Initial Environmental Examination

Stage of the document: Final
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VIE: Basic Infrastructure for Inclusive Growth in Nghe An, Ha Tinh, Quang Binh and Quang Tri Provinces Sector Project-District Road No.349 from Dinh Son at Km0 to Cay Khe Junction at Km8+000.71, Anh Son District, Nghe An Province

Prepared by Planning and Investment Department of Nghe An province for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 12 June 2017)

Currency unit	–	Viet Nam Dong (D)
D1.00	=	$0.000044
$1.00	=	Đ 22,680

ACRONYMS AND 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
GMS	Greater Mekong Sub-region
IEE	Initial Environmental Examination
IPM	Integrated Pest Management
LEP	Law on Environmental Protection
MPI	Ministry of Planning and Investment
MPN	Most Probable Number of viable cells of a pathogen - a measure of water quality
PCU	Passenger Car Units
PPC	Provincial People's Committee
PPE	Personal Protective Equipment
PPMU	Provincial Project Management Unit
PPTA	Project Preparatory Technical Assistant
ROW	Right of Way
SPS	Safeguard Policy Statement

SST	Subproject Support Teams
The PPTA	The Project Preparatory Technical Assistant Consultants
The Project	Basic Infrastructure for Inclusive Growth in Nghe An, Ha Tinh, Quang Binh and Quang Tri Provinces Sector Project
The Subproject	District Road 349 from Dinh Son at Km0 to Cay Khe Junction at Km8+000.71, Anh Son District, Nghe An 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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1. The proposed Basic Infrastructure for Inclusive Growth in Nghe An, Ha Tinh, Quang Binh and Quang Tri Provinces Sector Project will invest in implementation of the north central coastal provinces sub-region socio-economic development plans. The Project responds to the Government of Vietnam's strategy of targeting the use of concessional ODA investment into poorer provinces using economic sub-regions as a means of identifying interconnectivity and synergies between provinces to accelerate economic growth in provinces that have previously lagged in terms of economic growth.

2. The project has three outputs being (i) Improved connectivity within value chains and their supporting infrastructure; (ii) Improved business development infrastructure; and (iii) Strengthened Sub-regional infrastructure planning and management.

A. Subproject Summary

3. The subproject is entitled "District Road 349 from Dinh Son at Km0 to Cay Khe Junction at Km8+000.71, Anh Son District, Nghe An Province" and is a representative subproject for Output 1 of the Project: Improved connectivity within value chains and their supporting infrastructure. The road is 8.00071 km long, going through Dinh Son and Thanh Sơn communes, Anh Son district. The start point at Km0+000 at its conjunction with NH 7 at Cay Chanh Junction (Km81+650), Dinh Son commune, Anh Son district. The end point Km8+000.71 at Cay Khe T-junction crossing district road 349B in Thanh Son commune, Anh Son district.

4. The road will be improved to Grade V mountainous roads in compliance with Vietnamese Standard TCVN 4054-2005, with a roadway width of 6.5 m comprising a 3.5 m wide carriageway and shoulders of 1.5 m. The total right-of-way (ROW) including side drainage will generally be 11m.

- Design velocity: 30 km/h
- Width of subgrade: 6,5m
- Width of pavement: 3,5m
- Width of shoulder: 2 x 1,5m
- Width of hard road shoulders: 2 x 1,0m
- Pavement structure: Bituminous treatment

5. The DR349 road subproject uses the existing centreline alignment although some sections need adjusting to meet the design standards of the road.

6. On the route there are 03 bridges including one large bridge of 276m long at Km1 + 024 over Lam River, one beam bridge of 12m at Km2 01 + 108 over Khe Dat stream and one causeway bridge through Khe Xan at Km5 + 800. Two new bridges will be constructed on the road, including the bridge over Khe Dat and Khe Xan streams.

Table 1 – Hydrological Survey Results of Bridges on Dr349

No.	Name of Bridge/Station	Elevation of Maximum Flood Level	Year of Happening	Elevation of Average Flood Level	Remarks
1	Cay Chanh bridge K1+024	+19,6	1988	+ 17,5	
2	Slab bridge K2+108	+16,0	1988	+ 15,0	
3	Khe Xan Causeway bridge Km5+812	+ 13,7	1988	+ 15,4	
Source: PPTA Consultant's Nghe An field survey results, November 2016					

B. Environment Impacts and Mitigation

7. The Project has been categorized as B on environmental issues during the Project Concept note as it has few potential significantly adverse impacts and none of them are irreversible. The initial environmental concern is alteration of surface water hydrology of waterways crossed by road.

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

9. In the design and preconstruction phases, the potential issues that have been identified are (i) disturbance of UXO; and (ii) land acquisition and resettlement. To minimize the first impact, the PMU will coordinate with appropriate agencies to identify any UXO left and engage an authorized UXO clearing contractor. To minimize the impact on income and disturbance of local people's lives, the PMU will check and review the land acquisition and resettlement process before construction starts to ensure that all affected households have received compensation adequately in accordance with GOV and ADB safeguard policies.

10. The potential negative impacts of the construction phase have been identified as (i) encroachment the production forest along the road. To minimize the impact, the contractor should not store construction material in the forest area and may not source any materials from the forest. The workers should be informed and prohibited from cutting trees for firewood or extraction of any other forest products.

11. (ii) Alteration of surface water hydrology of waterways crossed by the subproject road. There are 3 crossing points with streams and the Lam River along the proposed road and 2 new bridges will be constructed. Excavation for foundations and pipe installation in the Khe Xan and Khe Dat streams for bridge construction will result in increased sediment release during the construction period. The proposed mitigation measures are design of bridges/ culverts of sufficient capacity to handle flood events; ensuring that no excavated material is deposited in the streams or river; use of coffer dams, silt fences, sediment barriers or other devices as appropriate during construction; and re-vegetation of bare surfaces with grasses and creepers to reduce runoff and prevent filling.

12. (iii) Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps. The subproject road almost runs along Lam River and its branches, and any release of raw sewage or other waste from workers' camps will impair the quality of river and stream water. To minimize the impact, the contractor will provide adequate drainage facilities at construction sites and worker camps; store lubricants, fuels and wastes in dedicated enclosures at least 50m from water bodies and use silt fences and coverings over stockpiles as necessary to prevent release of fine materials into the air or waterways.

13. (v) Impact of the operation of construction machines and vehicles on local traffic; impeding traffic flows and increasing risks of work accidents and traffic accidents. These risks will be reduced by careful planning of transport of materials and equipment around the site, restricting movements during peak traffic hours, parking vehicles and plant in designated areas that do not cause obstruction and ensuring that only trained and certified operators may drive vehicles or operate plant.

14. (vi) Noise and vibration from construction machines such as excavators, concrete mixing plants or trucks could disturb local people or damage their houses. Risks will be mitigated by ensuring that plant and vehicles are in sound operable condition, free of leaks and fitted with exhaust baffles to reduce noise. Construction methods that involve heavy vibration should be excluded from areas that are in close proximity to houses and structures. The Contractor will be responsible to rectify damage to private property caused by vibration or accidents involving construction vehicles ore plant.

15. (vi) The construction activities will pose potential safety risks to workers and also to the local public, to be mitigated by briefing and training workers on safety procedures, marking hazardous work sites, providing warning signs and assigning responsibility for site safety to on-site supervisors; (vii) Large numbers of construction workers brought to the construction area could cause social impacts on the local communities, particularly associated with activities such as gambling, use of drugs and alcohol and antisocial behavior. The Contractor will be required to implement strict codes of conduct relating to social and commercial interaction with local communities and facilitate constructive recreation such as sport activities;

16. In the operation phase, the main potential negative impacts that have been identified are related to (i) driving conditions and traffic safety and (ii) risk of natural calamity. To minimize the negative impact of driving condition and traffic safety, Nghe An Department of Transportation (DOT), the responsible agency for subproject management in the operation phase, will cooperate with Nghe An DONRE, Anh Son DPC, Dinh Son and Anh Son CPCs to maintain the road periodically and collaborate with traffic police to control speeds and vehicle loads on the road, especially near the start point of the road - Cay Chanh junction, Dinh Son commune center.

17. 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. In general all the stakeholders are showed their support to the subproject. There are concerns from local people related to subproject information disclosure and compensation. The concerns are addressed in the EMP (See Table 11 – 12 for more details).

