land for aquaculture	6.59
Forestry Land	4671.03

Source: Data collection from Boc Bo commune, 2016

50. The focus group discussions indicated farming is major livelihoods of 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 D16.2 million in Boc Bo and commune 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 D30 million; D20 million for Tay ethnic minorities, San Chi people only earned about D6.0 million on average per person annually.

3. Social services

51. The commune has a healthcare station without doctor. There are 6 nurses and midwives in Boc Bo commune health station respectively. Because Boc Bo commune located in district center therefore almost people go directly district hospital instead of commune health station. The head of commune health stations reported that in 2015 about 18% of pregnant women had given birth at home, especially remote villages in Boc Bo commune because of poor road condition. According to commune annual report, in 2015, the rate of immunized children under one year of age was 99.1% in the commune.

52. The commune has one kindergarten, one primary school and one secondary school. The subproject commune is connected to the national grid, two remote villages where is located 9 km far from commune center, only 33.5 and 85% households access grid.

4. Historical, cultural and religious presence

53. There are several archaeological sites that have been discovered in the subproject area, along Nang River showed the trace of ancient people like in Tham Hau place, Dai Khao village, Cao Tri commune, Ba Be district. Other locations have also been found in this area. In accordance to the specialists of Viet Nam Historical Museum, the area of Cao Tri commune, Ba Be district was the living area of ancient people in Old Stone Age - about 20,000 to 10,000 before Christ[9]. Ba Be National Park is also a famous tourist attraction site and it is located about 18 km to the south of the subproject area in Boc Bo commune.

5. Unexploded Ordnance

54. There has been no armed conflict in the site in recent decades. Nonetheless, nearly 40 years after Vietnamese - Chinese border war ended, unexploded ordnance (UXO) remains from aircraft, booby traps and land mines, all of which are indiscriminate and all of which result in concealment of the ordinance and information on the extent and location of UXO is sparse. In some locations, such as the sites of former combat bases or military supply routes, the scale of the risk is high. For most of the rest of the country, the level of risk for any one site is largely

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

unknown. Prior to earthworks and especially for the pipeline excavation corridors, survey for the presence UXOs has to be conducted by an authorized bomb and mine Clearance Company.

D. Surface Water Resources

55. The new water supply scheme will be served from Boc Bo river from a site selected just upstream of an existing 12.2 m wide reinforced concrete weir in Nam May hamlet. No stream gauging data is available but a recent study by the Ministry of Rural Development (MARD) measured flows across the weir. The district Division of Agriculture and Rural Development measured actual flow across the weir and assessed the minimum water level in the dry season was 26 mm with lowest velocity being 0.2 m/s. With a spillway width of 12.2 m, the minimum flow rate is 63.4 l/s or 5,477 m^3/day – exceeding the daily demand of 1,300 m^3 The river, and in particular the water retained by the weir, is adjacent to land used for grazing and the water is subject to a degree of contamination from animals and birds.

56. Downstream of the proposed intake site (see Figure 3) is a 16 ha irrigation command area fed by an ungated concrete lined supply canal leading off from the left hand side of the spillway. The spillway has been constructed to supply this canal and in the dry season, when the water depth across the spillway is at its lowest (0.2 m) and the demand is high, sufficient water will still be available for irrigation and water supply needs.

57. Using an irrigation demand of 1 l/sec/ha for the irrigated area this amounts to a hypothetical abstraction of about 0.016 m^3 per day or 1,382 m^3. When added to the daily water supply demand (1,300 m^3) this amount to 49% of the measured minimum daily flow (5,477 m^3) leaving a surplus of 2,795 m^3.

58. Including the expected impact of climate change, flows in the Boc Bo river would reduce by a further 33 m^3 which is inconsequential. Further downstream of the proposed extraction point community and agricultural demand is supported by inflow from tributaries, and no competition for water is currently known.

59. The selected site was assessed for its engineering suitability. With a minimum water depth of 0.2 m across the weir and a minimum depth of 0.5 m immediately upstream. The water level in the screened wet well could be set to ensure pump inlets are submerged. Field interviews found Boc Bo River has not dried up and that flow passes to the right hand side bank onto surrounding fields and dissipate quickly reducing the risk to the stream alignment which might threaten the intake works. The site would benefit from a fence lining the right hand bank to reduce the level of contamination from animal waste.[10]

E. Water Quality

60. The quality of the source water at the Boc Bo River, west tributary of Nang River is good, not polluted by cultivation activities. West tributary of Nang River meets the water needs for Boc Bo commune and Pac Nam district as the input for clean water demand at present and long term.

[10] The PPTA Consultants strongly recommend that ADB seek assurance from Bac Kan PMU that the subproject establish water gauging stations at the proposed water source prior to Fact Finding and that where the gauge data differs by more than 10% from current reported data a detailed hydrological assessment be undertaken prior to subproject approval. Concurrently monthly water quality tests should be undertaken

61. Based on the survey results, the quality of water in Nang River met the requirement as raw water for Water supply system for domestic use as stated in QCVN 08:2015-MT/BTNMT[11].

Table 8: Test Result of Nang River's Raw Water Source[12]

No.	Properties	Unit	Result	QCVN 08:2015-MT/BTNMT	Testing Method
1	pH	-	7.36	6 – 8.5	APHA 4500-pH
2	Turbidity	NTU	16	-	APHA 2130- Turbidity
3	Color	Pt – Co	10	-	A PHA 2120
4	Alkalinity	mg $CaCO_3$/l	200		APHA 2320-Alkalinity
5	Hardness	mg $CaCO_3$/l	110	-	APHA 2340-Hardness
6	Oxidization	mg O_2/l	4.5	>4	APHA 4500-KMnO4
7	Total Suspended Solid (TSS)	mg/l	25	50	APHA 2540
8	COD	mg O_2/l	23	30	APHA 5220-COD
9	Ammonium (NH_4+ - N)	mg/l	0.041	0.3	APHA 4500-NH3 TCVN 5988-1995
10	Nitrite (NO_{2-} - N)	mg/l	0	0,05	APHA 4500 TCVN 6180-1996
11	Nitrate (NO_{3-} - N)	mg/l	1.78	2	APHA 4500 TCVN 6178-1996
12	Arsenic (As)	mg/l	< 0.01	0.01	APHA 3500 - As
13	Zinc (Zn)	mg/l	0.04	1.5	SMEWW311B:2012
14	Total Iron (Fe)	mg/l	0.13	0.5	APHA 3500-Fe
15	Iron (II)	mg/l	< 0.01	0.5	APHA 3500-Fe
16	Copper (Cu)	mg/l	0.015	1	TCVN 5070:1995
17	Potassium (PO_4^{3-})	mg/l	0.029	0.3	TCVN 6202:2008
18	Chromium Cr (VI)	mg/l	-	0.04	TCVN 7939:2008

VI. IMPACT, ALTERNATIVES AND MITIGATION MEASURES

A. Area of Influence of the Subproject

62. The area of influence of the subproject includes the water intake area the WTP area, the area served by the pipe distribution network and the area along the raw water transmission pipe. It includes several villages of Boc Bo commune, Pac Nam district.

B. The Expected Benefits

63. Many households in the region recently seek water sources by themselves for the purposes of catering and drinking. Commonly, groups of about 3-5 households invest together

[11] QCVN 08-MT:2015/BTNMT National Technical Regulation on Surface Water Quality Column A1: Water quality for domestic water supply and other purposes

[12] Water sampled at the west tributary of Nang River afer flow through Boc Bo commune by Center of natural resources and environment monitoring under Bac Kan DONRE on 24 June 2016.

in a tank system and water pipeline directly from small stream heads to their house for catering. The capacity of these supplies is inadequate and also reportedly declining so households use dual systems of mountain water for consumption and stream for washing. The supply water quality is not well controlled to follow Vietnamese supply water quality regulations.

64. The benefits of the subproject are improved public health by ensuring full time reliable access to clean water for most of the local people in Boc Bo commune. The water will be safe for drinking and cooking, reducing the incidence of water related disease, which in turn improves the quality of life for beneficiaries, reducing the need to purchase safe water, and reduces productive time lost to illness.

C. Alternative; Design and Location Consideration

65. Surface water sources in Boc Bo district consist of rivers, streams, and rainwater retained in lakes and small ponds. Of these, the main sources of water considered as a raw water supply for the Subproject are as follows:

(i) Bo Luc stream: Originates from the Gia Ve waterfall and flows from south to north with a minimum discharge of 4 to 6 l/s. At the commune center the stream has an average width of about 2 m, and a depth of 0.2 m, as measured in September 2016 during the field investigations;
(ii) Choc Mac, Khuoi De, and Bo Luc streams: These join the Thom Moong stream in the southeast of the commune and flow to the Boc Bo River just downstream of Na Nghe bridge; and,
(iii) Boc Bo River: One branch of the Nang river (west tributary) and fed by the Nan Sai and Ta Cap streams in Cong Bang commune. In the dry season near Na Nghe bridge the river is 8 to 10 m wide and the water level is 0.5 m, as measured in September 2016 during the field investigations.

66. The subproject area has several watercourses, the three largest being the Nang river, the Cong Bang river, and the Nghien river. The Nang River is the largest with an average rainy the flow of 942 m^3/s reducing to a dry season flow of 19.5 m^3/s.

67. Based on a review of existing data, a site on the Boc Bo river in Nam May has been selected as the site for the proposed intake and pumping station. The selected site is about 2 km upstream of the confluence of the Boc Bo and Bo Luc river. The site is located in Nam May hamlet. Two other sites were assessed as providing increased supply security being (i) above the confluence of the Boc Bo river and Bo Luc stream, and (ii) just below the confluence of Boc Bo river and Bo Luc stream. Both were discounted due to a proposal to build a new wastewater treatment plant upstream. The effluent water from this plant would discharge into the Boc Bo river and threaten water quality[13].

D. Pre-construction Activities

68. The preconstruction activities under the subproject area are site clearance along the raw water pipeline, WTP and distribution networks. The rice field area where the proposed 200m raw water pipelines will be placed will be acquired for the construction activities. A Resettlement and Ethnic Development Plan (REMDP) has been prepared to cover compensation and assistance based on ADB SPS.

[13] The subproject Feasibility Study

69. **Slope stability**. The access road to the WTP will follow an existing track but will involve widening to form the road bench. This will involve some cutting into the hillside, and will also alter the existing water flows on the hillside. Risks are to be mitigated by design measures to protect the slopes and manage drainage. This will include (i) careful design of the access road, minimizing the amount of cutting necessary to form the road, (ii) providing for retention on the downslope side (iii) a geotechnical assessment of slopes to be cut should be made, and suitable retention or revetment structures included in the design as necessary (iv) a hydrological assessment and design of road drains and culverts, including cascades to direct runoff water as necessary (v) provision for cut slopes to be re-vegetated with grass and shrub species.

70. **Protection of the water source**. Provision will be made in the detailed design to include a perimeter fence around the water sources to exclude animal traffic and reduce contamination from animal waste.

E. Potential Impacts and Mitigation Measures in the Construction Phase

1. Loss of trees and impact to fauna

71. **Impacts:** Construction work will involve some removal of trees along 600 m access road and WTP proposed position itself. The trees on Keo Vai hill are mainly production young trees of less than 15cm diameter, and comprise species that have regenerated naturally. These species are well represented in nearby wooded areas and strips of riparian vegetation and forests in the area and as such the vegetation on Keo Vai hill does not present a unique habitat. The number of trees that will be cut down as part of the works will be very few, so the impact is not significant.

72. **Mitigation measures:** Trees owned 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, the DARD office of Pac Nam district will be counted the number of trees to be cut down, construction time and schedule. The contractor will not use or permit the use of fuel wood for construction activities or for cooking and water heating in worker's camps. The contractor will prohibit staff from collecting fuel wood 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. Generation of surplus soil

73. **Impacts:** Soil from excavation activities to construct the access road and leveling ground for construction of water treatment plant, which could not be reused as piled fill soil will release silt and cause possible soil erosion on slopes if discarded in situ.

74. **Mitigation measures:** A small amount of excavated soil will be reused as filling soil to cover the pipe system. The remaining surplus will be reused to the extent possible as a base material for the WTP site and for access road construction if suited for the purpose, or provided to local people for use on public or private land, as they desire. Not much of surplus soil will be transferred to a disposal site, to be agreed with the CSC and local authorities.

3. Generation of construction waste

75. **Impacts:** Solid waste that will be generated from construction mainly includes waste from workers' camps, debris, and packaging of materials and equipment cement cover, 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 a minor impact, as the main construction site is such of the WTP and small access road.

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

4. Impact from noise, dust and vibration generated by the construction activities

77. **Impacts:** Earthworks and rock crushing activities will be the main sources of dust. Construction machines and vehicles will generate gaseous emissions (NOx SOx, CO, CO_2, etc.) when they are in operation. These gaseous emissions and dust could cause health problems for residents who live near the construction site and along the transportation route and along the distribution pipeline network. The impact is considered as minor as the WTP and access road will be constructed at Keo Vai hill, about 1 km far from Boc Bo town. The installation of distribution network inside dense population will be done mainly by manual work.

78. **Mitigation measures:** The contractors will not locate any large or noisy construction machines near residential area of Boc Bo and will work with Boc Bo CPC, with the representative of ESS and PMU, to identify suitable materials transportation route. During the dry period, the sites and patches near residential areas, especially the sensitive receivers like Pac Nam Ethnic Boarding High School; Boc Bo High School; Boc Bo Secondary School; Boc Bo Primary School; Pac Nam Market; Pac Nam Vocational Center; Boc Bo Kindergarten should be sprayed with water regularly to suppress dust generated PMU and CSC will responsible to monitor these mitigation measures.

5. Impact on local traffic

79. **Impacts:** Distribution pipelines installation is likely to cause hindrance in traffic flow along PR258B and internal roads of Boc Bo town if not mitigated properly especially in the area of Pac Nam ethnic boarding high school, Boc Bo high school, Boc Bo secondary school and Pac Nam market. Pupils will get difficulties on their way to schools and local people will get difficulties on their way to the market. On the other hand, material transportation activities from proposed Keo Put quarry in Nhan Mon commune could also impact on the movement of local people especially at Pac Nam market. The impact duration will be short, during the distribution pipelines installation in 12 months construction phase.

80. **Mitigation measures:** To minimize the disturbance to local people, the contractor will inform Boc Bo CPC the construction schedule for distribution pipelines in advance and will also coordinate with local traffic authorities to implement appropriate traffic diversion schemes (if needed) to avoid inconvenience due to pipelines installation, setup clear traffic signal boards and traffic advisory signs at the market and school areas.

6. Safety of construction workers

81. **Impacts:** Workers are at risk of accidents associated with construction, particularly power connect to the nearby transmission line for the electricity substation of the WTP.

82. **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 all excavation sites are fenced with sign boards and perimeter markers; (iv) liaison with the power company to ensure that qualified technicians are on site to ensure that safety procedures are followed 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.

F. Potential Impacts and Mitigation Measures in the Operation Phase

1. Risk of water pollution and pipe breakages

83. **Impacts:** The water source of Boc Bo River could be polluted by the cultivation activities and animal waste along the river upstream; increasing the turbidity and contamination level for the raw water pumped to the WTP. Treated water could also be polluted due to the failure of the treatment system or inappropriate operation procedures such as incorrect chemical dosage. The water pipe could be broken, leading to waste of water and contamination.

84. **Mitigation measures:** MMB will install fences surround the water intake location to avoid cattle trespassing and install warning boards at the intake location as well as some main points along the distribution pipeline system. MMB will also inspect the water intake, pipeline system regularly and fix any system failure in time to ensure adequate water supply and quality. MMB, in collaboration with the DARD office of Pac Nam district, will take awareness raising measures such as signs and information displays and arrange appropriate propaganda to raise the awareness of local people on the importance of water source protection.

2. Risk of accident during WTP operation process

85. **Impacts:** Chemicals using in the WTP, like chlorine, especially in powder form, could be leaked and impact on the health of operation workers. Electric shock could be happened with worker working at the electricity substation. Other work accident could happen if the worker not to be trained properly and follow the safe working procedures.

Mitigation measures: The WTP must be equipped with a fire control system and protective gear for workers. Workers should be trained in the principles of safe working, emergency steps and proper handling and storage of chemicals. Among the chemicals, chlorine is the most toxic and therefore requires safe storage and handling. The operating procedures of the plant should include an inspection and maintenance schedule for all chemical storage and treatment equipment. Chlorine containers must be kept in a dry place and stored separately from non-hazardous materials.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. The purpose of Information Disclosure, Consultation and Participation

86. Public Consultation and Disclosure. Public consultation shall include discussions with members of project beneficiary groups, affected persons and commune officials, as a part of IEE preparation, in order to ascertain any concerns that may need to be addressed. In accordance to Circular No. 27/2015/TT-BTNMT, preparation of an EIA, entailing including public consultation is not required as the capacity of the subproject is only 2,200 m^3/day in comparison with the threshold for the EIA requirement being 50,000 m^3/day. As per ADB's SPS (2009), for category B subprojects however, it is necessary to conduct public consultation, including the following aspects:

(i) A summary of the proposed works under the subproject;

(ii) A summary of subproject objectives and likely positive and negative environmental impacts, covering the impacts in design, construction and operation phases for engaging stakeholders, including information disclosure and consultation with affected people and other stakeholders;

(iii) Invitation for feedback in respect of any areas of concern that the public may have, and suggested means of implementation; Summarizes comments and concerns received from affected people and other stakeholders and how these comments have been addressed in project design and mitigation measures, with special attention paid to the needs and concerns of vulnerable groups, including women, the poor, and Indigenous Peoples;

(iv) Acceptability of the proposed works to the public; and

(v) Request for information on the known occurrence of unexploded ordinance in the area where the scheme components will be built and facilitating participation of affected people during project implementation.

B. Method of Consultation and Participation

87. The method of information dissemination and consultation and participation includes the rapid assessment methodology and stakeholders participation and consultation using the following techniques:

- An in-depth interview (live-interview): organizing dialogues, meetings and discussions with local authorities, including interview via phone for additional information. At the commune level, the participants are usually deputy chairman and land administrative staff of the CPC.
- Obtaining information on the questionnaire (integrated with the social survey)
- Public consultation meeting at the CPC with the participant of affected households; representatives of commune, district and provincial level.

C. Consultation Process

88. The PPTA in collaboration with the local authorities held consultations with local stakeholders. These were conducted as part of the baseline survey on local environmental conditions along the pipeline corridor and the location of the WTP.

89. The main content of the consultation meeting was to provide information on the Water Supply System for Boc Bo commune, Pac Nam district; the adverse environment impacts, and proposed mitigation measures to be applied during the construction phase and operation phase. The participants also expressed their views as well as other opinions related to the Subproject and other issues.

D. The Result of Information Disclosure and Public Consultation

90. In general, there is no opposition from the public to the proposed subproject. All the local people have shown support for the subproject and are looking forward to the commencement of construction as soon as possible.

91. The public consultation meeting was carried out as part of a baseline survey of local environmental conditions along the projects sites. Meeting with local authorities took place on 12 September 2016. Public meetings were held in Boc Bo CPC on 14 September 2016.

92. The IEE, including the Environmental Management Plan (EMP) will be translated in Vietnamese and will be made available at the office of the People's Committees of Boc Bo commune.

VIII. GRIEVANCE REDRESS MECHANISM

A. Purpose of the Mechanism

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

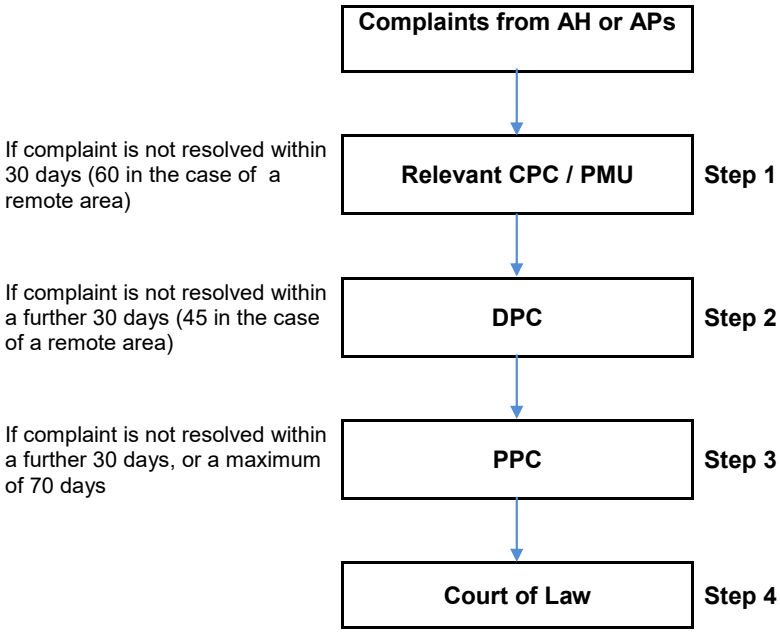
93. There are three steps to address complaints received from stakeholders:

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.



IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation Arrangements

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

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

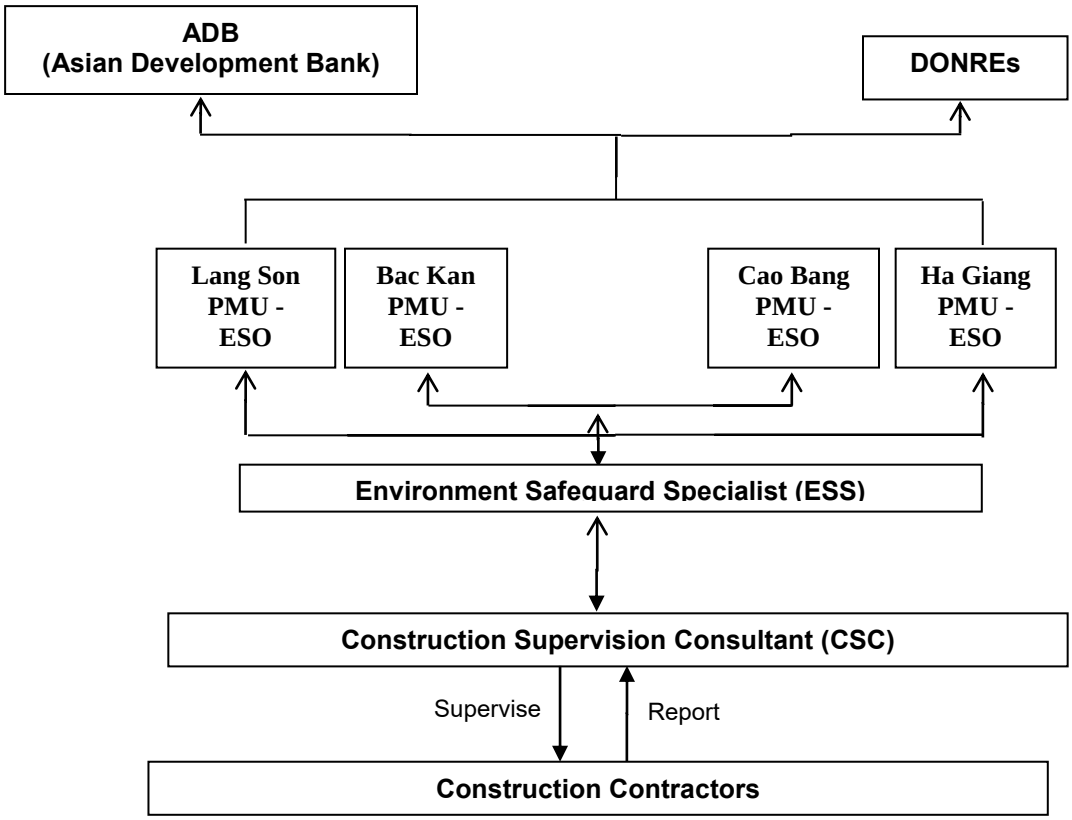
Table 9: Responsibilities for EMP Implementation

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 ESS. - Ensure that Subproject implementation complies with ADB's environmental policy and safeguards policy statement (SPS 2009) principles and requirements - For subproject duration, commit and retain a dedicated staff within PMU as environment and safeguards staff to oversee EMP implementation - Ensure that environmental protection and mitigation measures in the EMP are incorporated in the detailed design. - With the support from ESS, 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 ESS, 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 (ESS)	- 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 ESS'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 ESS'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.
onstruction Supervision onsultant (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.
ontractors	- 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 (including a Waste Management and Spoil 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
Market Management Board (MMB)	- Responsible for operation and maintenance of subproject. - 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 6: EMP Implementation Organization Chart



B. Environment Impact Mitigation

96. The anticipated environmental impacts and mitigation measures discussed in the previous section is presented in Table 10. The table also shows responsibilities and timeframe/schedule for implementation of mitigation measures and monitoring.

97. Table 10 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 operation stage, DARD 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 10: Detailed Environmental Mitigation Plan

Environmental Concern	Objective	Proposed Mitigation Measures	Locations	Timing	Responsible to implement	Budget
Preconstruction Detailed Designs Phase						
1. Land acquisition and resettlement	Control the impact of land acquisition and resettlement	1. Affected persons well informed ahead of project implementation 2. Monitor the compensation process to ensure it is suitable with the Land Acquisition and Resettlement Report	N/A	Before subproject starts	PMU	Included in the operation cost of PMU
2. Slope stability	Minimize the impact on the stability of the slope by access road construction activities	1. Minimize the amount of cutting necessary to form the road in the design 2. Design for retention on the downslope side. 3. Conduct geotechnical assessment and include suitable retention or revetment structures in the design. 4. Conduct hydrological assessment and design of road drains and culverts. 5. Design the re-vegetated with grass and shrub species for cut slopes.	In all subproject area	Before subproject starts	Design consultants	Included in the contract with the consultant
3. Protection of water source	Avoid water source pollution	1. Include a perimeter fence around the water sources in the detailed design	At the water intake area	Before construction start	Design consultants	Included in the contract with the consultant
Construction Phase						
4. Loss of trees and impact to fauna	Avoid and minimize impact to flora and fauna in the subproject area	1. Minimize 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 fuel for the execution of any part of the works and to the extent practicable will ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 4. Contractors will not buy or use wood from the illegal sources (that come from the illegal logging)	At the WTP construction area, along the proposed access road to the WTP	Through out the construction phase	CPC, Contractors	Included in the contract with the contractors
5. Generation of surplus soil	Control surplus soils	1. Reuse excavated soil as filling soil to cover the pipe system. 2. Surplus soil will be reused to the extent possible as a base material for the WTP site 3. Further surplus soil will be transferred to a disposal site as agreed with the CSC and	Through out construction site	Through out construction phase	Contractors	Included in the contract with the contractors

		local authorities				
6. Generation of construction waste and domestic waste from workers	Control waste disposal	1. Reuse construction waste such as cement bag cover, metal tools where possible. 2. Install rubbish bins at work sites and in worker's camps. 3. Transport the solid waste to a disposal site approved by the CSC.	Through out construction site and worker camps area	Through out construction phase	Contractors	Included in the contract with the contractors
7. Dust, noise and vibration	To minimize negative impacts from dust, noise and vibration during construction period	1. Large or noisy machines will not be located near residential area of Boc Bo. 2. Work with Boc Bo CPC, ESP and PMU to identify suitable materials transportation route. 3. Spray water regularly to suppress dust generated at the sites and patches near residential area during the dry period	Along the pipe installation line, WTP and access road construction site, material transportation road	Through out construction phase	Contractors	Included in the contract with the contractors
8. Traffic management	Minimize disturbance of traffic	1. Inform Boc Bo CPC in advance the construction schedule for distribution pipelines. 2. Coordinate with traffic police of Pac Nam district to implement appropriate traffic diversion schemes (if needed) 3. Setup clear traffic signal boards and traffic advisory signs at the market and school areas.	Along the distribution pipelines and materials transportation route, especially area near Pac Nam market.	Through out construction phase	Contractors	Included in the contract with the contractors
9. Safety precautions for workers and public safety	Ensure worker and local people safety	1. Conduct training for workers on safety, including roles and responsibilities, safe site practices and environmental hygiene 2. Institute site and camp rules like wearing protective tools properly. 3. Ensure all excavation sites are fenced and sign boards, perimeter markers installed 4. Liaison with the power company to ensure that qualified technicians are on site to ensure that safety procedures are followed 5. Assign responsibility to supervisor staff to ensure that all safety rules are followed	Through out the construction site	Through out the construction phase	Contractors	Included in the contract with the contractors
Operation phase						
10. Water pollution and pipe breakages	Ensure the quality of the water supply	1. Install fences surround the water intake location to avoid cattle trespassing 2. Install warning boards at the intake locations and some main points along the	Water intake area, along the pipeline	Continuously	Market Management Board (MMB)	Included in the operation budget of MMB

		pipeline. 3. Inspect the water intake, pipeline system regularly and fix any system failure in time. 4. Collaborate with DARD office of Pac Nam district to conduct propagandas to raise awareness of local people for water quality protection				

C. Environment Monitoring

Environment Compliance Monitoring

98. Table 11 below shows the program for monitoring the compliance on various provisions of the EMP during 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 11. During operation EMP implementation shall be the responsibility MMB.

99. 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.

Environmental Effects Monitoring

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

Table 11: Environmental Compliance Monitoring

Environmental Concern	Parameter to Monitor	Location	Frequency & Verification	Responsible to Monitor	Estimated Cost
Design and Pre-construction Phase					
1. Land acquisition and resettlement	Compensation documents	N/A	Once, before construction start	Bac Kan DPI, DONRE and PMU	Included in the operation budget of Bac Kan PMU
2. Slope stability	Design documents	N/A	Once, before construction start	Bac Kan PMU	Included in the operation budget of Bac Kan PMU
3. Pollution of water source	Perimeter fence in design documents	N/A	Once, before construction start	Bac Kan PMU	Included in the operation budget of Bac Kan PMU
Construction phase					
4. Loss of tree and impact to fauna	Check of implementation	At the WTP construction site, along the access road to the WTP	Before construction commencement and through out construction phase. Part of daily construction supervision	ESS/PMU CSC	Included in the operation budget of PMU/ESS/CSC
5. Waste and surplus soil disposal	Check of implementation	Through out construction site, designated disposal area	Bi-weekly Part of daily construction supervision	ESS/PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
6. Dust, noise and vibration	Check of implementation	Through out construction site	Bi-weekly and spot checks Part of daily construction supervision	ESS/PMU CSC	Included in the operation budget of PMU/ESS/CSC
7. Traffic management	Check of implementation	Through out construction site, along material transportation route, near Pac Nam market	Bi-weekly Part of daily construction supervision	ESS/PMU CSC	Included in the operation budget of PMU/ESS/CSC

8. Safety precautions for workers and public safety	Check of implementation. Check compliance to Labor Code of Vietnam and other relevant Decision, Decree and Circular under Government requirements	Through out construction site	Bi-weekly Part of daily construction supervision	ESS/PMU CSC	Included in the operation budget of PMU/ESS/CSC
Operation of WTPs & Pipeline Network					
9. Water pollution and pipe breakages	Public complaints of operation of WTPs, drinking water availability & quality, and malfunctions with pipelines (e.g., leaks).	On property of WTP, pipelines, and pump stations, water intake location	Continuously	MMB	Included in the operation budget of MMB

Table 12: Environmental Effects Monitoring

Environmental Concern	Parameter to Monitor	Location	Frequency & Verification	Responsible to Monitor	Estimated Cost
Design and Pre-construction Phase					
1. Air quality (dust, CO, NOx, SOx, noise, wind, and vibration levels) to supplement baseline air quality data collected during PPTA and reported in IEE Water quality parameters sampled west tributary of Nang River during PPTA & reported in IEE.	Using field and analytical methods described in QCVN and TCVN standards for ambient air and surface water quality sampling & analysis.	Representative sites of heavy civil & earthwork including along truck routes At raw water intake location	One day and one night measurement	ESO	Included in the operation budget of Bac Kan PMU
Construction Phase					
A) Air quality: dust, CO, NOx, SOx, noise, wind, and vibration levels B) Surface water quality: TSS, heavy metals (As, Cd, Pb) oil and grease, total & fecal coliform, pH, DO, COD, BOD_5, temperature, NH_3, and other nutrient forms of N & P. C) Public comments and complaints D) Incidence of worker or public accident or injury	A – B: Using field and analytical methods described in QCVN and TCVN standards for ambient air and surface water quality monitoring. Include visual observations of dust and noise from contractor & public reports. C) Information transferred by telephone hotline number D) Regular reporting by contractors/Bac Kan PMU	A – B): At the intake water area C): Using hotline number placed at construction areas D): At all construction	(A–B): Quarterly during construction periods (1 time for baseline data and 4 times in 1 year construction) C) Continuous public input D) Continuous	Quarterly	A) &B) (60$ & 500$) per sample times under cost norm of Ha Giang[14] C) & D) With (no extra cost)
Operation of WTPs & Pipeline Network					
Treated water quality: total & fecal coliform, pH, DO, NH_3, NO_3, NO, chlorine, PAC, NaCl, and heavy metals (As, Cd, Pb,).	Using field and analytical methods described in QCVN & TCVN standards for water quality monitoring, and parameters of QCVN 14:2008/BTNMT & TCXDVN 33:2008/BXD. Follow the procedures under Circular No.50/2015/TT-BYT providing for the inspection of drinking water and domestic water's sanitation and quality	At WTP & random user locations along distribution network	Biannually for parameter under B column, or when public complaint arises	MMB	Included in the operation budget of MMB

[14] There is no available cost norm for Bac Kan. Figures have been estimated base on Ha Giang cost norm.

D. Reporting

101. 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 13: 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	Daily	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 year of operation. On-going frequency to be determined based on review after 1 year.	MMB	DONRE Office of Pac Nam DPC

Table 14: Estimated Cost for EMP Implementation (1-year construction/2-year in total)

Item	Estimated cost (US$)
Staff Costs	
1. Environment Safeguard Specialist (ESS)	***10,720***
1 National ESS - 03 man-months (intermittent in 1 year construction) – $2,000/man-month	6,000
Per diem for ESS: $48 x 30 days x 3 months	4,320
Travelling cost for 2 round trips: $200 x 2 trips	400
EMP Budget	
2. Environmental effects monitoring (implemented by ESS)	***800***
Ambient air quality: 1 monitoring location x 5 times x $60/sample[15]	300
Surface water quality: 1 monitoring location x 5 times x $100/sample[16]	500
3. Training/orientation, local transportation, supplies (by ESS)	***1,500***
a) Training/orientation: 1 formal training course for PMU, CSC, Contractors, MMB and DARD office of Pac Nam district and other "on the job" training	1,000
b) Local transportation and supplies	500
4. Printing Environmental monitoring report by ESS (8 reports)	***300***
Subtotal (2+3+4)	**2,600**
5. Contingency	**130**
Total (2+3+4+5)	**2,730**

E. Capacity Building

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

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

[15] Due to there is no cost norm for Bac Kan province, figures have been estimated base on environmental monitoring cost norm of Ha Giang province.

[16] Due to there is no cost norm for Bac Kan province, figures have been estimated base on environmental monitoring cost norm of Ha Giang province.

Table 15: Detail Capacity Building Program

Objective	1. Build capacity and procedures in undertaking systematic environmental assessments in accordance with Government regulations and ADB guidelines 2. Provide training on international best practice on environmental management, monitoring and reporting. 3. Provide guidance on how to effectively incorporate environmental measures into project design and how to incorporate EMP provisions into tender and contract documents.
Tasks/Scope of Work	1. Undertake training needs analyses and review prevailing government regulations and donor guidelines governing the assessment and management of environmental impacts for road development. 2. Review the skills of PMU and MMB 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 2 months after construction commencement
Target participant	Staff in PMU and MMB who responsible for environmental management
Staff resources	National environmental specialist with at least 10 years experience on environmental management water supply projects and must possess relevant graduate degrees in civil engineering, environmental management and other relevant courses.

X. CONCLUSIONS AND RECOMMENDATIONS

104. 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.

105. The implementation of the subproject “Construction of a Water Supply System, Boc Bo Commune, Pac Nam District, Bac Kan Province” will improve conditions and enhance water supply services for people especially people in the mountainous areas and the poor people so that they can access the qualified and sanitary water resource for their domestic, production and tourism demand. Several actions are required during the detailed design stage to minimize impacts to acceptable levels. The negative environmental impacts from the upgrading works will mostly take place during the construction stage. All of the impacts during construction phase should be very predictable and manageable and with appropriate mitigation and few residual impacts are likely. Additional human and financial resources will be required to improve environmental capability and to progress and achieve necessary statutory compliance and environmental clearance certification for the subproject or associated activities that also require environmental permits under the environmental laws of Viet Nam – LEP 2014.

