Initial Environmental Examination

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VIE: Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project-Upgrading and Improving 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 Assistant Consultants

The Project	–	Basic Infrastructure for Inclusive Growth in the Northeastern Provinces Sector Project
The Subproject	–	Upgrading and Improving 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 "Upgrading and improving 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 upgrading 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 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. 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

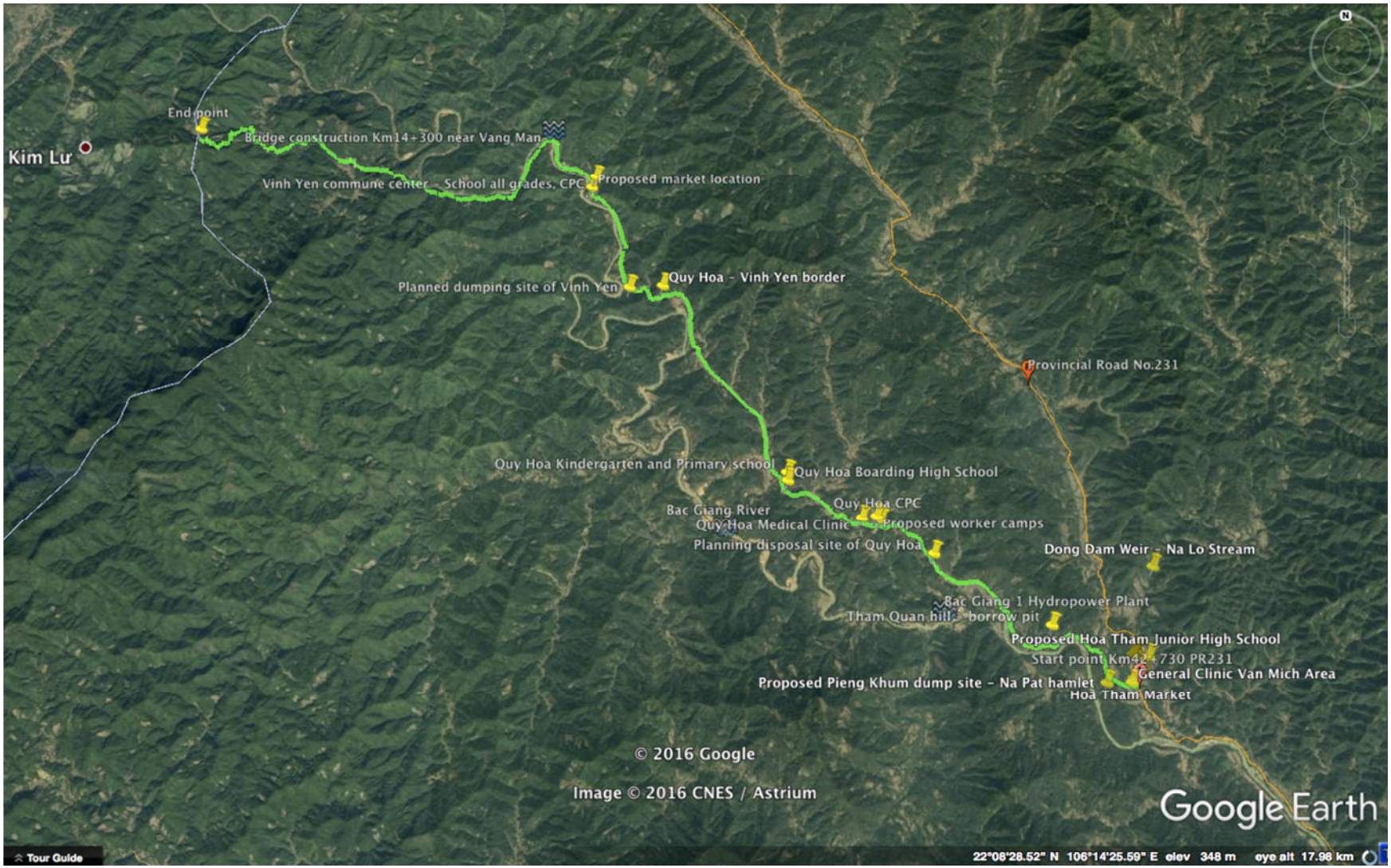
(v) Enabling access to outside employment opportunities.[1]