18. 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

19. Nghe An DPI will establish an Official Development Assistance (ODA) Project Management Unit (PMU) to implement the subproject in all phases. One PMU staff will be assigned as the Environmental Safeguards Officer (ESO). An Environmental Safeguards Specialist (ESS), within the Loan Implementation Consultant (LIC) team will organize a formal training course in roles and responsibilities for EMP implementation 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. The ESS will also support PMU's capacity building by reviewing and evaluating the capacity for environmental protection of the PMU and Nghe An Department of Transportation (DOT) – subproject management organization in the operation phase.

20. 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

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

Figure 1 – General Map of Thanh Son, Dinh Son Communes, Anh Son Districts and Subproject Area

II. BACKGROUND

A. Objectives of the Project

1. Basic Infrastructure for Inclusive Growth in Nghe An, Ha Tinh, Quang Binh and Quang Tri Provinces Sector Project

22. The Project Preparation Technical Assistance (PPTA) for the proposed Basic Infrastructure for Inclusive Growth Project in Nghe An, Ha Tinh, Quang Binh and Quang Tri Provinces (Project) was included in the Asian Development Bank's (ADB) Viet Nam Country Operations and Business Plan (2015–2017).[1]

23. The proposed Project will invest in implementation of the north central coastal provinces (NCCP) subregion socio-economic development plans. The Project responds to the Government of Vietnam's strategy of targeting the use of concessional ODA investment into poorer provinces using economic subregions as a means of identifying interconnectivity and synergies between provinces to accelerate economic growth in provinces that have previously lagged in terms of economic growth.

24. The project has three outputs being: (i) Improved connectivity within value chains and their supporting infrastructure; (ii) Improved business development infrastructure; and (iii) Strengthened Subregional infrastructure planning and management.

2. The Subproject

25. The subproject road is 8.00071 km long, going through Dinh Son and Thanh Son communes, Anh Son district. The start point at Km0+000 at its conjunction with NH 7 at Cay Chanh Junction (Km81+650), Dinh Son commune, Anh Son district. The end point Km8+000.71 at Cay Khe T-junction crossing district road 349B in Thanh Son commune, Anh Son district.

26. The current road bituminous macadam, which is seriously downgraded. On the whole route, the bitumen surface is replaced by aggregate, which makes the travel very difficult. On the whole route, the road surface is cracked, sunk, and damaged, the bituminous layer is completely blistered and the road base is deeply sunk and muddy in rainy season which makes it difficult for the transport of material and travel of local people. Some vehicles such as small-size cars and non-motorized are unable to travel on this road in rainy season.

27. 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.

[1] The Project is consistent with ADB's Country Partnership Strategy (CPS) 2012-2015.

III. POLICY AND LEGAL FRAMEWORK

28. The subproject shall comply with requirements of ADB SPS 2009 and the GOV's Guidelines on Implementation of Law on Environmental Protection 2014. Decree No. 18/2015/ND-CP has detailed information on strategic environmental assessment, environmental impact assessment and environmental protection plans. However certain activities commonly associated with infrastructure subproject such as quarry operations, extraction of gravel, etc., will also require permission from the relevant provincial level authorities. The two bridges will be constructed by the subproject are small bridges with the length of 12 and 13.5 m and will not be required for separated Environmental Impact Assessment[2].

A. Asian Development Bank SPS Requirements

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

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

30. For environmental safeguards, the Subproject is initially categorized as 'B'. A subproject that is classified as category A on environmental safeguards would be ineligible as a BIIG 2 subproject.

B. Legal and Administrative Framework for Environmental Protection in Vietnam

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

1. Laws

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

[2] In accordance to Decree No.18/2015/ND-CP, the construction or upgrade bridge with total length more than 500m should implement a separated Environmental Impact Assessment.

- 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.

C. Requirements for Subproject Categorization and Approval

32. Subproject selection and screening ensures that only subprojects ranked as Category B or C to follow ADB SPS 2009 will be included in the list of eligible subprojects for possible funding under the proposed Project. It is anticipated that all eligible subprojects will fall into Category B, whereby some adverse environmental impacts are expected additional subprojects will be screened by carrying out initial site visits to view local conditions, identify potential negative impacts, and complete Rapid Environmental Assessment (REA) Checklists. With regard to the requirements of Decree No. 18/2015/ND-CP, an Environmental Assessment Report is required for all development projects, either an Environmental Impact Assessment Report (EIAR) or an Environmental Protection Plan (EPP). In common with projects classified as Category B under the ADB SPS, smaller projects with some but limited adverse impacts will be subject to a lesser level of assessment in the form of an EPP. EPPs are required to be submitted for appraisal at the time of Subproject Investment Report preparation.

33. An IEE/EPP needs to be prepared if a subproject is classified as environmental category B following ADB SPS 2009. The IEE needs to include an environmental management plan (EMP). The PMU will select an appropriate national consulting firm to prepare the IEE/EPP with support from PMU/LIC environment specialist and update the representative IEE/EMP prepared by the PPTA Consultants if needed to reflect any change in the subproject detail design. The IEE/EPP should include the subproject scope, baseline information, materials to be used construction techniques, impact assessment, mitigation and environmental monitoring, and a minute of public consultation. The content and format of the IEE report should satisfy the requirements of both ADB and the Government of Viet Nam (EPP). Adequate public consultation needs to be carried out to share and get feedback on the initial findings of the IEE.

34. Review of IEE/EPPs: On completion, IEE/EPP reports will be reviewed initially by the PMU and if satisfactory, IEE/EPP reports will be forwarded to relevant PPC for approval. The environmental assessment and review procedures for IEE/EPP are as follows:

(i) PMU reviews IEE/EPP reports;
(ii) If found satisfactory, the PMU will forward to relevant PPC for approval and submit the IEE/EPP for each subproject to ADB for review, endorsement and uploading on the ADB website.

IV. DESCRIPTION OF THE SUBPROJECT

A. General Description

35. The road from Dinh Son to Binh Son, Anh Son district, after upgraded, will facilitate the connection between areas which have potential and advantages in agricultural and forestry production in the area of Anh Son district including Thanh Son, Binh Son and Tho Son communes to the processing facilities such as sugar plant of Lam River Sugar JSC in Dinh Son commune, Anh Son district; factories and processing facilities of Anh Son district; Medium-density Fiber board processing factory with the capacity of 400,000m^3/annum in Nghia Dan district, Nghe An, etc. via National Road QL7 and Ho Chi Minh road.

36. The road when completed will form a thorough traffic network from communes in the left bank of Lam River, Anh Son and Tan Ky districts to the arterial routes such as QL7, Ho Chi Minh on the East-West Economic Corridor to merge with the main roads in provinces to the important economic/industrial zones in and out the province and to neighbor countries in Southeast Asia region; then create favorable conditions for developing agriculture, rural area and exploiting the potential of the areas which it passes, particularly in forestation, production and agricultural and forest products processing.

37. Furthermore, the road helps to improve traffic condition, and people in the communes such as Thanh Son, Tho Son, and Binh Son to approach the centers of the districts and province easily. The road also enhances the commodity circulation for other localities of Con Cuong and Tan Ky districts in term of trading, travelling and transporting agricultural products to the processing and consuming facilities.

B. The Need for Subproject

38. The representative road subproject proposed for Nghe An is upgrading district road 349 (DR349) from Dinh Son to Cay Khe T-junction, Anh Sơn district, Nghe An province. The road is 8.00071km long, going through Dinh Son and Thanh Son communes, Anh Son district. The start point at Km0+000 at its conjunction with National 7 at Cay Chanh (Km81+650), Dinh Son commune, Anh Son district. The end point Km8+300 at Cay Khe T-junction crossing district road 349B in Thanh Son commune, Anh Son district. The road is invested and put into service at the end of 2014 as Cat V mountainous road in compliance with Vietnamese Standard TCVN 4054-2005. By present, after 12 years of using, the road has brought benefits to local people not only in Thanh Son, Binh Son, Tho Son communes but also in other localities of Con Cuong and Tan Ky districts in term of trade, travel and particularly transport of sugar cane material from Thanh Son, Binh Son and Tho Son to Song Lam Sugar Plant located in Dinh Son commune, Anh Son district, and cassava and paper materials from communes in the left riverbank. However, in recent years, the road is seriously downgraded affecting the travel, commodity transport of local people.