106. 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 Area

Boc Bo River - ahead of Vang My Weir

Waste accumulated near Vang My Weir

Current road condition at the proposed WTP

Public consultation in Boc Bo CPC

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. *Report on Water Quality Monitoring Plan in 2015 Bac Kan DONRE*
4. *The PO reports of the PPTA for Bac Kan Province*
5. *Social and Resettlement Report of the PPTA*

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

1. Loss of trees and impact to fauna	1. Minimize 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 fuel for the execution of any part of the works and to the extent practicable will ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 4. Contractors will not buy or use wood from the illegal sources (that come from the illegal logging)
2. Generation of surplus soil	1. Reuse excavated soil as filling soil to cover the pipe system. 2. Surplus soil will be reused to the extent possible as a base material for the WTP site 3. Further surplus soil will be transferred to a disposal site as agreed with the CSC and local authorities
3. Generation of construction waste and domestic waste from workers	1. Reuse construction waste such as cement bag cover, metal tools where possible. 2. Install rubbish bins at work sites and in worker's camps. 3. Transport the solid waste to a disposal site approved by the CSC.
4. Dust, noise and vibration	1. Large or noisy machines will not be located near residential area of Boc Bo. 2. Work with Boc Bo CPC, ESP and PMU to identify suitable materials transportation route. 3. Spray water regularly to suppress dust generated at the sites and patches near residential area during the dry period
5. Traffic management	1. Inform Boc Bo CPC in advance the construction schedule for distribution pipelines. 2. Coordinate with traffic police of Pac Nam district to implement appropriate traffic diversion schemes (if needed) 3. Setup clear traffic signal boards and traffic advisory signs at the market and school areas.
6. Safety precautions for workers and public safety	1. Conduct training for workers on safety, including roles and responsibilities, safe site practices and environmental hygiene 2. Institute site and camp rules like wearing protective tools properly. 3. Ensure all excavation sites are fenced and sign boards, perimeter markers installed 4. Liaison with the power company to ensure that qualified technicians are on site to ensure that safety procedures are followed 5. Assign responsibility to supervisor staff to ensure that all safety rules are followed

D. Appendix 4: National Technical Regulations of Viet Nam

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 solids (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

No.	Parameters	Unit	Limit Values			
			A		B	
			A1	A2	B1	B2
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 31 December 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

No.	Parameters	Unit	Limit values
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 25 June 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 25 October 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.	Parameter	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: Stakeholder Communication Strategy

Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources
Disseminate information on project design, key impacts anticipated as well as any mitigation measures, to project Aps and beneficiaries	Language/Culture Literacy Managing expectations, including that of free water delivery and compliance with Viet Nam law (full cost recovery) Reach of information, especially in isolated or remote settlements in peri-urban areas and communes Lack of confidence in local authorities	Subproject Aps Community members (men & women in urban/peri-urban/rural communes) Women headed HH Poor HH	Subproject design, key benefits (including those of treated water supply), implementation arrangements and schedule of civil works opportunities for temporary employment as construction workers, community mobilizers or IEC campaign facilitators Main impacts of subproject (positive and negative) through disclosure Planned mitigation measures, especially for female APs (including compensation rates, entitlements, grievance redress mechanism) View water as a commercial good and stress the importance of user cost recovery, including for poor HHs Targeted subsidies, including free connections and lifeline tariffs included in tariff by	Public information meetings Resettlement committee meetings in affected areas Printed information in local language(s) posted in accessible public areas Gender-sensitive IEC campaign, including community-level training and public media campaign Meetings, consultations and other interactions between PMUs/WSCs and CSBs in the subproject area's service zones	Ongoing prior to implementation of activities Early in each phase of subproject preparation Subproject detailed design Ongoing during civil works Post evaluation after project completion	Primary: PMUs WSCs Contractors/ subcontractors for civil works Local authorities at commune-, ward-, city- and district-level (CPCs, WPCs, CPCs and DPCs) VWU Community Health Centers (CHCs) Secondary: PPCs DPI DOLISA	Costs will be covered in part by the RPs, GAPs as well as basic project implementation budgets under PMU Incremental Cost and Construction Supervision Contract Resettlement Specialist WSC/PMU Social Development & Safeguards Specialists Compensation and Resettlement Committees (CRCs) Community Supervision Boards (CSBs) Community health workers (under respective DOHs)

Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources
			law to poor and women-headed households.				
Deliver information on labor opportunities and good labor practices	Language/Culture Literacy and low levels of awareness	Community members as well as outsiders hired as semi-skilled and skilled construction workers, community mobilizers and IEC campaign facilitators in subproject areas Contractors/ subcontractors for civil works	Opportunities for appropriate skills training/upgrading during period of hire, with quotas reserved for women (GAP) Core labor standards, including no forced labor and child labor Gender parity in work related compensation, i.e., equal pay for equal work, for women and men, and the right to separate living & toilet facilities at work sites Schedule of civil works Labor safety regulations Risks and prevention of HIV/AIDS transmission and Human Trafficking	Public information meetings Printed information in local language(s) and language(s) of migrant workers (on pamphlets and billboards), posted in accessible public areas, especially at or near construction sites IEC campaign for HIV/AIDs and Human Trafficking, including community-level training and public media campaign	Early in each phase of sub project preparation Ongoing during civil works and conduct of IEC campaigns	Primary: PMUs WSCs Local authorities at commune-, ward-, city- and district-level VWU CHCs Secondary: PPCs DOLISA	Costs will be covered in part by the GAPs as well as basic project implementation budgets under PMU Incremental Cost and Construction Supervision Contract PMU Social Development & Safeguards Specialists CSBs Community health workers Health NGOs
Highlight responsibility of provincial government agencies in enabling access of disadvantaged groups to municipal water supply	Lack of political willingness to implement decrees and decisions Provincial budget constraints	PPCs DOLISA PCs at other administrative levels in provinces, i.e., local authorities	Basic project design, anticipated impacts and any planned mitigation and grievance redress measures as they apply to APs, beneficiary groups and workers in the province State support for	WSC meetings with relevant local authorities and government agencies authorities, attended by VWU officials at the appropriate level	From outsets of the project	MPI (as CA) WSCs VWUs at all levels	Costs will be covered by the GAP and basic project implementation budgets under PMU Incremental Cost and Construction

Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources
			water related subsidies to poor and women headed HHs, and other vulnerable groups (including EMs, disabled, etc.), in accordance with Decrees 117 & 124				Supervision Contract WSC management PMU Director PMU Social Development & Safeguards Specialists
Inform Provincial VWUs about project design and entry points for their participation – community mobilization, IEC, and ensuring women's access to all project benefits	Lack of sectoral capacity Relative lack of resources and decision making authority compared to other departments and agencies, including WSCs	Vietnam Women's Union (VWU)	Basic project design and anticipated impacts, as they matter to women Disseminate information on improved HH water management, sanitation and hygiene to communities in collaboration with Community Health Centers.	Public information meetings IEC campaign (including materials) to raise awareness on links between gender and WASH issues Training materials integrating gender	From outsets of the project	VWU WSCs Local authorities at commune-, ward-, city- and district-level CHCs	Costs will be covered by the GAP budget PMU Director PMU Social Development & Safeguards Specialists CSBs Community health workers
Inform network of Community Health Centers in project areas about project design and the role they are expected to play in disseminating information on	Relative lack of resources and decision making authority compared to other departments and agencies, including WSCs	Community Health Centers (and community health workers), Department of Health	Disseminate information on health benefits of improved water supply, sanitation and hygiene to communities in collaboration with VWC Design and propagate training module about HIV/AIDS	Public information meetings, IEC sanitation and hygiene awareness materials, including community based training and public media campaign HIV/AIDS training module	Early in each phase of sub project preparation Ongoing during civil works and conduct of IEC campaigns	VWU PMUs WSCs Local authorities at commune-, ward-, city- and district-level CHCs	Costs will be covered by the project implementation budget (social development) PMU Social Development & Safeguards Specialists CSBs Community health workers

Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources
improved WASH as well as HIV/AIDS causes & prevention							
Promote community involvement in resettlement and project monitoring	Identifying valid community representatives Newly formed, slow to build up capacity required Functions vaguely defined	Community Supervision Boards (CSBs) Compensation and Resettlement Committees (CRCs)	Information on resettlement areas, affected households, resettlement plan and compensation policies Core labor standards integrating gender concerns and labor safety regulations Special consideration of community members from poor and/or women-headed HHs in all aspects of the project Risks and prevention of HIV/AIDS transmission and Human Trafficking	Meetings between WSCs/PMUs and CSBs and CRCs Public information meetings presided over by CSBs or CRCs Direct interactions between affected HHs and CSBs or CRCs Printed information in local language(s) posted in accessible public areas Gender-sensitive IEC campaign, including community-level training and public media campaign	Early in each phase of sub project preparation Ongoing during civil works and conduct of IEC campaigns	VWU PMUs WSCs Local authorities at commune-, ward-, city- and district-level	Costs will be covered by the GAPs and basic project implementation (social development component) budgets PMU Social Development & Safeguards Specialists CSBs Community health workers
Ensure understanding of HIV/AIDS transmission and	Language/Culture Literacy and low levels of awareness	Communities in or near project area construction sites Workers on construction	Key risks and mitigation measures of HIV/AIDS transmission and Human Trafficking	Public information meetings Printed information in local language(s) and language(s) of migrant workers (on pamphlets and billboards), posted in	Prior to commencement of civil works and throughout civil works	PMUs VWU CHCs Civil works contractors/ subcontractors	Costs will be covered in part by the GAPs as well as basic project implementation budgets PMU

Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources
Human Trafficking risks, and prevention measures for both		site		accessible public areas, especially at or near construction sites IEC campaign for HIV/AIDs and Human Trafficking, including community-level training and public media campaign			Social Development & Safeguards Specialists CSBs Community health workers Local NGOs with a health focus
Strengthen business processes and institutions, integrating gender issues	Inertia to change; tendency to maintain institutional and socioeconomic status quo	All WSC and PMU staff, especially women in executive and non-executive positions VWU members at all levels within the province	Reasons why profit generation, user cost recovery and tariff roadmap are core principles of business viability Negotiate sharing of capital costs and underwriting of any subsidies to consumers with state agencies (PCs and DOLISA) Opportunities for training, exposure visits, with quotas reserved for female staff and VWU members to learn more about the sector Gender parity in work related compensation, i.e., equal pay for equal work, for women and men in WSCs	Resettlement committee meetings and/or meetings with affected households, Printed information in local language posted in accessible public areas Training workshops and exposure visits to raise awareness about benefits of community participation in all aspects of project planning, implementation, and M&E Financial and technical training workshops Training materials to promote gender sensitivity Routine consultation with VWUs on gender-related matters relevant to project outputs Routine consultations between WSC management and women employees, in executive and non-executive positions, about professional issues that matter to them	From outset of each subproject Ongoing prior to implementation of activities Early in each phase of subproject preparation At project detailed design Ongoing during civil works	Water Supply Companies (WSCs) as independent commercial & legal entities MPI PPCs PMUs VWUs	Costs will be covered in part by the GAPs and project implementation budgets PMU Director PMU Social Development & Safeguards Specialists Staff welfare committees of WSCs

Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources

Key: ADB - Asian Development Bank; PMU –Projects Management Board; APs – Affected Persons; CSB – Community Supervision Board; CPC – Commune Peoples Committee; CWU – Commune Women's Union; DARD – Department of Agriculture & Rural Development; DOC – Department of Construction; DONRE – Department of Natural Resources & Environment; DOT – Department of Transport; DPI – Department of Plan and Investment DRCs – District Resettlement Committees; GAP – Gender Action Plan; IAs – Implementing Agencies; IPP – Indigenous Peoples Plan; PP – Project Proposal; O & M – Operation & Maintenance; PPC – Provincial peoples Committee; of RIs –Rural Infrastructure; RP – Resettlement Plan; VWU – Viet Nam Women's Union;

F. Appendix 6: Meeting Minute and List of Attendance - Public Consultation

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 Pắc 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 muốn tài liệu những nếu vướng hè rào, cây que 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.
  + Công 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 dâng nước phải rõ ràng để ng dân đc biết.
  + Cần phải xử lý đá với do nc có nhiều đá đỏ,
  + không chặng nguồn nước sông. Nâng đa mức bản, nhiều khu tầng 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 ĐỒNG 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 Hoa	Hoa
2	Lường Thị Vinh	Vinh
3	Ma Thị Lầu	Lầu
4	Dương Thị Cao	Cao
5	Hoàng Trung Bố	Bố
6	Đặng Văn Bảy	Bảy
7	Quách Văn Huấn	Huấn
8	Dương Hoàng Tuấn	Tuấn
9	Quách Thị Mận	Mận
10	Nông Thị Đào	Đào
11	Nông Thị Thường	Thường
12	Nguyễn Thị Thiện	Thiện
13	Hoàng Thị Tiếng	Tiếng
14	Lê Thị Mỹ	Mỹ
15	Thị Thị Nga	Nga
16	Đường Văn Mai	Mai
17	Ma ngọc Lập	Lập
18		

Initial Environmental Examination

Stage of the document: Final
Project number: 49026-002
April 2017

VIE: Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project-Construction of Water Supply System in Phu Ngoc Commune, Xuan Hoa Town, Ha Quang District, Cao Bang Province

Prepared by Planning and Investment Department of Cao Bang province for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 27 April 2017)

Currency unit	–	Viet Nam Dong (D)
D1.00	=	$0.000044
$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
ESWSC		Environment Sanitary and Water Supply Cooperative
IEE	–	Initial Environmental Examination
LEP	–	Law on Environmental Protection
lpd	–	Liters / person / day
MASL	–	Meters above sea level
MPI	–	Ministry of Planning and Investment
MPN	–	Most Probable Number of viable cells of a pathogen - a measure of water quality
PPC	–	Provincial People's Committee
PPE	–	Personal Protective Equipment
PPMU	–	Provincial Project Management Unit
PPTA	–	Project Preparatory Technical Assistant
ROW	–	Right of Way
SPS	–	Safeguard Policy Statement
The PPTA	–	The Project Preparatory Technical Assistant Consultants
The Project	–	Basic Infrastructure for Inclusive Growth in Northeast Provinces
The Subproject	–	Water Supply System for Domestic Use of Xuan Hoa Town, Phu Ngoc Commune - Ha Quang District, Cao Bang Province
UXO	–	Unexploded ordnance
WTP	–	Water Treatment Plant

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 (BIIG 1) will invest in the recently completed Four Northeast Provinces (FNEP) Overall Development Plan (2015). The development plan responds to the Government of Vietnam's strategy of targeting the investment into poorer provinces and regions. The use of a sub-regional approach seeks to build the interrelationship between provinces as one of the foundations for accelerating growth in the more remote regions. As such the plan targets investment into outputs that build areas of comparative advantage in a manner that increases the competitiveness of economic activity in the sub-region. The expected impact is to improve socio-economic wellbeing of local communities through the improved financial returns and through lower costs of accessing public health services, education, water supply and markets.

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 "Construction of a Water Supply System for Xuan Hoa Town, Phu Ngoc commune - Ha Quang district, Cao Bang Province" and is an output 2 representative subproject: Improved Rural Water Supply. The Subproject aims to expand water services in the district of Ha Quang, Cao Bang. It's objectives are to improve public hygiene, improve the landscape and appearance of the urban area, and to improve the health status and living conditions of people living in the town.

4. The project is expected to contribute to sustainable economic growth and to improve the quality of urban life through the provision of accessible, stable and sustainable water supply services. Plateau communes of Thong Nong district and Tra Linh district, Cao Bang province are home to about 30,000 people of ethnic groups, who have had little or no access to clean water supplies for many generations. Currently, Ha Quang district has been able to ensure water supply to the people, but only at an average level of 30 lpd (liters/person/day) and local water shortages still occur. With the goal of increasing the average level of access to clean water for people in the project to 45 liters/person/day sustainably, facilitating hygiene and water safety, reducing the incidence of water related disease, contributing to poverty reduction, and improving people's living conditions, investment in construction is essential and urgent.

5. The scope of the subproject is

- A reinforced concrete intake structure on the right hand side of the stream immediately upstream of the bridge on the road to Na Dam village
- A screened wet well set into the stream bed and equipped with a pair of pumps (pump station)
- Water treatment plant (WTP) - 250m from the pump station
- A pair of gravity mains to Xuan Hoa town and Phu Ngoc commune (transmission pipelines), run alongside the existing road for 4.4km long and 5.5km respectively.
- 100m access road to the WTP starting from the road connecting Xuan Hoa to Phu Ngoc.

6. The project, is classified as Environment Category B, is judged to have limited potential adverse environmental impacts, particularly in relation to pipeline construction activities, access road construction activities and, to a lesser degree, the disposal of sludge from the water treatment plant (WTP). The unavoidable construction impacts are temporary and can be mitigated, whereas adverse impacts related to incorporating grey water in the design of the WTP has minimized the discharge.

7. This Initial Environmental Assessment complies with the laws, decrees and circulars, the national technical standards and national technical standards of Vietnam and the Asian Development Bank (ADB) policy.

B. Environment impacts and mitigations

8. The project has very limited impacts on the natural environment, ecological resources and cultural assets. Most of the likely impacts are common for construction activities such as dust, noise, traffic disruptions, and waste can be prevented or minimized by standard mitigation measures.

9. During operation of the Water Treatment Plant (WTP) upgrading system, it is necessary to ensure that the management of chemical treatment process and new sludge tanks under the design meet the GOV discharge standards and water source protection management, hygiene condition of the WTP in accordance to Circular No.50/2015/TT-BYT[1].

10. In some proposed areas, the project may increase the volume of grey water produced by households receiving new connections. It is recommended that before installing the new water connection in each project area, construction supervision consultants, PMU, and representatives of Environment Sanitary and Water Supply Cooperative (ESWSC) make a general inspection to confirm that there is a combination of drainage system and WTP in the central area of Xuan Hoa town and Phu Ngoc commune to be able to handle the increased grey water load. On the other hand, they will identify additional works to be carried out by the drainage system and / or the local community before the new connection is made.

11. The EMP for the subproject includes mitigation measures and monitoring processes to manage and assess the expected and unexpected impacts of this project. The EMP also specifies responsibilities for implementation, and capacity development and training requirements of ESWSC and the appointed PMU to monitor the implementation of the EMP. The implementation of the EMP will require assistance from an environmental specialist (ESS), and a construction supervision consultant (CSC) to take part in the audit work of the EMP.

C. Information Disclosure, Public Consultation, and Grievance Redress

12. According to Vietnamese law, for a water supply facility with a capacity less than 50,000 m^3/day, it is not necessary to prepare an Environmental Impact Assessment Report (EIA) including public consultation but in accordance with the ADB Safeguard Policy Statement, for category B subprojects, it is necessary to conduct public consultation. As such, consultation on option of construction of WTP, technology processes, water supply alternatives, etc. is essential as a part of actual survey in project preparation. Public information and consultation activities were carried out as part of a baseline survey of local environmental conditions along the

[1] Circular No.50/2015/TT-BYT dated 11 December 2015 of the Ministry of Health, providing for the inspection of drinking water and domestic water's sanitation and quality.

projects sites. Meeting with local authorities took place on 16 September 2013. A public meeting was held in Xuan Hoa town center on 19 September 2016.

13. During the consultation on environmental matters, local leaders and members of some households were given an introduction to the project, anticipated environmental impacts and mitigation measurements, the project implementation schedule and relevant environmental issues. Overall, there was no opposition raised with respect to the proposed subproject.

14. A three-step grievance redress mechanism will be established for the subproject common to social as well as environmental safeguards to handle environmental impacts and land occupation. As a guideline, any complaints about any subproject's activity will be solved through negotiation to get agreement. Complaints will be submitted toward 3 levels of entities: First through commune/ward's PC, then the Town's PC and finally through PPC. If an agreement was not reach, then they will be law court as the final method. Environment Sanitary and Water Supply Cooperative (ESWSC) will bear all administrative and legal cost arising in such complaint solving processes in the operation phase.

D. Institutional arrangement

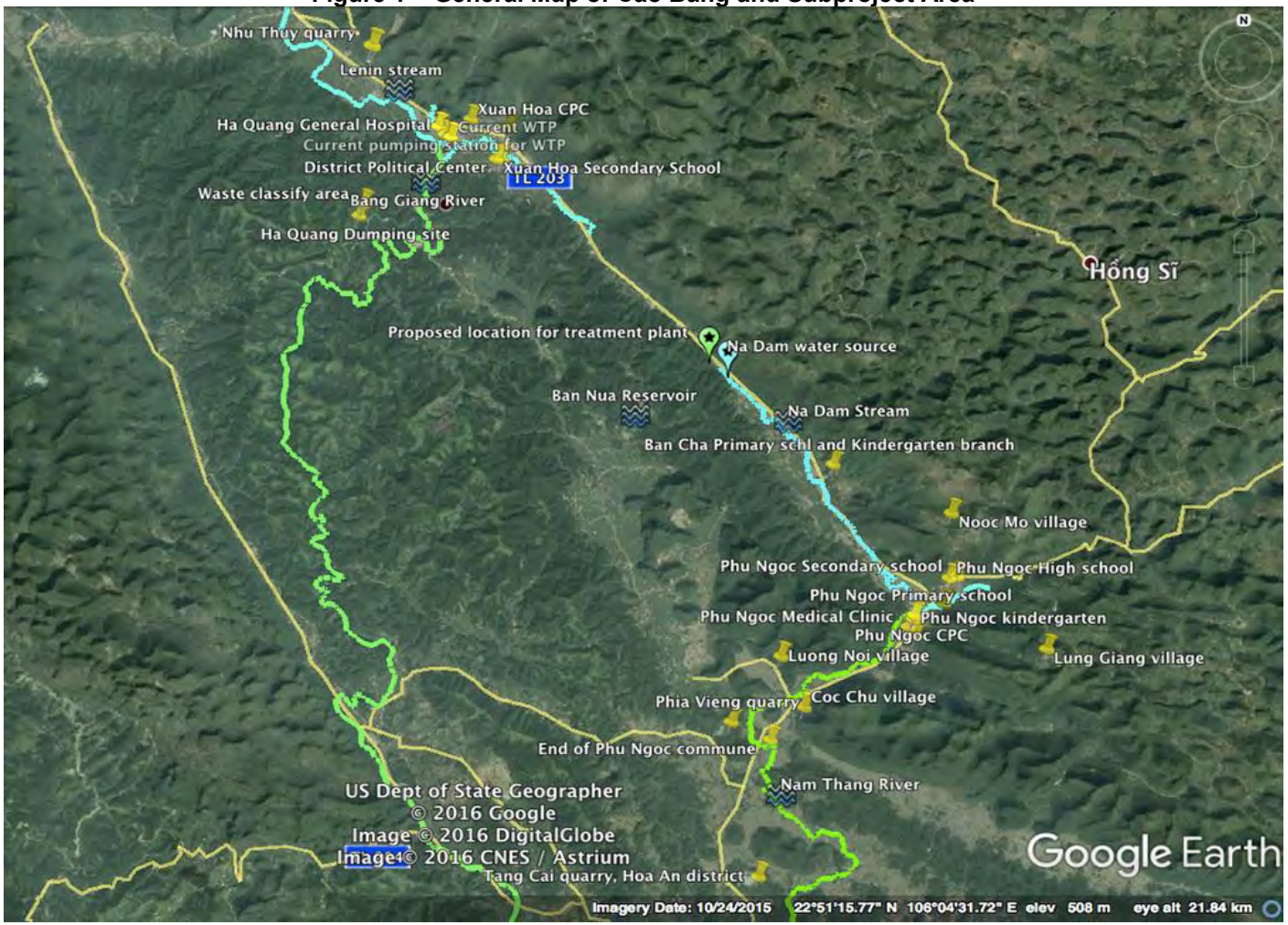
15. Cao Bang DPI has established an Official Development Assistance (ODA) Project Management Unit (PMU) and assigned relevant staff to support the preparation of the subproject in the PPTA period. One member of the PMU has been assigned as the Environmental Safeguards Officer (ESO). Two staff, including the ESO, have been participating in a training course on "Fundamental Safeguard and Gender Safeguard Policy Statement (SPS) of ADB" under TA8902-VIE Capacity Building for Project Management Unit Professionalization - organized by ADB in August 2016. The ESS will organize a formal training course and on-the-job training for relevant PMU staff, the CSC, communities, and contractors; and will provide support for establishment and operation of the subproject environment management system in the construction phase. The ESS will also support PMU's capacity building by reviewing and evaluating the capacity for environmental protection of the PMU and ESWSC – subproject management organization in the operation phase.

16. 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.

E. Conclusion

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

Figure 1 – General Map of Cao Bang and Subproject Area



II. BACKGROUND

A. Objectives of the Subproject

18. The objectives of the subproject will be achieved through upgrading the water supply system, providing greater access to clean water, especially for people in the remote areas, including poor households. Specifically, including Water supply system for domestic use for Xuan Hoa town, Phu Ngoc commune, Ha Quang district.

19. 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 water supply system subproject; (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

20. 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 environmental protection 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.

A. ADB SPS requirements

21. The ADB safeguard policy statement (SPS) 2009 imposes safeguard requirements for all 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:

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

22. For environmental safeguards, the subproject is initially categorized as 'B'. A subproject that would be classified as category A on environmental safeguards would be ineligible as a BIIG 1 subproject.

B. Legal and Administrative Framework for Environmental Protection in Vietnam

23. 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

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. 50/2015/TT-BYT dated 11 December 2015 of the Ministry of Health providing for the inspection of drinking water and domestic water's sanitation and quality.
- National Technical Regulations on air and noise quality
    - QCVN 05: 2013/BTNMT on ambient air quality
    - QCVN 26: 2010/BTNMT on noise
    - QCVN 27: 2010/BTNMT on vibration
- National Technical Regulations on water quality
    - QCVN 01: 2009/BYT on drinking water quality
    - QCVN 02: 2009/BYT on domestic water quality
    - QCVN 08: 2008/BTNMT on surface water quality
    - QCVN 09: 2008/BTNMT on underground water quality
    - QCVN 14: 2008/BTNMT on domestic wastewater

3. Other legislation applicable to the subproject are the following

- 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. PROJECT DESCRIPTION

A. The need for subproject

24. The proposed water supply scheme is the water supply system for Phu Ngoc commune and Xuan Hoa town to deliver 2,000m^3/day to supply 2,173 households (Cao Bang PDO). Household demand is high with population growth leading to Xuan Hoa commune being upgraded to a town in 2007. Consumers have no confidence in the quality of water and have been sourcing water from mountain streams and also from a private water supplier (Pac Bo) through bottled water. Some have switched to shallow wells however these have been drying up after 1-2 years. The general location of the proposed Water Treatment Plant (WTP) and the pipe system is shown in Figure 2.

25. Currently the subproject area only has partial water supply coverage. The scheme supplies only the centre of Xuan Hoa town, water quality is poor, and the supply is intermittent. Water is abstracted from the Bang Giang river adjacent to the district hospital and pumped to treatment works close by in Mai Nua hamlet were it undergoes some rudimentary treatment before distribution. The water treatment works were built in 2001 and since 2007 has been managed for the DPC by the ESWSC. The ESWSC is responsible for the operation of the assets and it is unclear if the assets are vested in the cooperative or not.

26. The treatment plant supplies partially treated water to about 130 households in Xuan Hoa town, which is way less than the original design number of 300 households. Water is pumped through a pressure main up to an adjacent service reservoir from where gravity feeds the distribution network. Delivery to each household is through a metered household connection to a point located typically inside the property boundary. There are a number of small-scale privately operated water supplies installed by the beneficiaries using springs and tanks. These prove sufficient during the rainy season but most dry up or become polluted when the rain season ends.

27. The existing water treatment plant is located in Mai Nưa hamet and the intake and raw water pumping station are located in Na Dam hamlet, Phu Ngoc commune, approximately 1,300 m away from Xuan Hoa town. The treatment plant occupies an area of about 5,000 m² and water charges are only collected from about 130 households. The works are in a very poor condition and there are serious weaknesses in O&M. Lack of pressure in the gravity delivery main means that households located at higher elevations cannot be served. In-migration to Xuan Hoa town from the surrounding communes is increasing demand, however demand is stated in terms of 24-hour supply of potable water.

28. The current pumping station is dilapidated however the pumps are in moderate to good condition due to the fact that they are idle for long periods of time, the water storage and treatment facility (settling tanks, filtering basin, fresh water storage) is located on a flow hill above the General Hospital of Ha Quang district and has insufficient space for the required expansion and works.

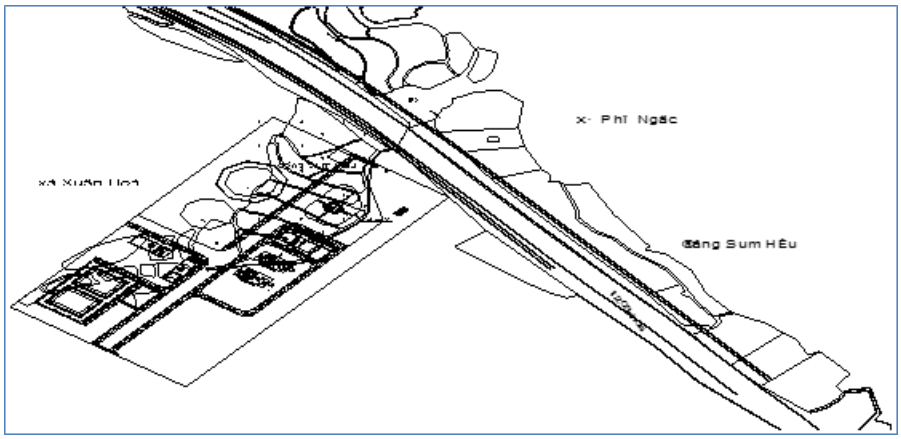


Figure 2 - Sketch map of the subproject works

29. Alternate water sources area available and offer significant operational advantages including water reliability, water quality and elevation enabling a gravity-based distribution that reduces the pumping costs currently incurred.

B. Location and scope

30. The location of the alternate supply is the Na Dam stream, Phu Ngoc commune about 6km southeast from Xuan Hoa town and about 20km from Cao Bang city in the Northeast direction. Water source shall be taken from Na Dam stream, according to the rapid inspection of the PPTA with Na Dam village the Na Dam stream originates from 3 underground water source. Water source is strong with high cleanness, continuous flow with an average flow depth of around 1.2m.

31. Construction of the Water Supply System for Domestic Use of Xuan Hoa Town, Phu Ngoc Commune subproject

- Construction of intake; 4.4 km and 5.5 km transmission pipe to Xuan Hoa town and Phu Ngoc commune respectively;
- Construction new WTP supply for the demand of 2,000 m^3/day;
- Gravity water supply delivery main 48 k
- Construction period 12 months

32. A reinforced concrete intake structure will be constructed on the right hand side of the river immediately upstream of the bridge on the road leading to Na Dam village. The riverbank is stable and rock is close to the surface allowing the structure to be located on a sound foundation. A screened wet well set into the river bed and equipped with a pair of pumps (one standby and one duty) will abstract and pump water about 250m up to a new treatment works to a ridge between Xuan Hoa town and Phu Ngoc commune. This will involve the construction of an access road, which will follow an existing forestry track on a steep 100m alignment. After treatment, water from the clean water tank will deliver water to the beneficiaries through a pair of gravity mains to Xuan Hoa town and Phu Ngoc commune. Both mains will run alongside the existing road for 4.4km long and 5.5 km respectively.

33. The need to site the new treatment plant with sufficient elevation to use a gravity system the recommended location will need an access road of about 100m starting from the road connecting Xuan Hoa to Phu Ngoc. The feasibility study fieldwork has proven the suitability of

the selected alignment (vertical and horizontal). A preliminary assessment of the geological and geotechnical characteristics has been made which indicates that the soils are stable and present no unforeseen challenges. At the detailed design stage further site investigations (trial pits and soils testing) will needed to confirm this initial assumption.

34. The water distribution pipelines will run alongside existing roads to minimize disruption and avoid compensation costs. They will transition down from large to small diameters and ultimately provide a metered house connection to each household. Valves and controls along the pipeline will control flows, quantify losses, and allow sections of the network to be isolated when a breakage or essential maintenance work is required. Where the pipeline crosses bridges or similar structures the pipeline will be in galvanized steel. Other than in situations where pipeline safety is threatened the pipe material will be HDPE or HDPE depending on the design application. The existing pipeline network serving Xuan Hoa town should remain in usable condition until 2030.

In details

- Location of the WTP: The WTP will be constructed in Na Dam village, Phu Ngoc commune, Ha Quang district - about 6km Southeast from Xuan Hoa town. The layout of the WTP is showed in the Figure 3 below:

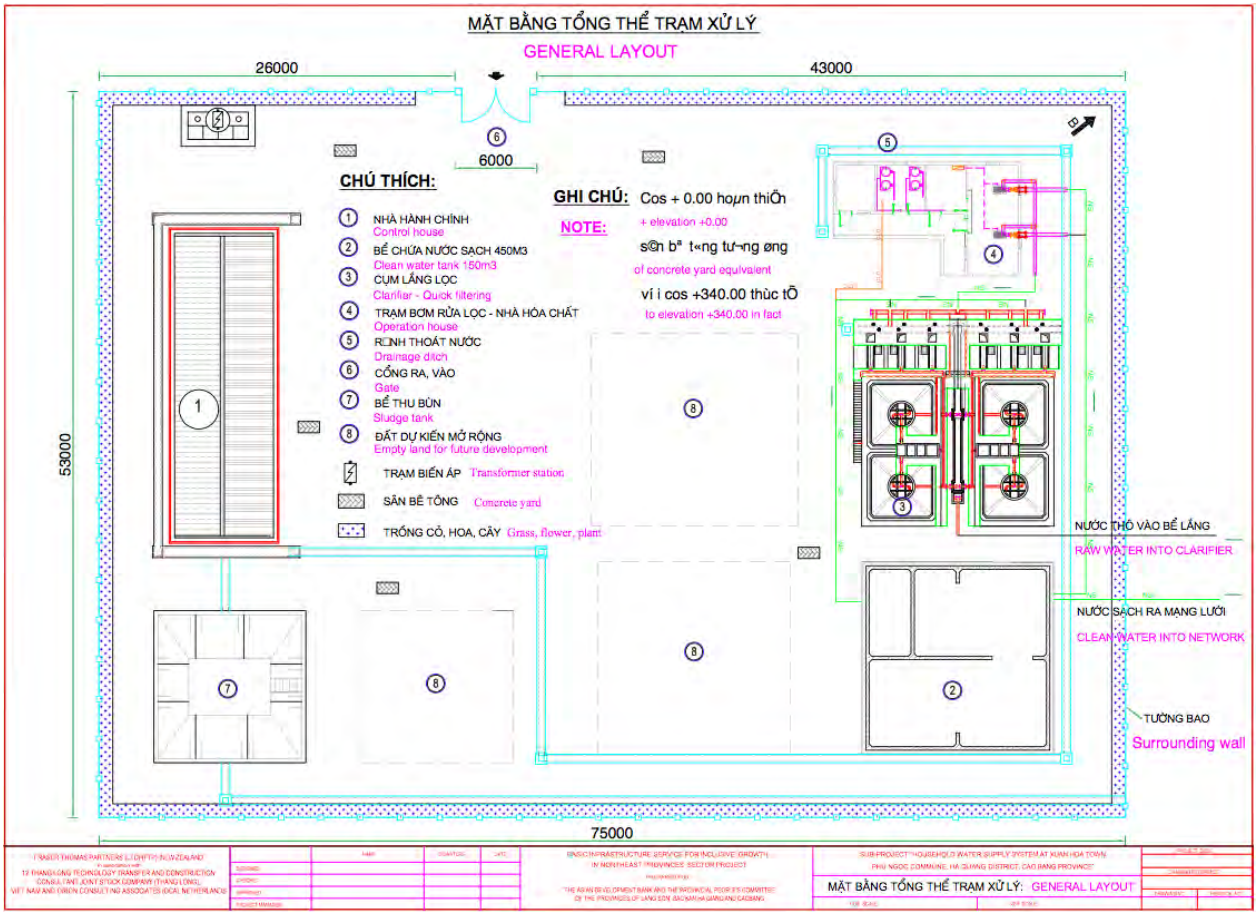


Figure 3 – Layout of the Water Treatment Plant

- Total investment capital: $ 2.310 mil USD; of which:
- Duration of the project: 2017 - 2018 (12 months)
- The estimated cost of the subproject is showed in the below table:

Table 1 - Subproject cost estimates

Summary of Xuan Hoa & Phu Ngoc Subproject Costs ex Tax			
No	**Cost items**	**Đ mil**	**$'000**
1	**Construction costs**		
	Materials	23359	1045
	Labor	8556	383
	Equipment	3167	142
	Subtotal	**35082**	**1570**
2	Equipment costs	591	26
3	Management costs	609	27
4	Consultancy	3300	148
5a	General costs and training	1115	50
5b	Contract Management	337	15
6	Peripheral electricity costs	909	41
7	Land compensation	708	31
8	Contingency cost	4285	192
	Tax (10%)	4707	211
	Total	**51644**	**2310**

Source: PPTA Consultant Estimates

35. The distribution system is planned as a single network delivering water from the new WTP. The new system will only utilize the services pipeline and meters from the existing system. A bulk transmission pipeline will be installed to link the new WTP with the distribution network.

36. The bulk transmission pipeline will be the networks backbone and will be installed to create a completed network to transfer water effectively to the service area of Xuan Hoa town and Phu Ngoc commune (except some remote villages including Nooc Mo and Lung Giang villages in Phu Ngoc commune).

V. DESCRIPTION OF THE ENVIRONMENT

A. Natural Conditions

1. Topography, Geology, and Soils

37. Cao Bang has a complex topography with an average elevation of 300m above MASL, gradually going down from North to South and from West to East. The highest point is the summit of Phia Oac Mountain in Nguyen Binh district with a height of 1,931m MASL. The topography of Cao Bang is divided in three main types: (i) a geosyncle depression in the central area of the province; (ii) hills formed from sedimentary deposits; and (iii) limestone karst. The karst area runs from the North, along the Vietnam - China border line to the South East part of the province. It is concentrated in Ha Quang, Tra Linh, Trung Khanh, Thong Nong, Ha Lang, Quang Uyen and Phuc Hoa districts. The subproject area is largely located inside this karst area in Ha Quang districts. Terrain in this karst area of the province is characteristically steep, with 75% of slopes steeper than 25^0.[2]

38. The soil of Cao Bang is divided in 3 main groups, with 24 types in total. These are high mountain soils, found over 900m MASL; hill soils on steep terrain below 900 MASL flat-valley soils hill soils with a typical yellow-red color. The predominant type in the subproject area is the hill soils.

39. The hill soil group is developed on low hill, or corrugated terrain. It features accumulated iron and aluminum compounds which result in the typical yellow red color. The soil is derived from basic and ultrabasic igneous parent rock and makes up around 47% of the total soil area of Cao Bang, while that derived from metamorphic rock such as gneiss makes up around 30%. [3]

40. The subproject area includes Xuan Hoa town and Phu Ngoc commune, Ha Quang district, shown in Figure 1Figure 4 below. The location is described as follows:

- Bordering with Truong Ha, Keo Yen, Van Dinh, Thuong Thon, Van Dinh communes, Ha Quang district to the North
- Ma Ba, Ha Thon communes, Ha Quang district to the East
- Nam Tuan, Dan Chu communes, Nuoc Hai district and Dao Ngan commune, Ha Quang district to the South
- Quy Nhan, Na Sac communes, Ha Quang district to the West

[2] Status of Environment report (SOE) of Cao Bang province 2015 - Prepared by Cao Bang DONRE 2015 http://tnmtcaobang.gov.vn/index.php?language=vi&nv=dltnmt&op=Du-lieu-ve-moi-truong/Bao-cao-hien-trang-moi-truong-theo-dinh-ky

[3] Cao Bang Electronic Portal - http://dukhach.caobang.gov.vn

Figure 4 - Subproject Location

2. Weather, natural disaster and climate change

41. Cao Bang has a tropical monsoon climate with two separated seasons in the year: a hot season with plentiful rainfall lasting from April to October and a cold season with less rain from November to March. The annual average temperature varies from 19.8^{0}C to 21.6^{0}C. In the summer months, the average temperature varies from 25^{0}C to 28^{0}C while in the winter months it varies between 14^{0}C to 18^{0}C. The average number of hours of sunshine in a year is 1,300 - 1,400, which is not distributed evenly over the year.