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

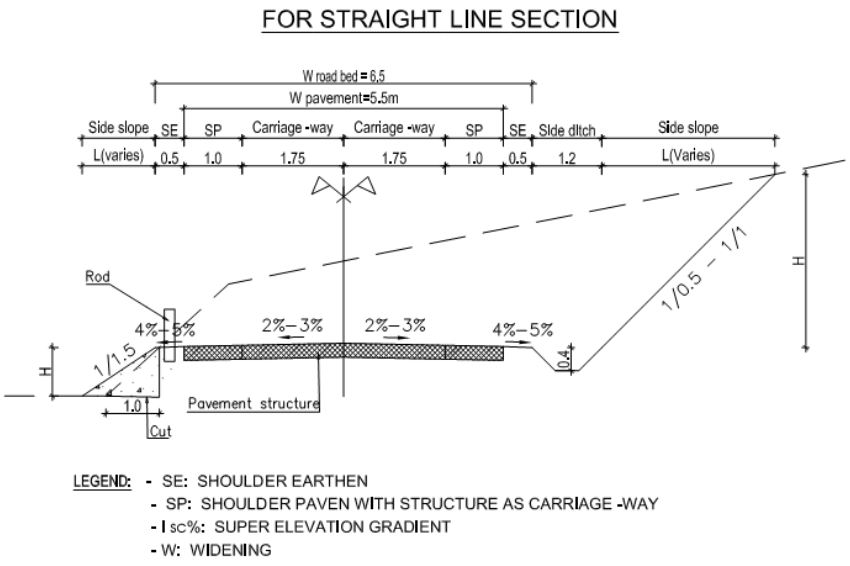
30. The representative road subproject for Lang Son is construction and upgrading of the road from Hoa Tham - Quy Hoa - Vinh Yen with total length of 22.95km passes through Hoa Tham, Quy Hoa and Vinh Yen communes, Binh Gia district, Lang Son province. The start point meets with provincial road No.231 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 conduct an investigation of these

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

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.

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. Biologica 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 Infrustucture

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
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 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.

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

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.

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 kind 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 Mittigation 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 Mittigation 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 are 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 use 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 down stream 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 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.

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 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 play 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 dto 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 Mittigation 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 th 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 Publuc 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 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 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

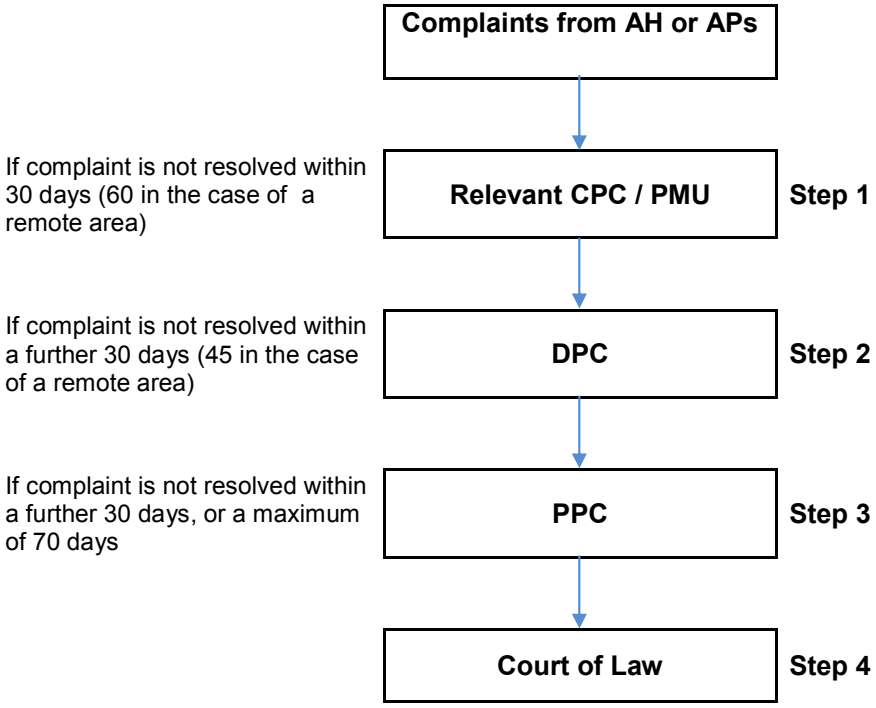
112. There are three steps to address complaints received from stakeholders:

***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.


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 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.