39. The road network of Anh Son district is unevenly allocated, the roads concentrates in the communes near NH7 and along Anh Son small town. Dinh Son - Binh Son road which is the only road connecting Thanh Son, Tho Son, and Binh Son communes to the center of the province is in poor condition and unable to ensure the traffic and cargo transport in the region.

40. The subproject is entirely included in the Transport Development Plan of Anh Son district, which was approved by Nghe An People's Committee at Decision No. 2045/QĐ.UBND-GT dated 23/5/2013. The alignment of the upgraded road is basically the

same with the existing route; some local locations are adjusted to ensure the specifications of a Cat-V mountainous road.

41. The investment and construction of District Road 349 from Dinh Son to Cay Khe T-junction will contribute to completing the infrastructure of Binh Son, Tho Son, and Thanh Son communes, help people to exchange food, foodstuffs, agricultural products, culture, and commodity with the localities in the province, in the country and overseas and create motive for socio-economic development of local people, hunger eradication and poverty reduction; create jobs and trading opportunities and improve living standard for people in the project area.

42. The project directly benefits 9,302 people including: people in Thanh Son commune (over 1,453 people), Tho Son commune (over 3,625 people) and Binh Son commune (over 4.224), additionally, indirect beneficiaries of the project also include people in Dinh Son commune, Anh Son small town and neighbour communes in Tan Ky district.

43. After the project is completed, total forestry and industrial land exploited in Binh Son commune is 7,545 ha, including 254 ha for industrial plant sugar cane, which is increasing in the future, and other 1,900 ha forestry land; in Tho Son commune, forestry land is over 3,257.42 ha, agricultural land is about 400 ha, for industrial plants including in Thanh Son commune, the forestry land is over 1,257.04 ha; the agricultural land is about 350 ha for industrial plants including sugar cane, tea, etc.

C. Subproject summary

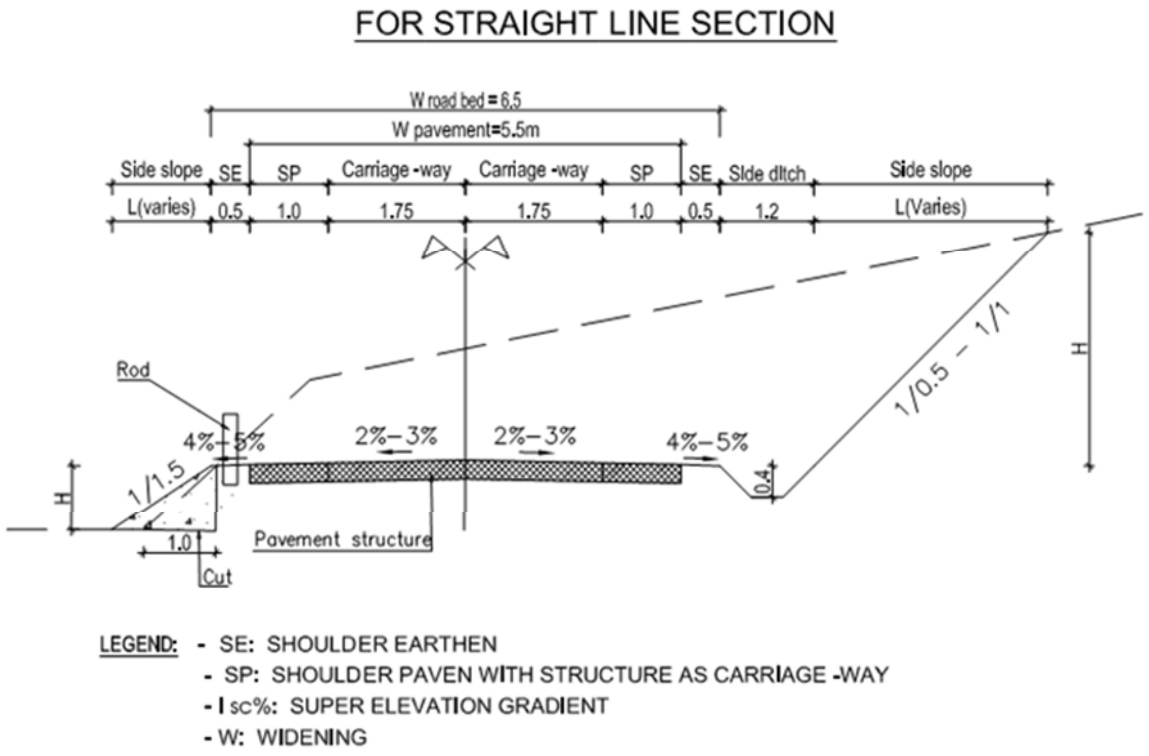
44. Upgrading district road (DR349) from Dinh Son to Star fruit tree (Cay Khe) T-junction, Anh Son district, Nghe An province. The road passes through Dinh Son and Thanh Son communes, Anh Son district.

(i) The start point at Km0+000 at its conjunction with NH 7 at Cay Chanh (Km81+650), Dinh Son commune, Anh Son district.
(ii) The end point Km8+000.71 at Cay Khe T-junction crossing district road 349B in Thanh Son commune, Anh Son district.
(iii) Total length: 8.00071 km

Table 2 – Road Subproject Summary

Name Representative	Upgrading District Road DH349 from Dinh Son to Cay Khe T-Junction, Anh Son District, Nghe An Province
Length Representative (km)	8.00071km
District – Representative	Anh Son
Total Number Districts	1
Total Number Communes	2 - Dinh Son and Thanh Son communes,
Beneficiaries	9,302
Investment Representative $mill	4,628,284
Investment per km (USD/km) $'000'	578,535

Figure 2 – Typical Straight Line Section



1. Hydrological Investigations

45. The hydrological survey was conducted through the observation of flow and interviews with the local people living in the subproject areas. Parameters of the hydrological survey of bridges, rivers, streams and the survey of water along the road were assessed and classified based on observation and description of the site and summarized in Table 2 above.

46. In addition to the fieldwork investigation of the hydrology, for the large bridge over the stream at Km5 + 826.03, a review and investigation was undertaken. The hydrological calculations provided by the local consultant are summarized below:

(i) The catchment area of the flow focus over Khe Xan bridge: 169.16Km²
(ii) Length of the main flow: 50km
(iii) Average slope: 25‰
(iv) Average slope of basin slope: 340 ‰
(v) The basin belongs to rain area X according to rain map of Viet Nam

2. Construction Material Sources

47. Quarries: After conducting and consulting with the local authorities, the PPTA engineering consultants came up with some suitable quarries including 2 soil quarries, 1 sand source and none rock quarry which meet the required capacity for the construction project and acceptable transport distance.

48. Rock and Stone Quarries

(i) The estimated volume of rock to be used for the subproject is 15,145 m^3. Based on the field investigation and consultation with the local authorities, in the area of the route, there are neither stone quarries nor building materials suppliers. However, the prices of stone, rocks and other materials will be identified quarterly in the notification of Nghe An Department of Finance – Construction.

49. Soil borrow pits: The estimated soil volume required for the subproject construction is 29,112 m^3 while the excavated soil volume is 15,086 m^3. Most of the excavated soil will be reused for filling. The rest will be purchased from the following borrow pits.

(ii) The soil borrow pit located in village 6, Dinh Son commune, Anh Son district, Nghe An province, at K1 + 500 nearby DR349 with capacity of 35.680m^2 x 6m = 214.080 m^3.

(iii) The soil borrow pit located in village 2 and village 3, Thanh Son commune, Anh Son district, Nghe An province, with capacity of 200m^2 x 6m = 1,200,000 m^3. This pit is in a hilly area located in village 3 (K7+550) and village 2 in the hill at Km7 + 650, Thanh Son commune near the route DR349, which is very convenient for materials transport.

50. Sand Source

(i) The sand source in village 6, Thanh Son commune, Anh Son district, Nghe An province is near the Hieu river bank, with a capacity of 40.000m^2 x 3m=120.000m^3. The sand source is in a mudflat area located in village 6, Thanh Son district, which is 100m from route DR349 at Km 5 + 250, which is very convenient for materials transport.

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

D. Land Acquisition

52. Impacts on land: According to the inventory of losses (IOL) results, the subproject will permanently acquire totally 4,788 m^2 of various kinds of land including 1,732 m^2 of residential land; 1,988 m^2 of agricultural land for annual crops; 287m^2 of perennial crop land and 781 m^2 of public land under management of CPCs (five households in Dinh Son commune have asset/crop affected and do not have land affected by the subproject). The IOL results are presented in Table 4.