42. The annual average rainfall for the province as a whole is from 1,450 to 1,600mm. The rainy season (also the hot season) makes up 70-80% of the year. The driest period is between December to March of the each year. Rainfall patterns vary over the province, with the highest rainfall in the subproject district - Ha Quang, reaching 1,637mm per year while Thach An and Bao Lac districts have the lowest rainfall at 1,000 - 1,300mm averaged over the year. The average humidity is 84-85%, reaching 88-89% in July and down to 80-82% in December.

43. There are two main wind directions: Northeast winds appear from December to April each year and a Southeast prevailing wind blows from May to November. Whirlwinds or tornados sometimes occur on a local scale.[4]

44. The average temperature of Cao Bang has a rising trend of 0.42^{0}C every 10 years. Summers are starting to last longer and more extreme hot days, with temperatures greater than 40^{0}C, are becoming more frequent. Winters are becoming shorter and later, while the extreme cold period is longer. Rain is irregular and the frequency of heavy rain is higher, concentrated in

[4] Status of Environment (SOE) of Cao Bang province 2015

the rainy season, leading to flash flooding and landslides in mountainous area. The water level in the river, stream, pond and lake has a decreasing trend[5].

45. The main weather related risks in the subproject area of Ha Quang district are hail, extreme cold and drought. Periods of extreme cold impact on cultivation activities, causing an increase in livestock deaths in the winter. Serious hail events have been reported in Ha Quang district, one in April 20, 2012, broke 235 household roofs while 2 households in Phu Ngoc commune lost their entire roof. Hail has also affected more than 100/160 ha of tobacco cultivation. In March 31, 2014, another serious hailstorm impacted more than 7 communes with more than 600 households sustaining roof damage, loss of 2 ha of tobacco, and 10 ha of corn. Nearly one month later, in April 26, 2014 the most serious hail storm occurred, damaging 313 household roofs broken in Ha Quang district, more than 214 ha tobacco and 100 ha corn fields.[6]

3. Hydrology

46. Cao Bang is situated upstream of several rivers under two main river systems: the Red River and the Ta Giang River (China). There are nearly 1200 rivers or streams that are more than 2 km in length. In Cao Bang province, the total combined length of rivers and streams is 3,175 km and the density is 0.47 km/km^2. The main Rivers are: Gam River; Bang River; Bac Vong River and part of the Nang River. The rivers and streams of Cao Bang flow through steep terrain and waterfall are common, within the Quay Son and Gam River systems. [7]

47. Bang Giang River is started in Xuan Hoa town then flow south to Cao Bang city. Le Nin stream, originated from Pac Bo Vestigial, Truong Ha commune, Ha Quang district is the main water source of Bang Giang River. In accordance to the subproject PO report, the annual highest water level of the Bang Giang River is 18.121 cm while the lowest level is 17.649 cm.

48. The water source of the proposed Water supply system is the Na Dam stream, located in Na Dam village, Phu Ngoc commune, Ha Quang district. In the subproject area, there is also the Ban Nua Reservoir, about 1.5 km Southwest of the proposed pumping station for the Na Dam stream separated by a mountain. The capacity of the reservoir is more than 1 million m^3 and used for irrigation in Dao Ngan commune, Ha Quang district.

4. Seismicity

49. Vietnam has been classified as a low seismicity region although earthquakes of up to degree VI on the Modified Mercali Scale have occurred in much of the northern mountain region, including Cao Bang province[8]. Ninety percent of the earthquakes that have occurred in Vietnam have taken place in the Northwestern Provinces. As Cao Bang lies along the Cao Bang - Tien Yen Fault, small earthquakes have been recorded in recent years. At 11 pm, August 29,

[5] Cao Bang Action Plan on Climate Change for 2011-2020 period. Prepared by Cao Bang DONRE in corporation with other Government Organizations of Cao Bang.
http://tnmtcaobang.gov.vn/index.php?language=vi&nv=dltnmt&op=Du-lieu-ve-Khi-tuong-thuy-van/Du-lieu-dieu-tra-danh-gia-ve-khi-hau-bien-doi-khi-hau-tac-dong-cua-bien-doi-khi-hau-tinh-hinh-va-ket-qua-thuc-hien-cac-giai-phap-ung-pho-voi-bien-doi-khi-hau

[6] Cao Bang Electronic Newspaper:
http://baocaobang.vn/Thoi-su/Mua-loc-gay-nhieu-thiet-hai-ve-nha-o-va-hoa-mau/7041.bcb
http://cdvccaobang.vn/chi-tiet-tin/680-mua-da-kem-loc-xoay-lam-thiet-hai-tai-san-va-hoa-mau-tai-4-huyen.html
http://www.caobang.gov.vn/news/2379.cb

[7] Cao Bang Action Plan on Climate Change for 2011-2020 period

[8] UN Office of the Coordination of Humanitarian Affairs (OCHA) Viet Nam: Natural Hazard Risks issued March 2011. http://www.preventionweb.net/files/23469_ochavnmhazardv3110606.pdf

2010, a magnitude 3-richter scale earthquake occurred in Ha Quang district causing minor damage but no fatalities[9]. Another earthquake was recorded at 18h15 on November 3, 2011 in Thong Nong district, about 15 km from the subproject area. This 3.6 magnitude-Richter scale earthquake with the epicenter about 10km under the ground[10].

B. Ecological Environment

50. Rice fields and banana cultivation areas cover the banks of Na Dam stream, where the water pumping station is located. The raw water pipe will cross mainly agricultural land. The proposed WTP is located on the top of a low hill, which are covered re-growth trees. At the base of hill is an area of rice cultivation.

Figure 5 – Location of proposed pumping station and WTP

Location of proposed pumping station

Proposed WTP location on top of the low hill

C. Socio-economic Context

1. Administration areas and population

51. Xuan Hoa commune was upgraded to Xuan Hoa town (Urban area class V) in 2007. The total population of Xuan Hoa town and Phu Ngoc commune is 4,358 people and 3,265 people in 2010 respectively. Xuan Hoa town and Phu Ngoc commune are located along provincial road No.203 connect to the Pac Bo Vestigial, a site officially recognized by the State on February 21, 1975 as a national vestige of particular significance, - about 10 km to North of Xuan Hoa town center.

52. According to information from ESWSC, currently the households (about 300 households) still use the water supply by the existing scheme. Some households use groundwater but these sources have mostly dried up after 1-2 years and the households return to use water from the scheme. All parties indicate a demand for water and a willingness to pay for water in the town and surrounding villages, however this demand is conditional on a reliable 24-hour supply of potable water.

[9] http://khoahoc.tv/dong-dat-o-cao-bang-29063
[10] http://www.tinmoi.vn/dong-dat-o-cao-bang-01626322.html

2. Historical, cultural and religious presence

53. The Pac Bo Vestigial is the place chosen by Ho Chi Minh as a secret base to build up the revolutionary movement. Right here, he made a number of important decisions, contributing to the success of the 1945 August revolution. The Pac Bo Vestigial is however some 10km distant to the project. There is no specific evidence or knowledge of the presence of any other site of cultural, religious or historical significance site located in or adjacent to the subproject area. The subproject areas are mainly under agriculture and plantation. Chance finds of artifacts of historical or cultural significance are very unlikely.

3. Unexploded Ordnance

54. There has been no armed conflict in the site in recent decades. Nonetheless, nearly 40 years after Vietnamese - Chinese border war ended, unexploded ordinance (UXO) remains from aircraft, booby traps and land mines, all of which are indiscriminate and all of which result in concealment of the ordinance and information on the extent and location of UXO is sparse. In some locations, such as the sites of former combat bases or military supply routes, the scale of the risk is high. For most of the rest of the country, the level of risk for any one site is largely unknown. Prior to earthworks and especially for the pipeline excavation corridors, survey for the presence UXOs has to be conducted by an authorized bomb and mine Clearance Company.

D. Surface Water Resources

55. Both ground and surface water sources have been assessed for their suitability as a water source. Groundwater exists in shallow and deep aquifers. Shallow aquifers face seasonal shortages while having low turbidity in the rainy season water quality quickly degenerates offering few development opportunities. Good quality groundwater is held in the deeper aquifers at depths from 10 to 50 m and is technically exploitable however available reserves are difficult to evaluate without exploratory drilling and testing.

56. There are 24-drilled wells and a number of hand dug mostly shallow wells in the subproject service areas but these dry up. The DPC and some district offices use ground water pumped from caves fed into surface reservoirs but this is often of poor quality and unreliable.

57. The water source serving the existing water treatment plant will have to come from the Lenin stream which surfaces in the Pác Bó cave and flows northwest to southeast and is augmented by numerous smaller streams and groundwater outlets. The Lenin stream is an important water source, and together with many other branches, joins the Bằng Giang river to form one of the three river systems in Cao Bằng province. Water from the Lenin stream supplies the existing treatment plant at Xuan Hoa town but the quality is poor and there is insufficient flow to meet current demand.

58. A site on the Na Dam stream has been selected as the proposed location for the water source and was assessed during field investigations. No stream gauging data[11] is available and a mixture of minimum flow estimates, and local knowledge has been used to access its suitability. The minimum stream width and depth are 15m and 0.7m respectively, and the

[11] The PPTA's advice to the ADB is to require gauging on all streams be established by loan fact finding and that the gauging be used to monitor stream flow against the rainfall record such that by loan effectiveness and the submission of subprojects for approval at least one year data is available with month stream gauge and catchment rainfall records. Where the reported data differs by more than 10% from the data presented to the FS additional hydrological investigation should be required.

average slope is 0.005 %. Using the stream cross section at the intake point, and inflows from its tributaries, the reliable flow in the Na Dam stream has been calculated, and is about 5 m^3/sec. This is approximately 432,000 m^3/day and well in excess of the daily twenty-four hour demand, which is 2,000 m^3.

59. The selected site has been checked to ensure its engineering suitability. A minimum water depth of 0.7 m is sufficient to maintain water level in a wet well to ensure that pump inlets are submerged. Field interviews indicate that the Na Dam stream never dries up and that floods that occur during the wet season spill out into the surrounding fields and dissipate quickly rather than concentrating flows along the immediate stream alignment which might threaten and damage the intake works.

60. The water source of the proposed Water supply system is the Na Dam stream, which starts from a natural spring in Na Dam village, Phu Ngoc commune, Ha Quang district. It flows southwards to the center of Phu Ngoc commune and then combines with other streams to form Nam Thang River. The River continues southwards then joins the Bang Giang River in Na Duoc village, Nuoc Hai town, Hoa An district.

61. The water intake is in Nam Dam village, Phu Ngoc commune, about 6 km southeast from Xuan Hoa town and about 35 km from Cao Bang city to the Northeast. The site was inspected by the PPTA team. The water source is clean, appears to flow steadily and has an average depth of around 1.2 m.[12]

E. Water Quality

62. Based on the survey results, the most suitable raw water for Water supply system for domestic use of Xuan Hoa town and Phu Ngoc commune is Na Dam stream.

63. The quality of the source water at the of Na Dam stream is good enough to use as the water source for water supply under QCVN 08:2015-MT/BTNMT[13], not polluted by cultivation activities as the intake to the pumping station will be located at the stream head.

64. Na Dam stream has been selected as the proposed location for the water source and was assessed during field investigations. No stream gauging data[14] is available and a mixture of minimum flow estimates, and local knowledge has been used to access its suitability. The minimum stream width and depth are 15m and 0.7m respectively, and the average slope is 0.005 %. Using the stream cross section at the intake point, and inflows from its tributaries, the reliable flow in the Na Dam stream has been calculated, and is about 5 m^3/sec. This is approximately 432,000 m^3/day and well in excess of the daily twenty four hour demand which is 2,000 m^3 [15]

[12] The PPTA Consultants strongly recommend that ADB seek assurance from Cao Bang PMU that the subproject establish water gauging stations at the proposed water source prior to Fact Finding and that where the gauge data differs by more than 10% from current reported data a detailed hydrological assessment be undertaken prior to subproject approval. Concurrently monthly water quality tests should be undertaken

[13] QCVN 08-MT:2015/BTNMT National Technical Regulation on Surface Water Quality Column A1: Water quality for domestic water supply and other purposes

[14] The PPTA advice to the ADB is to require gauging on all stream be established by loan fact finding and that the gauging be used to monitor stream flow against the rainfall record such that by loan effectiveness and the submission of subprojects for approval at least one year data is available with month stream gauge and catchment rainfall records. Where the reported data differs by more than 10% from the data presented to the FS additional hydrological investigation should be required.

[15] The subproject Feasibility Study

Table 2 - Test result of Nam Dam Stream's raw water source[16]

No	Properties	Unit	Result	QCVN 08:2015-MT/BTNMT[17]	Testing method
1	pH	-	6.5	6 – 8.5	APHA 4500-pH
2	Turbidity	NTU	2.20	-	APHA 2130- Turbidity
3	Color	Pt – Co	9	-	A PHA 2120
4	Alkalinity	mg $CaCO_3$/l	208		APHA 2320-Alkalinity
5	Hardness	mg $CaCO_3$/l	176	-	APHA 2340-Hardness
6	Oxidization	mg O_2/l	1.89	-	APHA 4500-KMnO4
7	Total Suspended Solid (TSS)	mg/l	1	20	APHA 2540
8	COD	mg O_2/l	4.46	10	APHA 5220-COD
9	Ammonium (NH_4+ - N)	mg/l	0.05	0.3	APHA 4500-NH3 TCVN 5988-1995
10	Nitrite (NO_{2-} - N)	mg/l	< 0,01	0,05	APHA 4500 TCVN 6180-1996
11	Nitrate (NO_{3-} - N)	mg/l	0.62	2	APHA 4500 TCVN 6178-1996
12	Arsenic (As)	mg/l	< 0.01	0.01	APHA 3500 - As
13	Manganese	mg/l	0.016	0.1	APHA 4500-Mn
14	Total Iron (Fe)	mg/l	0.09	0.5	APHA 3500-Fe
15	Iron (II)	mg/l	< 0.01	0.5	APHA 3500-Fe
16	Chloride	mg/l	10	250	HACH 4500-Chloride B

[16] Tests done by Laboratory of Water, Chemistry and Environment - Science Institute of Infrastructure Engineering and Environment (SIIEE), dated 01 September 2016

[17] QCVN 08-MT:2015/BTNMT National Technical Regulation on Surface Water Quality Column A1: Water quality for domestic water supply and other purposes

65. From the current state of the water treatment plant which has been used and degraded, not ensuring water quality, and from the fact of insufficient water amount for daily domestic use and production of people in Xuan Hoa town and Phu Ngoc commune, it leads to many difficulties for people's living and production.

66. Therefore, it is required to invest in renovation and upgrading of water supply system for Xuan Hoa town, Phu Ngoc commune, Ha Quang district, Cao Bang province. The investment in construction is consistent with the overall development of society; belonging to the National strategy of clean water and sanitation in order to enhance quality of life, reduce the gap in economic life between mountainous region and the deltas.

VI. IMPACT, ALTERNATIVE AND MITIGATION MEASURES

A. Area of influence of the subproject

67. The area of influence of the subproject includes the water intake area the WTP area, the area served by the pipe distribution network and the area along the raw water transmission pipe. It includes Xuan Hoa town, Phu Ngoc communes, Ha Quang district and the 2 downstream communes of Nam Thang River - Nam Tuan and Duc Long, Hoa An district.

B. The expected benefits

68. The benefits of the subproject are improved public health by ensuring full time reliable access to clean water for most of the local people in Xuan Hoa town and Phu Ngoc commune. The water will be safe for drinking and cooking, reducing the incidence of water related disease, which in turn improves the quality of life for beneficiaries, reducing the need to purchase safe water, and reduces productive time lost to illness.

69. Many households in the region seek other water sources by themselves for the purposes of catering and drinking. Commonly, groups of about 3-5 households invest together in a tank system and water pipeline directly from flumes, caves to their house for catering. The capacity of these supplies is inadequate and also reportedly declining so households use dual systems of mountain water for consumption and river water for washing.

C. Alternative; Design and Location Consideration

70. To meet the investment objective of sufficient water for domestic use for the 7,623 residents and staff of agencies, schools and clinics, the estimated scope of the subproject is:

- Fresh water treatment station with capacity of 2,000 m^3/day (1 station).
- Installation of a transmission pipeline network made of HDPE pipe, of total length 9.9 km.
- Proposal of position of new WTP: the site requirements will be at least 5,000-7,000 m^2.
- Household connections

71. There are two options for the water source: The water source from Bang Giang River at Xuan Hoa town and the source from the Na Dam stream, Na Dam village, Phu Ngoc commune. The quality of the Bang Giang River section in Xuan Hoa town is inadequate for household use and the Ha Quang General hospital located at head of the river, which is a significant source of pollution immediately downstream. The water source from Na Dam stream has been selected as the water source for the subproject. The selected site has been checked to ensure its engineering suitability. A minimum water depth of 0.7 m is sufficient to maintain water level in a wet well to ensure that pump inlets are submerged. Field interviews indicate that the Na Dam stream never dries up and that floods that occur during the wet season spill out into the surrounding fields and dissipate quickly rather than concentrating flows along the immediate stream alignment which might threaten and damage the intake works.[18]

72. The proposed location of the WTP has been chosen due to its middle position between Xuan Hoa town and Phu Ngoc commune. It is also has low impact on human activities (in

[18] The subproject Feasibility Report

habited areas, mainly agriculture plantation areas). As the WTP located on the top of the small hill to ensure water from WTP will be supplied to Xuan Hoa town and Phu Ngoc commune by gravity flow.

73. Climate change impacts will be considered during detail design. As the area is subjected to hail storms, proposed adaptation measures will be identified and included in the detail design (for example, avoiding glass structures in the pump station house and other buildings).

D. Pre-construction activities

74. The preconstruction activities under the subproject area are site clearance along the raw water pipeline, WTP and distribution networks. The rice field area where the proposed 250m raw water pipelines will be placed will be acquired for the construction activities. A Resettlement and Ethnic Development Plan (REMDP) has been prepared to cover compensation and assistance based on ADB SPS.

75. **Slope stability**. The 100-m access road to the WTP will follow an existing track but will involve widening to form the road bench. This will involve some cutting into the hillside, and will also alter the existing water flows on the hillside. Risks are to be mitigated by design measures to protect the slopes and manage drainage. This will include (i) careful design of the access road, minimizing the amount of cutting necessary to form the road, (ii) providing for retention on the downslope side (iii) a geotechnical assessment of slopes to be cut should be made, and suitable retention or revetment structures included in the design as necessary (iv) a hydrological assessment and design of road drains and culverts, including cascades to direct runoff water as necessary (v) provision for cut slopes to be re-vegetated with grass and shrub species.

76. **Protection of the water source.** Provision will be made in the detailed design to include a perimeter fence around the water sources to exclude animal traffic and reduce contamination from animal waste.

E. Potential Impacts and Mitigation Measures in the construction phase

1. Loss of trees and impact to fauna

77. **Impacts:** Construction work will involve some removal of trees along 100m access road and WTP proposed position itself. The trees on the edge are mainly young, of diameter less than 15cm and comprise species that have regenerated naturally. These species are well represented in nearby wooded areas and strips of riparian vegetation and forests in the area and as such the vegetation on the edge does not present a unique habitat. The number of trees that will be cut down as part of the works will be very few, so the impact is not large.

78. **Mitigation measures:** Trees owned 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, the DARD office of Ha Quang district will be informed about the number of trees to be cut down, construction time and schedule. The contractor will not use or permit the use of fuel wood for construction activities or for cooking and water heating in worker's camps. The contractor will prohibit staff from collecting fuel wood 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. Generation of surplus soil

79. **Impacts:** Soil from excavation activities to construct the access road and building platform, which could not be reused as fill soil will release silt and cause possible soil erosion on slopes if discarded in situ.

80. **Mitigation measures:** Most of the excavated soil will be reused as filling soil to cover the pipe system. Thus, large amounts of excavated soil will not need to be discarded. The remaining surplus will be reused to the extent possible as a base material for the WTP site, for access road construction if suited for the purpose, or provided to local people for use on public or private land, as they desire. Any further surplus soil will be transferred to a disposal site, to be agreed with the CSC and local authorities.

3. Generation of construction waste

81. **Impacts:** Solid waste that will be generated from construction mainly includes waste from workers' camps, debris, and packaging of materials and equipment cement cover, 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 a minor impact, as the main construction site is the proposed WTP, small access road.

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

4. Impact from noise, dust and vibration generated by the construction activities

83. **Impacts:** Earthworks and rock crushing activities will be the main sources of dust. Construction machines and vehicles will generate gaseous emissions (NOx SOx, CO, CO_2, etc.) when they are in operation. These gaseous emissions and dust could cause health problems for residents who live near the construction site and along the transportation route and along the distribution pipeline network. The impact is considered as minor as the WTP and access road will be constructed at an edge, about 4.5km to the nearest residential area (Phu Ngoc commune center). The installation of distribution network will be done mainly by manual work.

84. **Mitigation measures:** The contractors will not locate any large or noisy machines near residential area of Xuan Hoa town, Phu Ngoc commune and will work with Xuan Hoa, Phu Ngoc CPCs, with the representative of ESS and PMU, to identify suitable materials transportation route. During the dry period, the sites and patches near residential areas, especially the sensitive receivers like Xuan Hoa secondary school, Ethnic minority boarding school, Ha Quang general hospital, Phu Ngoc secondary school, Phu Ngoc high school, Phu Ngoc primary school and kindergarten should be sprayed with water regularly to suppress dust generated PMU and CSC will responsible to monitor these mitigation measures.

5. Impact on local traffic

85. **Impacts:** Distribution pipelines installation is likely to cause hindrance in traffic flow along PR203 and internal roads of Xuan Hoa town and Phu Ngoc commune if not mitigated properly especially in the area of Xuan Hoa secondary school, Ethnic minority boarding school, Ha Quang general hospital, Phu Ngoc secondary school, Phu Ngoc high school, Phu Ngoc primary school and kindergarten, Phu Ngoc market. Pupils will get difficulties on their way to schools and local people will get difficulties on their way to the market. It will also create difficulties for tourists on their way to Pac Bo cave. The impact duration will be short, during the distribution pipelines installation in 12 months construction phase.

86. **Mitigation measures:** To minimize the disturbance to local people, the contractor will inform Boc Bo CPC the construction schedule for distribution pipelines in advance and will also coordinate with local traffic authorities to implement appropriate traffic diversion schemes (if needed) to avoid inconvenience due to pipelines installation, setup clear traffic signal boards and traffic advisory signs at the market and school areas.

6. Safety of construction workers

87. **Impacts:** Workers are at risk of accidents associated with construction, particularly power connect to the nearby transmission line for the electricity substation of the WTP.

88. **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 all excavation sites are fenced with sign boards and perimeter markers; (iv) liaison with the power company to ensure that qualified technicians are on site to ensure that safety procedures are followed 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.

F. Potential Impacts and Mitigation Measures in the Operation Phase

1. Risk of water pollution and pipe breakages

89. **Impacts:** The water source of Na Dam stream could be polluted by the cultivation activities and animal waste along the upstream; increasing the turbidity and contamination level for the raw water pumped to the WTP. Treated water could also be polluted due to the failure of the treatment system or inappropriate operation procedures like the chemical control. The water pipe could be broken, leading to waste of water and contamination.

90. **Mitigation measures:** ESWSC will install fences surround the water intake location to avoid cattle trespassing and install warning boards at the intake location as well as some main points along the distribution pipeline system. ESWSC will also inspect the water intake, pipeline system regularly and fix any system failure in time to ensure adequate water supply and quality. ESWMC, in collaboration with DARD office of Ha Quang district, will conduct propagandas to raise awareness of local people for water quality protection

2. Risk of accident during WTP operation process

91. **Impacts:** Chemicals using in the WTP, like chlorine compounds, especially in powder form could be leaked and impact on the health of operation workers. Electric shock could happen with worker working at the electricity substation. Other work accident could happen if the worker not to be trained properly and follow the safe working procedures.

92. **Mitigation measures:** The WTP must be equipped with a fire control system and protective gear for workers. Workers should be trained in the principles of safe working, emergency steps and proper handling and storage of chemicals. Among the chemicals, chlorine is the most toxic and therefore requires safe storage and handling. The operating procedures of the plant should include an inspection and maintenance schedule for all chemical storage and treatment equipment. Chlorine containers must be kept in a dry place and stored separately from non-hazardous materials.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. The purpose of information disclosure, consultation and participation

93. Public Consultation and Disclosure. Public consultation included discussions with members of project beneficiary groups, affected persons and commune officials, as a part of IEE preparation, in order to ascertain any concerns that may need to be addressed. In accordance to Circular No. 27/2015/TT-BTNMT, preparation of an EIA, entailing including public consultation is not required as the capacity of the subproject is only 2200 m^3/day in comparison with the threshold for the EIA requirement being 50,000 m^3/day. As per ADB's SPS (2009), for category B subproject however, it is necessary to conduct public consultation, including the following aspects:

(i) A summary of the proposed works under the subproject;

(ii) A summary of subproject objectives and likely positive and negative environmental impacts, covering the impacts in design, construction and operation phases for engaging stakeholders, including information disclosure and consultation with affected people and other stakeholders;

(iii) Invitation for feedback in respect of any areas of concern that the public may have, and suggested means of implementation; Summarizes comments and concerns received from affected people and other stakeholders and how these comments have been addressed in project design and mitigation measures, with special attention paid to the needs and concerns of vulnerable groups, including women, the poor, and Indigenous Peoples;

(iv) Acceptability of the proposed works to the public; and

(v) Request for information on the known occurrence of unexploded ordinance in the area where the scheme components will be built and facilitating participation of affected people during project implementation.

B. Method of consultation and participation

94. The method of information dissemination and consultation and participation includes the rapid assessment methodology and stakeholders participation and consultation using the following techniques:

- An in-depth interview (live-interview): organizing dialogues, meetings and discussions with local authorities, including interview via phone for additional information. At the commune level, the participants are usually deputy chairman and land administrative staff of the CPC.
- Obtaining information on the questionnaire (integrated with the social survey)
- Public consultation meeting at the CPC with the participant of affected households; representatives of commune, district and provincial level.

C. Consultation process

95. The PPTA in collaboration with the local authorities held consultations. These were conducted as part of the baseline survey on local environmental conditions along the pipeline corridor and the location of the WTP.

96. The main content of the consultation meeting was to announce the main information of the Water Supply System for Domestic Use of Xuan Hoa Town, Phu Ngoc Commune- Ha Quang District, Cao Bang Province; the adverse environment impacts, proposed mitigation measures to be applied during the construction phase and operation phase. The participants also expressed their views as well as other opinions related to the Subproject and other issues.

D. The result of information disclosure and public consultation

97. In general, there is no opposition from the public to the proposed subproject. All the local people have showed support for the subproject and are forward to the commencement of construction as soon as possible.

98. The public consultation meeting was held in Xuan Hoa Town PC's meeting room attended by 8 people, of whom 3 were women; and the participant of local authorities of Xuan Hoa Town and Phu Ngoc commune. The meeting was held in September 19, 2016.

99. The IEE, including Environmental Management Plan (EMP) will be translated in Vietnamese and will be made available at the office of the People's Committees (PC) of Xuan Hoa town and Phu Ngoc commune.

VIII. GRIEVANCE REDRESS MECHANISM

A. Purpose of the mechanism

100. 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

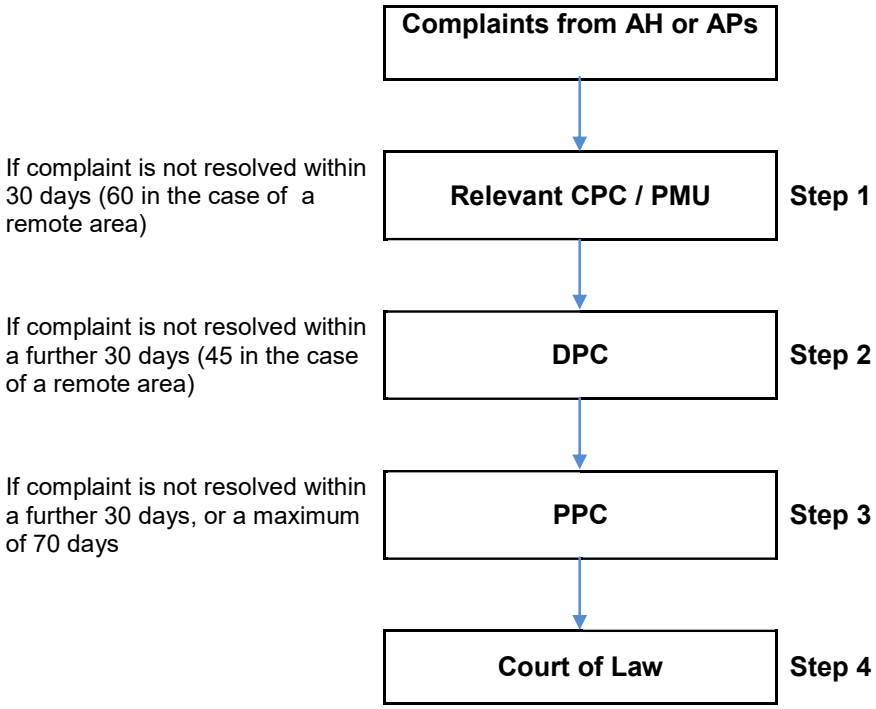
101. There are three steps to address complaints received from stakeholders:

***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.



IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation Arrangements

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

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

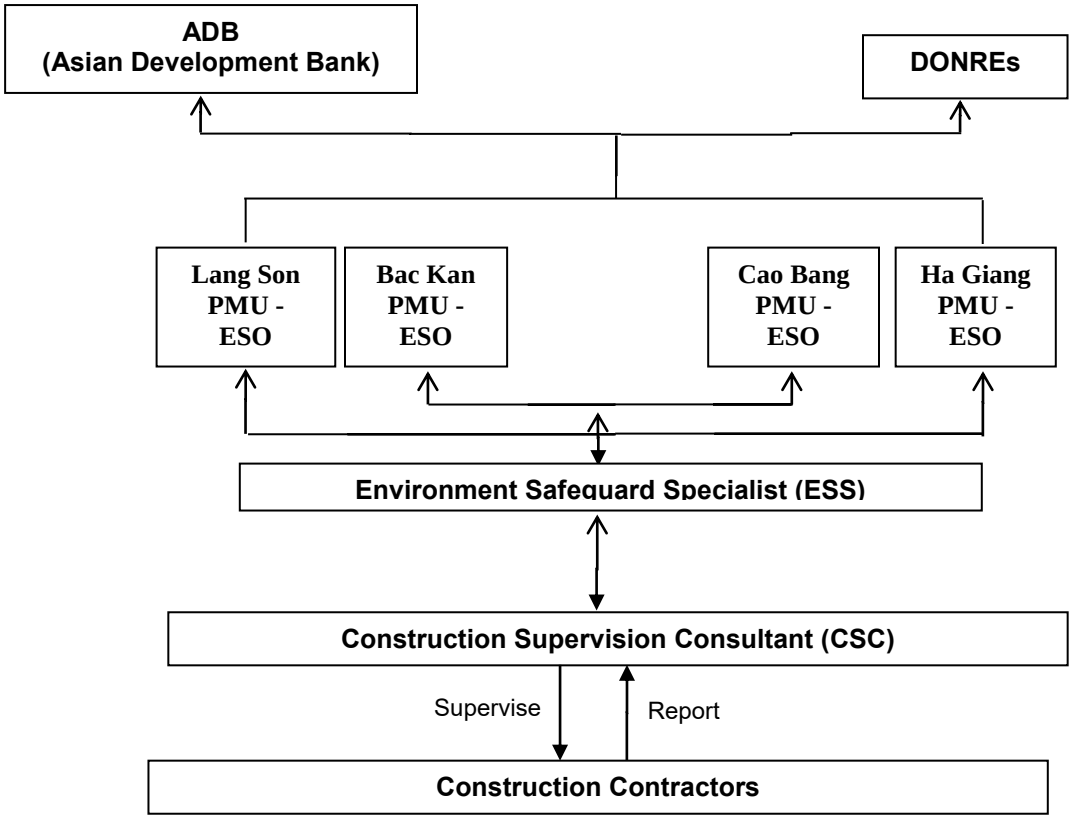
Table 3: Responsibilities for EMP implementation

Agency	Responsibilities
Cao Bang 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 ESS. - Ensure that subproject implementation complies with ADB's environmental policy and safeguards policy statement (SPS 2009) principles and requirements - For subproject duration, commit and retain a dedicated staff within PMU as environment and safeguards staff to oversee EMP implementation - Ensure that environmental protection and mitigation measures in the EMP are incorporated in the detailed design. - With the support from ESS, 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 ESS, 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 (ESS)	- 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 ESS'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 national environment specialists to ensure proper implementation of EMP provisions. Through these specialists, the ESS shall: (i) ensure proper and timely implementation of ESS'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
Environment Sanitary and Water Supply Cooperative (ESWSC)	- Responsible for operation and maintenance of Subproject road - Implement EMP monitoring during operation
Cao Bang 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 6: EMP Implementation Organization Chart



B. Environment impact Mitigation

104. The anticipated environmental impacts and mitigation measures discussed in the previous section is presented in Table 4. The table also shows responsibilities and timeframe/schedule for implementation of mitigation measures and monitoring.

105. Table 4 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 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 4: Detail Environmental Mitigation Plan

Environmental Concern	Objective	Proposed Mitigation Measures	Locations	Timing	Responsible to implement	Budget
Preconstruction Detailed Designs Phase						
1. Land acquisition and resettlement	Control the impact of land acquisition and resettlement	1. Affected persons well informed ahead of project implementation 2. Monitor the compensation process to ensure it is suitable with the Land Acquisition and Resettlement Report	N/A	Before subproject starts	PMU	Included in the operation cost of PMU
2. Slope stability	Minimize the impact on the stability of the slope by 100m access road construction activities	1. Minimize the amount of cutting necessary to form the road in the design 2. Design for retention on the downslope side. 3. Conduct geotechnical assessment and include suitable retention or revetment structures in the design. 4. Conduct hydrological assessment and design of road drains and culverts. 5. Design the re-vegetated with grass and shrub species for cut slopes.	In all subproject area	Before subproject starts	Design consultants	Included in the contract with the consultant
3. Protection of water source	Avoid water source pollution	1. Include a perimeter fence around the water sources in the detailed design	At the water intake area	Before construction start	Design consultants	Included in the contract with the consultant
Construction Phase						
1. Loss of trees and impact to fauna	Avoid and minimize impact to flora and fauna in the subproject area	1. Minimize 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 fuel for the execution of any part of the works and to the extent practicable will ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 4. Contractors will not buy or use wood from the illegal sources (that come from the illegal logging)	At the WTP construction area, along the proposed access road to the WTP	Through out the construction phase	Xuan Hoa Town PC, Phu Ngoc CPC, Contractors	Included in the contract with the contractors
2. Generation of surplus soil	Control surplus soils	1. Reuse excavated soil as filling soil to cover the pipe system. 2. Surplus soil will be reused to the extent possible as a base material for the WTP site 3. Further surplus soil will be transferred to a disposal site as agreed with the CSC and local authorities	Through out construction site	Through out construction phase	Contractors	Included in the contract with the contractors
3. Generation of construction waste and domestic waste from workers	Control waste disposal	1. Reuse construction waste such as cement bag cover, metal tools where possible. 2. Install rubbish bins at work sites and in worker's camps. 3. Transport the solid waste to a disposal site approved by the CSC.	Through out construction site and worker camps area	Through out construction phase	Contractors	Included in the contract with the contractors

Environmental	Objective	Proposed Mitigation Measures	Locations	Timing	Responsible	Budget
4. Dust, noise and vibration	To minimize negative impacts from dust, noise and vibration during construction period	1. Large or noisy machines will not be located near residential area of Xuan Hoa town and Phu Ngoc commune. 2. Work with Xuan Hoa town PC, Phu Ngoc CPC, ESP and PMU to identify suitable materials transportation route. 3. Spray water regularly to suppress dust generated at the sites and patches near residential area during the dry period	Along the pipe installation line, WTP and access road construction site, material transportation road	Through out construction phase	Contractors	Included in the contract with the contractors
5. Traffic management	Minimize disturbance of traffic	1. Inform Xuan Hoa town PC, Phu Ngoc CPC in advance the construction schedule for distribution pipelines. 2. Coordinate with traffic police of Ha Quang district to implement appropriate traffic diversion schemes (if needed) 3. Setup clear traffic signal boards and traffic advisory signs at the residential and school areas.	Along the distribution pipelines and materials transportation route.	Through out construction phase	Contractors	Included in the contract with the contractors
6. Safety precautions for workers and public safety	Ensure worker and local people safety	1. Conduct training for workers on safety, including roles and responsibilities, safe site practices and environmental hygiene 2. Institute site and camp rules like wearing protective tools properly. 3. Ensure all excavation sites are fenced and sign boards, perimeter markers installed 4. Liaison with the power company to ensure that qualified technicians are on site to ensure that safety procedures are followed 5. Assign responsibility to supervisor staff to ensure that all safety rules are followed	Through out the construction site	Through out the construction phase	Contractors	Included in the contract with the contractors
Operation phase						
1. Water pollution and pipe breakages	Ensure the quality of the water supply	1. Install fences surround the water intake location to avoid cattle trespassing 2. Install warning boards at the intake locations and some main points along the pipeline. 3. Inspect the water intake, pipeline system regularly and fix any system failure in time. 4. Collaborate with DARD office of Ha Quang district to conduct propagandas to raise awareness of local people for water quality protection	Water intake area, along the pipeline	Continuously	ESWSC	Included in the operation budget of ESWSC

C. Environmental monitoring

106. An environmental monitoring program will be outlined to monitor the environmental impacts arising during project implementation, including:

- Monitoring the surrounding environment: only typical pollutants arising from the project construction is required to be monitored in accordance with existing standards and regulations of Vietnam with a frequency of at least once in every 6 months, the supervisory positions will be expressed explicitly in a diagram with annotation and coordinate under current regulations.

107. Cao Bang PMU or ESS under LIC will implement environmental monitoring program during the construction phase. In the operation phase, ESWSC and DARD office in Ha Quang district will implement environmental monitoring program.