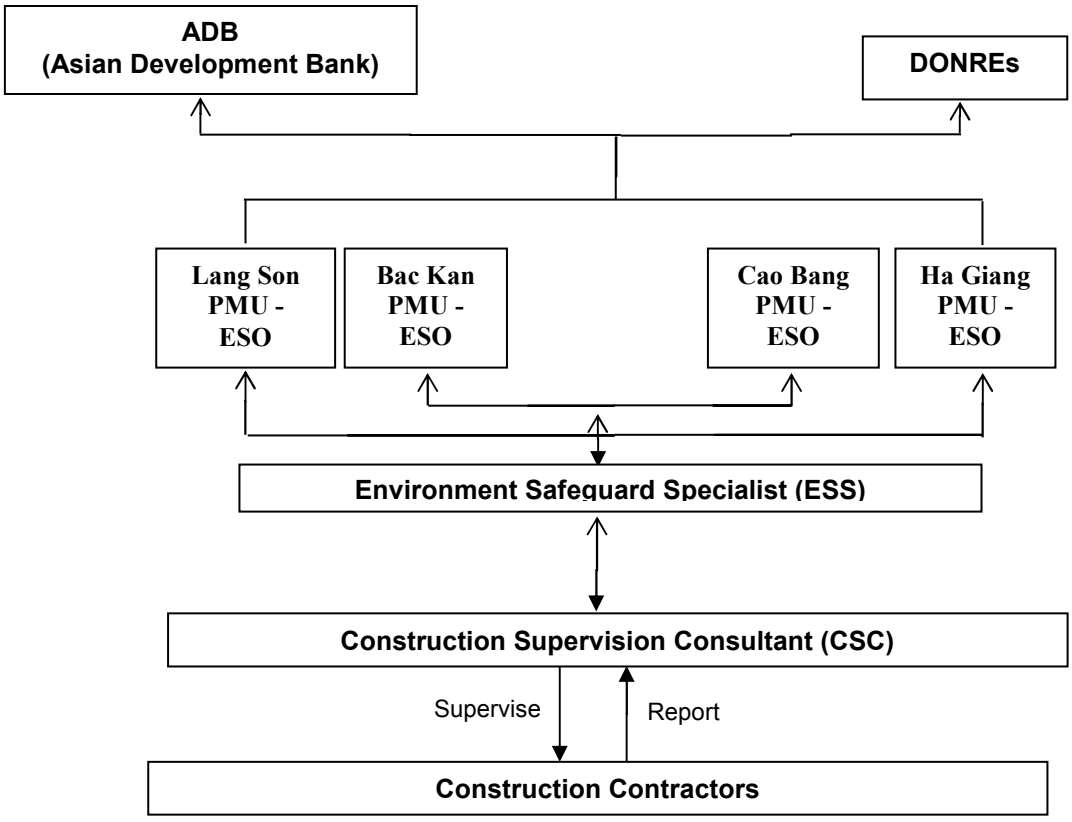
Table 14 – Responsibilities for EMP implementation

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. - 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 damaged vegetation.	CPCs; Contractors	Through out construction phase	Along the subproject road, worker camps area	Included in the contract with contractors

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 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	Contractors	Though out construction phase	Subproject site, quarries and borrow pit areas	Included in the contract with contractors

		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	Through out construction phase	Through out construction site, material storage areas, machines and vehicles maintenance area	Included in the contract with contractors
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,	Contractors	Through out construction phase	Through out construction site	Included in the contract with contractors

		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	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 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	Contractors	Through out construction phase	Through out construction site	Included in the contract with contractors

		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 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/ 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	Contractors	Through out construction phase	4 streams/ Bac Giang River crossing points	Included in the contract with contractors

		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	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 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	Contractors	Through out construction phase	Through out construction sites and worker camps	Included in the contract with contractors

		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 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	Contractors	Through out construction phase	Through out construction sites; at start and end points	Included in the contract with contractors

		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.			of the subproject road.	
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	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 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	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

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 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
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, 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	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;	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 years 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 years 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 years 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 by the Environment Safeguard Specialist (ESS) during subproject implementation as "on the job" training or by formal training courses.

[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.