Table 3 – Impacts on Land of Households and Organization/Agency

No.	District/ Commune	Total Affected Land Area (m^2)	Residential Land (m^2)	Annual Agriculture Land (m^2)	Perennial Crop Land (m^2)	Other Public Land (m^2)
1	Dinh Son	-	-	-	-	-
2	Thanh Son	4,788	1,732	1,988	287	781
	Total	4,788	1,732	1,988	287	781

53. Impacts on houses and structures: The subproject does not affect any houses, only structures of 49 households situated along the route (including two households in Dinh Son commune and 47 households in Thanh Son commune), specifically: 155m^2 of fibro cement roof, 169m^2 of concrete yard, 382m^2 of tree fence, 28 end posts, 87m^2 of iron gate, 103m^2 of bamboo/wooden gate, 163m^2 of brick wall, 21 concrete drainage culverts, and 31m^2 of concrete slab. The subproject does not affect house of households/organization.

E. Cost Estimate

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

Table 4 – Estimated Budget of the Subproject

No	Cost Items	Unit	Before Tax Costs	VAT	After Tax Costs (VND)	After Tax Costs (USD)[3]
I	**Civil Works Cost**		**67,144,227,273**	**6,714,422,727**	**73,858,650,000**	**3,304,638**
2	**Project Management Cost**	1.60%	**1,071,487,579**	**107,148,758**	**1,178,636,337**	**52,735**
3	**Construction Investment Consultancy Cost**		**4,627,282,667**	**462,728,267**	**5,090,010,933**	**227,741**
-	*Project Investment Survey Cost*	*Estimate*	*727,272,727*	*72,727,273*	*800,000,000*	*35,794*
-	*Design Survey Cost*	*Estimate*	*1,363,636,364*	*136,363,636*	*1,500,000,000*	*67,114*
-	*Project Investment Cost*	*0.33%*	*222,650,258*	*22,265,026*	*244,915,284*	*10,958*
-	*Environmental Impact Assessment Cost*	*Estimate*	*181,818,182*	*18,181,818*	*200,000,000*	*8,949*
-	*Shop Drawings Design Cost*	*0.98%*	*657,409,129*	*65,740,913*	*723,150,042*	*32,356*
-	*Shop Drawings Design Verification Cost*	*0.08%*	*55,595,420*	*5,559,542*	*61,154,962*	*2,736*
-	*Construction Works Cost Estimates Verification Cost*	*0.08%*	*53,178,228*	*5,317,823*	*58,496,051*	*2,617*
-	*Bidding Documents Preparation Cost*		*50,000,000*	*5,000,000*	*55,000,000*	*2,461*
-	*Bidding Documents Evaluation Cost*		*50,000,000*	*5,000,000*	*55,000,000*	*2,461*
-	*Expression of Interest & Prequalification Bidding Documents Evaluation Costs*		*30,000,000*	*3,000,000*	*33,000,000*	*1,477*
-	*Bidding Document & Request for Proposal Evaluation Costs*		*50,000,000*	*5,000,000*	*55,000,000*	*2,461*
-	*Contractor Selection Results Evaluation Cost*		*50,000,000*	*5,000,000*	*55,000,000*	*2,461*
-	*Cost of the consultant*		*37,551,233*	*3,755,123*	*41,306,356*	*1,848*

[3] US$ 1= VND 22,350

No	Cost Items	Unit	Before Tax Costs	VAT	After Tax Costs (VND)	After Tax Costs (USD)[3]
	Committee to resolve Contractors' Requests					
-	*Construction Supervision Cost*	*1.72%*	*1,155,149,286*	*115,514,929*	*1,270,664,215*	*56,853*
4	**Other Costs**		**4,478,081,093**	**428,269,104**	**4,906,350,197**	**219,523**
-	*General Costs*		*2,685,769,091*	*268,576,909*	*2,954,346,000*	*132,186*
-	*Design Verification Cost*	*0.07%*	*44,429,982*	*4,442,998*	*48,872,980*	*2,187*
-	*Construction Investment project appraisal cost*	*0.05%*	*55,894,940*	*5,589,494*	*61,484,434*	*2,751*
-	*Construction Works Evaluation & Approval Cost*	*0.36%*	*195,390,049*		*195,390,049*	*8,742*
-	*Independent audit cost*	*0.55%*	*590,713,974*	*59,071,397*	*649,785,371*	*29,073*
-	*Construction insurance cost*	*1.03%*	*691,585,541*	*69,158,554*	*760,744,095*	*34,038*
-	*Project Investment supervision and evaluation Cost*	*20.00%*	*214,297,516*	*21,429,752*	*235,727,267*	*10,547*
5	**Land Acquisition and Resettlement Costs**	*Estimate*	**3,200,000,000**	**320,000,000**	**3,520,000,000**	**157,494**
6	**Contingency**	16.00%	**13,535,008,941**	**1,353,500,894**	**14,888,509,836**	**666,153**
Total (1+2+3+4+5+6)					**103,442,157,303**	**4,628,284**

V. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

1. Topography, Geology, and Soils

55. Anh Sơn is a mountainous district in the Southwest of Nghe An province, with coordinates of $104^0$55' to $105^0$15' East longitude, $18^0$46' to $19^0$10' North latitude. The administrative boundary of the district is determined as follows:

- Bordering with Tan Ky and Quy Hop districts in the north
- Bordering with Thanh Chuong district in the south
- Bordering with Do Luong district in the east
- Bordering with Con Cuong district and Lao People's Democratic Republic.

56. The topography of the district is mostly mountainous, interspersed with plains. The Lam river is in a steep valley. The terrain is split by 3 large rivers (Lam, Con and Giang Rivers) and prone to droughts and floods. It can be classified into 3 terrain types: riverine plains, hills and low mountains.

57. According to investigation documents of the soils of Nghe An province, in Anh Son district there are several main types of soil as follows: (i) Alluvial soils, covering 5,728 hectares, accounting for 9.45% of the total natural area and 10.3% of the total area of soil types, existing in the communes Hung Son, Hoi Son, Tuong Son, Duc Son, Thach Son, Long Son, Tao Son, Binh Son and the subproject commune of Thanh Son; (ii) Beck alluvial soil; (iii) Convergence sloping soils; (iv) Brown-yellow Feralit soils developed on ancient alluvial deposits, covering an area of 1,993 ha, accounting for 3.28% of total natural area and 3.6% of the total area of soil types in the communes of Thanh Son and Binh Son (situated in the hills along the right bank of the Con river), (v) Brown-red Feralit developed on limestone covering an area of 392 ha at the foot of limestone mountains in the communes around Cam Son, Tho Son and the subproject commune of Dinh Son; (vi) Red-yellow Feralit soils developed on shale; (vii) Yellow-red Feralit soils developed on sandstone; (viii) Yellow-red Feralit soils developed on granite; (ix) Eroded Feralit exposing gravel; (x) Red-yellow Feralit soils developed on shale and metamorphic rock and (xi) Yellow-red Feralit developed on clay schists.

2. Weather, Natural Disaster and Climate Change

58. Anh Son district has a tropical monsoon climate and takes the specific characteristics of the climate in the central region. The climate is classified into 2 distinct seasons: the rainy hot season from May to October every year and the cold season from November to April. Winters are cold and wet, affected by the Northeast wind between October and January.

59. The annual average rainfall varies from 1,278 to 1,951mm/year. The rainy season lasts from May to October yielding 80-85% of the total rainfall of the year. The dry season lasts from November to April and January is usually the driest month.

60. The main weather related risk in the project is thunderstorm. It is usually happen from June to October in the mountainous area of the district.[4]

3. Hydrology

61. Hydrological regime of the district gets affected by the following rivers:

- Lam river: This is the largest river in Anh Son district, with a watershed of 17,730 km^2. The density of river network is 0.60 km/km^2. The annual average flow of the river reaches 688 m^3/s. The highest average water level was 5.03 m, the highest average flow is 2,260 m^3/s (measured at Cua Rao station). The river connects Laos with Nghe An and to East Sea.

- Con river: is a tributary of Lam river, with the section running through the district being 20km long, through the area of the communes: Binh Son, Thanh Son and Dinh Son. The watershed area of the river is 5,340 km^2, average flow is 141 m^3/s, and the flow modulus is 25.4 $l/s/km^2$.