Compliance Monitoring

108. Table 5 below shows the program for monitoring the compliance on various provisions of the EMP during 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 5. During operation EMP implementation shall be the responsibility ESWSC.

109. 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.

Environmental Effects Monitoring

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

Table 5: Environmental Compliance Monitoring

Environmental Concern	Parameter to monitor	Location	Frequency & verification	Responsible to monitor	Estimated Cost
Design and Pre-construction Phase					
1. Land acquisition and resettlement	Compensation documents	N/A	Once, before construction start	Cao Bang DPI, DONRE and PMU	Included in the operation budget of Cao Bang PMU
2. Slope stability	Design documents	N/A	Once, before construction start	Cao Bang PMU	Included in the operation budget of Cao Bang PMU
3. Pollution of water source	Perimeter fence in design documents	N/A	Once, before construction start	Cao Bang PMU	Included in the operation budget of Cao Bang PMU
Construction phase					
4. Loss of tree and impact to fauna	Check of implementation	At the WTP construction site, along the access road to the WTP	Before construction commencement and through out construction phase. Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
5. Waste and surplus soil disposal	Check of implementation	Through out construction site, designated disposal area	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
6. Dust, noise and vibration	Check of implementation	Through out construction site	Bi-weekly and spot checks Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC

7. Traffic management	Check of implementation	Through out construction site, along material transportation route	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
8. Safety precautions for workers and public safety	Check of implementation. Check compliance to Labor Code of Vietnam and other relevant Decision, Decree and Circular under Government requirements	Through out construction site	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
Operation of WTPs & Pipeline Network					
9. Water pollution and pipe breakages	Public complaints of operation of WTPs, drinking water availability & quality, and malfunctions with pipelines (e.g., leaks).	On property of WTP, pipelines, and pump stations, water intake location	Continuously	MMB	Included in the operation budget of ESWSC

Table 6: Environmental Effects Monitoring

Environmental Concern	Parameter to monitor	Location	Frequency & verification	Responsible to monitor	Estimated Cost
Design and Pre-construction Phase					
1. Air quality (dust, CO, NOx, SOx, noise, wind, and vibration levels) to supplement baseline air quality data collected during PPTA and reported in IEE Water quality parameters sampled in Na Dam stream PPTA & reported in IEE.	Using field and analytical methods described in QCVN and TCVN standards for ambient air and surface water quality sampling & analysis.	Representative sites of heavy civil & earthwork including along truck routes At raw water intake location	One day and one night measurement	ESO	Included in the operation budget of Cao Bang PMU
Construction phase					
A) Air quality: dust, CO, NOx, SOx, noise, wind, and vibration levels B) Surface water quality: TSS, heavy metals (As, Cd, Pb,) oil and grease, total & fecal coliform, pH, DO, COD, BOD_5, temperature, NH_3, and other nutrient forms of N & P. C) Public comments and complaints D) Incidence of worker or public accident or injury	A – B: Using field and analytical methods described in QCVN and TCVN standards for ambient air and surface water quality monitoring. Include visual observations of dust and noise from contractor & public reports. C) Information transferred by telephone hotline number D) Regular reporting by contractors/ Cao Bang PMU	A – B): At the intake water area C): Using hotline number placed at construction areas D): At all construction	(A–B): Quarterly during construction periods (1 time for baseline data and 4 times in 1 year construction) C) Continuous public input D) Continuous	Quarterly	A) &B) (60$ & 500$) per sample times under cost norm of Ha Giang[19] C) & D) With (no extra cost)
Operation of WTPs & Pipeline Network					
Treated water quality: total & fecal coliform, pH, DO, NH_3, NO_3, NO, chlorine, PAC, NaCl, and heavy metals (As, Cd, Pb,).	Using field and analytical methods described in QCVN & TCVN standards for water quality monitoring, and parameters of QCVN 14:2008/BTNMT & TCXDVN 33:2008/BXD. Follow the procedures under Circular No.50/2015/TT-BYT providing for the inspection of drinking water and domestic water's sanitation and quality	At WTP & random user locations along distribution network	Biannually for parameter under B column, or when public complaint arises	ESWSC	Included in the operation budget of ESWSC

[19] There is no available cost norm for Cao Bang. Figures have been estimated base on Ha Giang cost norm.

D. REPORTING

111. 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 7: 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	Daily	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 year of operation. On-going frequency to be determined based on review after 1 year.	ESWSC	DONRE Office of Ha Quang DPC

Table 8: Estimated cost for EMP Implementation (1-year construction/ 2-year in total)

Item	Estimated cost (US$)
1. Environment Safeguard Specialist (ESS)	***10,720***
1 National ESS - 03 man-months (intermittent in 1 year construction) – 2,000 US$/ man-month	6,000
Per diem for ESS: 48 US$ x 30 days x 3 months	4,320
Travelling cost for 2 round trips: 200 US$ x 2 trips	400
2. Environmental effects monitoring (implemented by ESS)	***2,800***
Ambient air quality: 1 monitoring location x 5 times x 60 US$/sample[20]	300
Surface water quality: 1monitoring location x 5 times x 500 US$/sample[21]	2,500
3. Training/orientation, local transportation, supplies (by ESS)	***1,500***
a) Training/orientation: 1 formal training course for PMU, CSC, Contractors, ESWSC and DARD office of Ha Quang district and other "on the job" training	1,000
b) Local transportation and supplies	500
4. Printing Environmental monitoring report by ESS (8 reports)	***300***
Subtotal (1+2+3+4)	**15,320**
5. Contingency	**680**
Total (1+2+3+4+5)	**16,000**

E. Capacity Building

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

113. The most significant challenge is the lack of human and financial resources and necessary infrastructure. To address this constraint, Cao Bang 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 by the Environment Safeguard Specialist (ESS) during subproject implementation as "on the job" training or by formal training courses.

[20] Due to there is no cost norm for Cao Bang province, figures have been estimated base on environmental monitoring cost norm of Ha Giang province.

[21] Due to there is no cost norm for Cao Bang province, figures have been estimated base on environmental monitoring cost norm of Ha Giang province.

Table 9: Detail capacity building program

Objective	1. Build capacity and procedures in undertaking systematic environmental assessments in accordance with Government regulations and ADB guidelines 2. Provide training on international best practice on environmental management, monitoring and reporting. 3. Provide guidance on how to effectively incorporate environmental measures into project design and how to incorporate EMP provisions into tender and contract documents.
Tasks/Scope of Work	1. Undertake training needs analyses and review prevailing government regulations and donor guidelines governing the assessment and management of environmental impacts for road development. 2. Review the skills of PMU and ESWSC 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 2 months after construction commencement
Target participant	Staff in PMU and ESWSC who responsible for environmental management
Staff resources	National environmental specialist with at least 10 years experience on environmental management of water supply projects and must possess relevant graduate degrees in civil engineering, environmental management and other relevant courses.

X. CONCLUSIONS AND RECOMMENDATIONS

114. 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.

115. The implementation of the subproject “Water Supply System for Domestic Use of Xuan Hoa Town, Phu Ngoc Commune - Ha Quang District, Cao Bang Province” will improve conditions and enhance water supply services for people especially people in the rural areas and the poor people so that they can access the qualified and sanitary water resource for their domestic, production and tourism demand. Several actions are required during the detailed design stage to minimize impacts to acceptable levels. The negative environmental impacts from the upgrading works will mostly take place during the construction stage. All of the impacts during construction phase should be very predictable and manageable and with appropriate mitigation and few residual impacts are likely. Additional human and financial resources will be required to improve environmental capability and to progress and achieve necessary statutory compliance and environmental clearance certification for the subproject or associated activities that also require environmental permits under the environmental laws of Viet Nam – LEP 2014.

116. 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 area

Proposed area for pump station (view from road to Na Dam village)

Road to Na Dam village, closed to the proposed pump station

PR203 the main road through subproject area of

Local people "agreed" with the implementation the subproject in public consultation meeting

B. Appendix 2: Source of Reference Information

1. *Cao Bang Status of Environmental Report 2015*
2. *Cao Bang Climate Change Adaptation Plan (2011-2020)*
3. *Report on Pollution control under Environmental Protection Plan in 2015 Cao Bang Environmental Agency*
4. *The PO reports of the PPTA for Cao Bang Province*
5. *The Subproject Feasibility Report*

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

1. Loss of trees and impact to fauna	1. Minimize 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 fuel for the execution of any part of the works and to the extent practicable will ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 4. Contractors will not buy or use wood from the illegal sources (that come from the illegal logging)
2. Generation of surplus soil	1. Reuse excavated soil as filling soil to cover the pipe system. 2. Surplus soil will be reused to the extent possible as a base material for the WTP site 3. Further surplus soil will be transferred to a disposal site as agreed with the CSC and local authorities
3. Generation of construction waste and domestic waste from workers	1. Reuse construction waste such as cement bag cover, metal tools where possible. 2. Install rubbish bins at work sites and in worker's camps. 3. Transport the solid waste to a disposal site approved by the CSC.
4. Dust, noise and vibration	1. Large or noisy machines will not be located near residential area of Xuan Hoa town and Phu Ngoc commune. 2. Work with Xuan Hoa town PC, Phu Ngoc CPC, ESP and PMU to identify suitable materials transportation route. 3. Spray water regularly to suppress dust generated at the sites and patches near residential area during the dry period
5. Traffic management	1. Inform Xuan Hoa town PC, Phu Ngoc CPC in advance the construction schedule for distribution pipelines. 2. Coordinate with traffic police of Ha Quang district to implement appropriate traffic diversion schemes (if needed) 3. Setup clear traffic signal boards and traffic advisory signs at the residential and school areas.
6. Safety precautions for workers and public safety	1. Conduct training for workers on safety, including roles and responsibilities, safe site practices and environmental hygiene 2. Institute site and camp rules like wearing protective tools properly. 3. Ensure all excavation sites are fenced and sign boards, perimeter markers installed 4. Liaison with the power company to ensure that qualified technicians are on site to ensure that safety procedures are followed 5. Assign responsibility to supervisor staff to ensure that all safety rules are followed

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 solids (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	Chloride (Cl^-)	mg/l	250	400	600	-
8	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	Cyanide (CN-)	mg/l	0,005	0,01	0,02	0,02
13	Arsenic (As)	mg/l	0,01	0,02	0,05	0,1
14	Cadmium (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	Chrome III (Cr^{3+})	mg/l	0,05	0,1	0,5	1
17	Chrome 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	Phenol (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, thermo tolerant 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	Arsenic (As)	mg/l	0,05

14	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

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.	Parameter	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 6: Stakeholder Communication Strategy

Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources
Disseminate information on project design, key impacts anticipated as well as any mitigation measures, to project Aps and beneficiaries	Language/Culture Literacy Managing expectations, including that of free water delivery and compliance with Viet Nam law (full cost recovery) Reach of information, especially in isolated or remote settlements in peri-urban areas and communes Lack of confidence in local authorities	Subproject Aps Community members (men & women in urban/peri-urban/rural communes) Women headed HH Poor HH	Subproject design, key benefits (including those of treated water supply), implementation arrangements and schedule of civil works Opportunities for temporary employment as construction workers, community mobilizers or IEC campaign facilitators Main impacts of subproject (positive and negative) through disclosure Planned mitigation measures, especially for female APs (including compensation rates, entitlements, grievance redress mechanism) View water as a commercial good and stress the importance of user cost recovery, including for poor HHs Targeted subsidies, including free connections and lifeline tariffs	Public information meetings Resettlement committee meetings in affected areas Printed information in local language(s) posted in accessible public areas Gender-sensitive IEC campaign, including community-level training and public media campaign Meetings, consultations and other interactions between PMUs/ESWSC and CSBs in the subproject area's service zones	Ongoing prior to implementation of activities Early in each phase of subproject preparation Subproject detailed design Ongoing during civil works Post evaluation after project completion	Primary: PMUs ESWSC Contractors/ subcontractors for civil works Local authorities at commune-, ward-, city- and district-level (CPCs, WPCs, CPCs and DPCs) VWU Community Health Centers (CHCs) Secondary: PPCs DPI DOLISA	Costs will be covered in part by the RPs, GAPs as well as basic project implementation budgets under PMU Incremental Cost and Construction Supervision Contract Resettlement Specialist ESWSC/PMU Social Development & Safeguards Specialists Compensation and Resettlement Committees (CRCs) Community Supervision Boards (CSBs) Community health workers (under respective DOHs)

Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources
			included in tariff by law to poor and women-headed households.				
Deliver information on labor opportunities and good labor practices	Language/Culture Literacy and low levels of awareness	Community members as well as outsiders hired as semi-skilled and skilled construction workers, community mobilizers and IEC campaign facilitators in subproject areas Contractors/ subcontractors for civil works	Opportunities for appropriate skills training/upgrading during period of hire, with quotas reserved for women (GAP) Core labor standards, including no forced labor and child labor Gender parity in work related compensation, i.e., equal pay for equal work, for women and men, and the right to separate living & toilet facilities at work sites Schedule of civil works Labor safety regulations Risks and prevention of HIV/AIDS transmission and Human Trafficking	Public information meetings Printed information in local language(s) and language(s) of migrant workers (on pamphlets and billboards), posted in accessible public areas, especially at or near construction sites IEC campaign for HIV/AIDs and Human Trafficking, including community-level training and public media campaign	Early in each phase of sub project preparation Ongoing during civil works and conduct of IEC campaigns	Primary: PMUs ESWSC Local authorities at commune-, ward-, city- and district-level VWU CHCs Secondary: PPCs DOLISA	Costs will be covered in part by the GAPs as well as basic project implementation budgets under PMU Incremental Cost and Construction Supervision Contract PMU Social Development & Safeguards Specialists CSBs Community health workers Health NGOs
Highlight responsibility of provincial government agencies in enabling access of disadvantaged groups to municipal	Lack of political willingness to implement decrees and decisions Provincial budget constraints	PPCs DOLISA PCs at other administrative levels in provinces, i.e., local authorities	Basic project design, anticipated impacts and any planned mitigation and grievance redress measures as they apply to APs, beneficiary groups and workers in the province State support for	ESWSC meetings with relevant local authorities and government agencies authorities, attended by VWU officials at the appropriate level	From outsets of the project	MPI (as CA) ESWSC VWUs at all levels	Costs will be covered by the GAP and basic project implementation budgets under PMU Incremental Cost and Construction Supervision

Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources
water supply			water related subsidies to poor and women headed HHs, and other vulnerable groups (including EMs, disabled, etc.), in accordance with Decrees 117 & 124				Contract ESWSC management PMU Director PMU Social Development & Safeguards Specialists
Inform Provincial VWUs about project design and entry points for their participation – community mobilization, IEC, and ensuring women's access to all project benefits	Lack of sectoral capacity Relative lack of resources and decision making authority compared to other departments and agencies, including ESWSC	Vietnam Women's Union (VWU)	Basic project design and anticipated impacts, as they matter to women Disseminate information on improved HH water management, sanitation and hygiene to communities in collaboration with Community Health Centers.	Public information meetings IEC campaign (including materials) to raise awareness on links between gender and WASH issues Training materials integrating gender	From outsets of the project	VWU ESWSC Local authorities at commune-, ward-, city- and district-level CHCs	Costs will be covered by the GAP budget PMU Director PMU Social Development & Safeguards Specialists CSBs Community health Workers
Inform network of Community Health Centers in project areas about project design and the role they are expected to play in disseminating information on improved WASH as well as HIV/AIDS causes &	Relative lack of resources and decision making authority compared to other departments and agencies, including ESWSC	Community Health Centers (and community health workers), Department of Health	Disseminate information on health benefits of improved water supply, sanitation and hygiene to communities in collaboration with VWC Design and propagate training module about HIV/AIDS	Public information meetings, IEC sanitation and hygiene awareness materials, including community based training and public media campaign HIV/AIDS training module	Early in each phase of sub project preparation Ongoing during civil works and conduct of IEC campaigns	VWU PMUs ESWSC Local authorities at commune-, ward-, city- and district-level CHCs	Costs will be covered by the project implementation budget (social development) PMU Social Development & Safeguards Specialists CSBs Community health workers

Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources
prevention							
Promote community involvement in resettlement and project monitoring	Identifying valid community representatives Newly formed, slow to build up capacity required Functions vaguely Defined	Community Supervision Boards (CSBs) Compensation and Resettlement Committees (CRCs)	Information on resettlement areas, affected households, resettlement plan and compensation policies Core labor standards integrating gender concerns and labor safety regulations Special consideration of community members from poor and/or women-headed HHs in all aspects of the project Risks and prevention of HIV/AIDS transmission and Human Trafficking	Meetings between ESWSC/PMUs and CSBs and CRCs Public information meetings presided over by CSBs or CRCs Direct interactions between affected HHs and CSBs or CRCs Printed information in local language(s) posted in accessible public areas Gender-sensitive IEC campaign, including community-level training and public media campaign	Early in each phase of sub project preparation Ongoing during civil works and conduct of IEC campaigns	VWU PMUs ESWSC Local authorities at commune-, ward-, city- and district-level	Costs will be covered by the GAPs and basic project implementation (social development component) budgets PMU Social Development & Safeguards Specialists CSBs Community health Workers
Ensure understanding of HIV/AIDS transmission and Human Trafficking risks, and prevention measures for both	Language/Culture Literacy and low levels of awareness	Communities in or near project area construction sites Workers on construction site	Key risks and mitigation measures of HIV/AIDS transmission and Human Trafficking	Public information meetings Printed information in local language(s) and language(s) of migrant workers (on pamphlets and billboards), posted in accessible public areas, especially at or near construction sites IEC campaign for HIV/AIDs and Human Trafficking, including community-level training and public media campaign	Prior to commencement of civil works and throughout civil works	PMUs VWU CHCs Civil works contractors/ subcontractors	Costs will be covered in part by the GAPs as well as basic project implementation budgets PMU Social Development & Safeguards Specialists CSBs Community health workers Local NGOs with a health focus

Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources
Strengthen business processes and institutions, integrating gender issues	Inertia to change; tendency to maintain institutional and socioeconomic status quo	All ESWSC and PMU staff, especially women in executive and non-executive positions VWU members at all levels within the province	Reasons why profit generation, user cost recovery and tariff roadmap are core principles of business viability Negotiate sharing of capital costs and underwriting of any subsidies to consumers with state agencies (PCs and DOLISA) Opportunities for training, exposure visits, with quotas reserved for female staff and VWU members to learn more about the sector Gender parity in work related compensation, i.e., equal pay for equal work, for women and men in ESWSC	Resettlement committee meetings and/or meetings with affected households, Printed information in local language posted in accessible public areas Training workshops and exposure visits to raise awareness about benefits of community participation in all aspects of project planning, implementation, and M&E Financial and technical training workshops Training materials to promote gender sensitivity Routine consultation with VWUs on gender-related matters relevant to project outputs Routine consultations between ESWSC management and women employees, in executive and non-executive positions, about professional issues that matter to them	From outset of each subproject Ongoing prior to implementation of activities Early in each phase of subproject preparation At project detailed design Ongoing during civil works	Water Supply Companies (ESWSC) as independent commercial & legal entities MPI PPCs PMUs VWUs	Costs will be covered in part by the GAPs and project implementation budgets PMU Director PMU Social Development & Safeguards Specialists Staff welfare committees of ESWSC

Key: ADB - Asian Development Bank; PMU –Projects Management Board; APs – Affected Persons; CSB – Community Supervision Board; CPC – Commune Peoples Committee; CWU – Commune Women's Union; DARD – Department of Agriculture & Rural Development; DOC – Department of Construction; DONRE – Department of Natural Resources & Environment; DOT – Department of Transport; DPI – Department of Plan and Investment DRCs – District Resettlement Committees; GAP – Gender Action Plan; IAs – Implementing Agencies; IPP – Indigenous Peoples Plan; PP – Project Proposal; O & M – Operation & Maintenance; PPC – Provincial peoples Committee; of RIs –Rural Infrastructure; RP – Resettlement Plan; VWU – Vietnam Women's Union;

F. Appendix 5: Meeting minutes and Public consultation meeting 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 16 tháng 9 năm 2016
Tại Sở Tài nguyên và Môi trường tỉnh Cao Bằng

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/ Bà Doãn Hồng Anh - Cán bộ hỗ trợ

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

Nội dung trao đổi làm việc:

1) Trao đổi các thông tin chung về Dự án Hạ tầng Cơ bản PT toàn diện các tỉnh Đông Bắc
- Tiểu Dự án: Nâng cấp tỉnh lộ 211 từ tt Hùng Quốc đi tt Trùng Khánh.
- Tiểu Dự án: Cấp nước xã Phú Ngọc và tt Xuân Hòa huyện Hà Quảng
2) Các thông tin về khu vực TDA
- Rừng phòng hộ nằm ở các khu bảo tồn. Có 8 khu ở tỉnh Cao Bằng như Phia Oắc - [illegible] Cao VSF [illegible] ở huyện Trùng Khánh không cách xa điểm cuối tuyến đg (khoảng 10 km)
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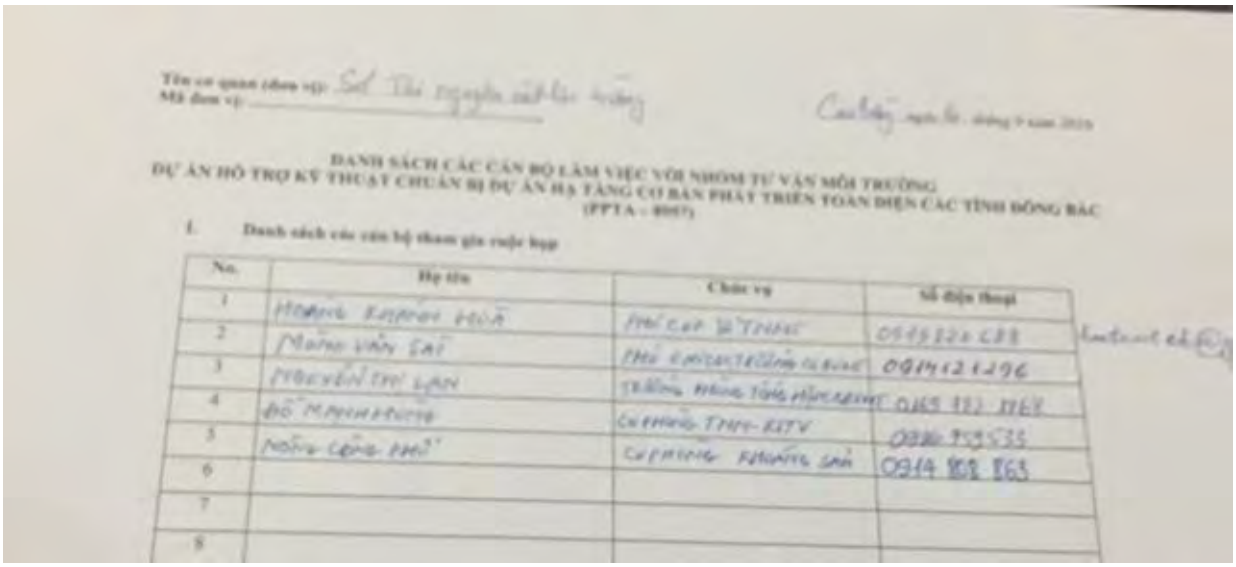
- Có danh sách các mỏ vật liệu cấp phép đến 2050



Tên cơ quan công tác: Sở Tài nguyên và Môi trường
Mã đơn vị:

Cao Bằng, ngày 06 tháng 9 năm 2019

DANH SÁCH CÁC CÁN BỘ LÀM VIỆC VỚI NHÓM TƯ VẤN MÔI TRƯỜNG
DỰ ÁN HỖ TRỢ KỸ THUẬT CHUẨN BỊ DỰ ÁN HẠ TẦNG CƠ BẢN PHÁT TRIỂN TOÀN DIỆN CÁC TỈNH ĐÔNG BẮC
(PPTA - 8057)

I. **Danh sách các cán bộ tham gia cuộc họp**

No.	Họ tên	Chức vụ	Số điện thoại
1	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]
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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 16 tháng 9 năm 2016

Tại Nông nghiệp và Phát triển Nông thôn tỉnh Cao Bằng

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/ Bà Doãn Hồng Anh - Cán bộ hỗ trợ

Đã làm việc với:

Đại diện Sở Nông nghiệp và Phát triển Nông thôn tỉnh Cao Bằng (có danh sách kèm theo)

Nội dung trao đổi làm việc:

1/ Trao đổi các thông tin chung về DA Hạ tầng Cơ bản PT Toàn diện các tỉnh Đông Bắc
- TDA: Nâng cấp tỉnh lộ 211 Trà Lĩnh - Trùng Khánh
- TDA NSH thị trấn Xuân Hòa + xã Phù Ngọc, Hà Quảng

2/ Thông tin chung khu vực TDA:

Rừng Cao Bằng phân 3 loại theo QĐ định 445 của UBND tỉnh Cao Bằng

TT Hùng Quốc: 13378.8 ha, huyện Trùng Khánh: 25.546.1 ha, Huyện Hà Quảng: 27.034.5 ha, khu Pác Bó: 1385 ha. Ko có diện tích rừng phòng hộ tại khu vực 2 TDA. Rừng chủ yếu phân kết về cho người dân quản lý.

Các huyện có Ban chỉ đạo Quản BV và PT rừng bao gồm cả kiểm lâm và các bộ ở xã.

Có file pdf diện tích rừng phòng hộ của 3 huyện.

Tên cơ quan (đơn vị): Sở NN& PTNT
Mã đơn vị: .....

Cao Bằng, ngày 16 tháng 9 năm 2016

DANH SÁCH CÁC CÁN BỘ LÀM VIỆC VỚI NHÓM TƯ VẤN MÔI TRƯỜNG
DỰ ÁN HỖ TRỢ KỸ THUẬT CHUẨN BỊ DỰ ÁN HẠ TẦNG CƠ BẢN PHÁT TRIỂN TOÀN DIỆN CÁC TỈNH ĐÔNG BẮC (PPTA – 8957)

I. **Danh sách các cán bộ tham gia cuộc họp**

No.	Họ tên	Chức vụ	Số điện thoại
1	Trần Minh Hoàng	Chuyên Viên SNN	0912423663
2	Vi Văn Chương	Kiểm lâm viên	0913.566.433
3	Lã ái Lê	Chi cục Lâm Nghiệp	0914247188.
4	Hứa Mỹ Ngọc	Chi cục Thuỷ lợi	0948 922 955
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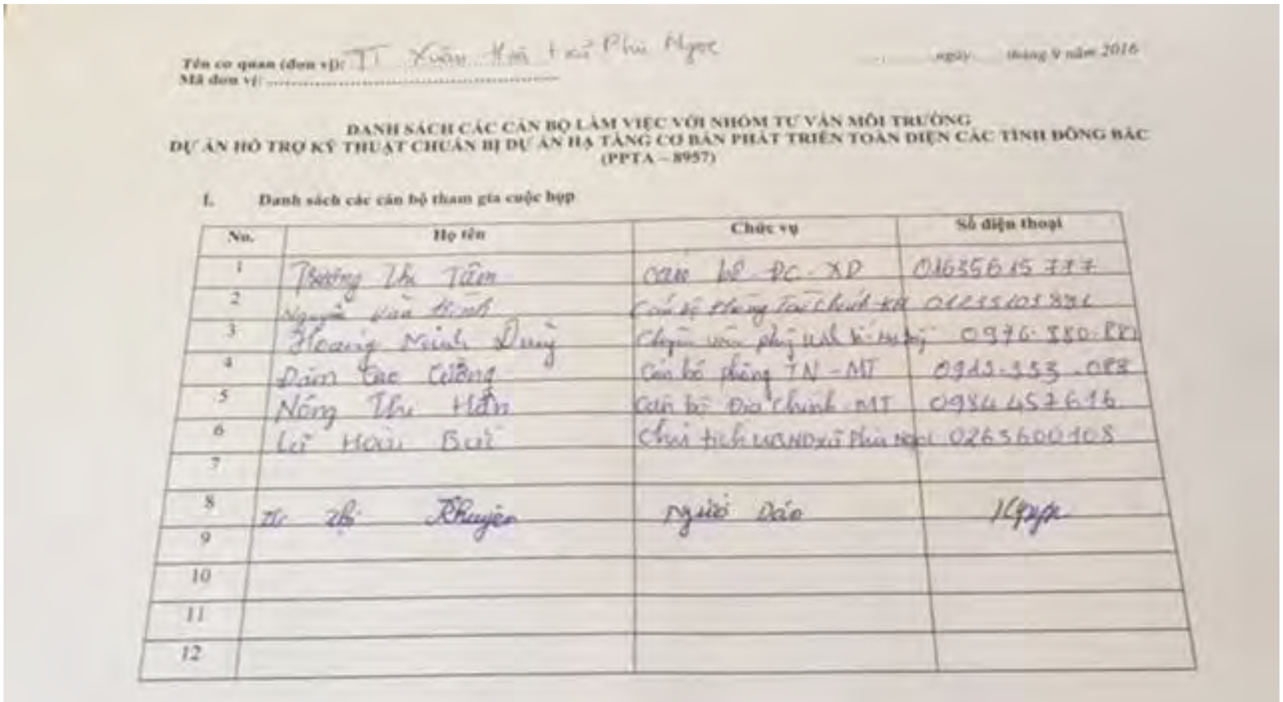

Tên cơ quan (đơn vị): TT Xuân Hòa + xã Phù Ngọc ....ngày..... tháng 9 năm 2016
Mã đơn vị: ....

DANH SÁCH CÁC CÁN BỘ LÀM VIỆC VỚI NHÓM TƯ VẤN MÔI TRƯỜNG
DỰ ÁN HỖ TRỢ KỸ THUẬT CHUẨN BỊ DỰ ÁN HẠ TẦNG CƠ BẢN PHÁT TRIỂN TOÀN DIỆN CÁC TỈNH ĐÔNG BẮC
(PPTA – 8957)

I. Danh sách các cán bộ tham gia cuộc họp

No.	Họ tên	Chức vụ	Số điện thoại
1	Trương Thị Tâm	cán bộ ĐC - XD	01635615777
2	Nguyễn Văn Bình	Cán bộ phòng Tài chính KH	01235101891
3	Hoàng Minh Duy	Chuyên viên phụ trách kĩ thuật	0976.880.[illegible]
4	Đàm Tác Cường	Cán bộ phòng TN - MT	0913.353.088
5	Nông Thị Hân	cán bộ Địa chính MT	0984457616
6	Lê Hoài Bắc	Chủ tịch UBND xã Phù Ngọc	0263600108
7			
8	[illegible] Thị Khuyên	người Dao	[illegible]
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Initial Environmental Examination

Stage of the document: Final
Project number: 49026-002
April 2017

VIE: Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project

Subproject: Construction and Widening of Domestic Water Supply System for Vinh Quang Town, Tu Nhan and Ban Nhung Communes, Hoang Su Phi District, Ha Giang Province

Prepared by Planning and Investment Department of Ha Giang province for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 27 April 2017)

Currency unit	–	Viet Nam Dong (D)
D1.00	=	$0.000044
$1.00	=	Đ 22,730

ABBREVIATIONS

ADB	–	Asian Development Bank
CPC	–	Commune People's Committee
CSC	–	Construction Supervision Consultant
CWMS		Center for Water Management and Supply
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
LEP	–	Law on Environmental Protection
lpd	–	Liters / person / day
MASL	–	Meters above sea level
MONRE	–	Ministry of Natural Resources and Environment
MPN	–	Most Probable Number of viable cells of a pathogen - a measure of water quality
PPC	–	Provincial People's Committee
PPE	–	Personal Protective Equipment
PMU	–	Project Management Unit
PPTA	–	Project Preparatory Technical Assistant
ROW	–	Right of Way
SPS	–	Safeguard Policy Statement
The PPTA	–	The Project Preparatory Technical Assistant Consultants
The Project	–	Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project

The Subproject	–	Construction and Expanding Water Supply System of Vinh Quang Town and Tu Nh Ban Nhung Communes, Hoang Su Phi District, Ha Giang Province
UXO	–	Unexploded ordnance
WTP	–	Water Treatment Plant

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 (BIIG 1) will invest in the recently completed Four Northeastern Provinces (FNEP) Overall Development Plan (2015). The development plan responds to the Government of Vietnam's strategy of targeting the investment into poorer provinces and regions. The use of a sub-regional approach seeks to build the interrelationship between provinces as one of the foundations for accelerating growth in the more remote regions. As such the plan targets investment into outputs that build areas of comparative advantage in a manner that increases the competitiveness of economic activity in the sub-region. The expected impact is to improve socio-economic wellbeing of local communities through the improved financial returns and through lower costs of accessing public health services, education, water supply and markets.

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 "Construction and Expanding Water Supply System of Vinh Quang Town and Tu Nhan, Ban Nhung Communes, Hoang Su Phi District, Ha Giang Province" and is an output 2 representative subproject: Improved Rural Water Supply. The Subproject aims to expand water services in the district of Hoang Su Phi, Ha Giang. Its objectives are to improve public hygiene, improve the landscape and appearance of the urban area, and to improve the health status and living conditions of people living in the town.

4. A suitable water source on the Pin Ho stream has been identified, and using a time horizon of 2030, the water demand has been projected based on national guidelines. Consultation with the Hoàng Su Phi DPC, village heads and community representatives have confirmed demand for a metered 24 - hour potable water service and indicate a willingness to pay. A set of engineering drawings, bill of quantities, construction cost estimate, and tender/contract documentation have been prepared with supporting social assessments, ADB safeguard documentation and a financial and economic assessment.

5. The feasibility study has identified an adequate supply of water (volume and quality) in the Pin Ho stream. A reinforced concrete weir will be constructed to raise river water levels for the in-stream offtake via a gated off-take. Abstracted water will flow by gravity to a treatment plant from where it passes to a clean water tank. The clean water tank supplies the 18km distribution network to connections using a long gravity main. The networks pass through challenging terrain, and will in places need protection. Some sections will be encased in concrete and need anchoring to withstand external pressures (vertical and lateral) and high hydraulic heads generated by the nature of the topography.

6. The intake structure is located on the true right (on creek 1), Pin Ho stream located in Ta Su Choong commune, Hoang Su Phi District, Ha Giang Province. The site for extraction is modified by constructing a weir, made of M200 Reinforced concrete; length L = 12m, height H = 4.0m, width of dam crest B = 2.0m.

7. The elevation of the new treatment plant enables gravity feed but requires an access road. The field surveys established the feasibility of the selected alignment (vertical and horizontal) and provided a preliminary assessment of the geological and geotechnical design

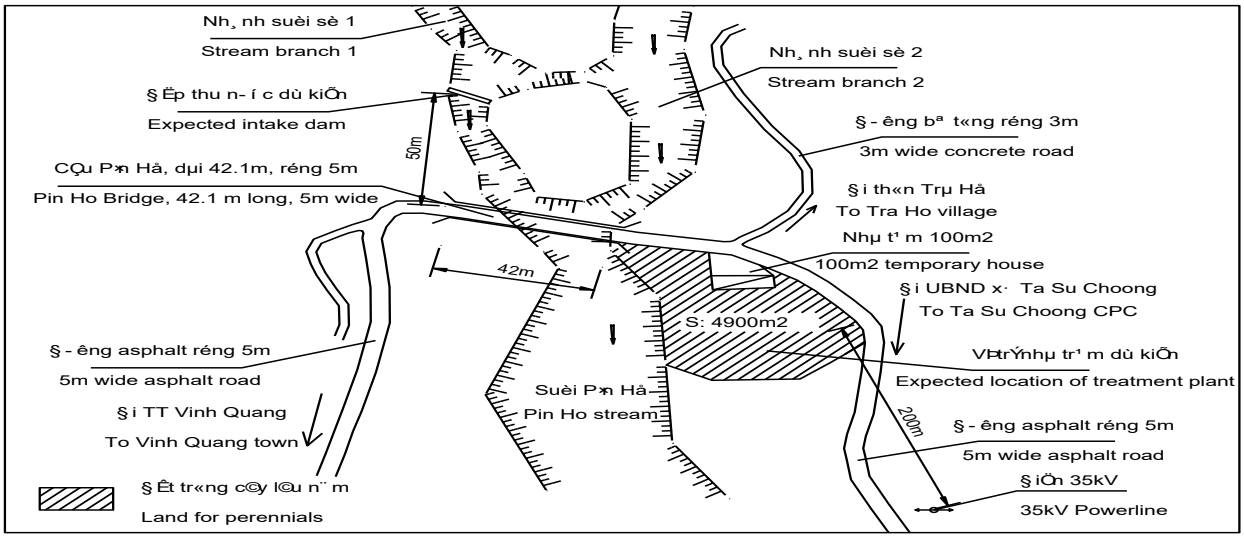
parameters. Other civil engineering earthworks examined include: the identification of suitable and conveniently located construction materials; and a location to dump surplus material (excavated soil) and waste (concrete detritus from road crossings).

8. The treatment plant consists of a vertical clarifier tank - rapid filter with capacity of 2200m^3/day, clean water tank of 400m^3, an operational office, a management office, a sludge tank and other auxiliary works. From the clean water tank water distribution pipelines run alongside existing roads to minimize disruption and avoid costly land compensation. They will transition down from large to small diameters and ultimately provide a metered house connection to each household.

9. For the proposed water supply network, with the treatment plant located at a higher elevation and distant from Vinh Quang town center two distribution networks are proposed. Network 1 supplies from the treatment plant to a pressurized tank to supply Vinh Quang town center. The total length of network 1 pipeline is 18.3km (excluding services pipelines). Network 2 starts from the network 1 pressurized tank in Vinh Quang town serves households of Vinh Quang town (excluding Po Lung hamlet) and Tu Nhan commune. The total length of pipeline of network 2 is 4.76km (excluding services pipelines).

10. Locations of subproject items are presented in the Figure below.

Figure 1: Locations of subproject items



11. Upon completion, the water supply scheme will have capacity to supply clean potable water for domestic use and production to 2,045 households with 8,263 people and 78 locally based organization, administrative units. The subproject will help local people access sanitary and hygienic water source that meets standards of Ministry of Health, which contributes to fulfilment of National Targets on clean water usage rate and will contribute to Viet Nam's commitment to Sustainable Development Goal number 6.

12. The current scheme is limited by (i) insufficient water with current daily supply is 900m^3/day compared to the expected design standard of 1500m^3/day, (ii) poor water quality, and (iii) inadequate electricity supply. Phase 1, sourced water from the Chay River, however water availability is inadequate and water quality is often below required standards. Both of these issues were not identified at design. Current plant and operational management standards are high well organized and managed with supporting records and financial statements.