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 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 "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. APPENDIX

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: Source 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 Ethinic 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

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

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

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

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

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

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

3. METHOD FOR DETERMINATION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4. IMPLEMENTATION ORGANIZATION

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

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

QCVN 09 : 2008/BTNMT

NATIONAL TECHNICAL REGULATION

ON UNDERGROUND WATER QUALITY

Introduction

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

NATIONAL TECHNICAL REGULATION

ON UNDERGROUND WATER QUALITY

1. GENERAL PROVISIONS

1.1. Scope of application

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

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

1.2. Explanation of terms

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

2. TECHNICAL REGULATIONS

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

Table 1: Limit values of the underground water quality parameters

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

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

3. METHOD FOR DETERMINATION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4. IMPLEMENTATION ORGANIZATION

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

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

QCVN 05:2013/BTNMT

NATIONAL TECHNICAL REGULATIONS ON AMBIENT AIR QUALITY

Introduction

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

National Technical Regulation on Ambient Air Quality

1. GENERAL PROVISIONS

1.1. Scope of applications

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

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

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

1.2. Interpretation of terms

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

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

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

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

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

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

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

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

2. Technical Reputation

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

Table 1: Maximum value of basic parameters of ambient aire

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

No.	Paramater	Average 1 hour	Average 8 hours	Average 24 hours	Annual average
1	SO_2	350	-	125	50
2	CO	30.000	10.000	-	-
3	NO_2	200	-	100	40
4	O_3	200	120	-	-
5	Total Suspended Particle (TSP)	300	-	200	100
6	Dust PM_{10}	-	-	150	50
7	Dust $PM_{2,5}$	-	-	50	25
8	Pb	-	-	1,5	0,5
Note: (-) unspecified					

E. Appendix 5: Meeting minutes and 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)

Mr. Lý Viết Hưng: PGĐ Sở NN&PTNT

Mr. Cao Xuân Cường: Trg phòng QLBV rừng và BTTN. Tel: 0949217596

Nội dung trao đổi làm việc: Mr. Sầm Đình Chiến: Chuyên viên Chi cục Thủy lợi. Tel: 01634969176

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 19/8/2014 của UBND tỉnh Lạng Sơn về việc giao ~~rừng~~ và đất rừng phòng hộ chưa giao, chưa cho thuê cho UBND xã quản lý)

QĐ số 17/2015 của Thủ tg CP 9/6/2015 về ban hành quy chế quản lý rừng phòng hộ. Được phép khai thác, tỉa cành theo băng theo đám (không quá 20% diện tích).

Nếu giữ tuyến 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 - Pg phòng kiểm soát ô nhiễm
Ms. Nguyễn Hoài Thương - Pg phòng tổng hợp ĐTM

1) Trao đổi thông tin chung về DA BIIG và 2 TDA mới
2) Toàn tỉnh có 5 khu bảo tồn: Khu vực 2 TDA ko nằm gần khu Bảo tồn, rừng, VQG nào.
Trong khu vực huyện Bình Gia có có loài Động thực vật đặc hữu trong sách đỏ, cần bảo tồn
Huyện có mỏ đá Na Rong đang hoạt động nhằm 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 vệ sinh khoảng mía. Rừng dọc theo tuyến đường đã phân hết 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. Cần bố trí lán trại công nhân hợp lý khoảng 4 điểm dọc theo tuyến đã qua xã. Rác thải theo sông Bắc Giang như: Bia, lk bởi hoạt động khai thác vàng của huyện Na Rì. Lo ngại dự án tốt sẽ làm tăng hoạt động khai khoáng.

UBND xã Quý Hòa:
Người dân chưa yêu cầu dùng nước suối. Hiện nay có một công trình NSH phục vụ cho trụ PTTH nội tại. 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 Vĩnh Yên huyện Bắc Hà tỉnh Lào Cai

I. Danh sách các đại biểu nhận tiền hỗ trợ

No.	Họ tên	Ký nhận
1	Triệu Văn Thái	
2	Triệu Văn Phúng	
3	Triệu Văn Thắng	
4	Đồng Thị Khế	
5	Bàn Minh Quyền	
6	Triệu Thị Phạm	
7	Triệu Thị Chúa	
8	Đồng Thị Nhất	
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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)

Quý Hòa, ngày 2 tháng 9 năm 2016

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

I. Danh sách các đại biểu nhận tiền hỗ trợ

No.	Họ tên	Ký nhận
1	Lăng Thị Ổn	
2	Lương Chí Dũng	
3	Lý Văn Quyền	
4	Hoàng Thị Mích	
5	Hoàng Thị Phương	
6	Nông Văn Trò	
7	Hoàng Văn Xuân	
8	Hoàng Văn Liên	
9	Lý Văn Ết	
10	Lý Văn Hường	
11	Lý Văn Ngày	
12	Hứa Văn Sơn	
13	Lộc Thị Điền	
14	Lý Văn Bế	
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