- Giang river: is a tributary of Lam river, with the section running through the district being 20km long, through the area of the communes: Hoa Son, Hoi Son and Phuc Son. Basin area of the river is 1,050 km2. The average flow is 688 m^3/s and flow modulus is 25.3 $l/s/km^2$. The riverbed is small and narrow, making transportation difficult.

62. In addition to the 3 main rivers above, in Anh Son district, there are small streams forming a network of major river basins, including Khe Xan and Khe Dat streams cross the subproject road. This is water source of for production and daily life of the people in the district.[5]

4. Surface and Ground Water

Surface water resources

63. There are currently 72 lakes in Anh Son, along with the system of rivers and streams, with a total water surface area of 3,000 ha. Despite these extensive surface water reserves, irrigation is constrained by uneven distribution over the district, limited elevations and uneven terrain. The area is prone to droughts and floods.

64. As stated in the State of the Environment (SOE) report for Nghe An, 2015, surface water quality of the Lam River in the subproject area is still in good. Nearly all the testing parameters are within the allowed limits of standard QCVN 08-MT:2015/BTNMT except Total Suspended Solid (TSS) which is three times higher than the allowed level (150 mg/l in comparison with 50 mg/l of the QCVN) in the 3 years from 2010 to 2012[6].

Groundwater resources

65. The groundwater yield capacity of Nghe An up to May 2014 is about 3,887,462 m^3/day. Ground water is an important water source for domestic and also industrial purpose. 30-35% of

[4] Natural and Socio-economical Status of Anh Son district, provided by Anh Son DPC
[5] Natural and Socio-economical Status of Anh Son district, provided by Anh Son DPC
[6] Monitoring by DONRE of Nghe An for 2010-2014 period. The monitoring point is the Lam River at Cay Chanh Bridge

the domestic water supply is using ground water as the water source[7]. The monitoring result of Nghe An DONRE for 2010-2014 period shows that all the ground water quality parameters are within permissible levels of QCVN[8].

5. Air Quality and Noise

66. Compared to the standard QCVN[9] for ambient air quality, the monitored parameters for air quality in Nghe An province are all within permissible limits, showing some minor variation between 2011 and 2014. The nearest point to the subproject area is located in Do Luong town, about 34km to the Southeast.

67. In general, noise levels of the province are within the allowed levels of the QCVN[10] standard, with noise level of production, construction, trade and service activities not higher than 70 dBA during the daytime (from 6 am to 9 pm) and 55 dBA at night (from 9 pm to 6 am).[11]

B. Biological Environment

1. Forestry

68. According to land inventory data in 2014, forestry land in the district occupies 32,797 ha, accounting for 54% of the natural area of the district and includes production forest, protection forest and special forest. The forestry potential of Anh Son district is quite large and diverse, with forest land in the district being mainly on low hills, small slopes with good soils (mainly developed on shale and metamorphic rock). Therefore there is no need to invest too much on restoration; in many places forest regeneration is also very fast with proper protection[12].

69. All the protection forest and special forest areas of Anh Son district are located in Pu Mat National Park, about 12 km to the Southwest of the proposed route. There are only some areas of production forest existing in the subproject area.

2. Agriculture

70. Agricultural land accounts for 31% of total land area of the district of which 15% is used for annual crops 16% for perennial plants. Forest land occupies 53 % of the total district land area.

Table 5 – Land use in Subproject District

Type of Land	Area	%
Total land area	60,326 ha	100
Agricultural Land	51,106 ha	84.72
Agricultural production land	18,858 ha	31.26
Land for annual crops	9,219 ha	15.28
Paddy land	3,660 ha	6.07
Land for other crops	5,546 ha	9.2

[7] Status of Environment (SOE) Report of Nghe An, 2015
[8] QCVN 09: 2015-MT/BTNMT National Technical Regulation on Ground Water Quality
[9] QCVN 05: 2013/BTNMT National Technical Regulation on Ambient Air Quality
[10] QCVN 26:2010/BTNMT National Technical Regulation on Noise
[11] Nghe An SOE report 2015
[12] Natural and Socio-economical Status of Anh Son district, provided by Anh Son DPC

Type of Land	Area	%
Land for perennial plant	9,640 ha	16
Forestry land	31,793 ha	52.7
Aquaculture land	454.6 ha	0.75
Non- agricultural land	6,113.6 ha	10.13

Source: Anh Son Districts Statistic Yearbook, 2015

C. Socio-Economy and Infrastructure

1. Population and Ethnicity

71. The total population in the four target communes (Dinh Son, Thanh Son, Binh Son and Tho Son) is 17,562 people in 4,275 households. The number of people from ethnic minority groups who will benefit from proposed subproject is 3,127 in 713 households, accounting for 18% of the total beneficiary population. The majority of these are of Thai Ethnicity.

2. Land use Status in Subproject Area

72. Agricultural land accounts for 31.26% of total area of the province, of which the agricultural land area available for annual crops and perennial plants is only 15% to 16% respectively. Forest land occupies 52.7 % of total district land area.

Table 6 – Land use 2015 in Target Communes (Hectares)

Type of Land	Dinh Son Commune	Thanh Son Commune	Tho Son Commune	Binh Son Commune
Total land area	2303.5	1703.8	4387	2762
Agricultural production land	1554	1494	3687	2454
Land for annual crops	520.7	339.4	524.6	678.5
Paddy land	26.7	126.8	37.1	244.6
Land for perennial plants	287.4	227.6	110.8	282.4
Forestry land	724.2	919.3	3051.4	1481.77
Aquaculture land	21.5	7.9	0	11.5
Non- agricultural land	356	169	443.3	276.4

Source: Anh Son district Statistics Yearbook, 2015

3. Incidence of Poverty

73. Table 5 presents the poverty incidence in the target communes. The data indicates a high incidence of poverty in the communes where ethnic minorities live. Poverty is more concentrated in ethnic minority groups.

Table 7 – Number of Poor Households in the Subproject Area

Communes	2012	2013	2014	2015			2016[13]		
	As Overall	As Overall	As Overall	As Overall	Kinh People	EM	As Overall	Kinh People	EM
Tho Son	46.8	37	39.7	28.7	15.2	71.5	35.99	21.1	81.64
Binh Son	42.6	39.8	32.1	24.2	20.6	40.5	32.62	na	na
Thanh Son	41	35.7	33.1	28.5	28.8	28.1	37.47	32.7	43
Dinh Son	8.6	6.2	4.4	3.3	3.30	na	4.67	4.67	na

Source: Data collection from Anh Son District, 2016

4. Employment and Income

74. Agriculture production is the major income source in these communes. The main crops are paddy, maize, cassava, sweet potato and groundnut with sugarcane as a cash crop. Livestock is a source of income in these communes.

[13] Poverty rate 2012, 2013, 2014 and 2014 are based on the national poverty line set by the GoV for period 2011-2015 (income- based poverty criteria). Poverty rate 2016 is based on the new national poverty line set by the GoV for period 2016- 2020 (multi-dimension poverty criteria)

Table 8 – Main Agricultural Products in Target Communes, 2015

Indicators		Dinh Son Commune	Thanh Son Commune	Binh Son Commune	Tho Son Commune
Gross output of agriculture at current price	VND Million	73,743	33,617	59,928	56,779
From crops	VND million	50,427	14,785	40,123	36,791
From Livestock	VND Million	22,091	18,146	18,517	19,589
Total production of cereals	Ton	2570	1274	2319	831
Average cereals per capita	kg/person	524	407	541	249
Main agricultural products					
Paddy					
+ Planted Areas	ha	47	198	395	102
+ Production	Ton	254	1067	2104	509
Maize					
+ Planted Areas	ha	976	67	70	111
+ Production	Ton	3316	207	215	322
Sweet potato					
+ Planted Areas	ha	10	1	8	8
+ Production	Ton	63	6	47	47
Cassava					
+ Planted Areas	ha	9	75	151	80
+ Production	Ton	126	1260	2580	1200
Groundnut					
+ Planted Areas	ha	3	0	17	70
+ Production	Ton	6	0	35	158
Sugarcanes					
+ Planted Areas	ha	23	53	334	400
+ Production	Ton	1334	3250	20106	24551
Livestock					
Buffaloes	head	439	662	1077	873
Cow	head	1058	449	630	942
Pig	head	1353	1444	1454	623
Poultry	head	41329	21719	31399	28591
Goat	head	339	520	733	913

Source: Anh Son district Statistic Yearbook, 2015

5. Education Levels

75. A survey of 80 respondents was conducted in the two communes of Dinh Son and Thanh Son with 40 in each commune. Table 9 shows that nearly 5% of the respondents among poor households had never been to school. The percentage of respondents who never attended school is 3% for men compared to none for women. Of the 80 people interviewed, 2 had graduated from the university, both women. It seems that in the project area received higher levels of education level than men did. The higher the level attained, the more likely the

household is to be non-poor. Amongst poor households, the majority had attained only a primary level of education with 61% compared to 27.8% and 7.3% of near- poor and non- poor households.