Table 1: Water supply for Xuan Quang, Tu Nhan commune, Ban Nhung commune, from the Ta Su Choong stream of Hoang Su Phi District

Representative Subproject	Vinh Quang Town Hoang Su Pi
Project Daily Water Capacity (m3 per day)	2,200
Number of households supplied	2,045
Number of Govt Inst.'s	35
Total Population supplied	11,301
Reservoir capacity (m3)	500m3
Dam Height (m)	Dam Length Lđ=12m, Dam Height Hđ=4,0m, Dam Width Bđ =2,0m
Supply Area Town	Vinh Quang
Commune Name	Tu Nhan(961 hh) Ban Nhung (640 hh)
Number of admin units	3
Name of Operating unit	Hoang Su Phi Clean Water Supply and Management Centre
Total Investment (USD mill)	$2.3

13. The Hoang Su Phi Center of Water Management and Supply currently operate the existing water supply scheme. The Center was established in 2009 and has operated as a public service delivery agency. The Center has responsibilities (i) to supply water to residents and agencies located in Vinh Quang Township; (ii) for operation and maintenance of the WS scheme and (iii) collection of water fees in order to cover operation cost including recurrent costs, taxes (revenue tax, tax on exploitation of natural resources, VAT) electricity fees and small repairing/ maintenance costs.

14. Nearly half of households in Vinh Quang town center are currently supplied from CWMS managed infrastructure. Service is not possible on a 24 - hour basis and as such supply is rotated between areas to maximize the number of households that receive water. Connected households indicate a strong desire for improved service and are willing to pay for reliability and quality of water supplied. The growth in the number of households connected or registering to be connected is high with the number of new connection requests in the first six months of 2016 being 30% higher than for the same period in 2015.

15. Current water pricing (tariffs) are set at the Provincial level. The current tariffs levied and collected from consumers by the CWMS are based on metered supply (measured by cubic meter of consumption) are as follows:

(i) Households; Đ 5,800 /m^3;
(ii) Business services: Đ 8,700 /m^3;
(iii) Other services: Đ 12,000 /m^3.

16. The main components of the subproject:

(i) Construction of a small weir to collect raw water at Ta Su Choong stream.
(ii) Installation of 0.15 km raw water pipeline leading water from raw water pump station to the WTP using HDPE material. This pipeline is light, easy to install, low roughness and corrosion resistance.

(iii) Construction of WTP with the capacity of 2,200 m^3/day, located about 150 m downstream of the reservoir near the bridge on the way from Pin Ho Bridge to Ta Su Choong commune, Hoang Su Phi district.
(iv) The utility works: the operating house; chemical house; factory; warehouse; gate; fence; trees; road; drainage; electricity.
(v) Construction of transmission pipe system with the estimated length of 16.7 km from WTP to Vinh Quang town, Ban Nhung and Tu Nhan communes.
(vi) a distribution pipeline network made of HDPE pipe, of total length 20.428 km.

B. Environment impacts and mitigation

17. The project has very limited impacts on the natural environment, ecological resources and cultural assets. Most of the likely impacts are common for construction activities such as dust, noise, traffic disruptions, and waste can be prevented or minimized by standard mitigation measures.

18. During operation of the WTP, it is necessary to ensure that the management of chemical treatment process and new sludge tanks under the design meet the GOV discharge standards and water source protection management, hygiene condition of the WTP in accordance to Circular No.50/2015/TT-BYT[1].

19. In some proposed areas, the project may increase the volume of grey water produced by water users receiving new connections. It is recommended that before installing the new water connection in each subproject area, construction supervision consultants, PMU, and representatives of local sewerage unit make a general inspection to confirm that there is a combination of drainage system and grey water in the central area of Vinh Quang town, Ban Nhung, Tu Nhan communes to be able to handle the increased wastewater load. On the other hand, they will identify additional works to be carried out by the drainage system and / or the local community before the new connection is made.

20. The EMP for the subproject includes mitigation measures and monitoring processes to manage and assess the expected and unexpected impacts of this project. The EMP also specifies responsibilities for implementation, and capacity development and training requirements of CWMS and the appointed PMU to monitor the implementation of the EMP. The implementation of the EMP will require assistance from an environmental specialist (ESS), and a construction supervision consultant (CSC) to take part in the audit work of the EMP.

C. Information Disclosure, Public Consultation, and Grievance Redress

21. According to Vietnamese law, for a water supply facility with a capacity of less than 50,000 m^3/day, it is not necessary to prepare an Environmental Impact Assessment Report (EIA) including public consultation but in accordance with the ADB Safeguard Policy Statement, for category B subprojects, it is necessary to conduct public consultation. As such, consultation on option of construction of WTP, technology processes, water supply alternatives, etc. is essential as a part of actual survey in project preparation. Public information and consultation activities were carried out as part of a baseline survey of local environmental conditions along the projects sites. Meeting with local authorities took place on 21 September 2013. Two public meetings were held in Ban Nhung CPC and Vinh Quang Town PC on 23 September 2016.

[1] Circular No.50/2015/TT-BYT dated 11 December 2015 of the Ministry of Health, providing for the inspection of drinking water and domestic water's sanitation and quality

22. During the consultation on environmental matters, local leaders and members of some households were given an introduction to the project, anticipated environmental impacts and mitigation measurements, the project implementation schedule and relevant environmental issues. Overall, there was no opposition raised with respect to the proposed subproject.

23. Three-step grievance redress mechanism will be established for the project, common to social as well as environmental safeguards, to handle environmental impacts and land occupation. As a guideline, any complaints to any project's aspects will be solved through negotiation to get agreement. Complaints will be submitted toward 3 levels of entities: First through commune/town's PC, then the Town's PC and finally through PPC. If an agreement was not reach, then they will be law court as the final method. The Center of Water Management and Supply (CWMS) will be responsible for the administration and costs of dispute resolution procedures in the operation phase.

D. Institutional arrangement

24. Ha Giang DPI will establish 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 Environmental Safeguards Officer (ESO). Three staff, including the ESO, have been participating in a training course on "Fundamental Safeguard and Gender Safeguard Policy Statement (SPS) of ADB" under TA8902-Vie Capacity Building for Project Management Unit Professionalization - organized by ADB in August 2016. Environmental specialist (ESS) for subproject implementation will organize a formal training course and on-the-job training for relevant PMU staff, Construction Supervision (CSC), communities, contractors; and support for establishment and operation of the subproject environment management system in construction phase. The ESS will also support PMU's capacity building by reviewing and evaluating the capacity for environmental protection of the PMU and CWMS – subproject management organization in the operation phase.

25. 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.

E. Conclusion

26. 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. The ESS will update EMP on finalization of detailed design, the ESS will update EMP in accordance with changes in design, if any.

Figure 2 – General Map of Ha Giang and Subproject Area

II. BACKGROUND

A. Objectives of the Subproject

27. The objectives of the subproject will be achieved through upgrading the water supply system, providing greater access to clean water, especially for people in the mountainous areas, including poor households. Specifically, including Water supply system for domestic use for Vinh Quang town, Ban Nhung and Tu Nhan commune, Hoang Su Phi district.

28. 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 water supply system subproject; (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

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

A. ADB SPS Requirements

30. ADB safeguard policy statement (SPS) 2009 imposes safeguard requirements for all 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

31. For environmental safeguards, the Project is initially categorized as 'B' for environmental safeguards. Any subproject which is classified as category A on environmental safeguards will not be supported by the Project as it will rescale the whole Project to category A on environment.

B. Legal and Administrative Framework for Environmental Protection in Vietnam

32. The subproject must 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

(i) Law No. 55/2014/QH13 of 23 June 2014 by the National Assembly on environment protection

(ii) Law No. 17/2012/QH13 of 21 June 2012 by the National Assembly on water resources

(iii) Law No. 20/2008/QH12 of 13 November 2008 by the National Assembly on Biodiversity Conservation

(iv) Law No. 68/2006/QH11 of 29 June 2006 by the National Assembly on standards and technical regulations

2. Decrees and Regulations

(i) Decree No. 18/2015/ND-CP dated February 14, 2015 on environmental protection planning, strategic environmental assessment, environmental impact assessment and environmental protection plans.

(ii) Circular No. 27/2015/TT-BTNMT dated May 29, 2015 on strategic environmental assessment, environmental impact assessment and environmental protection plans.

(iii) Circular No.50/2015/TT-BYT dated 11 December 2015 of the Ministry of Health, providing for the inspection of drinking water and domestic water's sanitation and quality.

(iv) 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

(v) National Technical Regulations on water quality

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

3. Other legislation applicable to the subproject are the following

(i) 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

(ii) Law No. 50/2014/QH13 of 18 June 2014 by the National Assembly on construction

(iii) Circular No. 22/2010/TT-BXD of 03 December 2010 by the Ministry of Construction on labor safety in work construction

(iv) Law No. 10/2012/QH13 of 18 June 2012 by the National Assembly on labor code.

IV. PROJECT DESCRIPTION

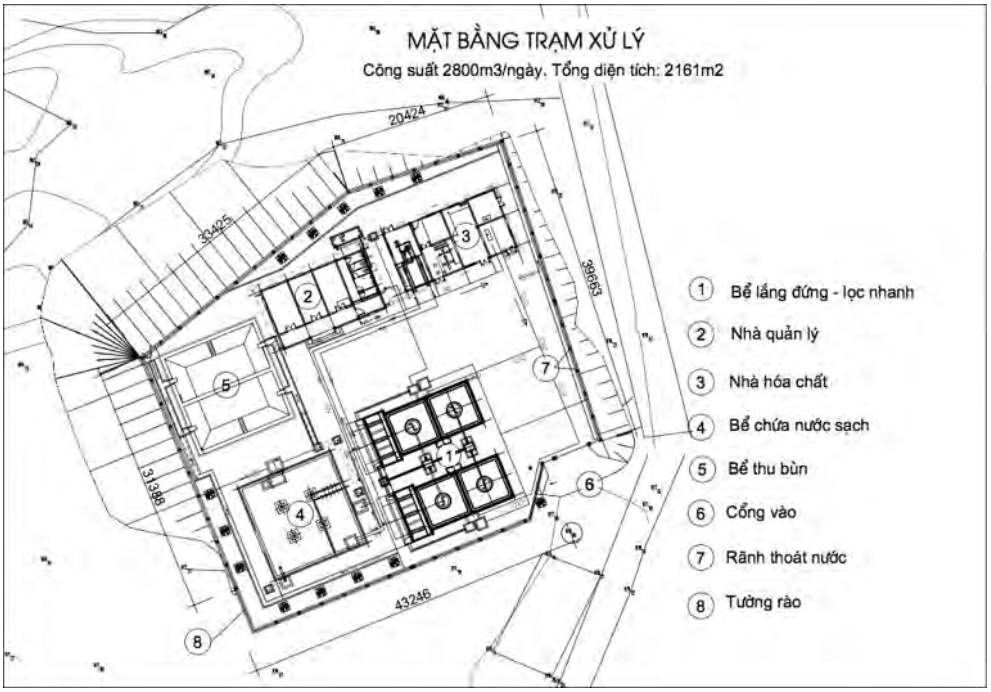
A. The need for subproject

33. The Vinh Quang water supply scheme was built in 2008 as phase I of a two-phase development. Phase 1 has 1,070-metered connections and is over-subscribed. Connected households fail to receive supply or supply at the design standard due to insufficient water (only 900 m^3/day) relative to design requirements (1,500 m^3/day). The current head works, treatment and pumping facilities are estimated to have a residual economic life of 5 years or less.

34. Phase II was planned to address the lack of water for households already connected to the system and increase the number of households receiving water by 2,500. Water is currently sourced from the Chay river but the lack of sufficient water and high turbidity were not anticipated at the design stage and a cleaner supplementary source, namely the Ta Su Chong stream, has been identified. Current plant and operational management standards are generally high, being well organized and managed with supporting records and financial statements.

35. The feasibility study confirms that on completion, the subproject will supply a secure twenty - four hour water supply service to approximately 8,263 beneficiaries based on the projected population and demand forecasts for 2030. The system can support an expected population growth rate of 2.2% / year in 10 years (increase to 11,630 people). The general location of the proposed Water Treatment Plant (WTP) is shown in Figure 3.

Figure 3 - Sketch map of the subproject works



(i)

B. Location and scope

36. The location of the proposed water source is the Pin Ho stream which flows into the Ta Su Choong stream in Ta Su Choong commune about 18km southeast from Vinh Quang town. According to a rapid inspection of the PPTA and consult with people in Ta Su Choong commune, the stream originates from area near the peak of Ta Su Choong, divided into two branches at the proposed small dam. The dam will be constructed to collect water from the left branch. The water source is strong with low turbidity, continuous flow and an average flow depth of around 1.2m. The stream water has low turbidity and can be readily treated to feed a potable water supply system.

(i) Total estimated investment cost of the subproject is $2.3 million
(ii) The capital cost per household is $1,146.
(iii) Duration of construction period 12 months
(iv) The main components of the subproject:
- Construction of small dam to collect raw water at Ta Su Choong stream.
- Installation of 0.15 km raw water pipeline leading water from raw water pump station to the WTP using HDPE material. This pipeline is light, easy to install, low roughness and corrosion resistance.
- Construction of WTP with the capacity of 2,200 m^3/day, located about 150 m downstream of the reservoir near the bridge on the way from Pin Ho Bridge to Ta Su Choong commune, Hoang Su Phi district.
- The utility works: the operating house; chemical house; factory; warehouse; gate; fence; trees; road; drainage; electricity.
- Construction of transmission pipe system with the estimated length of 18 km from WTP to Vinh Quang town, Ban Nhung and Tu Nhan communes.

37. The distribution system is planned as an integrated network delivering water from the new WTP together with the existing system. A transmission pipeline will be installed to link the new WTP with the distribution network to create a completed network to transfer water effectively to the service area of Vinh Quang town, Ban Nhung and Tu Nhan communes (both existing and new water supply system could serve only two small residential areas of Ban Cay village with about 90 households in total 500 households of Tu Nhan commune).

C. Cost estimate

38. A construction cost estimate has been prepared for the Sub project based on the feasibility study outline designs. The unit rates used in estimating cost are published by the province and are current, and regularity updated.

39. The bill items have been rearranged in order to reflect more accurately common practice (civil engineering, treatment plant, distribution works, and construction management) and ADB procurement procedures, although still not in total agreement. The reordered bill of quantities is as follows.

Table 2 – Subproject Construction Estimate

No	Cost items	Base cost (Đ)	Tax (Đ)	Total Cost (Đ)	Total Cost (USD)
1	Construction costs	36,222,534,912	3,622,253,490	39,844,788,402	1,782,765
	Pipeline	24,547,591,505	2,454,759,150	27,002,350,655	1,208,159

No	Cost items	Base cost (Đ)	Tax (Đ)	Total Cost (Đ)	Total Cost (USD)
	Clean water tank (after treatment)	1,684,849,362	168,484,936	1,853,334,298	82,923
	Intermediate water tank (on the hill, before distribute to the town)	1,326,719,776	132,671,978	1,459,391,754	65,297
	Clarifying tank	3,662,979,797	366,297,980	4,029,277,777	180,281
	Sludge tank	90,055,699	9,005,570	99,061,269	4,432
	Water collector (intake tank)	116,714,723	11,671,472	128,386,195	5,744
	Gate, surrounding wall	1,153,201,675	115,320,167	1,268,521,842	56,757
	Internal power	394,587,850	39,458,785	434,046,635	19,420
	Operation house	552,212,783	55,221,278	607,434,061	27,178
	Management house	823,219,426	82,321,943	905,541,369	40,516
	Water trench for treatment station	131,610,102	13,161,010	144,771,112	6,477
	Ground leveling	1,738,792,215	173,879,221	1,912,671,436	85,578
2	Equipment costs	531,964,444	53,196,444	585,160,888	26,182
3	Management costs	624,311,926	62,431,193	686,743,119	30,727
4	Construction investment consultation costs	3,395,011,305	339,501,131	3,734,512,436	167,092
5	Other costs	1,723,427,468	165,829,850	1,889,257,319	84,531
5.1	General costs (temporary hut for workers, etc.)	1,332,151,962	133,215,197	1,465,367,159	65,565
5.2	Cost of design verification (Circular 75/2014/TT-BTC)	36,193,557	3,619,356	39,812,913	1,781
5.3	Cost of estimate verification (Circular 75/2014/TT-BTC)	34,976,480	3,497,648	38,474,128	1,721
5.4	Cost of examination and approval of final account	65,128,973	0	65,128,973	2,914
5.5	Independent audit	100,854,346	10,085,435	110,939,781	4,964
5.6	Works insurance	108,667,605	10,866,760	119,534,365	5,348
5.7	Management and operation training cost	45,454,545	4,545,455	50,000,000	2,237
6	Peripheral electricity costs	181,818,182	18,181,818	200,000,000	8,949
7	Compensation cost for land clearance	306,798,150	30,679,815	337,477,965	15,100
8	Contingency cost	4,298,586,639	429,858,664	4,728,445,303	211,564

No	Cost items	Base cost (Đ)	Tax (Đ)	Total Cost (Đ)	Total Cost (USD)
	Total	47,284,453,025	4,721,932,406	52,006,385,431	2,326,908
	Rounding			52,006,385,000	2,327,000

V. DESCRIPTION OF THE ENVIRONMENT

A. Natural Conditions

40. Ha Giang has a complex topography with large altitude variation. The average elevation of Ha Giang is 800m - 1200m Meters above sea level (MASL) with 5 mountains with the height varied from 2,000m to 2,500m. In general, Ha Giang topography could be divided into three main areas - they are:

41. **Area I**: the high stone mountains in the North, called Dong Van Karst Plateau, lying on the administrative areas of four districts (Quan Ba, Yen Minh, Dong Van, Meo Van). 90% of the natural area is karst mountain, typical for karst topography. Dong Van Karst Plateau has become a member of Global Geological Park network in 03 October 2010.

42. **Area II**: High area in the West including 3 districts of Hoang Su Phi, Xin Man and Quang Binh. This is the subproject area and is part of Bac Ha plateau, called Chay River stilted arch with average elevation from 1,000m to 2,000m. The mother rock in this area is mainly granite with feralit topsoil, from red to light yellow, grey yellow and some parts of humus allitic soil in the mountain.

43. **Area III**: The low soil mountains including the administrative area of Bac Me, Vi Xuyen, Bac Quang districts and Ha Giang city. The mother rock in this area is mainly metamorphic rock with topsoil, that varies from red to light yellow, grey yellow and the thickness of the layer is varied from 0.8 to 2m. The dominant topography of the area is low slope mountain; create large cultivation area above 50ha. This are is also has some dense forest strip in the flat and narrow valley along rivers and streams.[2]

44. The subproject area includes Vinh Quang town, Ban Nhung and Tu Nhan communes, Hoang Su Phi district, shown in Figure 2Figure 4 below. The location is described as follows:

(i) Bordering with Po Lo, Dan Van, Tan Tien communes, Hoang Su Phi district to the North
(ii) Truong Son commune, Vi Xuyen district to the East
(iii) Ban Peo, Ngam Dong Vai, Ban Luoc, San Sa communes, Hoang Su Phi district to the South
(iv) Po Li, Chien Pho communes, Hoang Su Phi district to the West.

45. The Hoang Su Phi district is mostly 1,300m -1,700m above sea level with two of the highest mountains in Vietnam being Tay Con Linh peak (2,423m), and Chieu Lau Thi peak (2,402m). Hoang Su Phi district terrain is basin shaped with the lowest levels in Vinh Quang town, neighbouring villages, and adjacent communes.

46. The site of the proposed treatment works (elevation 980m asl) requires the pipe network to be laid through steep terrain however this provides sufficient head to serve Vinh Quang town (average altitude approximately 550m), as well as surrounding communes (average altitude approximately 620m). At a service distribution level, Vinh Quang town has somewhat flatter terrain than the communes of Tu Nhan, Ban Nhung, but little flat area over 1ha exists. Not all households in the three administrative units will be served by the scheme.

[2] Status of Environment report (SOE) of Ha Giang province 2015 prepared by Environment Analysing and Technique Joint Stock Company under the Assignment of Ha Giang DONRE 07/2015

Figure 4 - Subproject Location

1. Weather, natural disaster and climate change

47. Ha Giang usually received deflect cold movement from the plain area and the Northeast mountainous area so there is no extreme cold condition period like in the Northeast mountainous area. Only in some high area, near the peak of the mountain like in Pho Bang area - 1,400m MASL, where the lowest temperature could fall down to 5.6^0C.

48. The topographical conditions of Viet Bac Mountainous area and Hoang Lien Son Range where Ha Giang is lying on has support the Province a high humidity conditions. The average humidity usually high, from 80 to 87%.

49. The annual rainfall is different between regions, from 1,031mm in Thuong Phung commune, Meo Vac district to 4,721mm in the subproject district of Bac Quang and 4,846 in Quang Ngan commune, Vi Xuyen district. The largest rainfall center of the country has been formed in two districts of the subproject: Bac Quang - Vi Xuyen, reached to 4,700 - 4,800mm. The rainy season lasts 6 - 7 months from April to October with the rainfall make up 83-91% of the total annual rainfall. December and January are the driest months of the year with the rainfall of 25mm. The rainfall of Hoang Su Phi is 1,388 mm.

50. The climate in Ha Giang is diversified not only based on the elevation but also the direction of mountain range. Ha Giang is not usually suffered from tropical storm but

thunderstorm, hailing and frost fog are happening frequently. The "thunderstorm" day could be reached to 90 - 100 days per year[3].

2. Hydrology

51. Ha Giang is situated upstream of 3 river basins including Lo River, Gam River and Chay River. Chay River originated from Tay Con Linh, flow Northeast - Southwest direction though the subproject area of Hoang Su Phi district then to Xin Man district before enter Yen Bai province. The total length of Chay River in Ha Giang is 44km and the water basin area is 816km^2 [4]. Chay River has a deep riverbed and steep riverbank with bank height of 400 to 450m. There are several mountain ranges run along the river and make many difficulties for local people to get water for their daily purpose[5].

52. Ta Su Choong stream originated from Ta Su Choong Mountain about 18km southeast from Vinh Quang town. The stream pours in Chay River at about 2km from the town.

53. Groundwater exists in both shallow and deep aquifers, however shallow aquifers (up to 10m) are often turbid and risk surface contamination from open streams and sinks holes. Groundwater is almost non-existent at higher elevations. Groundwater exists at greater depths (50m or more) and water in these aquifers is generally good quality. Reserves are difficult to evaluate, primarily as explorative drilling and pump testing has yet to be undertaken. Economically exploitable groundwater is difficult to evaluate.

3. Seismicity

54. Vietnam has been classified as a low seismicity region although earthquakes of up to degree VI on the Modified Mercali Scale have occurred in much of the northern mountain region, including Ha Giang province[6]. Ninety percent of the earthquakes that have occurred in Vietnam have taken place in the Northwestern Provinces. As Ha Giang lies along the Lai Chau - Dien Bien Fault, earthquakes could happen but mostly with low intensity (under degree IV) and the earthquakes center usually along the fault next to Thanh Thuy Border Gate in Thanh Thuy commune, Vi Xuyen district. At 12h45, July 17, 2005, a magnitude 4.5-richter scale earthquake occurred in the area of Lung Cu, Dong Van district causing minor damage but no fatalities[7]. Before that, a small earthquake was recorded at 8h54 on May 13, 2011 in the area of Piabioc Mountain, 50km from Ha Giang city with the magnitude of 4.7-richter scale[8].

B. Ecological environment

55. The Pin Ho stream is fast flowing and follows a winding course, with steep banks. The vegetation on the stream banks is mainly shrub vegetation, which has colonized on the steep, rocky terrain. Species are well represented in forester and seep stream bank and hillside locations in the area. Water will be collected from the branch in the left then raw water pipe will cross the other branch, connect to the proposed WTP, on the side of the small mountain,

[3] Status of Environment report (SOE) of Ha Giang province 2015 prepared by Environment Analysing and Technique Joint Stock Company under the Assignment of Ha Giang DONRE 07/2015. SOE has analyzed hydrological data of 35-50 years from 5 hydrological stations and 32 rainfall stations in Ha Giang.
[4] Status of Environment report (SOE) of Ha Giang province 2015
[5] Status of Environment report (SOE) of Ha Giang province 2015
[6] UN Office of the Coordination of Humanitarian Affairs (OCHA) Viet Nam: Natural Hazard Risks issued March 2011. http://www.preventionweb.net/files/23469_ochavnmhazardv3110606.pdf
[7] http://vietbao.vn/Xa-hoi/Dong-dat-o-Ha-Giang-du-chan-o-Dien-Bien/10918673/157/
[8] http://vietbao.vn/Xa-hoi/Dong-dat-o-Ha-Giang/10770031/157/

roadside of the road from Pin Ho Bridge (Bac Quang - Xin Man road) to Ta Su Choong commune, about 150m from the proposed dam.

Figure 5 – Location of proposed dam and WTP

Location of proposed water intake

Proposed WTP location - next to the house

C. Social- economic Context

1. Administration areas and population

56. The total population in the three target communes is 9,680 people of 952 households but the number of beneficiaries will be 6,038 people in 13 villages out of 21 villages. The total number of households most likely to benefit is about 1,473, this represents 66% of the population of the three target communes. There are at least 389 households (10%) with female headed directly benefited from the proposed Project. Almost beneficiaries are ethnic minorities (85%). (See Table 3).

57. Three ethnic minority communities dominate in these communes/townships included Tay, Nung and Hoa (Chinese). In Vinh Quang Township, four main ethnic groups are Kinh (23%), Tay (23%), Nung (21%) and Dao (20%). Tu Nhan commune is home of three ethnic minorities of Tay (26%), Nung (32%) and Hoa- Chinese (36%), while almost inhabitants in Ban Nhung commune are Nung (89%) and Tay (10%).

Table 3 – Population and Ethnicity in Subproject Area

	Whole commune/township			Beneficiary area			
	Vinh Quang	Ban Nhung	Tu Nhan	Vinh Quang	Ban Nhung	Tu Nhan	Total
Number of Villages	8	8	5	8	3	2	13
Population (person)	3644	2458	3578	3644	1017	1377	6038
By sex							
Women	1786	1345	1672	1786	480	659	2925
Men	1858	1113	1906	1858	537	718	3113
Number of Households	952	499	778	952	206	315	1473
By ethnic group							
Kinh	217	4	3	217	4	2	223

	Whole commune/township			Beneficiary area			
	Vinh Quang	Ban Nhung	Tu Nhan	Vinh Quang	Ban Nhung	Tu Nhan	Total
Tay	216	49	120	216	38	82	336
Nung	198	446	524	198	164	100	462
Dao	187	0	1	187		1	188
Hoa (Chinese)	59	0	113	59		113	172
Hmong	15	0	2	15		2	17
Khac	60	0	15	60		15	75
Female headed households	342	30	60	342	9	38	389

Source: Data collected from Vinh Quang, Tu Nhan and Ban Nhung CPC, 2016

2. Economic development and income

58. Agriculture production is the dominant income source in the two communes, while trade and services are the main income source the Vinh Quang Township. In Vinh Quang township, agricultural gross value contributes 15% of the town's GRDP, while in Tu Nhan and Ban Nhung, agricultural production contributes about 90% of the commune's GRDP. Main crops are paddy, maize, soybean and ground nut. Agriculture occupies 21%, 58% and 50% of the total land area in Vinh Quang town, Tu Nhan Commune and Ban Nhung commune respectively. Plantation forestry occupies about 44% of total land area but has limited direct economic contribution as it is mostly protection forest.

3. Social services

59. Health facilities including quality clinic facilities, doctors and nurses are available to provide health care services at commune level. Every commune has a clinic located in the commune center with one doctor and three nurses/midwives. In Quang Vinh Township, there is a district hospital. At site visits, participants in the focus group discussion stated that they are satisfied with the health care services and more ethnic minority women now give birth at the commune clinic.

4. Historical, cultural and religious presence

60. The terraced field located in Ban Luoc, San Sa Ho, Ban Phung, Ho Thau, Nam Ty and Thong Nguyen communes of Hoang Su Phi district has received the certifications of National Heritage on 16 September 2012. The area is about 40km to the west of Vinh Quang town and it is the cultivation area of La Chi, Red Dao, Dao Ao Dai and Nung people from hundred years ago.

5. Unexploded Ordnance

61. There has been no armed conflict in the site in recent decades. Nonetheless, nearly 40 years after Vietnamese - Chinese border war ended, unexploded ordinance (UXO) remains from aircraft, booby traps and land mines, all of which are indiscriminate and all of which result in concealment of the ordinance and information on the extent and location of UXO is sparse. In some locations, such as the sites of former combat bases or military supply routes, the scale of the risk is high. For most of the rest of the country, the level of risk for any one site is largely

unknown. Prior to earthworks and especially for the pipeline excavation corridors, survey for the presence UXOs has to be conducted by an authorized bomb and mine Clearance Company.

D. Surface Water Resources

62. The water source of the proposed Water supply system is the Ta Su Choong stream, which starts from natural spring from Ta Su Choong mountain, Ta Su Choong commune, Hoang Su Phi district. It flows westwards to the center of Vinh Quang town and then pour in Chay River, about 2km from the town.

63. The water intake is located less than 500m downstream of the stream head, where the stream is divided into two branches. The site was inspected by the PPTA team. The water source is clean, appears to flow steadily and has an average depth of around 2 m.[9]

64. The intake is located in the upper reaches of the catchment area. While there are offtakes for irrigation further downstream, Due to steep terrain and sparse population in the valley, there is limited competing use for the stream water.

E. Water Quality

65. The quality of the source water at the of Ta Su Choong stream is good, not polluted by cultivation activities as the proposed dam location is less than 500m from the stream head. Ta Su Choong stream meets the water needs for Vinh Quang town, Ban Nhung and Tu Nhan communes as the input for clean water demand at present and long term.

66. The Ta Su Choong (Pin Ho) water was sampled in September 2016 and tested by an accredited testing laboratory (Vilas). High levels of turbidity are a source of concern when sourcing water in upland mountainous catchments like the Pin Ho river as the treatment process is more laborious and produces filtered material (sludge). The turbidity in the sample was 0.52 NTU and well within WHO guidelines, which establishes that the turbidity of drinking water shouldn't be more than 5 NTU, and ideally be below 1 NTU. An earlier set of samples tested in March and May 2016 recorded higher levels of turbidity (9.31 and 3.2). The latter of these is within the WHO limit but the former is high and may have been after a rainy period. Tested result in May 2016 is showed in Table 4 below.

67. There are currently no known upstream sources of sanitation pollution (town, industry, agribusiness, etc.) that might threaten water quality. However, the coliform value of the water sample testing September 2016 is high (800 MPN/100ml), no coliforms or E.coli should be detectable in 100 ml. The earlier samples recorded levels of 2,400 and 2,500 (MPN/100ml), which suggests that dwellings along the river are discharging wastewater into the water and causing localized pollution. To address chlorine dosing will be used in the treatment works.

68. The test results were checked against the relevant national standards (QCVN 08-MT 2015, 01-2009 and TCVN 33-2006) and confirm the proposed water source is suitable provided the scale and level of treatment plant technology is appropriate. The Subproject O&M plan would include a regular water testing program to detect any changes in the ambient quality in the water

[9] The PPTA Consultants strongly recommend that ADB seek assurance from Ha Giang PMU that the subproject establish water gauging stations at the proposed water source prior to Fact Finding and that where the gauge data differs by more than 10% from current reported data a detailed hydrological assessment be undertaken prior to subproject approval. Concurrently monthly water quality tests should be undertaken

source and confirm that the water in the clear water tank distributed through the pipeline network meets national treated water standards.

69. Based on the survey results, the quality of water in Ta Su Choong stream met the requirement as raw water for Water supply system for domestic use as stated in QCVN 08:2015-MT/BTNMT[10].

Table 4 - Test result of Ta Su Choong Stream's raw water source[11]

No	Properties	Unit	Result	QCVN 08:2015-MT/BTNMT	Testing method
1	pH	-	7.6	6 – 8.5	APHA 4500-pH
2	Turbidity	NTU	9.31	-	APHA 2130- Turbidity
3	Color	Pt – Co	11	-	A PHA 2120
4	Alkalinity	mg $CaCO_3$/l	200		APHA 2320-Alkalinity
5	Hardness	mg $CaCO_3$/l	130	-	APHA 2340-Hardness
6	Oxidization	mg O_2/l	2	-	APHA 4500-KMnO4
7	Total Suspended Solid (TSS)	mg/l	1	20	APHA 2540
8	COD	mg O_2/l	2	10	APHA 5220-COD
9	Ammonium (NH_4+ - N)	mg/l	0.04	0.3	APHA 4500-NH3 TCVN 5988-1995
10	Nitrite (NO_{2-} - N)	mg/l	0	0,05	APHA 4500 TCVN 6180-1996
11	Nitrate (NO_{3-} - N)	mg/l	0.12	2	APHA 4500 TCVN 6178-1996
12	Arsenic (As)	mg/l	< 0.01	0.01	APHA 3500 - As
13	Manganese	mg/l	0.01	0.1	APHA 4500-Mn
14	Total Iron (Fe)	mg/l	0.01	0.5	APHA 3500-Fe
15	Iron (II)	mg/l	< 0.01	0.5	APHA 3500-Fe
16	Chloride	mg/l	8.51	250	HACH 4500-Chloride B
17	Coliform	MPN/100ml	-	0	

[10] QCVN 08-MT:2015/BTNMT National Technical Regulation on Surface Water Quality Column A1: Water quality for domestic water supply and other purposes

[11] Water sampled at Ta Su Choong bridge on 12 May 2016 by Environment Analysing and Technique Joint Stock Company

VI. IMPACT, ALTERNATIVE AND MITIGATION MEASURES

A. Area of influence of the subproject

70. The area of influence of the subproject includes the water intake area, the adjacent water treatment plant site, the area involving the pressure tank at Vinh Quang town and the areas served by the two pipe distribution networks and the area along the raw water transmission pipe. It includes Vinh Quang town, Tu Nhan, Ban Nhung and Ta Su Choong communes, Hoang Su Phi district.

B. Expected benefits

71. The benefits of the subproject are improved public health by ensuring full time reliable access to clean water for most of the local people in Vinh Quang town, Ban Nhung and Tu Nhan communes. The water will be safe for drinking and cooking, reducing the incidence of water related disease, which in turn improves the quality of life for beneficiaries, reducing the need to purchase safe water, and reduces productive time lost to illness.

72. Many households in the region seek other water sources by themselves for the purposes of catering and drinking. Commonly, groups of about 3-5 households invest together in a tank system and water pipeline directly from small stream heads to their house for catering. The capacity of these supplies is inadequate and also reportedly declining so households use dual systems of mountain water for consumption and stream, and river water for washing.

C. Alternative; Design and Location Consideration

73. To meet the investment objective of sufficient water for domestic use for the 2,045 households, 17 businesses, and 61 Government agencies with total 8,263 people – being the demand requirement forecast for 2030, the estimated scope of the subproject is:

(i) Small dam for water collection
(ii) Water extraction pumping station
(iii) Fresh water treatment station with capacity of 2,200 m3/day (1 station).
(iv) Installation of a distribution pipeline network of total length 18 km.
(v) Household connections

74. Potential sources of water examined during the field study for the Sub project include the Vinh Quang, Phu Lung, Nam Pung, Ta Su Choong, and Pin Ho streams. A summary of their suitability is as follows:

(i) The Vinh Quang stream flow varies between 0.3 m^3/s and 2.1 m^3/s but is heavily polluted from gravel and sand extraction and unsuitable;
(ii) The Phu Lung stream has a minimum flow of around 0.6m^3/s and highest of 4.2 m^3/s. It currently supplies water for two small hydropower stations and is an unsuitable water supply source as dry season abstraction would seriously affect their operation;
(iii) Flows in the Nam Pung stream vary from 0.36 m^3/s and 2.52 m^3/s although during the field survey, flows were negligible and this source is clearly incapable of supplying water for the Sub project;

(iv) The Ta Su Choong stream is served by a waterfall located at an altitude at about 1,100m and has been ruled out as a potential water supply source because of poor access; and,
(v) The Pin Ho Stream (Hoang Su Phi district's meteorological centre), the smallest volume is 0.97 m^3/s with a maximum estimated flow of 6.14 m^3/s.

75. The Pin Ho Stream (Ta Su Choong stream) is recommended as the water source for the implementation of the subproject.

D. Pre-construction activities

76. The preconstruction activities under the subproject area are site clearance along the raw water pipeline, WTP and distribution networks. A small house located where the proposed 150m raw water pipelines will be relocated for the construction activities. A Resettlement and Ethnic Development Plan (REMDP) has been prepared to cover compensation and assistance based on ADB SPS.

77. **Slope stability**. The 150m-access road to the WTP will follow an existing track but will involve widening to form the road bench. This will involve some cutting into the hillside, and will also alter the existing water flows on the hillside. Risks are to be mitigated by design measures to protect the slopes and manage drainage. This will include (i) careful design of the access road, minimizing the amount of cutting necessary to form the road, (ii) providing for retention on the downslope side, (iii) a geotechnical assessment of slopes to be cut should be made, and suitable retention or revetment structures included in the design as necessary, (iv) a hydrological assessment and design of road drains and culverts, including cascades to direct runoff water as necessary, (v) provision for cut slopes to be re-vegetated with grass and shrub species.

78. **Protection of the water source**. Provision will be made in the detailed design to include a perimeter fence around the water sources to exclude animal traffic and reduce contamination from animal waste.

E. Potential Impacts and Mitigation Measures in the construction phase

1. Loss of trees and impact to fauna

79. **Impacts:** Construction work will involve some removal of trees along 150m access road and WTP proposed position itself. The trees on the hill of proposed WTP are mainly young trees, shrubs and terraced fields. These species are well represented in nearby wooded areas, and strips of riparian vegetation and forests in the area and as such the vegetation on the hill does not present a unique habitat. The number of trees that will be cut down as part of the works will be very few, so the impact is not large.

80. **Mitigation measures**: Trees owned 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, the DARD office of Hoang Su Phi district will be informed about the number of tree to be cut down, construction time and schedule. The contractor will not use or permit the use of fuel wood for construction activities or for cooking and water heating in worker's camps. The contractor will prohibit staff from collecting fuel wood 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. Generation of surplus soil

81. **Impacts:** Soil from excavation activities to construct the access road and building platform, which could not be reused as piled fill soil will release silt and cause possible soil erosion on slopes if discarded in situ.