Table 9 – Education by Economic Status and Sex Disaggregation

Education Level	% Survey Respondents					
	By Poverty Classes			By Sex		Female Headed HH
	Poor	Near Poor	Non-poor	Women	Men	
Never been to school	4.8%	0.0%	0.0%	0.0%	3.0%	0.0%
Primary school	61.9%	27.8%	7.3%	34.0%	15.2%	56.3%
Secondary school	19.0%	50.0%	61.0%	46.8%	48.5%	31.3%
High school	9.5%	16.7%	19.5%	10.6%	24.2%	6.3%
Vocational training	4.8%	5.6%	7.3%	4.3%	9.1%	6.3%
University	0.0%	0.0%	4.9%	4.3%	0.0%	0.0%

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

6. HIV and Human Trafficking

76. Human trafficking has not been recorded in the subproject area. Related to knowledge of HIV/AIDS, 97.5% of respondents of the survey had heard about HIV/AIDS with more women, 97.9%, as compared to 97% of men. For those that had some knowledge of HIV/AIDS, the main sources of information were television (93.8%). The role of medical staff/ healthcare workers at commune/ village level was weak in dissemination of HIV/AIDS knowledge; only 2.5% of respondents had knowledge of HIV/AIDS through health worker.

77. Overall the survey results revealed that many people are uncertain of what causes and prevents HIV/AIDS. Although 97% of the men and 98% women respectively agreed that having sex with only one faithful partner reduces the risk of HIV transmission. A high proportion of both men (97%) and women (96%) agreed with the statement that using a condom prevents HIV transmission. However, 30% men and 28% women still believed that mosquitoes and other insect bites would transmit HIV. Overall, 30% of respondents and 50% female-headed households agreed that it could be tell someone is infected with HIV just by looking at him/her.

Table 10 – Sources of Information on HIV/AIDS

	HIV Sources				
	TV	Radio	Images/ Posters	Friends/ Family	Medical Staffs
Percentage of respondents know about HIV	97.5%				
Percentage of respondents	93.8%	1.3%	0.0%	0.0%	2.5%
Men	97%	0%	0%	0%	0%
Women	91%	2%	0%	0%	4%
No. of respondents with female-headed family know about HIV	88%	0%	0%	0%	6%

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

Table 11 – Knowledge of HIV/AIDS (% of Survey Respondents)

Survey Responses	Men	Women	Total	Female Headed HH
Having sex with only one faithful partner reduces the risk of HIV transmission	97%	98%	98%	94%
Using condom every time during sex prevents HIV transmission	97%	96%	96%	94%
In your opinion, can you tell someone is infected with HIV just by looking at him/her	27%	32%	30%	50%
Mosquitoes and other insect bites will transmit HIV	30%	28%	29%	13%
One can get HIV if one uses public toilets	0%	2%	1%	0%

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

7. Infrastructure

78. ***Transportation***

79. The contribution of the road to improved inclusive growth will be achieved through the connectivity to both the district center of Ahn Son and the connection through to Quy Hop and the industrial zones to the North East of Nghe Ahn. The road will improve traffic conditions for the people in the communes such as Thành Sơn, Thọ Sơn, and Bình Sơn to access the administrative services located in the districts and province. The road enhances the commodity circulation for other localities of Con Cuông and Tân Kỳ districts in term of trading, travelling and transporting agricultural products to the processing and consuming facilities providing lower costs, increased returns that support the competitive advantage of small producers and enterprises providing additional incentives for additional investment in production systems.

80. The subproject supports the connectivity of roads into the GMS regional east – west corridor based on NH 7 from which the subproject starts and provides a spur road connection. Currently Department of Transport and SEDP plans have prioritized the inter-district road from Quay Hop through to Anh Son District. The 2016 to 2020 plans include the 10.7 km section from Quy Hop to the end point of the proposed subproject using provincial resources. The PPC proposes to use the BIIG2 investment to complete the inter-district connection through to Ahn Son District connecting onto NH 7.

81. The road when completed will connect the communes in the left bank of Lam River, Anh Sơn and Tân Kỳ districts to the arterial routes such as NH7, Hồ Chí Minh on the East-West Economic Corridor that integrates them with provincial markets and important economic/industrial zones; these linkages will reduce costs and improve conditions for developing agriculture, rural area and exploiting the potential of the areas, particularly in forestation, production and agricultural and forest products processing.

82. The road from Dinh Sơn to Bình Sơn, Anh Sơn district, after upgraded, will facilitate the connection between production areas for agriculture and forestry in Anh Sơn district including Thành Sơn, Bình Sơn and Thọ Sơn communes to the processing facilities such as sugar plant

of Sông Lam Sugar JSC in Đỉnh Sơn commune, Anh Sơn district; factories and processing facilities of Anh Sơn district; MDF processing factory with the capacity of 400,000m^3/annum in Nghĩa Đàn district, Nghệ An, etc. via National Road NH7 and Ho Chi Minh road. The road is expected to increase the sourcing of raw materials by processors for example, sugar company indicated interest in expanding the area they contract growers with a possible doubling of production areas due to lowered costs for sourcing raw materials.

83. ***Traffic Forecast - PCU (Passenger Car Units) Ratings***

84. The traffic forecasts derived from the traffic counts and the generated traffic are presented in Table 12 indicates significant growth in the freight movement reflected in trucks and heavy traffic along with motorbike and passenger car growth with lower increases in passenger vehicles such as buses. A clear challenge from the forecast is the increase in number and size of trucks that are forecast to use the road.

Table 12 – PCU Forecasts

Design Category (TCVN 4054 standard)	Design Traffic Volume (Daily PCU)
I	>15,000
II	>6,000
III	>3,000
IV	>500
V	>200
VI	<200

85. Based on the forecast traffic the PPTA estimate of the PCU rating of the subproject road is provided in Table 12. The PCU overall is estimated to reach 1,366 the majority of this being motorized, with the heavy vehicles providing 887 PCU.

Table 13 – Estimated PCU at Subproject Design Life

AADT	AADT (Motorised)	AADT Bicycles	AADT MC	AADT (>4)	PCU	PCU (Motorised)	PCU (> 4)
2,028	1,949	79	1,544	405	1,366	1,350	887

PPTA Design Consultant Estimates

8. Unexploded Ordnance

86. In Nghe An province, ordnance used by combatants during conflict that took place in the region between 1962 and 1975. 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 ordnance, defying the assessment of risks to a reliable level. Information on the extent and location of UXO is sparse at any level. The Viet Nam military authorities estimate that the volume of UXO left in the country following the cessation of hostilities with the United States was between 350,000 to 700,000 tons, which does not take into account ordnance that remains from earlier conflict with French colonial forces and later conflicts with China in border regions. In some locations, such as the sites of former combat bases or military supply routes,

the scale of the risk is high. For most of the rest of the country, the level of risk for any one site is largely unknown.

87. UXO devices are encountered when ploughing fields, searching for scrap metal and even by children playing. 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 Bomcien, under the Ministry of Defense. There has been no incident relating to UXO recorded in Anh Son district in recent years although a 500kg-bomb was revealed in Long Son commune, Anh Son district in 14 April 2015[14], indicating that some risk remains. 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

88. There are several historical sites located in the subproject area but mainly from the wartime between 1954 and 1976. In Anh Son district, there is only one archaeological site - Dong Truong cave - in the administrative area of Hoi Son commune, located roadside of NR7, about 15 km to the East of the subproject starting point. The archaeologists has discovered from Dong Truong tools from Stone Age, ceramic, bronze and iron tools and tombs. There are 10 tombs with ages from 10,000 to 12,000 years.[15]. In case excavations lead to the discovery of artifacts, procedures for addressing chance finds of antiques and artifacts will be set up for the construction phase.

E. Key Environmental Features

89. ***Physical environmental features:*** 8km of the subproject route runs mainly in the flat terrain of the Lam river delta, especially the first 3 km, which runs through an area cultivated with rice, corn, sugar cane and cassava and some small sections through hilly terrain with production forests of acacia and bamboo. The subproject road crosses 3 main waterways: the Lam River, Khe Xan and Khe Dat streams. Two new bridges will be constructed over Khe Xan and Khe Dat stream.

90. ***Social environmental features:*** The road runs through several residential areas of Dinh Son and Thanh Son communes, Anh Son district, especially Dinh Son commune center, at the start point of the road. The last 5 km runs through residential areas of Thanh Son commune center, Hung Thanh, Truong Thanh and Lang Mai villages of Thanh Son commune.

[14] http://www.vietgiaitri.com/xa-hoi/doi-song/2015/04/dao-duoc-qua-bom-gan-nua-tan-khi-lam-mong-xay-nha/
[15] http://ngaynay.vn/van-hoa/di-chi-khao-co-hoc-dong-truong-nghe-an-lieu-co-chim-vao-quen-lang-2610.html

VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

91. 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.

92. Activities during the construction phase will be mainly being 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.

93. Subproject implementation will impact on the lives of local people, especially those who live along the subproject road. The largest residential area is Dinh Son commune center - Cay Khe Junction, the start point of the subproject road.

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

A. Potential Impacts and Mitigation Measures in the Pre-Construction Phase

1. Land Acquisition and Resettlement

95. **Impacts:** The impact is mainly on residential area along the road like Dinh Son commune center, Thanh Son commune center, Hung Thanh, Truong Son and Lang Mai village, Thanh Son commune, Dinh Son district. The subproject will affect a total of 85 households (AH) in two communes (comprising 80 households in Thanh Son commune and five households in Dinh Son commune). There is no household adversely affected by construction of the subproject to the extent that they lose more than 10% of their productive land and no household to be relocated. Besides impacts on households, the subproject also causes impacts on land and assets of two agencies/organizations including Thanh Son CPC and Anh Son District Power Company.

96. **Mitigation measures:** During the feasibility study phase, resettlement and land acquisition impacts have been identified and a Resettlement and Ethnic Minority Development Plan has been prepared. As there is no household severely affected by construction of the subproject, the REMDP will be updated and validated, and will provide for compensation and support of affected households as appropriate before construction starts. The PMU will also inform Thanh Son and Dinh Son CPCs, local people and Anh Son District Power Company of all information related to road construction. Arrangements will be made for regular monitoring and to record and redress grievances.

2. Disturbance of Unexploded Mine and Bomb (UXO)

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

98. **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 Nghe An Provincial Military Command to check whether the area along the subproject route has been checked for in the past. If it has not, and if a risk is identified following consultation, an authorized UXO clearing contractor will be engaged to undertake UXO detection and clearing along the subproject road. The PMU must ensure that the construction contractors shall only commence site works after the UXO clearing contractor has certified that the subproject areas as safe.

B. Potential Impacts and Mitigation Measures in the Construction Phase

1. Encroachment the Forest

99. **Impacts:** Construction work will involve some removal of trees along the route, mainly some sections that go through production forest and other trees cultivated by people who live along the road. A total of 1,273 m^2 of crops are affected and 820 trees, including 592 fruit trees and 228 timber trees are cleared by the upgrading and renovation of the subproject road. There is a risk of workers cutting down trees in the production forest area for fuel wood during construction time of 24 months.

100. **Mitigation measures:** Trees and crops 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, DARD offices of Anh Son 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 not use or permit the use of fuel wood for construction activities or for cooking and water heating in worker's camps. The contractors should not buy or use wood from illegal sources. The PMU assisted by the ESP and CSC will strictly supervise and monitor the protection of trees and other vegetation.

2. Impact on Crossing Streams or Bridge Construction Locations

101. **Impacts:** Careless construction and poor handling of materials at two bridge construction sites can cause blockages and release of silt to streams/ streamlets. Runoff water during rain could bring waste and soil into Khe Xan, Khe Dat streams and the Lam River, leading to siltation and reduced water quality, impacting cropped areas downstream of the Lam River. The impact is not large as the main water source for domestic water supply of Anh Son district is come from 72 lakes in the district.

102. **Mitigation measures:** Excavated material is to be used as fill or distributed to local users or taken to approve disposal sites, and not stored close to the waterline. Silt fences, consisting of fine, flexible mesh firmly secured to the ground will be used as appropriate at the excavation sites for bridge abutments on Khe Xan and Khe Dat's banks to prevent silt release to these streams. Fine material stockpiles should be covered with tarpaulin and located at least 50m from the river/stream bank. The contractors should limit the main construction activities of the 2 bridges to the dry season.

3. Deterioration of Surface Water Quality

103. **Impacts:** Surface water quality of the subproject area could be degraded due to silt runoff, release of chemicals used in construction and sanitary wastes from worker-based camps as follows: a) surface and subsurface water resources, like the rice fields near the Lam river at Km1+024 of the road and lakes and ponds along the road may be contaminated by fuel and chemical spills, or by solid waste and effluent generated at construction campsites; (b) at the Khe Xan and Khe Dat streams and the Lam River, silt may be released with runoff from the construction area, workshops and equipment washing-yards; (c) water flows could be temporarily blocked during pier installation for bridges over the Khe Xan and Khe Dat streams. The impact will mainly on water bodies along the subproject road and the workers' camp area, especially at the bridge construction sites over the Khe Xan stream where floods usually happen.

104. **Mitigation measures:** In order to minimize this negative impact, the contractor will provide adequate drainage facilities at construction sites and worker camps; store lubricants, oils in designated roofed areas with impervious foundation situated at least 50m from water bodies. Sediment ditches and silt fences should be installed in sensitive locations to avoid runoff, erosion and silt release in to the water bodies. Material storage sites should also be covered carefully with tarpaulin and located at least 50m away from water bodies. PMU and CSC will responsible to monitor these mitigation measures.

4. Increased Local Air Pollution Due to Rock Crushing, Cutting and Filling Works

105. **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. Bitumen activity will also generate gas and odor. Construction machines will also create noise during their operation. These gaseous emissions, dust and noise could cause respiratory and hearing problems for residents who live along the subproject road likes Dinh Son and Thanh Son commune centers; Hung Thanh village, Dinh Son commune; Truong Thanh, Lang Mai villages, Thanh Son commune, especially the sensitive receivers like Thanh Son kindergarten, Thanh Son primary and secondary school...

106. **Mitigation measures:** The contractors should not locate any noise generating vehicles and machinery or large material storage site near or within the above residential areas. Warning signs, speed limit signs should be placed at the sites of sensitive receptors to reduce the transportation speed and reduce dust, gaseous emissions. The contractors will work with the 2 CPCs of Dinh Son and Thanh Son as well as Anh Son DPC and the representative of ESP 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.

5. Impacts on Local Traffic

107. **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. The road runs along the cultivated areas and small hills where there are no alternative routes to access the commune center. The subproject road is also the access for students in Thanh Son commune to travel to Anh Son Junior High School in the Dinh Son commune center and also there are several schools and kindergarten and their branches located roadside. Cay Chanh market located near the start point of the subproject road and Cau Dat market, located near Thanh Son commune center. Construction activities may constrain access and cause difficulty for people during the construction phase. Local people and people from other areas who travel on the subproject road will be affected during 24 months construction period.

108. **Mitigation measures:** To minimize the disturbance to local people, the contractor will prepare and submit to the CSC a construction traffic plan indicating the timing of vehicle journeys to avoid peak traffic hours. The contractor will also coordinate with local traffic authorities to implement appropriate traffic diversion schemes to maintain traffic flow during construction, set up clear traffic signal boards and traffic advisory signs at the start and end points of the road, at the T-junction with the road to Con Cuong town and at the sensitive locations likes Thanh Son kindergarten, Thanh Son primary and secondary school and Cau Dat market. 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. Guidance for the preparation of traffic management plans is provided as Appendix 6.

6. Safety of Local People or Construction Workers

109. **Impacts:** Workers and the public are at risk of accidents associated with construction, particularly excavations, and operations involving heavy machinery. Material transport and construction activities on the existing road may create the risk of traffic safety and affect houses

and other structures on roadsides, particularly on the sensitive receivers such as Thanh Son primary and secondary school, Thanh Son kindergarten, Thanh Son commune center, Cau Dat market, Cay Chanh market and several residential areas along the road.