82. **Mitigation measures:** Most of the excavated soil will be reused as filling soil to cover the pipe system. Thus, large amounts of excavated soil will not need to be discarded. The remaining surplus will be reused to the extent possible as a base material for the WTP site, for access road construction if suited for the purpose, or provided to local people for use on public or private land, as they desire. Any further surplus soil will be transferred to a disposal site, to be agreed with the CSC and local authorities.

3. Generation of construction waste

83. **Impacts:** Solid waste that will be generated from construction mainly includes waste from workers' camps, debris, and packaging of materials and equipment cement cover, 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 a minor impact, as the main construction site is the proposed WTP, small access road.

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

4. Impact from noise, dust and vibration generated by the construction activities

85. **Impacts:** Earthworks and rock crushing activities will be the main sources of dust. Construction machines and vehicles will generate gaseous emissions (NOx SOx, CO, CO_2, etc.) when they are in operation. These gaseous emissions and dust could cause health problems for residents who live near the construction site and along the transportation route and along the distribution pipeline network. The impact is considered as minor as the WTP and access road will be constructed at a hill near Ta Su Choong mountain, about 3 km from the nearest residential area of Ban Nhung commune. The installation of distribution network will be done mainly by manual work.

86. **Mitigation measures:** The contractors should not locate any large or noisy construction machines near residential area of Ban Nhung, Tu Nhan communes and especially Vinh Quang town and will work with 3 CPCs, with the representative of ESS and PMU, to identify suitable materials transportation route. During the dry period, the sites and patches near residential areas, especially the sensitive receivers like Hoang Su Phi Ethnic Boarding High school, Vinh Quang secondary school, Hoang Su Phi high school, Vinh Quang kindergarten, Vinh Quang primary school, Vinh Quang temple... should be sprayed with water regularly to suppress dust generated PMU and CSC will responsible to monitor these mitigation measures.

5. Impact on local traffic

87. **Impacts:** Distribution pipelines installation is likely to cause hindrance in traffic flow along PR177 and road from Pin Ho Bridge to Ta Su Choong commune center if not mitigated properly especially in the area of Vinh Quang town. Pupils will get difficulties on their way to schools and local people will get difficulties on their way to Hoang Su Phi trade center. The impact duration will be short, during the distribution pipelines installation in 12 months construction phase.

Mitigation measures: To minimize the disturbance to local people, the contractor will inform Tu Nhan, Ban Nhung CPCs, Vinh Quang town PC the construction schedule for distribution pipelines in advance and will also coordinate with traffic police of Hoang Su Phi district to implement appropriate traffic diversion schemes (if needed) to avoid inconvenience due to pipelines installation, setup clear traffic signal boards and traffic advisory signs at the trade center and school areas.

6. Safety of construction workers

88. **Impacts:** Workers are at risk of accidents associated with construction, particularly the installation of the long distribution water pipe from Ta Su Choong stream to Vinh Quang town and Tu Nhan commune.

89. **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 all excavation sites are fenced with sign boards and perimeter markers; (iv) 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.

F. Potential Impacts and Mitigation Measures in the Operation Phase

1. Risk of water pollution and pipe breakages

90. **Impacts:** The water source of Ta Su Choong stream could be polluted by the cultivation activities and animal waste along the upstream; increasing the turbidity and contamination level for the raw water pumped to the WTP. Treated water could also be polluted due to the failure of the treatment system or inappropriate operation procedures like the chemical control. The water pipe could be broken, leading to waste of water and contamination.

91. **Mitigation measures:** CWMS will install fences surround the water intake location to avoid cattle trespassing and install warning boards at the intake location as well as some main points along the distribution pipeline system. CWMS will also inspect the water intake, pipeline system regularly and fix any system failure in time to ensure adequate water supply and quality. CWMS, in collaboration with DARD office of Hoang Su Phi district, will conduct propagandas to raise awareness of local people for water quality protection.

2. Risk of accident during WTP operation process

92. **Impacts:** Chemicals using in the WTP, like chlorine, especially in powder form, could be leaked and impact on the health of operation workers. Other work accident could happen if the worker not to be trained properly and follow the safe working procedures.

93. **Mitigation measures:** The WTP must be equipped with a fire control system and protective gear for workers. Workers should be trained in the principles of safe working, emergency steps and proper handling and storage of chemicals. Among the chemicals, chlorine is the most toxic and therefore requires safe storage and handling. The operating procedures of the plant should include an inspection and maintenance schedule for all chemical storage and treatment equipment. Chlorine containers must be kept in a dry place and stored separately from non-hazardous materials.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. The purpose of information disclosure, consultation and participation

94. Public consultation shall include: the following aspects:

(i) A summary of the proposed works under the subproject;

(ii) A summary of subproject objectives and likely positive and negative environmental impacts, covering the impacts in design, construction and operation phases for engaging stakeholders, including information disclosure and consultation with affected people and other stakeholders;

(iii) Invitation for feedback in respect of any areas of concern that the public may have, and suggested means of implementation; Summarizes comments and concerns received from affected people and other stakeholders and how these comments have been addressed in project design and mitigation measures, with special attention paid to the needs and concerns of vulnerable groups, including women, the poor, and Indigenous Peoples;

(iv) Acceptability of the proposed works to the public; and

(v) Request for information on the known occurrence of unexploded ordinance in the area where the scheme components will be built and facilitating participation of affected people during project implementation.

B. Method of consultation and participation

95. The method of information dissemination and consultation and participation includes the rapid assessment methodology and stakeholder's participation and consultation using the following techniques:

(i) In-depth interview (live-interview): organizing dialogues, meetings and discussions with local authorities, including interview via phone for additional information. At the commune level, the participants are usually deputy chairman and land administrative staff of the CPC.

(ii) Obtaining information on the questionnaire (integrated with the social survey)

(iii) Public consultation meeting at the CPC with the participant of affected households; representatives of commune, district and provincial level.

C. Consultation process

96. The PPTA in collaboration with the local authorities held consultations. These were conducted as part of the baseline survey on local environmental conditions along the pipeline corridor and the location of the WTP.

97. The main content of the consultation meeting was to announce the main information of the Water Supply System for Vinh Quang town and neighboring communes; the adverse environment impacts, proposed mitigation measures to be applied during the construction phase and operation phase. The participants also expressed their views as well as other opinions related to the Subproject and other issues.

D. The result of information disclosure and public consultation

98. In general, there is no arising opposition against the proposed subproject. All the local people have showed their supportive altitude and looking the construction commencement as soon as possible.

99. The public consultation meeting was held in Vinh Quang Town PC's meeting room for people of Vinh Quang town and Tu Nhan commune with the participant of 11 people, of whom 4 are women; and in Ban Nhung CPC's meeting room for people of Ban Nhung commune with the participant of 8 people, of whom 1 is woman. These two meetings are also organized with the participant of local authorities of Vinh Quang Town, Ban Nhung and Tu Nhan communes. The meetings were held in September 23, 2016.

100. IEE, including Environmental Management Plan (EMP) will be translated in Vietnamese and will be made available at the office of the People's Committees (PC) of Vinh Quang town, Tu Nhan and Ban Nhung communes.

VIII. GRIEVANCE REDRESS MECHANISM

A. Purpose of the mechanism

101. 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

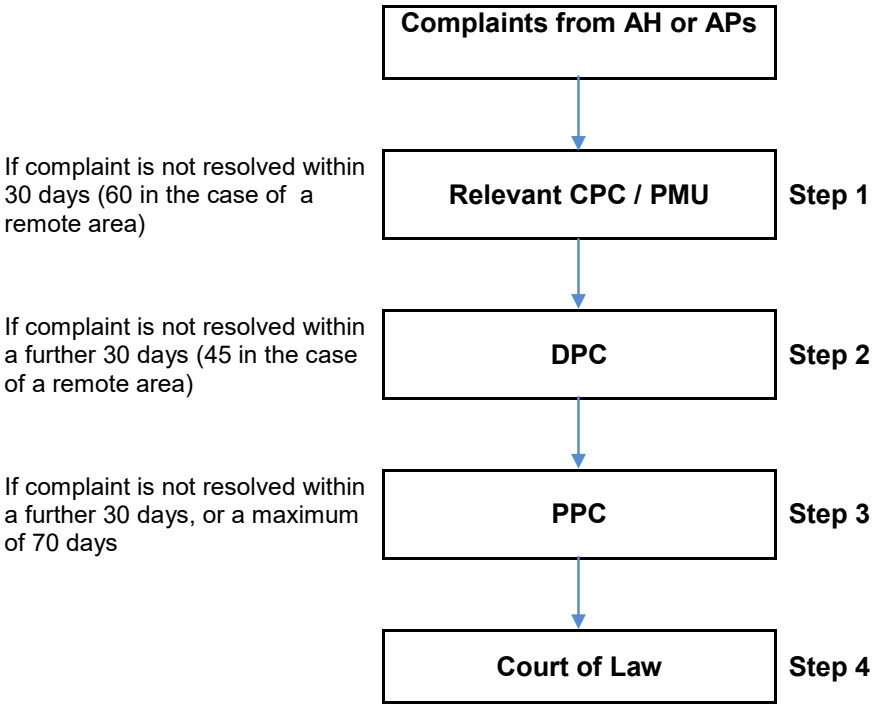
102. There are three steps to address complaints received from stakeholders:

***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.



C. Stake holder communication strategy

103. Messages to be delivered and disclosures to be made to the whole range of stakeholders involved in the subproject are also being made cleared by the PPTA. Details are showed in the Appendix

IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation Arrangement

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

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

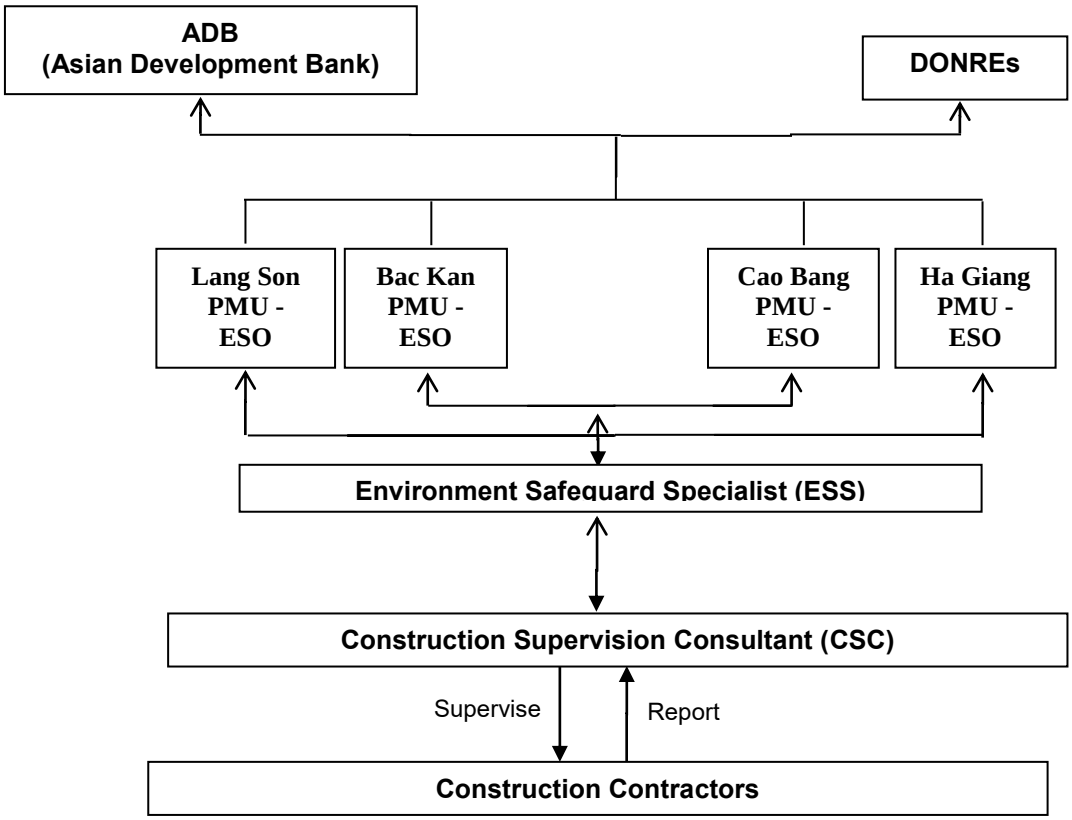
Table 5 – Responsibilities for EMP implementation

Agency	Responsibilities
Ha Giang 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 ESS. - Ensure that Subproject implementation complies with ADB's environmental policy and safeguards policy statement (SPS 2009) principles and requirements - For subproject duration, commit and retain a dedicated staff within PMU as environment and safeguards staff to oversee EMP implementation - Ensure that environmental protection and mitigation measures in the EMP are incorporated in the detailed design. - With the support from ESS, 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 ESS, 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 (ESS)	- 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) - Review the Contractor's method statements on waste management and spoils

Agency	Responsibilities
	disposal to ensure compliance with the EMP - Implement all mitigation and monitoring measures for various subproject phases specified as ESS'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 ESS'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 - 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 - During detailed design phase, prepare method statement (Waste Management and Spoils Disposal Plan) described in the IEE/EMP.
Center for Water Management and Supply (CWMS)	- Responsible for operation and maintenance of subproject assets - Implement EMP monitoring during operation
Ha Giang 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

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

Figure 6*:* EMP Implementation Organization Chart



B. Environment Impact Mitigation

107. The anticipated environmental impacts and mitigation measures discussed in the previous section is presented in Table 6. The table also shows responsibilities and timeframe/schedule for implementation of mitigation measures and monitoring.

108. Table 6 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 operation stage, DARD 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 6 - Detail Environmental Mitigation Plan

Environmental Concern	Objective	Proposed Mitigation Measures	Locations	Timing	Responsible to implement	Budget
Preconstruction Detailed Designs Phase						
1. Land acquisition and resettlement	Control the impact of land acquisition and resettlement	1. Affected persons well informed ahead of project implementation 2. Monitor the compensation process to ensure it is suitable with the Land Acquisition and Resettlement Report	N/A	Before subproject starts	PMU	Included in the operation cost of PMU
2. Slope stability	Minimize the impact on the stability of the slope by access road construction activities	1. Minimize the amount of cutting necessary to form the road in the design 2. Design for retention on the downslope side. 3. Conduct geotechnical assessment and include suitable retention or revetment structures in the design. 4. Conduct hydrological assessment and design of road drains and culverts. 5. Design the re-vegetated with grass and shrub species for cut slopes.	In all subproject area	Before subproject starts	Design consultants	Included in the contract with the consultant
3. Protection of water source	Avoid water source pollution	1. Include a perimeter fence around the water sources in the detailed design	At the water intake area	Before construction start	Design consultants	Included in the contract with the consultant
Construction Phase						
1. Loss of trees and impact to fauna	Avoid and minimize impact to flora and fauna in the subproject area	1. Minimize 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 fuel for the execution of any part of the works and to the extent practicable will ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 4. Contractors will not buy or use wood from the illegal sources (that come from the illegal logging)	At the WTP construction area, along the proposed access road to the WTP	Throug out the construction phase	CPCs, Contractors	Included in the contract with the contractors
2. Generation of surplus soil	Control surplus soils	1. Reuse excavated soil as filling soil to cover the pipe system. 2. Surplus soil will be reused to the extent possible as a base material for the WTP site 3. Further surplus soil will be transferred to a disposal site as agreed with the CSC and local authorities	Throughout construction site	Throughout construction phase	Contractors	Included in the contract with the contractors
3. Generation of construction waste and domestic waste from workers	Control waste disposal	1. Reuse construction waste such as cement bag cover, metal tools where possible. 2. Install rubbish bins at work sites and in worker's camps. 3. Transport the solid waste to a disposal site approved by the CSC.	Throughout construction site and worker camps area	Throughout construction phase	Contractors	Included in the contract with the contractors

Environmental	Objective	Proposed Mitigation Measures	Locations	Timing	Responsible	Budget
4. Dust, noise and vibration	To minimize negative impacts from dust, noise and vibration during construction period	1. Large or noisy machines will not be located near residential area of Ban Nhung, Tu Nhan communes and Vinh Quang town. 2. Work with Ban Nhung, Tu Nhan CPCs, Vinh Quang town PC, ESP and PMU to identify suitable materials transportation route. 3. Spray water regularly to suppress dust generated at the sites and patches near residential areas during the dry period	Along the pipe installation line, WTP and access road construction site, material transportation road	Throughout construction phase	Contractors	Included in the contract with the contractors
5. Traffic management	Minimize disturbance of traffic	1. Inform Ban Nhung, Tu Nhan CPCs, Vinh Quang town PC in advance the construction schedule for distribution pipelines. 2. Coordinate with traffic police of Hoang Su Phi district to implement appropriate traffic diversion schemes (if needed) 3. Setup clear traffic signal boards and traffic advisory signs at the Hoang Su Phi trade center and school areas.	Along the distribution pipelines and materials transportation route, especially area near Hoang Su Phi trade center.	Throughout construction phase	Contractors	Included in the contract with the contractors
6. Safety precautions for workers and public safety	Ensure worker and local people safety	1. Conduct training for workers on safety, including roles and responsibilities, safe site practices and environmental hygiene 2. Institute site and camp rules like wearing protective tools properly. 3. Ensure all excavation sites are fenced and sign boards, perimeter markers installed 4. Liaison with the power company to ensure that qualified technicians are on site to ensure that safety procedures are followed 5. Assign responsibility to supervisor staff to ensure that all safety rules are followed	Throughout the construction site	Throughout the construction phase	Contractors	Included in the contract with the contractors
Operation phase						
1. Water pollution and pipe breakages	Ensure the quality of the water supply	1. Install fences surround the water intake location to avoid cattle trespassing 2. Install warning boards at the intake locations and some main points along the pipeline. 3. Inspect the water intake, pipeline system regularly and fix any system failure in time. 4. Collaborate with DARD office of Hoang Su Phi district to conduct propagandas to raise awareness of local people for water quality protection	Water intake area, along the pipeline	Continuously	CWMS	Included in the operation budget of CWMS

C. Environmental monitoring

109. An environmental monitoring program will be outlined to monitor the environmental impacts arising during project implementation, including:

(i) Monitoring the surrounding environment: only typical pollutants arising from the project construction is required to be monitored in accordance with existing standards and regulations of Vietnam with a frequency of at least once in every 6 months, the supervisory positions will be expressed explicitly in a diagram with annotation and coordinate under current regulations.
(ii) Monitoring will capture impacts identified during contract supervision including erosion impact, sediment, changes of surface water level, groundwater, and impact on the socio-economic objects (if any).
(iii) The monitoring locations will also be shown in a diagram with annotation and coordinate under current regulations.

110. Ha Giang PMU or ESS under Loan Implementation Consultants will implement environmental monitoring program during the construction phase. In the operation phase, CWMS and DARD office in Hoang Su Phi district will implement environmental monitoring program.

Compliance Monitoring

111. Table 7 below shows the program for monitoring the compliance on various provisions of the EMP during 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 7. During operation EMP implementation shall be the responsibility CWMS.

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.

Environmental Effects Monitoring

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

Table 7 - Environmental Compliance Monitoring

Environmental Concern	Parameter to monitor	Location	Frequency & verification	Responsible to monitor	Estimated Cost
Design and Pre-construction Phase					
1. Land acquisition and resettlement	Compensation documents	N/A	Once, before construction start	Ha Giang DPI, DONRE and PMU	Included in the operation budget of Ha Giang PMU
2. Slope stability	Design documents	N/A	Once, before construction start	Ha Giang PMU	Included in the operation budget of Ha Giang PMU
3. Pollution of water source	Perimeter fence in design documents	N/A	Once, before construction start	Ha Giang PMU	Included in the operation budget of Ha Giang PMU
Construction phase					
4. Loss of tree and impact to fauna	Check of implementation	At the WTP construction site, along the access road to the WTP	Before construction commencement and throughout construction phase. Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
5. Waste and surplus soil disposal	Check of implementation	Throughout construction site, designated disposal area	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
6. Dust, noise and vibration	Check of implementation	Throughout construction site	Bi-weekly and spot checks Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC

Environmental Concern	Parameter to	Location	Frequency & verification	Responsible to	Estimated Cost
7. Traffic management	Check of implementation	Throughout construction site, along material transportation route, near Hoang Su Phi trade center in Vinh Quang town	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
8. 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 site	Bi-weekly Part of daily construction supervision	ESS/ PMU CSC	Included in the operation budget of PMU/ ESS/ CSC
Operation of WTPs & Pipeline Network					
9. Water pollution and pipe breakages	Public complaints of operation of WTPs, drinking water availability & quality, and malfunctions with pipelines (e.g., leaks).	On property of WTP, pipelines, and pump stations, water intake location	Continuously	CWMS	Included in the operation budget of CWMS

Table 8 - Environmental Effect Monitoring

Environmental Concern	Parameter to monitor	Location	Frequency & verification	Responsible to monitor	Estimated Cost
Design and Pre-construction Phase					
1. Air quality (dust, CO, NOx, SOx, noise, wind, and vibration levels) to supplement baseline air quality data collected during PPTA and reported in IEE Water quality parameters sampled in Ta Su Choong stream during PPTA & reported in IEE.	Using field and analytical methods described in QCVN and TCVN standards for ambient air and surface water quality sampling & analysis.	Representative sites of heavy civil & earthwork including along truck routes At raw water intake location	One day and one night measurement	ESO	Included in the operation budget of Ha Giang PMU
Construction phase					
A) Air quality: dust, CO, NOx, SOx, noise, wind, and vibration levels B) Surface water quality: TSS, heavy metals (As, Cd, Pb,) oil and grease, total & fecal coliform, pH, DO, COD, BOD_5, temperature, NH_3, and other nutrient forms of N & P. C) Public comments and complaints D) Incidence of worker or public accident or injury	A – B: Using field and analytical methods described in QCVN and TCVN standards for ambient air and surface water quality monitoring. Include visual observations of dust and noise from contractor & public reports. C) Information transferred by telephone hotline number D) Regular reporting by contractors/ Ha Giang PMU	A – B): At the intake water area C): Using hotline number placed at construction areas D): At all construction	(A–B): Quarterly during construction periods (1 time for baseline data and 4 times in 1 year construction) C) Continuous public input D) Continuous	Quarterly	A) &B) (60$ & 500$) per sample times under cost norm of Ha Giang[12] C) & D) With (no extra cost)
Operation of WTPs & Pipeline Network					
Treated water quality: total & fecal coliform, pH, DO, NH_3, NO_3, NO, chlorine, PAC, NaCl, and heavy metals (As, Cd, Pb,).	Using field and analytical methods described in QCVN & TCVN standards for water quality monitoring, and parameters of QCVN 14:2008/BTNMT & TCXDVN 33:2008/BXD. Follow the procedures under Circular No.50/2015/TT-BYT providing for the inspection of drinking water and domestic water's sanitation and quality	At WTP & random user locations along distribution network	Biannually for parameter under B column, or when public complaint arises	CWMS	Included in the operation budget of CWMS

[12] Figures have been estimated base on Ha Giang cost norm.

D. Reporting

114. PMU will submit the following reports to ADB:

(i) ***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.

(ii) ***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 9 – 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	Daily	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 year of operation. On-going frequency to be determined based on review after 1 year.	CWMS	DONRE Office of Hoang Su Phi DPC

Table 10 – Estimated cost for EMP Implementation (1-year construction/ 2-year in total)

Item	Estimated cost (US$)
Staff Costs	
1. Environment Safeguard Specialist (ESS)	***9,568***
1 National ESS - 03 man-months (intermittent in 1 year construction) – 2,000 US$/ man-month	6,000
Per diem for ESS: 48 US$ x 22 days x 3 months	3168
Travelling cost for 2 round trips: 200 US$ x 2 trips	400
EMP Budget	
2. Environmental effects monitoring (implemented by ESS)	***800***
Ambient air quality: 1 monitoring location x 5 times x 60 US$/sample[13]	300
Surface water quality: 1 monitoring location x 5 times x 100 US$/sample[14]	500
3. Training/orientation, local transportation, supplies (by ESS)	***1700***
a) Training/orientation: 1 formal training course for PMU, CSC, Contractors, CWMS and DARD office of Hoang Su Phi district and other "on the job" training	750
b) Local transportation and supplies	950
4. Printing Environmental monitoring report by ESS (2 reports)	***500***
Subtotal (2+3+4)	**3,000**
5. Contingency	**150**
Total (2+3+4+5)	**3,150**

E. Capacity Building

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

116. The most significant challenge is the lack of human and financial resources and necessary infrastructure. To address this constraint, Ha Giang DPI/PMU will designate a fulltime 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

[13] Figures have been estimated base on environmental monitoring cost norm of Ha Giang province.
[14] 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 11 – Detail capacity building program

Objective	1. Build capacity and procedures in undertaking systematic environmental assessments in accordance with Government regulations and ADB guidelines 2. Provide training on international best practice on environmental management, monitoring and reporting. 3. Provide guidance on how to effectively incorporate environmental measures into project design and how to incorporate EMP provisions into tender and contract documents.
Tasks/Scope of Work	1. Undertake training needs analyses and review prevailing government regulations and donor guidelines governing the assessment and management of environmental impacts for road development. 2. Review the skills of PMU and CWMS 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 2 months after construction commencement
Target participant	Staff in PMU and CWMS who responsible for environmental management
Staff resources	National environmental specialist with at least 15 years experience on environmental management water supply subprojects and must possess relevant graduate degrees in civil engineering, environmental management and other relevant courses.

X. CONCLUSIONS AND RECOMMENDATIONS

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

118. The implementation of the subproject “Construction and Expanding Water Supply System of Vinh Quang Town and Tu Nhan, Ban Nhung Communes, Hoang Su Phi District, Ha Giang Province” will improve conditions and enhance water supply services for project beneficiaries especially people in the mountainous areas and the poor people so that they can access the qualified and sanitary water resource for their domestic, production and tourism demand. Several actions are required during the detailed design stage to minimize impacts to acceptable levels. The negative environmental impacts from the upgrading works will mostly take place during the construction stage. All of the impacts during construction phase should be very predictable and manageable and with appropriate mitigation and few residual impacts are likely. Additional human and financial resources will be required to improve environmental capability and to progress and achieve necessary statutory compliance and environmental clearance certification for the subproject or associated activities that also require environmental permits under the environmental laws of Viet Nam – LEP 2014.

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

Overview of water intake area (Pin Ho bridge

Water intake of the existing water supply in Chay River

Grass grow on top of sludge tank as a natural cooling system

Public consultation in Ban Nhung commune

B. Appendix 2: Source of Reference Information

1. *Ha Giang Status of Environmental Report 2015*
2. *Ha Giang Climate Change Adaptation Plan (2011-2020)*
3. *Report on Pollution control under Environmental Protection Plan in 2015 Ha Giang Environmental Agency*
4. *The PO reports of the PPTA for Ha Giang Province*
5. *Social and Resettlement Report of the PPTA*
6. *The subproject Feasibility Study*

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

1. Loss of trees and impact to fauna	1. Minimize 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 fuel for the execution of any part of the works and to the extent practicable will ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 4. Contractors will not buy or use wood from the illegal sources (that come from the illegal logging)
2. Generation of surplus soil	1. Reuse excavated soil as filling soil to cover the pipe system. 2. Surplus soil will be reused to the extent possible as a base material for the WTP site 3. Further surplus soil will be transferred to a disposal site as agreed with the CSC and local authorities
3. Generation of construction waste and domestic waste from workers	1. Reuse construction waste such as cement bag cover, metal tools where possible. 2. Install rubbish bins at work sites and in worker's camps. 3. Transport the solid waste to a disposal site approved by the CSC.
4. Dust, noise and vibration	1. Large or noisy machines will not be located near residential area of Ban Nhung, Tu Nhan communes and Vinh Quang town. 2. Work with Ban Nhung, Tu Nhan CPCs, Vinh Quang town PC, ESP and PMU to identify suitable materials transportation route. 3. Spray water regularly to suppress dust generated at the sites and patches near residential areas during the dry period
5. Traffic management	1. Inform Ban Nhung, Tu Nhan CPCs, Vinh Quang town PC in advance the construction schedule for distribution pipelines. 2. Coordinate with traffic police of Hoang Su Phi district to implement appropriate traffic diversion schemes (if needed) 3. Setup clear traffic signal boards and traffic advisory signs at the Hoang Su Phi trade center and school areas.
6. Safety precautions for workers and public safety	1. Conduct training for workers on safety, including roles and responsibilities, safe site practices and environmental hygiene 2. Institute site and camp rules like wearing protective tools properly. 3. Ensure all excavation sites are fenced and sign boards, perimeter markers installed 4. Liaison with the power company to ensure that qualified technicians are on site to ensure that safety procedures are followed 5. Assign responsibility to supervisor staff to ensure that all safety rules are followed

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

No.	Parameters	Unit	Limit values			
			A		B	
			A1	A2	B1	B2
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

No.	Parameters	Unit	Limit values
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 determining 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

No.	Paramater	Average 1 hour	Average 8 hours	Average 24 hours	Annual average
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: Stakeholder Communication Strategy

Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources
Disseminate information on project design, key impacts anticipated as well as any mitigation measures, to project Aps and beneficiaries	Language/Culture Literacy Managing expectations, including that of free water delivery and compliance with Viet Nam law (full cost recovery) Reach of information, especially in isolated or remote settlements in peri-urban areas and communes Lack of confidence in local authorities	Subproject Aps Community members (men & women in urban/peri-urban/rural communes) Women headed HH Poor HH	Subproject design, key benefits (including those of treated water supply), implementation arrangements and schedule of civil works Opportunities for temporary employment as construction workers, community mobilizes or IEC campaign facilitators Main impacts of subproject (positive and negative) through disclosure Planned mitigation measures, especially for female APs (including compensation rates, entitlements, grievance redress mechanism) View water as a commercial good and stress the importance of user cost recovery, including for poor HHs Targeted subsidies, including free connections and lifeline tariffs	Public information meetings Resettlement committee meetings in affected areas Printed information in local language(s) posted in accessible public areas Gender-sensitive IEC campaign, including community-level training and public media campaign Meetings, consultations and other interactions between PMUs/WSCs and CSBs in the subproject area's service zones	Ongoing prior to implementation of activities Early in each phase of subproject preparation Subproject detailed design Ongoing during civil works Post evaluation after project completion	Primary: PMUs WSCs Contractors/ subcontractors for civil works Local authorities at commune-, ward-, city- and district-level (CPCs, WPCs, CPCs and DPCs) VWU Community Health Centers (CHCs) Secondary: PPCs DPI DOLISA	Costs will be covered in part by the RPs, GAPs as well as basic project implementation budgets under PMU Incremental Cost and Construction Supervision Contract Resettlement Specialist WSC/PMU Social Development & Safeguards Specialists Compensation and Resettlement Committees (CRCs) Community Supervision Boards (CSBs) Community health workers (under respective DOHs)

Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources
			included in tariff by law to poor and women-headed households.				
Deliver information on labor opportunities and good labor practices	Language/Culture Literacy and low levels of awareness	Community members as well as outsiders hired as semi-skilled and skilled construction workers, community mobilizers and IEC campaign facilitators in subproject areas Contractors/ subcontractors for civil works	Opportunities for appropriate skills training/upgrading during period of hire, with quotas reserved for women (GAP) Core labor standards, including no forced labor and child labor Gender parity in work related compensation, i.e., equal pay for equal work, for women and men, and the right to separate living & toilet facilities at work sites Schedule of civil works Labor safety regulations Risks and prevention of HIV/AIDS transmission and Human Trafficking	Public information meetings Printed information in local language(s) and language(s) of migrant workers (on pamphlets and billboards), posted in accessible public areas, especially at or near construction sites IEC campaign for HIV/AIDs and Human Trafficking, including community-level training and public media campaign	Early in each phase of sub project preparation Ongoing during civil works and conduct of IEC campaigns	Primary: PMUs WSCs Local authorities at commune-, ward-, city- and district-level VWU CHCs Secondary: PPCs DOLISA	Costs will be covered in part by the GAPs as well as basic project implementation budgets under PMU Incremental Cost and Construction Supervision Contract PMU Social Development & Safeguards Specialists CSBs Community health workers Health NGOs
Highlight responsibility of provincial government agencies in enabling access of disadvantaged groups to	Lack of political willingness to implement decrees and decisions Provincial budget constraints	PPCs DOLISA PCs at other administrative levels in provinces, i.e., local authorities	Basic project design, anticipated impacts and any planned mitigation and grievance redress measures as they apply to APs, beneficiary groups and workers in the province	WSC meetings with relevant local authorities and government agencies authorities, attended by VWU officials at the appropriate level	From outsets of the project	MPI (as CA) WSCs VWUs at all levels	Costs will be covered by the GAP and basic project implementation budgets under PMU Incremental Cost and

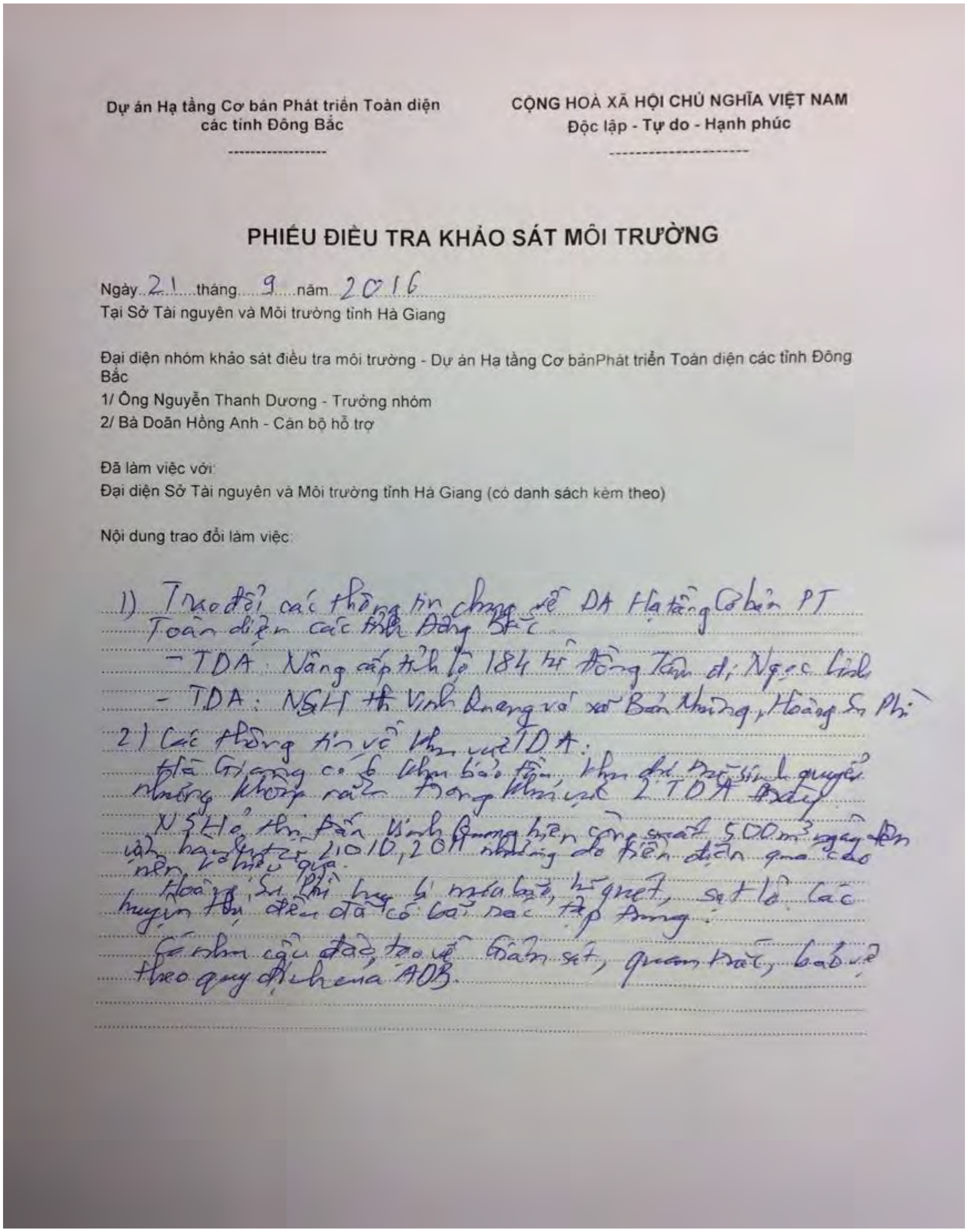
Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources
municipal water supply			State support for water related subsidies to poor and women headed HHs, and other vulnerable groups (including EMs, disabled, etc.), in accordance with Decrees 117 & 124				Construction Supervision Contract WSC management PMU Director PMU Social Development & Safeguards Specialists
Inform Provincial VWUs about project design and entry points for their participation – community mobilization, IEC, and ensuring women's access to all project benefits	Lack of sectoral capacity Relative lack of resources and decision making authority compared to other departments and agencies, including WSCs	Vietnam Women's Union (VWU)	Basic project design and anticipated impacts, as they matter to women Disseminate information on improved HH water management, sanitation and hygiene to communities in collaboration with Community Health Centers.	Public information meetings IEC campaign (including materials) to raise awareness on links between gender and WASH issues Training materials integrating gender	From outsets of the project	VWU WSCs Local authorities at commune-, ward-, city- and district-level CHCs	Costs will be covered by the GAP budget PMU Director PMU Social Development & Safeguards Specialists CSBs Community health workers
Inform network of Community Health Centers in project areas about project design and the role they are expected to play in disseminating information on improved WASH as well	Relative lack of resources and decision making authority compared to other departments and agencies, including WSCs	Community Health Centers (and community health workers), Department of Health	Disseminate information on health benefits of improved water supply, sanitation and hygiene to communities in collaboration with VWC Design and propagate training module about HIV/AIDS	Public information meetings, IEC sanitation and hygiene awareness materials, including community based training and public media campaign HIV/AIDS training module	Early in each phase of sub project preparation Ongoing during civil works and conduct of IEC campaigns	VWU PMUs WSCs Local authorities at commune-, ward-, city- and district-level CHCs	Costs will be covered by the project implementation budget (social development) PMU Social Development & Safeguards Specialists CSBs Community health workers

Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources
as HIV/AIDS causes & prevention							
Promote community involvement in resettlement and project monitoring	Identifying valid community representatives Newly formed, slow to build up capacity required Functions vaguely defined	Community Supervision Boards (CSBs) Compensation and Resettlement Committees (CRCs)	Information on resettlement areas, affected households, resettlement plan and compensation policies Core labor standards integrating gender concerns and labor safety regulations Special consideration of community members from poor and/or women-headed HHs in all aspects of the project Risks and prevention of HIV/AIDS transmission and Human Trafficking	Meetings between WSCs/PMUs and CSBs and CRCs Public information meetings presided over by CSBs or CRCs Direct interactions between affected HHs and CSBs or CRCs Printed information in local language(s) posted in accessible public areas Gender-sensitive IEC campaign, including community-level training and public media campaign	Early in each phase of sub project preparation Ongoing during civil works and conduct of IEC campaigns	VWU PMUs WSCs Local authorities at commune-, ward-, city- and district-level	Costs will be covered by the GAPs and basic project implementation (social development component) budgets PMU Social Development & Safeguards Specialists CSBs Community health Workers
Ensure understanding of HIV/AIDS transmission and Human Trafficking risks, and prevention measures for both	Language/Culture Literacy and low levels of awareness	Communities in or near project area construction sites Workers on construction site	Key risks and mitigation measures of HIV/AIDS transmission and Human Trafficking	Public information meetings Printed information in local language(s) and language(s) of migrant workers (on pamphlets and billboards), posted in accessible public areas, especially at or near construction sites IEC campaign for HIV/AIDs and Human Trafficking, including community-level training and public media campaign	Prior to commencement of civil works and throughout civil works	PMUs VWU CHCs Civil works contractors/ subcontractors	Costs will be covered in part by the GAPs as well as basic project implementation budgets PMU Social Development & Safeguards Specialists CSBs Community health workers Local NGOs

Objective	Key Risks Challenges	Stakeholder Group	Messages	Means of Communication	Timeline	Responsibility	Resources
							with a health focus
Strengthen business processes and institutions, integrating gender issues	Inertia to change; tendency to maintain institutional and socioeconomic status quo	All WSC and PMU staff, especially women in executive and non-executive positions VWU members at all levels within the province	Reasons why profit generation, user cost recovery and tariff roadmap are core principles of business viability Negotiate sharing of capital costs and underwriting of any subsidies to consumers with state agencies (PCs and DOLISA) Opportunities for training, exposure visits, with quotas reserved for female staff and VWU members to learn more about the sector Gender parity in work related compensation, i.e., equal pay for equal work, for women and men in WSCs	Resettlement committee meetings and/or meetings with affected households, Printed information in local language posted in accessible public areas Training workshops and exposure visits to raise awareness about benefits of community participation in all aspects of project planning, implementation, and M&E Financial and technical training workshops Training materials to promote gender sensitivity Routine consultation with VWUs on gender-related matters relevant to project outputs Routine consultations between WSC management and women employees, in executive and non-executive positions, about professional issues that matter to them	From outset of each subproject Ongoing prior to implementation of activities Early in each phase of subproject preparation At project detailed design Ongoing during civil works	Water Supply Companies (WSCs) as independent commercial & legal entities MPI PPCs PMUs VWUs	Costs will be covered in part by the GAPs and project implementation budgets PMU Director PMU Social Development & Safeguards Specialists Staff welfare committees of WSCs

Key: ADB - Asian Development Bank; PMU –Projects Management Board; APs – Affected Persons; CSB – Community Supervision Board; CPC – Commune Peoples Committee; CWU – Commune Women's Union; DARD – Department of Agriculture & Rural Development; DOC – Department of Construction; DONRE – Department of Natural Resources & Environment; DOT – Department of Transport; DPI – Department of Plan and Investment DRCs – District Resettlement Committees; GAP – Gender Action Plan; IAs – Implementing Agencies; IPP – Indigenous Peoples Plan; PP – Project Proposal; O & M – Operation & Maintenance; PPC – Provincial peoples Committee; of RIs –Rural Infrastructure; RP – Resettlement Plan; VWU – Vietnam Women's Union;

F. Appendix 6: Meeting minute and Public Consultation Meeting 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 21 tháng 9 năm 2016
Tại Sở Tài nguyên và Môi trường tỉnh Hà Giang

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/ Bà Doãn Hồng Anh - Cán bộ hỗ trợ

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

Nội dung trao đổi làm việc:

1) Trao đổi các thông tin chung về DA Hạ tầng Cơ bản PT Toàn diện các tỉnh Đông Bắc
- TDA: Nâng cấp tỉnh lộ 184 từ Đồng Tâm đi Ngọc Linh
- TDA: NSH thị trấn Vinh Quang và xã Bản Nhùng, Hoàng Su Phì
2) Các thông tin về khu vực TDA:
Hà Giang có 6 khu bảo tồn, khu dự trữ sinh quyển nhưng không nằm trong khu vực 2 TDA [illegible]
NSH thị trấn Vinh Quang hiện công suất 500 m^3/ngày đêm vận hành từ 2010, 2011 nhưng do tiền điện quá cao nên vô hiệu quả.
Hoàng Su Phì hay bị mưa bão, lũ quét, sạt lở. Các huyện thị đều đã có bãi rác tập trung.
Có nhu cầu đào tạo về giám sát, quan trắc, bảo vệ theo quy định của ADB.

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 21 tháng 9 năm 2016

Tại Nông nghiệp và Phát triển Nông thôn tỉnh Hà Giang

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

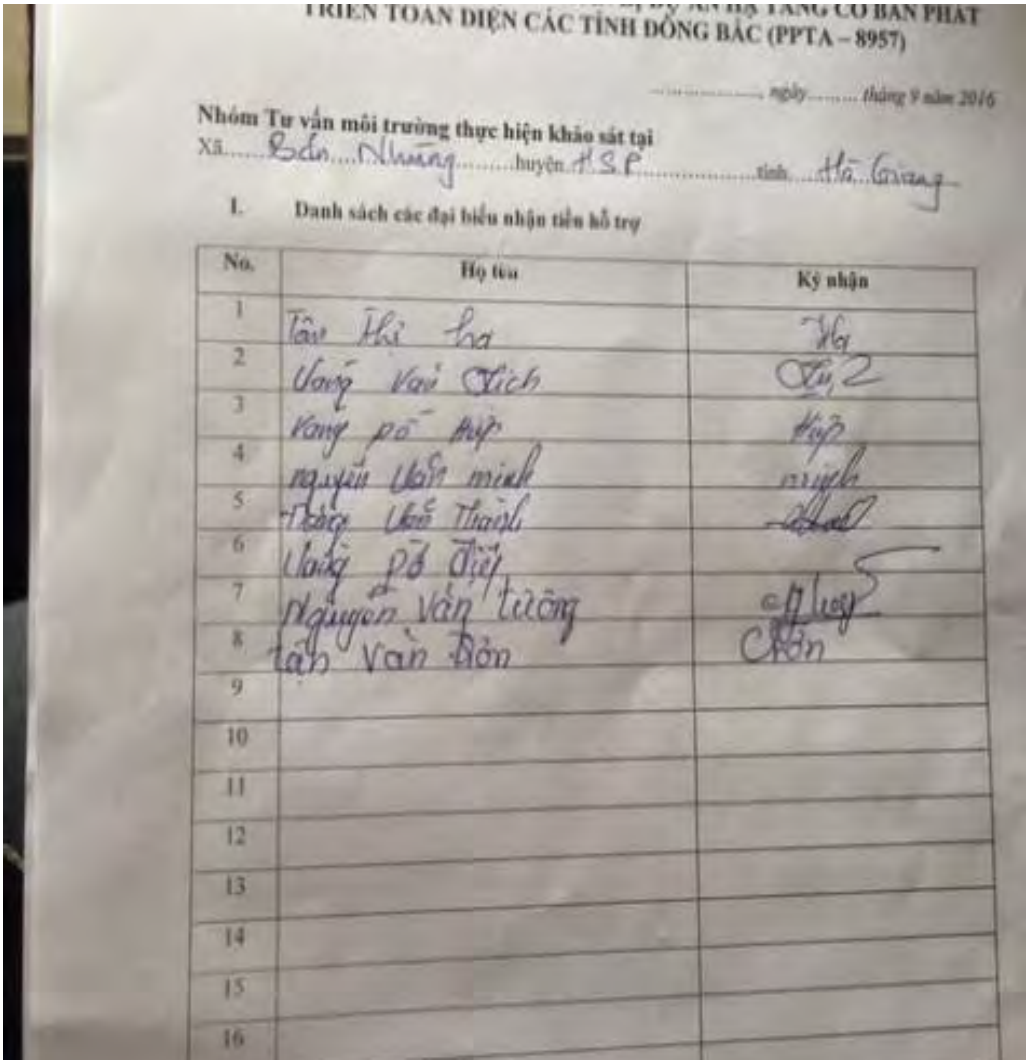
2/ Bà Doãn Hồng Anh - Cán bộ hỗ trợ

Đã làm việc với:

Đại diện Sở Nông nghiệp và Phát triển Nông thôn tỉnh Hà Giang (có danh sách kèm theo)

Nội dung trao đổi làm việc:

1) Trao đổi thông tin chung về DA BIIG và 2 TDA
2) Các thông tin về khu vực TDA
- Cả 3 huyện Bắc Quang, Vị Xuyên và Hoàng Su Phì đều ko có diện tích rừng đặc dụng.
Hiện Hà Giang chưa giao rừng cho dân. Rừng sx giao cho các cơ quan như tổ chức nhà nước như UBND xã
Rừng phòng hộ giao cho BQL Bảo vệ PT rừng.
BQL BVPT rừng huyện Vị Xuyên
BQL BVPT rừng huyện Bắc Quang (Ban 611)
Ở Vị Xuyên trên danh nghĩa rừng do UBND xã q/lý nhưng trên thực tế ng dân đang sử dụng.
Kiến nghị: Ngành NN ủng hộ. Cần khảo sát bồi thường thỏa đáng diện tích đất NN của dân bị a/h.
- Tả Sử Choóng có các ctrình thủy lợi nhỏ tưới diện tích 10-15 ha. Xem chắn dòng suối có a/h đến các ctrình này không.



TRIỂN TOÀN DIỆN CÁC TỈNH ĐÔNG BẮC (PPTA – 8957)

..... ngày ..... tháng 9 năm 2016

Nhóm Tư vấn môi trường thực hiện khảo sát tại
Xã Bản Nhùng huyện H.S.P tỉnh Hà Giang

I. Danh sách các đại biểu nhận tiền hỗ trợ

No.	Họ tên	Ký nhận
1	Tẩu Thị Ba	Ba
2	Vàng Văn Tích	Tích
3	Vàng Pó Páp	Páp
4	Nguyễn Văn Minh	Minh
5	Vàng Văn Thành	Thành
6	Vàng Pó Diệp	
7	Nguyễn Văn Tường	Tường
8	Lâm Văn Đôn	Đôn
9		
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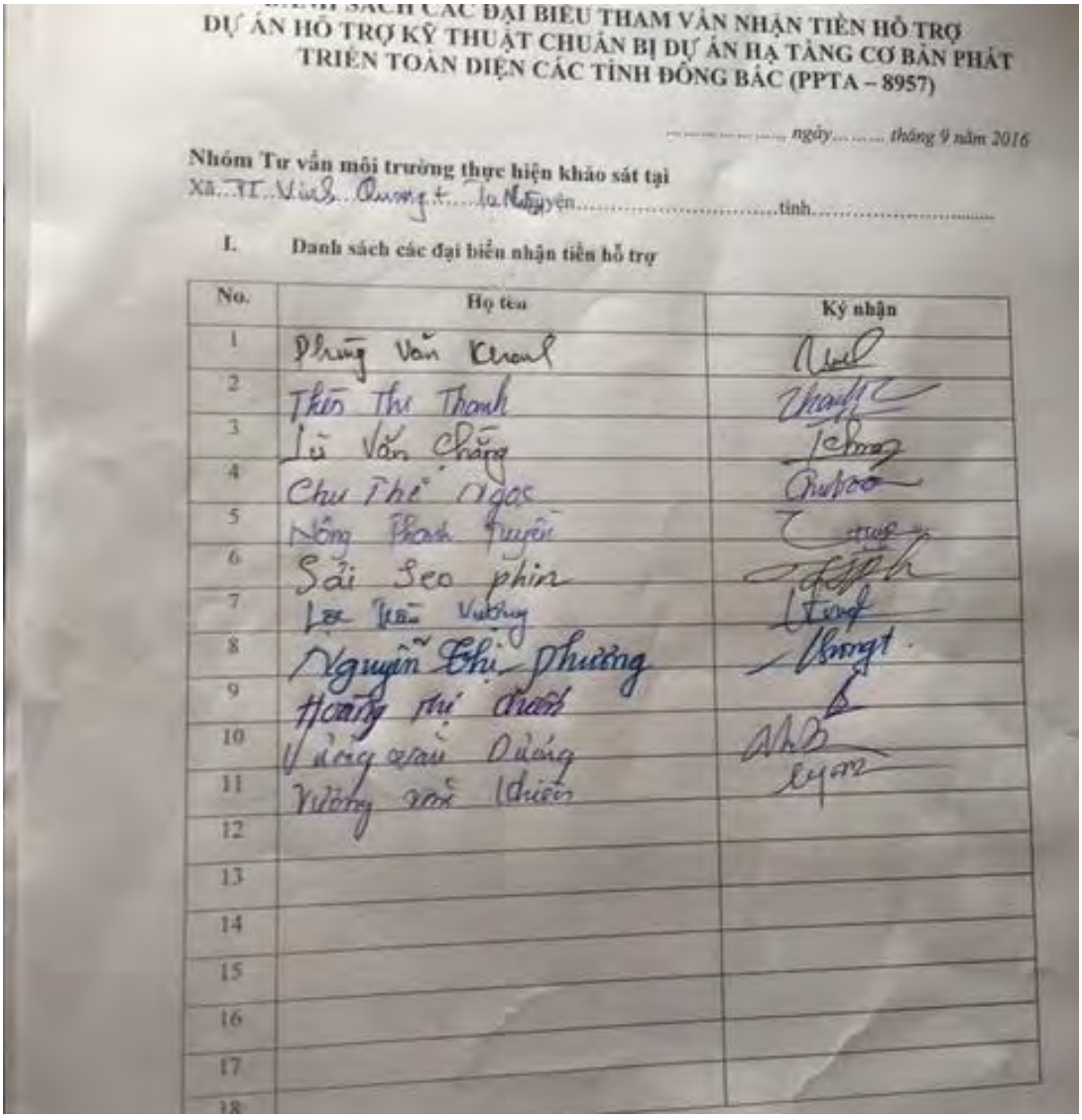
15		
16		



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)

..... ngày..... tháng 9 năm 2016

Nhóm Tư vấn môi trường thực hiện khảo sát tại
Xã..... Huyện..... tỉnh.....

I. Danh sách các đại biểu nhận tiền hỗ trợ

No.	Họ tên	Ký nhận
1	Phùng Văn Khanh	
2	Thèn Thị Thanh	
3	Lù Văn Chăng	
4	Chu Thế Ngọc	
5	Nông Thanh Tuyền	
6	Sải Seo phìn	
7	Lò Thị Vương	
8	Nguyễn Thị Phương	
9	Hoàng Thị Chiết	
10	Vàng Seo Dủng	
11	Vương Văn Chiến	
12		
13		
14		
15		
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17		
18		

DANH SÁCH CÁN BỘ LÀM VIỆC VỚI NHÓM

TƯ VẤN MÔI TRƯỜNG

22.09.2016

STT	Họ tên	Chức vụ	Số điện thoại
1.	Phạm Kim Sơn	P. CT UBND xã Trung Thành	0945561616
2	Trần Thị Linh	phòng Tài nguyên & MT	0972193748
3	Đặng Ngọc Tuyến	phó CT UBND xã Ngọc Linh	0968661970
4.	Lê Bích phương	CB Địa chính N.Linh	0986 89528
5.	Bàn Văn Bình	CT UBND xã Đồng Tâm CBộ địa chính xã Đồng Tâm	0942 3505 0918225980
6.	Trần Thị Thảo	Nhân viên Phòng TN & MT	0973031299
7	Bế Thị Thanh Nga	Cán bộ Phòng Kinh tế Hạ tầng	0983645786
8	Hoàng Ngọc Thiện	CT UBND Bản Nhùng	0965729789
9.	Nguyễn Quang Vinh	CB: Ban QL DAĐTXD Huyện	0912109 79
10	Âu Văn Nhâm	PCT UBND xã Sủ Phìn Tả Nhìu	01649019 99
11	Nguyễn Mạnh Duy	PCT UBND thị trấn	0974 5869
12	Trần Việt Phong		

Initial Environmental Examination

Stage of the document: Final
Project number: 49026-002
April 2017

Viet Nam: Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project

Construction of Infrastructure for Agricultural and Rural Value Chains in Van Quan District, Lang Son Province

Prepared by Planning and Investment Department of Lang Son province for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 27 April 2017)

Currency unit	–	Viet Nam Dong (D)
D1.00	=	$0.000044
$1.00	=	Đ 22,730

ABBREVIATIONS

ADB	–	Asian Development Bank
ARVCs	–	Agricultural and Rural Value Chains
CPC	–	Commune People's Committee
DARD	–	Department of Agriculture and Rural Development
DONRE	–	Department of Natural Resources and Environment
DPC	–	District People's Committee
EMP	–	Environmental Management Plan
HortLangSon	–	Horticultural Sector Industry Organization
IEE	–	Initial Environmental Examination
MONRE	–	Ministry of Natural Resources and Environment
MPI	–	Ministry of Planning and Investment
PMU	–	Project Management Unit
PPC	–	Provincial People's Committee
PPE	–	Personal Protective Equipment
PPTA	–	Project Preparatory Technical Assistance
SPS	–	Safeguard Policy Statement
SST	–	Subproject Support Teams
The PPTA	–	The Project Preparatory Technical Assistance Consultants
The Project	–	Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project

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

A. Objectives

1. The proposed Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project (BIIG 1) will include support to improved agricultural and rural value chains (ARVCs) among investments to support transport and water resource management infrastructure. The subproject comprises the support to ARVCs in Lang Son province, complementing existing support projects to ARVCs.

2. The subproject is initially categorized as B for environmental safeguards, according to the ADB system as specified in the 2009 Safeguards Policy Statement (SPS). This IEE is prepared as required for category B projects.

B. Policy and Legal Framework

3. The subproject shall comply with requirements of ADB SPS 2009 and the GOV's Guidelines on Implementation of Law on Environmental Protection 2014, both of which are detailed in the IEE.

C. Description of the Subproject

4. The subproject is designed to strengthen co-ordination of agricultural industries in Lang Son, assist with strategic planning to overcome constraints of small product industry size and develop competitive export produce value chains. The expected outcome is improved horticultural sector economic performance through a coordinated industry led business and market focused strategy for sector growth and development that features market driven product value chains aimed at added value "export" markets. It has the following outputs:

(i) **Horticultural Industry Organization Developmen**t: to support development of a horticultural sector industry body in the province

(ii) **Star Anise Value Chain Development**: to consist of a set of activities that will coordinate star anise export orientated product development through the product group and value chain development. Output 2 will support the construction of small buildings for production and processing such as greenhouses and shade houses, tanks and pipe systems for drip irrigation, pulley systems for conveyance of produce growing on slopes to collection points, and feeder roads (of maximum 1.5m width) on primarily flat land connecting connection points to local roads. A combination of these will be included for each production group supported, of which there will be a maximum of 20, and the value of such improvements will be in the order of $10,000 to $20,000, to fit within a budget ceiling of $55,000 per group, which will also be used for organizational support and training.

(iii) **Safe Vegetable Value Chain Development**: this will be based upon intensifying district vegetable production farming systems that are currently producing for local markets. The Project will connect the farmers with safe vegetable markets in Lang Son city and in Hanoi. Vegetable farmer groups will be formed, and will consist of farmers who are experienced winter season vegetable producers. There will be an investment package with an upper limit of $40,000. Output 3, similar to output 2, will support the construction of small buildings for production and processing such as greenhouses and

shade houses, tanks and pipe systems for drip irrigation, and possibly pulley systems for conveyance of produce. Feeder roads (of maximum 1.5m width) may also be supported which will also be on primarily flat land connecting connection points to local roads. A combination of these items will be included for each production group supported, of which there will be a maximum of 30, and the value of such improvements will be in the order of $10,000 to $20,000, to fit within a budget ceiling of $40,000 per group, which will also be used for organizational support and training.

(iv) **Support to Other Product Value Chains:** To commence in the third year of subproject implementation, support for other value chains will be dependent on decisions of HortLangSon, with the input of sector product groups as to which value chains to assist. Activities will be preparation of Preparation of plans for product value chain development; implementation of product value chain development plans; establishment of farmer groups and assistance with their operations, including technical market assistance and assistance to farmer groups with production and marketing advice.

5. Planning and organizational support activities will be directed province wide, with pilot activities for the various outputs in Van Quan district, including the communes of Yen Phuc, Binh Phuc and Tu Xuyen.

6. The total budget for each of the four outputs is **$14,958,000**.

D. Description of the Environment

1. Physical Environment

7. Lang Son has a complex topography including a high mountain area; a low mountain area; a limestone mountain area; and cultivated valleys. The subproject is located in Van Quan district, has an average elevation of about 400m above sea level and features small valleys that lie in Southwest - Northeast direction. Soils in the project area are predominantly ferralitic soils.

8. The climate is classified as warm temperate, with wet winters and hot summers. Total is around 1,500mm and temperatures average 21.2^{o}C over the year, with lowest temperatures of around 13.8^{o}C occurring in January, and reaching 27.1^{o}C in July.

9. The province a dense river and stream network, and some 271 reservoirs and 639 rolling weirs. Surface water quality is monitored in the province, including two monitoring stations are in Van Quan district. Groundwater in the region occurs in fissures in limestone rock, and in sandstone and clay stone deposits but yields are minor and difficult to assess or predict.

10. In comparison to QCVN standards, the parameters of air quality and noise in Lang Son province and in particular Van Quan district are within the allowable levels.

2. Biological Environment

11. Forests covered 48% of the total area of the province in 2010, of which 55% was natural forest, and the balance being plantation forest, following a trend of increasing forest cover attributable to plantations. Agricultural land occupies a smaller proportion of the land area, around 4%, largely due to the steep terrain.

3. Socio-Economic Conditions and Infrastructure

12. The total population in the three target communes is 6,517 people in 1,476 households, in 23 villages. Ethnic minorities account for 99.25% total population in the project area, primarily the Tay ethnic group (28.6%), Nung (55.3%) and Dao (15.3%). All three communes are primarily poor under according to the government classification P135. Agriculture remains dominant economic activity in the district. The main agricultural crops in the district are rice, maize, cassava, soybean, groundnut and cash crops such as tobacco, sugarcane and star anise. Livestock rearing and poultry raising are important.

13. Each commune has a healthcare station with one doctor and four nurses and midwives, one kindergarten, one primary school and one secondary school. The proportion of households with access to mains electricity varies from 57% in Quy Hoa commune, to 76% in Hoa Tham commune and 95.46% in Vinh Yen commune.

14. Access to schools is high, around 4% have never been to school, the figure is higher among the Dao ethnic group (11%) and the poor (8.75%). Education levels are highest amongst the Tay people, the majority of whom have completed high school education.

15. Common to much of Northern Viet Nam, unexploded ordinance remaining from the conflict that took place in the region between 1962 and 1976, and also longer border conflicts into the 1980s may be present in some areas, which can be encountered when ploughing fields, searching for scrap metal and similar activities.

16. There is no archaeological significance in Van Quan district.

E. Anticipated Environmental Impacts and Mitigation Measures

1. Impacts related to Support to Sector Planning and Organization

17. Support to HortLangSon is to be broad, helping to overcome constraints of small product group size to develop competitive export value chains. Secondary impacts associated with increased production and processing are, those associated with (i) the use of inputs such as pesticides and fertilizers, (ii) crop water requirements and (iii) the need for facilities and inputs for processing including extraction, drying and packaging.

2. Support for infrastructure

18. Infrastructure that may be supported by contestable funding includes trickle feed irrigation equipment, installation of water tanks, shading and greenhouses, and feeder road improvements. A pre-requisite for funding of these is submission of a competent business development plan. Water tanks, shade houses and greenhouses will entail only minor impacts, and not more than one of each will be built per production group. Impacts associated with the construction of these buildings will be mitigated by preparing environmental management requirements to be included in bid documents for construction contracts.

19. Feeder roads will be constructed from produce collection points to local roads, along primarily flat or undulating terrain and will be up to 1.5m in length. Potential impacts will be addressed in design and in the preparation of an environmental management plan for each subproject guiding subproject planning, design and construction and detailing mitigation.

20. Other items of infrastructure may include pulley systems, and pack houses. Safety of pulley systems is potentially and mitigation will include adherence to high specifications during construction, making funding conditional on user commitment for upkeep and training in safe operation and maintenance.

21. Further, unspecified initiatives may be supported with the use of contestable funds, the precise scope of which will not be known until applications are received. Impacts will generally be minor (small quantities of spoil generation; impacts associated with sourcing of materials; site clearance) and an environmental statement will be prepared prior to approval of funding demonstrating that there will either be no significant impacts or that these will be mitigated. Impacts on biodiversity will be avoided by the exclusion of subprojects that involve or may involve: (i) clearance of previously undisturbed forest and (ii) possible encouraging of illegal logging or other illegal activity. In addition, applications should include a statement indicating that environmental impacts have been considered, and information on how these will be avoided or mitigated.

F. Information Disclosure, Consultation and Participation

22. Stakeholders include Lang Son DPI; Van Quan DPC; DONRE and DARD offices of Van Quan district; Tu Xuyen, Yen Phuc and Binh Phuc CPCs; and local people who cultivate star anise in Yen Phuc, Binh Phuc communes and vegetable in Tu Xuyen commune. Consultations took place in 12 December 2017.

23. The information disseminated during public consultation included: (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. Stakeholders are support the implementation of the subproject.

G. Grievance Redress Mechanism

24. A three - stage grievance redress mechanism has been developed for the project as a whole, providing for resolution of any complaints at the commune level in the first instance, the district level at the next stage and the provincial level, coordinated by the Department of Natural Resources and Environment (DONRE).

H. Environmental Management Plan

25. An environmental management plan has been prepared for the subproject detailing mitigation and management measures and responsibility for implementation. Environmental measures relate to the use of agrochemicals and impacts associated with track improvements to facilitate motorcycle access, small scale irrigation and buildings as may be required for processing and cultivation. Such impacts are generally limited by the small scale of each investment, which relate to growing operations of around one to two hectares and would be assessed on a case by case basis. Environmental compliance monitoring is carried out to test the compliance with operating procedures, technical standards and/or contractor specifications in the EMP.

I. Conclusions and Recommendations

26. The assessment finds that no further or additional impact assessment is considered necessary at this stage and the subproject is category B.

II. BACKGROUND

A. Objectives of the Project

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

27. The proposed Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project (BIIG 1) will invest in the recently completed Four Northeastern Provinces (FNEP) Overall Development Plan (2015). The development plan responds to the Government of Vietnam's strategy of targeting the investment into poorer provinces and regions. The use of a sub-regional approach seeks to build the interrelationship between provinces as one of the foundations for accelerating growth in the more remote regions. As such the plan targets investment into outputs that build areas of comparative advantage in a manner that increases the competitiveness of economic activity in the sub-region. The expected impact is to improve socio-economic wellbeing of local communities through the improved financial returns and through lower costs of accessing public health services, education, water supply and markets.

28. The project has four outputs being (i) improved FNEP road network connectivity, (ii) improved rural water supply, (iii) improved ARVCs in Lang Son and (iv) strengthened FNEP regional investment planning and development management.

29. 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 area; (ii) identify potential environmental impacts from the proposed improvement works; (iii) evaluate and determine the significance of the impacts; (iv) develop an environmental management plan (EMP) detailing mitigation measures, monitoring activities, reporting requirements, institutional responsibilities and cost estimates to address adverse environmental impacts; and (v) carryout public consultations to document any issues/ concerns that stakeholders may have on the subproject and to ensure that such concerns are addressed in the subproject design and mitigation measures.

III. POLICY AND LEGAL FRAMEWORK

30. The subproject shall comply with requirements of ADB SPS 2009 and the GOV’s Guidelines on Implementation of Law on Environmental Protection 2014. Decree No. 18/2015/ND-CP has detailed information on environmental protection assessment, environmental impact assessment and environmental protection plans.

A. Asian Development Bank requirements

31. 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:

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

32. For environmental safeguards, the Subproject is initially categorized as 'B'. A subproject that is classified as category A on environmental safeguards would be ineligible as a BIIG 1 subproject.

B. Legal and Administrative Framework for Environmental Protection in Vietnam

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

1. Laws

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

2. 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

34. The subproject is designed to strengthen co-ordination of agricultural industries in Lang Son, assist with strategic planning to overcome constraints of small product industry size and develop competitive export produce value chains. The expected outcome is improved horticultural sector economic performance through a coordinated industry led business and market focused strategy for sector growth and development that features market driven product value chains aimed at added value "export" markets, prioritises quality assurance, achieves strong business relationships between value chain actors, and where income for all actors, including farmers, is increased.

35. The subproject's proposed investment will address the need for coordinating the small, fragmented and disjointed structure of the existing horticulture sector and the associated market failure, primarily through support to the functioning of the Horticultural Sector Industry Organization (which has the working title HortLangSon). There will be three outputs, Horticultural Industry Organization Development; Star Anise Value Chain Development, Safe Vegetable Value Chain Development and support to other product value chains. The outputs and their component activities are as follows:

A. Outputs

1. Horticultural Industry Organization Development

36. This output will support development of a horticultural sector industry body mandated for coordinated strategic sector planning and oversight, enhanced quality control standards, trade relationships and compliance, and representing the product members. Activities will be:

(i) Establishment and operational support to (HortLangSon)
(ii) Appointment of a Service Provide for HortLangSon
(iii) Preparation of a horticulture sector strategic and market plan
(iv) Establishment of a contestable funding mechanism
(v) Provision of trade, markets and quality information and support for HortLangSon members
(vi) Establishment of quality assurance systems
(vii) Formation and operational support to product groups
(viii) Sector outreach and education
(ix) Design and implementation of a system to monitor and assess sector performance

37. The industry level support will operate at two levels. One at the sector level involving marketing, quality assurance systems, and logistics. Secondly support will be provided for post-harvest value chain infrastructure that may include cross commodity facilities such as logistics and distribution based on the finding of market and sector assessments conducted during implementation

38. At the producer level of the value chain the project will support first step value additions this may include the construction of small scale production and processing facilities for drying, storing and aggregation of output. Within the production systems member of producer groups with market linkages can access resources to finance greenhouses and shade houses, tanks and pipe systems for drip /spray irrigation, pulley systems for conveyance of produce growing on slopes to collection points, and feeder roads (of maximum 1.5m width) on primarily flat land

connecting connection points to local roads. A combination of these will be included for each production group supported for up to 80 producer groups depending on feasibility and market assessments and to fit within a budget ceiling of $55,000 per group, which will also be used for organizational support and training.

2. Representative Long Value Chain - Star Anise Value Chain Development

39. The output will consist of the activities that will coordinate star anise export orientated product development through producer groups and value chain development.

(i) Preparation of a plan for star anise value chain development
(ii) Implement of the star anise value chain development plan
(iii) Assistance to farmer group formation and operations
(iv) Farmer groups assisted with production and marketing advice
(v) Producer groups will receive support for infrastructure including feeder roads, harvesting equipment and first step storage grading and drying

3. Safe Vegetable Value Chain Development

40. Support to vegetable value chains will be based upon intensifying district vegetable production farming systems that are currently producing for local markets. The Project will connect the farmers with safe vegetable markets in Lang Son city and in Hanoi. Vegetable farmer groups will be formed, and will consist of farmers who are experienced winter season vegetable producers. There will be an investment package with an upper limit of $40,000. Some flexibility is needed with investment activities in the package as the conditions in the various commune production sites will vary. Investments items in the package may include: (i) group formation and legal costs (ii) trickle feed irrigation equipment and water tank; (iii) shade (green) houses, (iv)feeder roads to improve access to production areas and land levelling - if required; (v) working capital for vegetable inputs and then used as revolving fund; and (vi) contracted technical and business advice. The irrigation equipment and shade houses must be shared on a group basis. The Project will not fund any investment in upgrading of the commune's irrigation canals. The final mix of investment items will be decided by the group and presented in their business plan. Activities will be:

(i) Preparation of a plan for vegetable value chain development (based on satisfactory market assessment)
(ii) Implementation of the vegetable value chain development plan
(iii) Establishment of farmer groups and assist their operations, and technical market assistance
(iv) Assistance to farmer groups with production and marketing advice

4. Support to Other Product Value Chains

41. To commence based on market assessments to be conducted in year 1 of implementation, support for other value chains will be provided depending on decisions of HortLangSon, with the input of sector product groups as to which value chains to assist. Investment inputs will be available for the value chain members including the farmer groups on the same basis as for star anise and vegetable value chain members. Thus, the activities will be:

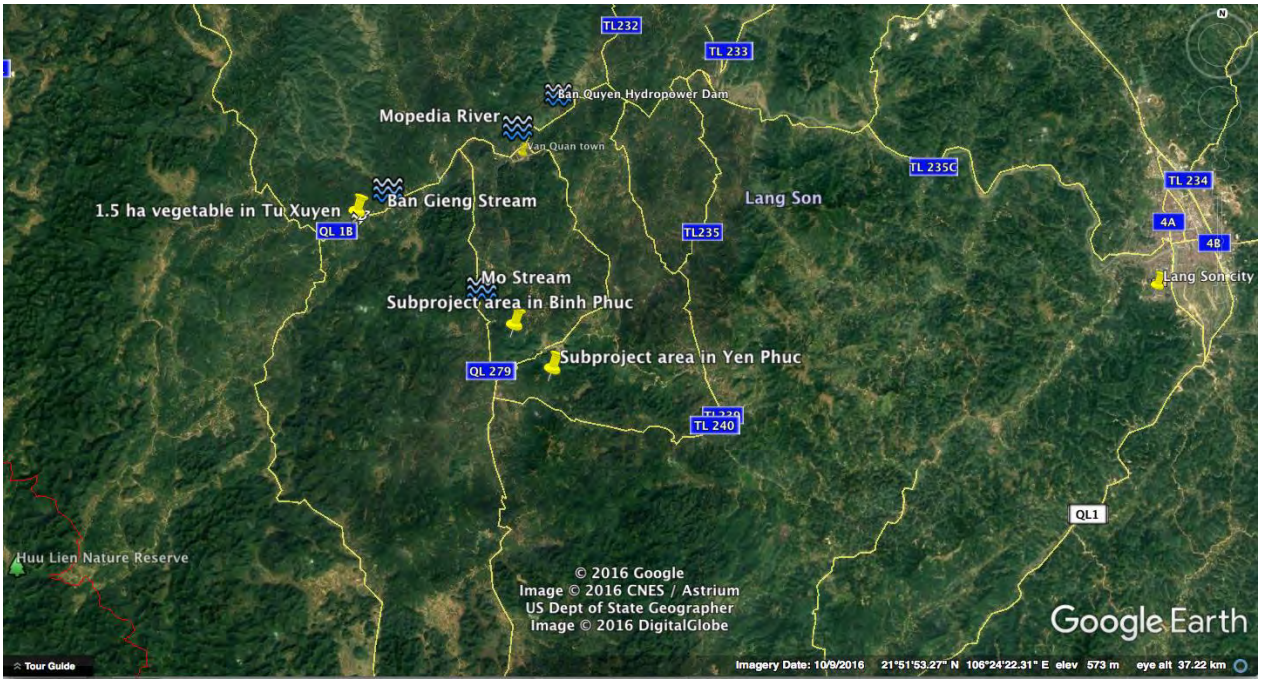
(i) Preparation of plans for product value chain development (based on satisfactory market assessment)

(ii) Implementation of product value chain development plans
(iii) Establishment of farmer groups and assistance with their operations, including technical market assistance
(iv) Assistance to farmer groups with production and marketing advice

B. Location

42. Planning and organizational support activities will be directed province wide, with representative subproject value chains being developed in Van Quan district, including the communes of Yen Phuc, Binh Phuc and Tu Xuyen.

Figure 1– General Map of the Subproject and the vicinity



C. Budget

Detailed Costs	Base Cost (US$ '000)					
	2018	2019	2020	2021	2022	Total
I. Investment Costs						
A. HORTLANGSON_Marketing Association Horticultural Values Ch						
1. 3.1.2: Business and Support Service Provider	480.0	720.0	720.0	480.0	-	2,400.0
2. Establishment OF HortLangSon						
a. Activity 3.1.1: Organisation Development						
Subtotal	72.5	180.0	105.0	105.0	105.0	567.5
b. Activity 3.1.3 Contracted Sector and Thematic Studies						
Subtotal	18.0	54.0	54.0	36.0	36.0	198.0
Subtotal	90.5	234.0	159.0	141.0	141.0	765.5
3. HortLang Son Industry Membership						
Commodity Association Support	40.0	120.0	40.0	-	-	200.0
4. HortLangSon Core Services						
Trade Access and market definiton services	-	90.0	135.0	45.0	45.0	315.0
Quality Assurance Systems	180.0	180.0	180.0	180.0	180.0	900.0
Advocacy, Outreach and Training	-	180.0	180.0	180.0	180.0	720.0
Subtotal	180.0	450.0	495.0	405.0	405.0	1,935.0
5. Value Chain Financial Support						
Business grants	340.0	340.0	340.0	340.0	340.0	1,700.0
Innovation Grants	180.0	180.0	180.0	180.0	180.0	900.0
Subtotal	520.0	520.0	520.0	520.0	520.0	2,600.0
Subtotal	1,310.5	2,044.0	1,934.0	1,546.0	1,066.0	7,900.5
B. Representative Sub project Value Chain Investment Support						
1. Producer Group Investment						
Star Anise - Producer Group Infrastructure Investment /c	275.0	550.0	1,100.0	-	-	1,925.0
Safe Vegetable Group Infrastructure	200.0	500.0	1,500.0	-	-	2,200.0
Subtotal	475.0	1,050.0	2,600.0	-	-	4,125.0
C. Additional Sub project Value Chain Investment Support						
1. ADB COL Funded						
a. Producer Group Investment						
Producer Group Infrastructure Investment /d	-	329.1	548.5	658.2	658.2	2,194.0
2. Counter Part Contribution						
Process costs and Support	-	312.5	312.5	312.5	312.5	1,250.0
Subtotal	-	641.6	861.0	970.7	970.7	3,444.0
Total Investment Costs	1,785.5	3,735.6	5,395.0	2,516.7	2,036.7	15,469.5

V. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

1. Topography, Geology, and Soils

43. Lang Son has a complex topography including a high mountain area; a low mountain area; a limestone mountain area; and cultivated valleys. In the Northeast of the province are continuous mountain ranges along the border with China. The Southwest side is the limestone mountain area with steep slopes and a large cave system. In the Southeast side is a hilly area mainly in Loc Binh and Dinh Lap districts.

44. The subproject is located in Van Quan district, which borders with Van Lang and Binh Gia districts to the North; Bac Son district to the West; Lang Son city and Cao Loc district to the East and the borders with Chi Lang district to the South. The average elevation of Van Quan district is about 400m above sea level with discontinuous topography of mountains and small valleys lie in Southwest - Northeast direction.

45. In general, soil in Lang Son includes those that have originated from metamorphic parent rock such as limestone, clay schist and conglomerate.[1] Soils in the project area are predominantly ferralitic soil.

2. Weather, natural disaster and climate change

46. The climate is classified as warm temperate, with wet winters and hot summers[2]. Rainfall is influenced mainly by the southern monsoon, when south to south easterly winds carrying moist air result in higher rainfall, peaking in July to August. A north monsoon also occurs between October and April, bringing cloud, light rain and cooler air. Total rainfall in Van Quan district is1,500mm. The occurrence of very dry, or wet years is well known and pre-dates the emergence of the concept of climate change. Climate change may result in greater frequency and intensity of droughts, or of high precipitation. Similarly, the catchment is vulnerable to typhoons, which can be catastrophic (local residents report that severe typhoons took place in 2003) and the occurrence of typhoons may be influenced by climate change.

47. Temperature averages 21.2^{o}C over the year, with lowest temperatures of around 13.8 ^{o}C occurring in January, and reaching 27.1^{o}C in July.

3. Hydrology

48. Lang Son has a dense river and stream network, with a density ratio varying from0.6 km - 1.2 km of waterway per square kilometer. The district has two rivers namely Ky Cung and Mo Phia with several tributaries and streams.

49. Ky Cung River is the biggest river in Lang Son with total length of 243 km, total catchment area of 6,660 km^2. Annual average flow capacity is 2,300 m^3/s, flow module of 17.5 liter/s/km^2. It belongs to the Tay Giang River system originating from mountainous area of Bac Xa (Dinh Lap), flowing from Southeast to the West. The Ky Cung River has total of 77 tributaries

[1] Status of Environment report (SOE) of Lang Son province 2015 prepared by Lang Son DONRE

[2] Kottek, M., J. Grieser, C. Beck, B. Rudolf, and F. Rubel, 2006: World Map of the Köppen-Geiger climate classification updated. *Meteorol*. Z., 15, 259-263

with an average river density of 0.88 km/km^2, including 26 primary river branches, 34 secondary river branches; 16 tertiary river branches and 1 quaternary river branch.[3]

4. Surface and ground water

Surface water resources

50. Lang Son is a mountainous province with a dense river, stream, lake and pond network. There are 271 reservoirs and 639 rolling weirs. Lang Son DONRE has implemented a monitoring program for surface water quality with 31 monitoring locations in all 11 district towns /cities of Lang Son over the 2011-2015 period. Water in each location has been sampled 2 times per year in dry and rainy season. The main monitoring parameters are pH; Dissolved Oxygen (DO); NH_4^+; NO_2^-; COD; BOD_5; Fe; Zn; Oil and grease and coliform bacteria. Two of the monitoring stations are in Van Quan district. The first one is in Ban Quyen Reservoir, about 7km to the Northeast of the subproject area and the second is the pumping site for irrigation water in Van Quan town, about 5km to the Northeast of the subproject area. Results show that water quality of both stations are good, within all the monitoring parameters are under the allowed level of QCVN 08MT:2015/BTNMT - National Technical Regulation on Surface Water quality.[4]

Groundwater resources

51. Groundwater in the region occurs in fissures in limestone rock, and in sandstone and clay stone deposits. Owing to the complexity and fragmented nature of the aquifers, groundwater yields are usually small and better suited to domestic use. Sources within Lang Son are monitored by DONRE which has established 32 monitoring stations around the province. Results show that water quality of all stations in Van Quan district are good, within all the monitoring parameters are under the allowed level of QCVN 09MT:2015/BTNMT - National Technical Regulation on Ground Water quality.[5]

5. Air quality and noise

52. In comparison to QCVN standards[6], all the parameters of air quality and noise in Lang Son province and in particular Van Quan district are within the allowed levels, according to monitoring data obtained between 2011 and mid 2015. The monitoring locations in Van Quan district are residential area near Van Quan District People Committee and Diem Hemarket area in Van Quan town. Both locations are about 5 km to the Northeast of the subproject area.

B. Biological Environment

1. Forestry

53. The total forest area of Lang Son in 2010was 401,616ha, or 48.27% of the total area of the province. Fifty-five percent of the forested area, 223,269ha, was natural forest, the balance being plantation forest (178,347ha), following a trend of increasing forest cover, primarily due to the establishment of plantation forest. The forest cover status of the province is shown in Table 5 below.

[3] Status of Environment report (SOE) of Lang Son province 2015
[4] Status of Environment report (SOE) of Lang Son province 2015
[5] Status of Environment report (SOE) of Lang Son province 2015
[6] QCVN 05: 2013/BTNMT National Technical Regulation on Ambient Air Quality and QCVN 26:2010/BTNMT National Technical Regulation on Noise

Table 1 – Forest cover status of Lang Son province in 1998-2013 period(ha)[7]

Year	Forest area (ha)	Natural forest (ha)	Plantation forest (ha)
1998	248,913	184,077	64,836
1999	243,331	184,017	59,314
2000	259,160	185,000	74,160
2001	264,000	185,000	79,000
2002	288,587	185,457	103,130
2003	322,820	185,457	137,363
2004	336,149	185,457	150,674
2005	346,799	185,457	161,324
2006	357,660	214,716	142,944
2007	368,676	220,249	148,427
2008	383,787	217,699	166,088
2009	400,026	218,052	181,974
2010	408,698	219,069	189,629
2011	414,524	222,863	191,688
2012	435,117	252,521	182,596
2013	446,658	257,646	189,012

Source: Statistical Yearbook 2000-2014 period

54. Despite the high level of forest coverage, there are no fauna or flora species listed in the Vietnam Red Book that have been found in the subproject area in the recent years[8]. The nearest protected area is the Huu Lien Nature Reserve in Huu Lung district, about 15 km to the South of the subproject area.

2. Agriculture and land use

55. Agricultural land occupies a smaller proportion of the land area, largely due to the steep terrain. Coverage is 2.4% in Hoa Tham, 4.3% in Quy Hoa communes and 1.6% in Vinh Yen commune (see table 6), although agricultural production is still the dominant income source in these communes. Main crops are paddy, maize, cassava, and soybean. Livestock is considered as one of main income sources of the target communes. Information related to land use in the subproject area could be found in Table 2 below.

[7] Figures provided by Lang Son DONRE
[8] Information provided by staff of Lang Son Environmental Protection Agency and via public consultation meeting in Hoa Tham, Quy Hoa and Vinh Yen communes.

Table 2 - Land use in the subproject area 2015

Type of land	Hoa Tham commune		Quy Hoa commune		Vinh Yen commune	
	Area (Ha)	%	Area (Ha)	%	Area (Ha)	%
Total of land	11,300	100.0%	7990.7	100.0%	5,014.80	100.0%
Agricultural land	266	2.4%	345.1	4.3%	77.8	1.6%
Forestry land	7,800	69.0%	5,887.7	73.7%	2,601.5	51.9%

C. Socio – Economic Conditions and Infrastructure

1. Population and Ethnicity

56. The total population in the three target communes is 6,517 people in 1,476 households, in 23 villages. Ethnic minoritiesaccount for 99.25% total population in the project area, primarily the Tay ethnic group (28.6%), Nung (55.3%) and Dao (15.3%), see table 7.

57. All three communes are primarily poor under according to the government classification P135. Table 8 presents the poverty incidence in the target communes.

Table 3 – Composition of population in target commune, 2015

	Hoa Tham commune	Quy Hoa commune	Vinh Yen commune	Total
Number of Villages	13	5	5	23
Population (person)	3514	1994	1009	6517
By sex				
Women	1748	656	508	2912
Men	1766	1338	501	3605
Number of Households	821	427	228	1476
By ethnic group				
Kinh	10	1	0	11
Tay	422	0	1	423
Nung	383	426	7	816
Dao	6	0	220	226
other	0	0	0	0
Female headed households	68	13	19	100
Number of poor household	469	290	155	914

Source: Data collection from Hoa Tham, Quy Hoa and Vinh Yen communes, 2016

Table 4 – Poverty incidence in target commune, 2016

	Poverty rate (%)		
	As whole	**Kinh people**	**Ethnic minority**
Binh Gia district	46.4	1	99
Hoa Tham commune	57.12	0	100
Quy Hoa commune	67.9	0	100
Vinh Yen commune	68.0	0	100

Source: Data collection from target communes, 201

2. Economic development and income

58. Agriculture remains dominant economic activity in the district. According to the district annual report 2015, the economic growth rate of district was 10.26%. Growth rates for agriculture and services were 7.83% and 14.14% respectively. The shares of the agricultural sector in the district GRDP is 43.86%, almost equivalent to the service sector (43.29%). The industry sector contributes 13.85%. Income per capita in 2015 reached VND 17.6 million.

59. The contribution of agricultural production to gross output in the district is shown in Table 5. The main agricultural crops in the district are rice, maize, cassava, soybean, groundnut and cash crops such as tobacco, sugarcane and star anise. Livestock rearing and poultry raising are important.

Table 5 – Gross output in project district, 2014-2015 (VND million)

Indicators	**2014**	**2015**
Gross output value	429,297	544,153
From Industry	114,428	129,971
From Agriculture	153,604	165,186
From Services	224,256	248,996

Source: Annual report 2015 of Binh Gia district People's Committee

3. Social services

60. According to the annual reports of the three communes, each commune has a healthcare station with one doctor and four nurses and midwives, one kindergarten, one primary school and one secondary school. The proportion of households with access to mains electricity varies from 57% in Quy Hoa commune, to 76% in Hoa Tham commune and 95.46% in Vinh Yen commune.

4. Education levels

61. Survey results undertaken by the PPTA team showed that overall, 4% respondents had never been to school. Amongst ethnic minority groups, a higher proportion of Dao people had never been to school (11.54%) compared to those of other ethnic minority groups. The proportion of poor people who had never been to school was 8.75 %. A greater proportion of women (4.7%) than men (3.7%) had never been to school. Ninety-two percent of respondents had attained at least a primary level of education. Education levels were highest amongst the Tay people, the majority of whom had completed high school 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 attained by members offemale-headed households was primary school (100%).

5. Unexploded Ordinance

62. In farthest region of Northern Viet Nam, ordnance used by combatants during conflict that took place in the region 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. The Viet Nam military authorities estimate that the volume of UXO left in the country following the cessation of hostilities with the United States was between 350,000 to 700,000 tons, which does not take into account ordnance that remains from earlier conflict with French colonial forces and later conflicts with China in border regions. In some locations, such as the sites of former combat bases or military supply routes, the scale of the risk is high. For most of the rest of the country, the level of risk for any one site is largely unknown.

63. UXO devices are encountered when ploughing fields, searching for scrap metal and even by children playing. 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, 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

64. There is no archaeological significance in Van Quan district. Some sites have been discovered in the neighbor districts of Van Lang and Binh Gia districts. The subproject will only concrete some small road and the potential of artifacts is insignificant.

E. Key Environmental Features

65. ***Physical environmental features:*** The subproject area is located in the central area of Lang Son in the star anise plantation area of Yen Phuc, Binh Phuc communes and vegetable cultivation area of Tu Xuyen commune, Van Quan district.

66. ***Social environmental features:*** There is no residential area located along the proposed trails for upgrading.

VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

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

68. Subproject activities focus on sector planning and organization, and funds will be provided on a contestable basis for the development of infrastructure including drip irrigation systems and feeder roads.

A. Support to Sector Planning and Organization

69. Support to HortLangSon is to be broad, helping to overcome constraints of small product group size to develop competitive export value chains. This support will translate to improved performance in production, processing and marketing and thus there are potential secondary impacts which may be associated with increased production and processing. However, negative impacts will be avoided by the inclusion of guidelines for environmentally friendly development of production and processing. Any expansion of these activities or establishment of new facilities will be subject to EPL provisions.

70. Secondary impacts associated with increased production and processing are, those associated with (i) the use of inputs such as pesticides and fertilizers which may be necessary to improve yields and combat persistent pest problems, (ii) crop water requirements should these significantly increase demand for irrigation water and (iii) the need for facilities and inputs for processing including extraction, drying and packaging such as buildings drying areas and sheltered areas. The impacts of these, if any, would be assessed on a case by case basis. The scope of these impacts will be determined by the scale of operations and the nature of the support to the value chain groups. In terms of scale, support, whether for assistance with improved techniques, use of agrochemicals, construction of buildings or others, will be given to up to 20 star anise value chain groups and up to 30 vegetable production groups, each group being a cluster of farmers with a production area in the order of 1 to 2 hectares. The budget for support in each case will be in the order of $10,000 to $20,000. While production will increase, potentially harmful effects of the use of agrochemicals will be mitigated through advice and guidance given to the groups which will cover (i) avoidance of the use of chemicals where practicable, (ii) approach choice of inputs, which significantly will be restricted to the use of registered chemicals, (iii) correct, or optimized dosing and (iv) safety in handling, application and storage. Similarly, advice will be provided as required on issues related to irrigation and construction of storage and handling facilities, the impacts of which, in terms of impacts related to location, construction and operation, would be assessed on a case by case basis. While Vietnam has strict regulations on the registration of agrochemicals and requirements for clear instructions to be included with the sale of such products, the ease of access to Chinese manufactured agrochemicals over the border at Lang Son has resulted in use of unregistered agrochemicals.

B. Support for infrastructure

71. Infrastructure that may be supported by contestable funding include trickle feed irrigation equipment, installation of water tanks, shading and greenhouses, and feeder road improvements. A pre-requisite for funding of these is submission of a competent business development plan.

72. Water tanks, shade houses and greenhouses will entail only minor impacts. Not more than one of each will be built per production group. Impacts associated with the construction of these buildings include site clearance, effects on slope stability, sourcing of materials (ensuring that they come from licensed sources to avoid use of ad hoc quarries or timber extracted from natural forests) and arrangements for waste management. These will be mitigated by preparing environmental management requirements to be included in bid documents for construction contracts.

73. Feeder roads will be constructed from produce collection points to local roads, along primarily flat or undulating terrain and will be up to 1.5m in length. Potential impacts include issues associated with the sourcing of materials, effects on drainage flows, and construction impacts such as management of construction waste, noise and dust generation, temporary use of land for storage and parking of plant and impedance to traffic during construction. These measures can be mitigated by inclusion of an environmental management plan for each subproject guiding subproject planning, design and construction and detailing mitigation.

1. Feeder road improvement

74. Support to feeder road improvement is aimed at upgrading tracks to small, all weather roads usually by concreting. Support will be provided in response to requests from users, and each request shall be subject to an engineering review of feasibility and cost. Important factors will include the feasibility at each site to construct safe roads, in terms of gradient, width and visibility, particularly at the point where the roads join existing trafficked roads, as well as cost considerations. Improvements will generally consist of concreting of existing pathways, with some minor realignment where warranted, and provision of drains and culverts where necessary. The roads are intended to serve the movement of people between population groups, households and from home to fields, production facilities, for transport of commodities and small livestock. Forms of transportation on the routes are mainly bicycles, motorized two-wheelers, rickshaws, or horse-drawn carts. Roads are to be Category D: 2.0 m bed width and pavement of 1.5m width. During the PPTA, feasibility studies have been prepared for one subproject, entitled "Construction of Improved Agricultural and Rural Infrastructure for Value Chains in Van Quan district, Lang Son province". This includes 15.5km of such road improvements.

75. While narrow, with limited requirement for realignment or slope cutting, potential impacts may include (i) generation of spoil, which if cast onto the downslope side of the road can smother vegetation and encourage gully formation (ii) changes in drainage flows, which can also lead to gully formation and slope instability and (iii) construction impacts, including temporary impedance of traffic on the tracks, (iv) generation of waste, including cement bags, discarded formwork and human waste from workers on the site. Risks can be minimized by requiring a simple environmental management plan to be included with contracts for the road improvement work addressing these risks. Use of labour based techniques, engaging local labour will also minimize potential effects associated with groups of construction workers residing temporarily in the project area, including waste management.

2. Drip irrigation

76. Assistance will be given in the use of drip irrigation, aimed at high efficiency in the use of water. The assistance will be provided in response to requests from users, and the emphasis will be on minimizing use of available water, either reducing the level of water use from existing schemes or ensuring that, in the case of new irrigation installations, only minimal levels of water

are drawn to enable growing stock to benefit while reducing impacts on stream flow. Environmental risks such as those associated with competition for water from other users and waterlogging of soils are minimal because of the limited use of water to provide the drip supply. Tanks for drip irrigation will have significant capacities in order to be able to maintain supplies through rainless periods. Care is therefore required in the siting and installation of tanks, ensuring that they are on level platforms with secure foundations.

3. Other infrastructure

77. Other items of infrastructure may include pulley systems, and pack houses. Pulley systems have a minimal footprint and consequently limited impacts on the environment such as clearance of vegetation or effects on slope stability during the operational phase. Safety of operation can be ensured by (i) ensuring a high standard of construction including foundations and cable strength and durability, (ii) making the grant of funds conditional on users providing a commitment to control operation and carry out maintenance of the systems, and (iii) providing instruction to user groups in safe operation and maintenance,

78. Steps need to be taken during construction to ensure that clearance for the construction of foundations for support structures, and access to construction sites, is kept to a minimum and areas are revegetated if necessary.

C. Management of contestable funds

79. Potentially, a wide range of initiatives may be supported with the use of contestable funds, the precise scope of which will not be known until applications are received. Potential impacts are those that arise from the activities that will be funded. These activities may include the installation of equipment such as pulleys for transporting produce grown on steep slopes, improved "feeder" paths (up to 1.5m width connecting pulley stations to district roads along primarily flat land), small scale drip irrigation, crop drying facilities or shade houses. The scope of investment will be within the grant envelope, which is $55,000 for star anise value chain groups and $40,000 for vegetable value chain groups of which between $20,000 to $30,000 would be available for construction, the remainder being used to meet organizational and training costs. Impacts will generally be minor (small quantities of spoil generation; impacts associated with sourcing of materials; site clearance) and an environmental statement will be prepared prior to approval of funding demonstrating that there will either be no significant impacts or that these will be mitigated. Impacts on biodiversity will be avoided by the exclusion of subprojects that involve or may involve: (i) clearance of previously undisturbed forest and (ii) possible encouraging of illegal logging or other illegal activity. In addition, applications should include a statement indicating that environmental impacts have been considered, and information on how these will be avoided or mitigated.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

80. 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 implementation of the subproject included representatives from Lang Son DPI; Van Quan DPC;DONRE and DARD offices of Van Quan district; Tu Xuyen, Yen Phuc and Binh Phuc CPCs; and local people who cultivate star anise in Yen Phuc, Binh Phuc communes and vegetable in Tu Xuyen commune. Consultations took place in 12 December 2017.

81. The information disseminated during public consultation included: (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.

82. In general, all the relevant stakeholders are support the implementation of the subproject. As the subproject implementation has no significant impact on environment, the main concern is related to product processing and develop the main agriculture product of for Van Quan district.

VIII. GRIEVANCE REDRESS MECHANISM

A. Purpose of the mechanism

83. During the preparation of the subproject, information is disseminated to local people on the scope of the subproject, and environmental and social impacts. 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.

B. Grievance redress process

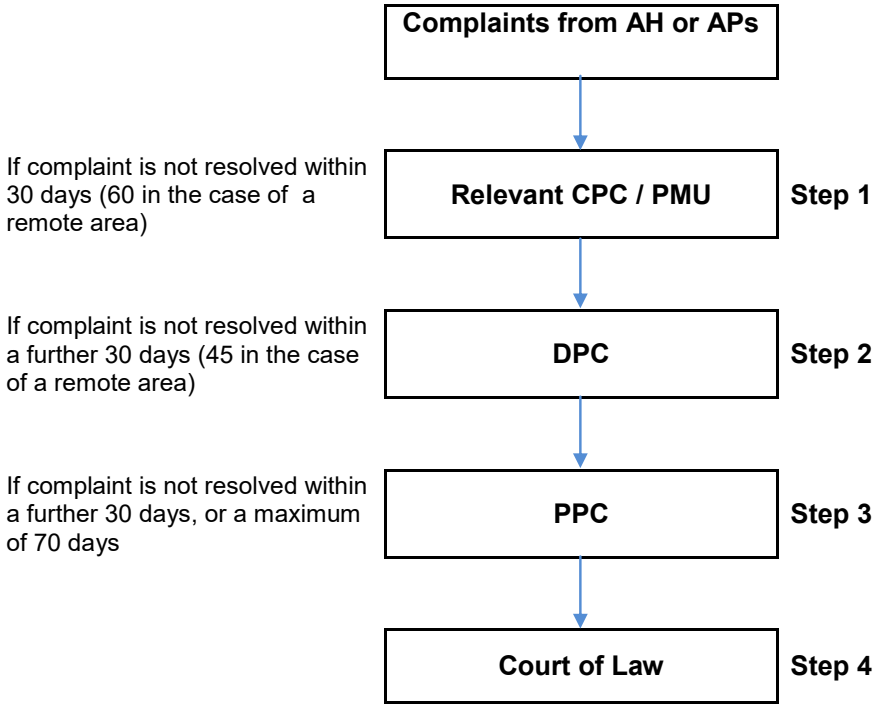
84. The GRM will be disclosed with the IEE and other safeguard documents to ensure that potentially affected persons are aware of it and their entitlement to raise complaints. The subproject is designed to proceed on the basis of close co-operation with participants and beneficiaries, ensuring that interventions are acceptable to users. However, in the event grievances may arise, a focal point will be appointed from HortLangSon or other appropriate stakeholder agency. 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.



IX. ENVIRONMENTAL MANAGEMENT PLANIMPLEMENTATION ARRANGEMENTS

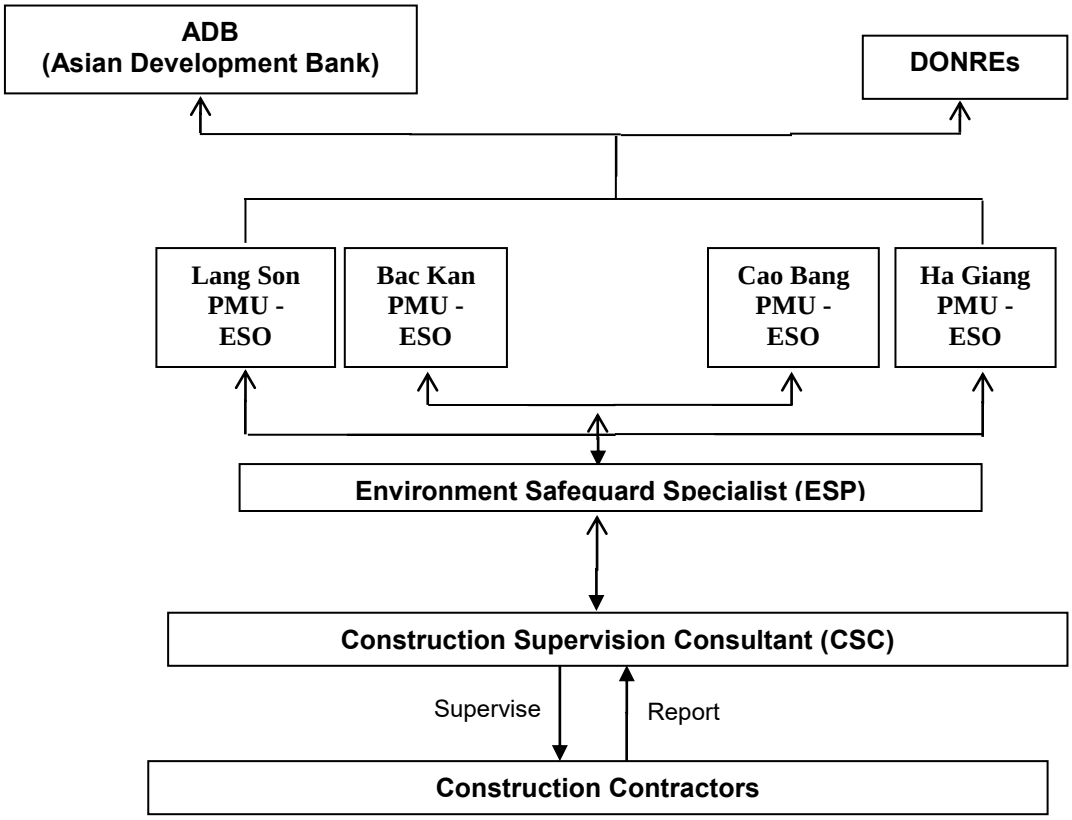
Table 6 – Responsibilities for EMP implementation

Agency	Responsibilities
Lang Son 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. - Ensure that Subproject implementation complies with ADB's environmental policy and safeguards policy statement (SPS 2009) principles and requirements - 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 - 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.
Environmental Safeguards Staff (ESO)	- PMU staff support for EMP implementation - Work closely with ESP 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. - Undertake environmental management capacity building activities for PMU as described in the IEE and EMP. - Ensure proper implementation of EMP provisions. Through these specialists, the ESP shall: (i) ensure proper and timely implementation of ESP's tasks specified in the EMP, (ii) conduct environmental training as specified in the IEE/EMP for PMU, (iii) conduct workers' orientation on EMP provisions.
Construction Supervision Consultant (CSC)	- Provide the ESP relevant information as well as full access to the subproject site and all project-related facilities (such as construction yards, workers' camps, borrow and quarry areas 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. - 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.
Contractors	- Provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the EMP - Implement additional environmental mitigation measures, as necessary
Lang Son Department of Transportation (DOT)	- Responsible for operation and maintenance of Subproject infrastructures - Implement EMP monitoring during operation
Lang Son Department of	Review and approve environmental assessment reports required by the

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

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

Figure 2 – EMP Implementation organization chart



A. ENVIRONMENTAL MITIGATION

86. The anticipated environmental impacts and mitigation measures discussed in the previous section is presented in Table 9. The table also shows responsibilities and timeframe/schedule for implementation of mitigation measures and monitoring.

Table 7 – Detail Environmental Mitigation Plan

Potential Impact	Mitigation Measure	Responsibility	Cost (Price unit)
Pre-construction Phase: Measures relating to planning and design to take place at the PMU in Lang Son			
Management of Contestable funds	Screening of applications to remove those that entail environmental damage such as disturbance of intact forests or other threats to biodiversity. Inclusion of condition on grants as appropriate.	PMU	Included in PMU staff cost
Feeder roads: Changes in drainage flows	Examination of hydrology on the alignment and provision for side drainage and culverts as appropriate.	Designers	Included in design cost
Siting of tanks for drip irrigation	Ensuring tanks are on suitable firm ground and have adequate foundations		
Potential hazards associated with pulley systems	Ensuring adequate specifications for foundations, cable strength and durability and other critical components are included. Making support to pulley systems conditional on user commitment to safe operation and regular maintenance	Designers	Included in design cost
Assessment of activities to be funded under contestable funds	Screening to exclude any activities that involve clearance of natural forests or that may in any way encourage illegal logging or other illegal activity. Reviewing for potential impacts and making support conditional on an environmental statement and commitment to carrying out specified mitigation.	PMU	Included in PMU staff cost
Construction Phase: Measures to be implemented at subproject sites			
Generation of spoil when constructing feeder roads	Utilise excavated spoil for filling purpose, as much as possible, to minimize the volume of excess spoil Temporary spoil disposal site shall be located at least 50 m from water bodies, like Ban Gieng and Mo streams, Mopedia river, Ban Quyen reservoir Unused excavated soil need to be transported to and disposed at the agreed dumping site with Tu Xuyen, Binh Phuc and Yen Phuc CPCs	Contractor	Includes in contract with contractor
Pollution risks associated with construction	Store chemicals (oil, lubricants, etc.) for construction in a secure place with impervious floor and roof cover to avoid rainwater and flooding. No temporary material stockpile near Ban Gieng stream in Tu Xuyen commune or Mo stream in	Contractor	Includes in contract with contractor

Potential Impact	Mitigation Measure	Responsibility	Cost (Price unit)
	Binh Phuc commune (50 m) Ensure vehicles and equipment are maintained in good condition Regularly collecting waste land to avoid sedimentation; Wash construction vehicles and equipment near Ban Gieng and Mo streams shall not allow avoiding pollution by lubricating oil from washing. Install sediment ditches at the construction site near the stream. Collect sediment from the ditches regularly and transfer to the temporary dumping sites as agreed with Tu Xuyen, Binh Phuc and Yen Phuc CPCs.		
Temporary impedance of traffic on the tracks	Inform construction schedule and scope to Tu Xuyen, Yen Phuc and Binh Phuc CPCs and local people in the subproject area through informal public consultation or any local people meetings and notice board in the CPCs; Arrange construction material neatly along the tracks and complete construction section by section to reduce the impact period; Avoid material transportation in the rush hours	Contractor	Includes in contract with contractor
Generation of waste, including cement bags, discarded formwork and human waste from workers on the site	Waste water and wasted lubricating oil should be controlled in accordance with relevant regulations on wastewater and hazardous wastes; Provide rubbish bins for each construction sites request workers to collect waste and not to leave litter into any water resources	Contractor	Includes in contract with contractor
Clearance of vegetation on steep sites when constructing support towers for pulley systems	Minimizing clearance of vegetation at construction sites and access pathways	Contractor	Includes in contract with contractor

B. Environmental monitoring

87. Environmental compliance monitoring is carried out to test the compliance with operating procedures, technical standards and/or contractor specifications in the EMP

Table 8 - Environmental Effects Monitoring Plan

Mitigation Measure	Parameters	Location	Methods	Frequency	Responsibility	Cost
Construction Stage						
Minimization of noise generation	Noise level	At 6 track-construction sites in Binh Phuc and Yen Phuc	Observation and community consultation	Weekly, monthly or when community's feedback is raised	CSC	Included in the Contract signed with PMU
				Monthly during construction duration or if there is feedback about high noise levels from the community	ESO of PMU	PMU Operation budget
Minimization of dust generation	Dust concentration	At 6 track-construction sites in Binh Phuc and Yen Phuc	Observation and community consultation	Weekly, monthly or when community's feedback is raised	CSC	Included in the Contract signed with PMU
				Monthly during construction duration or if there is feedback about high dust concentration levels from the community	ESO of PMU	PMU Operation budget

Mitigation Measure	Parameters	Location	Methods	Frequency	Responsibility	Cost
Control of surface water quality	Sedimentation, rubbish, lubricating oil and solid waste	Water bodies near the track-construction sites	Visual observation; Public consultation	Weekly and after the heavy rain events	CSC	Included in the Contract signed with PMU
				Once during the construction phase or in case of complaints of residents	ESO of PMU	PMU Operation budget

Table 9 - Environmental Compliance Monitoring Plan

Mitigation Measure	Parameters	Location	Methods	Frequency	Responsibility	Cost
Construction Stage						
Storage of materials, spoil dumping sites; waste disposal impact on water quality	Condition of material stockpile, spoil dumping site, waste disposal area	Overall construction area	Observation and community consultation	Monthly or after heavy rainfall, flood	CSC	Included in the Contract signed with PMU
Impact on the traffic	Use of equipment; signal system; material arrangement at site; obey for traffic law of transportation vehicles	In construction site and on material transportation road	Observation and community consultation	Weekly/ Monthly or when community's feedback is raised	CSC/ ESO of PMU	Included in the contract signed with PMU
Control dust, noise and vibration generated from construction activities	Ensure to minimize dust, noise and vibration generated from construction activities	Overall construction area.	Observation and community consultation	Monthly	CSC	Included in the Contract signed with PMU

C. Reporting

Table 10 - Monitoring and reporting system

Project Phase	Type of Report	Frequency	Responsibility	Submitted To Whom
Construction	EMP Compliance Report **indicating compliance with all subprojects' EMPs and monitoring results**	Monthly	CSC	PMU
	EMP Environmental Report **indicating overall subproject environmental performance and EMP compliance**	Semi-annually	PMU	ADB

X. CONCLUSIONS AND RECOMMENDATIONS

88. The subproject of "Agricultural and Rural Value Chain Infastructure in Lang Son Province" in Tu Xuyen, Binh Phuc and Yen Phuc Communes, Van Quan District, Lang Son Province is being implemented by Lang Son PMU, as a part of the Basic Infrastructure for Inclusive Growth Sector Project in Northeast Provinces.

89. An environmental assessment of the project has been carried out and the main potential environmental impacts of the sub-project during construction phase are:

(i) Generation of spoil.
(ii) Changes in drainage flows, which can also lead to gully formation and slope instability.
(iii) Construction impacts, including temporary impedance of traffic on the tracks.
(iv) Generation of waste, including cement bags, discarded formwork and human waste from workers on the site.
(v) Potential impacts from the use of contestable funds for different initiatives proposed by beneficiaries

90. A range of mitigation and monitoring measures has been developed for the sub-project, which have been described in the Table 9 above.

91. Based on the findings of the environmental assessment and EMP contained in this document, it is concluded that:

92. The investment on the Subproject "Agricultural and Rural Value Chain Infastructure in Lang Son Province" aims to upgrade the tracks for the transportation of star anise product and support the clean vegetable cultivation model, contribute to social and economic development activities and modernization in rural area, improve the welfare of people in Tu Xuyen, Binh Phuc and Yen Phuc communes, Van Quan district, Lang Son province.

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

APPENDIX: RECORD OF CONSULTATIONS

Meeting minutes

Time: December 12, 2016
Venue: Meeting room of Van Quan District People's Committee (DPC)
Participant: See Attendance List

Mr. Hong - Chairman of Van Quan' s DPC:

There are about 400ha of star anise plantation in 2 communes - Yen Phuc and Binh Phuc.
Yen Phuc: mainly in Dong B and Tay B villages
Binh Phuc: mainly in Khon Nhu and Khon Moi

Chairman of Tu Xuyen Commune People's Committee (CPC): Need support for the clean vegetable in Na Lim village, Tu Xuyen commune: about 1.5 ha.

Main current production is squash, calabash. There is some cooperation program with the small enterprises. For squash: more than 200 ha under cultivation in seasonal manner.

Mr. Hong - Chairman of the DPC: The main obstacle is the small scale and separated cultivation. There is no cooperation in terms of planning and processing the product. Local farmers are cultivating in their own land and decide which kind of crops they will apply.

The irrigation water supply for vegetable plantation area is adequate. Water could be taken from Ban Gieng stream of Tu Xuyen commune; Suoi Mo stream (Yen Phuc - Binh Phuc communes). These streams are then form Mopedia river before join Ky Cung River and flow to China.

Cho Bai town of Yen Phuc has a waste-collecting system. Waste is tranfer to the dumping site of Van Quan district.
The main water supply source for Van Quan town is ground water. Stream and lake water is use for irrigation purpose only.

The star anise productivity is not constantly every year. Star anise could be harvested when they are planted for 7 years. The trees could be stay up to 100 years.

Irrigation water: Taking from Dong Xe pumping station in Tu Xuyen commune.

List of people met in Lang Son (Value chain component 12 December 2016)

No	Name	M/F	Position/ address
1	Mr. Hong	M	Chairman of Van Quan district
2	Mr. Vuong	M	Officer of District Division of Agriculture and Rural Development
3	Mr. Hoang	M	Chairman of Tu Xuyen Commune
4	Mr. Chuyen	M	Chairman of Yen Phuc Commune
5	Mr. Linh	M	Chairman of Binh Phuc Commune
6	Mr. Kiem	M	Social (poverty reduction) staff of Tu Xuyen commune
7	Mr. Giang	M	Agricultural staff of Tu Xuyen commune
8	Mrs Van	F	Head of Tu Xuyen commune Youth Union
9	Mrs. Thoan	F	Head of Tu Xuyen commune Women Union
10	Mr. Phan	M	Cadastral staff of Yen Phuc commune
11	Mr. Loc	M	Statistic officer of Yen Phuc commune
12	Mrs. Tu	F	Head of Yen Phuc commune Women Union
13	Mr. Cuong	F	Head of Yen Phuc commune Youth Union
14	Mrs Thuy	F	Head of Binh Phuc Women Union
15	Mr. Tien	M	Statistic officer of Binh Phuc commune
16	Nguyễn Thị Trường	F	Farmer at Tây B Village of Yen Phuc commune
17	Hoàng Thị Hường	F	Farmer at Đông B Village of Yen Phuc commune
18	Lô Thị Điệp	F	Farmer at Tây B Village of Yen Phuc commune
19	Hoàng Thị Thu	F	Farmer at Đông B Village of Yen Phuc commune
20	Nông Văn Cao	M	Farmer at Tây B Village of Yen Phuc commune
21	Linh Thị Bình	F	Farmer at Tây B Village of Yen Phuc commune
22	Nông Văn Dự	M	Farmer at Đông B Village of Yen Phuc commune
23	Lô Văn Hải	M	Farmer at Đông B Village of Yen Phuc commune
24	Phùng Văn Mến	M	Farmer at Đông B Village of Yen Phuc commune
25	Linh Thị Xéo	F	Farmer at Tây B Village of Yen Phuc commune
26	Trần Thị Hồng	F	Farmer at Còn Mới village of Binh Phuc commune
27	Triệu Thị Yến	F	Farmer at Còn Nhừ village of Binh Phuc commune
28	Hoàng Thị Thoa	F	Farmer at Còn Nhừ village of Binh Phuc commune
29	La Thị Thanh	F	Farmer at Còn Nhừ village of Binh Phuc commune
30	Triệu Thị Toàn	F	Farmer at Còn Nhừ village of Binh Phuc commune
32	Hoàng Văn Hiệu	M	Farmer at Còn Nhừ village of Binh Phuc commune
33	Mạc Văn Bình	M	Farmer at Còn Nhừ village of Binh Phuc commune