110. **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.

7. Impact by the Large Influx of Construction Worker

111. ***Impacts:*** About 80 workers will be mobilized discontinuously in 24-month construction phase. The influx of construction worker can cause (i) a burden on local public services like electric and water supply; (ii) risk of transmission of diseases to the subproject area; (iii) conditions for great spread of diseases such as sore eyes, cholera, flu and respiratory problems; (iv) risks 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.

112. ***Mitigation measures:*** (i) Careful siting of workers' camps and facilities as agreed by local communities and approved by the PMU (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 cleaned 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.

C. Potential Impacts and Mitigation Measures in the Operation Phase

1. Driving Conditions and Community Safety

113. The upgrading and construction of the road is likely to increase the vehicle speed on the road. Increases in traffic flow indicate additional future traffic should be moderate and unlikely to create many community safety issues. Increases in traffic flow will possible create traffic jam condition. On the other hand, the condition of the road facilities will be enhanced and driving conditions should improve. The beneficiaries of the subproject are local people in Anh Son districts and two neighbouring districts of Con Cuong and Tan Ky and people who travel on the subproject road. This is an average impact as the subproject road will be upgraded to Grade V - Moutainous road and creates favorable travel condition for local people.

114. **Mitigation measures:** Nghe An DOT will install speed limit board and road hump at the residential areas like Dinh Son and Thanh Son commune centers, Hung Thanh, Truong Thanh and Lang Mai villages, and some other sensitive points. Danger cross signboard will be installed at the start and end point of the road, at the intersection with the road to Con Cuong town and at

the residential areas. Nghe An DOT will cooperate with local traffic police to navigate the transportation along the whole 8 km of the subproject road.

2. Favorable Conditions for Transportation of Goods and People Movement

115. **Impacts:** The project directly benefits 9,302 people including: people in Thanh Son commune (over 1,453 people), Tho Son commune (over 3,625 people) and Binh Son commune (over 4.224), additionally, indirect beneficiaries of the project also include people in Dinh Son commune, Anh Son small town and neighbouring communes in Tan Ky district. The completion of the road will support students in Truong Thanh and Lang Mai villages and households and businesses near Cay Khe T-Junction to travel to Anh Son Junior High School and back home on the same day, avoiding the need for boarding.

116. After the project is completed, access to plantation forest and industrial land Binh Son commune will be facilitated. The area is 7,545 ha in extent and includes 254 ha for industrial sugar cane, which is increasing in the future, and other 1,900 ha of plantation forest land. Tho Son commune, forestry land is over 3,257 ha, agricultural land is about 400 ha in extend. In Thanh Son commune, the plantation forest land is over 1,257 ha; and agricultural land is about 350 ha for industrial plantations including sugar cane and tea.

VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

117. The objectives of the stakeholder consultation process was to disseminate information on the subproject and its expected impact, long-term as well as short-term, among primary and secondary stakeholders, and to gather information on relevant issues so that the feedback received could be used to address these issues at early stages of subproject design. Another important objective was to determine the extent of the concerns amongst the community, to address these in the subproject implementation and to suggest appropriate mitigation measures.

A. Public Consultation Preparation

118. 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 district road 349 included representatives from Nghe An DPI, DONRE and DARD offices of Anh Son district. Consultation has also been implemented in a meeting with representatives from 2 CPCs - Dinh Son and Thanh Son, Anh Son district and local people who live along the subproject road, in Cay Chanh village, Dinh Son commune and Truong Thanh village, Thanh Son commune, the beneficiaries and affected people of the subproject implementation. Among 8 people have been consulted at Anh Son DPC, 3 are women. Consultations took place in 15 December 2017.

B. Information Dissemination during Public Consultation

119. 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.

120. 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. Obtained Results and use of Results from Public Consultation

121. The results of the public consultations are recorded in Table 11 and 12 below. In general, all the relevant stakeholders are support the implementation of the subproject. As the subproject located in the low population density and the main construction work will be upgrade road

surface based on the existing road foundation, no house must be relocated and no major land acquisition will be taken, the local people is totally support the subproject implementation.

Table 14 – Main Issues and Information from Local Authorities

Main issues	Information from relevant authorities
Forest in the subproject area	DARD office of Anh Son district: forestry land in the district occupies 32797 ha, accounting for 54% of the natural area of the district, with coverage of 48%, including 22,359 ha of production forest, 8,211 ha of protection forest and 2,226 ha of special forest. However, there is neither special forest nor protection forest in the administrative area of the subproject communes that is vulnerable to activities from the subproject
Protection forest in the subproject area	DONRE office of Anh Son district: Pu Mat National Park locates 12 km away from the subproject road but there is no protection and special forest existed in the subproject area.

Table 15 – Main Environmental Concerns from Public Consultation

Concerns Expressed	How Concerns are Addressed in IEE
No clear information related to the road construction be provided to local people	The IEE refers to the REMDP, which is to be updated and validated, and will provide for information to affected households, compensation and support as appropriate before construction starts.
Land acquisition and compensation	

122. 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 Headquarter and on the ADB website. Nghe An PMU will responsible for IEE translation to Vietnamese and disclose at Dinh Son and Thanh Son communes of Anh Son district.

D. Public Consultation during Detailed Design

123. Further public consultation will take place during detailed design. This will be organized in each of An Thuy, Son Thuy, Cam Thuy, Ngu Thuy Bac communes. Meetings will be announced in advance, and shall be open to all members of public and in a manner free of coercion. Updates on the subproject will be given, including an outline of the improvements to be made, and information on the construction schedule including duration of construction and likely construction impacts on local communities. Views will be recorded and any concerns referred to the design engineers to take consideration of in detailed design.

VIII. GRIEVANCE REDRESS MECHANISM

A. Purpose of the Mechanism

124. During the preparation of the subproject, information is disseminated to local people on the scope of the subproject, and environmental and social impacts. Negative impacts of an environmental or social nature, or resettlement impacts, may occur during the construction and operational phases. Any comments/ suggestions of local people will be solved quickly, transparently in accordance with protected the law, particularly for people affected by the subproject. This grievance redress mechanism is classified by level and responsibilities of involved parties.

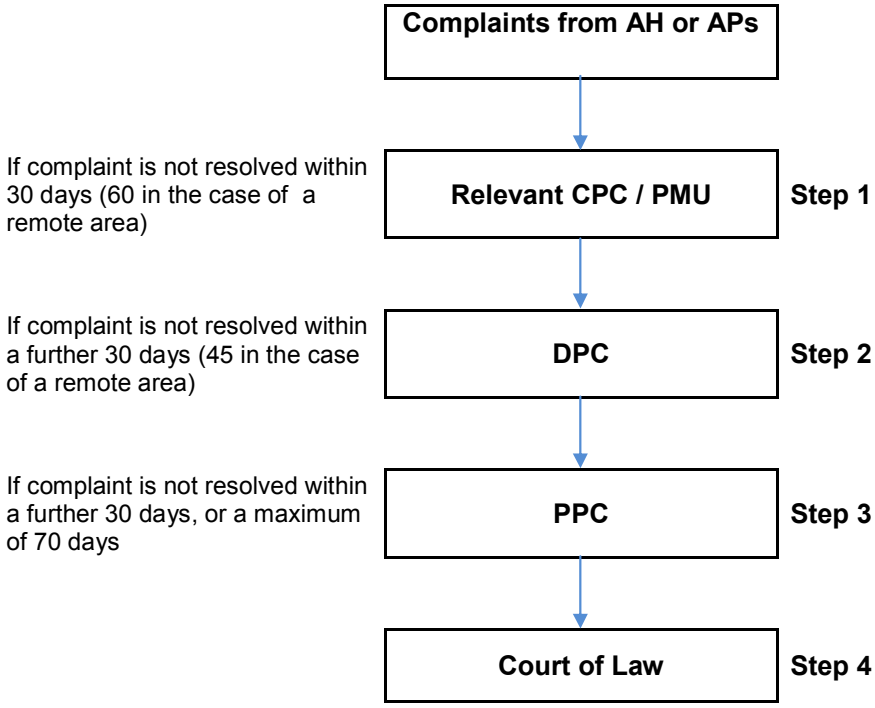
B. Grievance Redress Process

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

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

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

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


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

IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation Arrangements

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

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

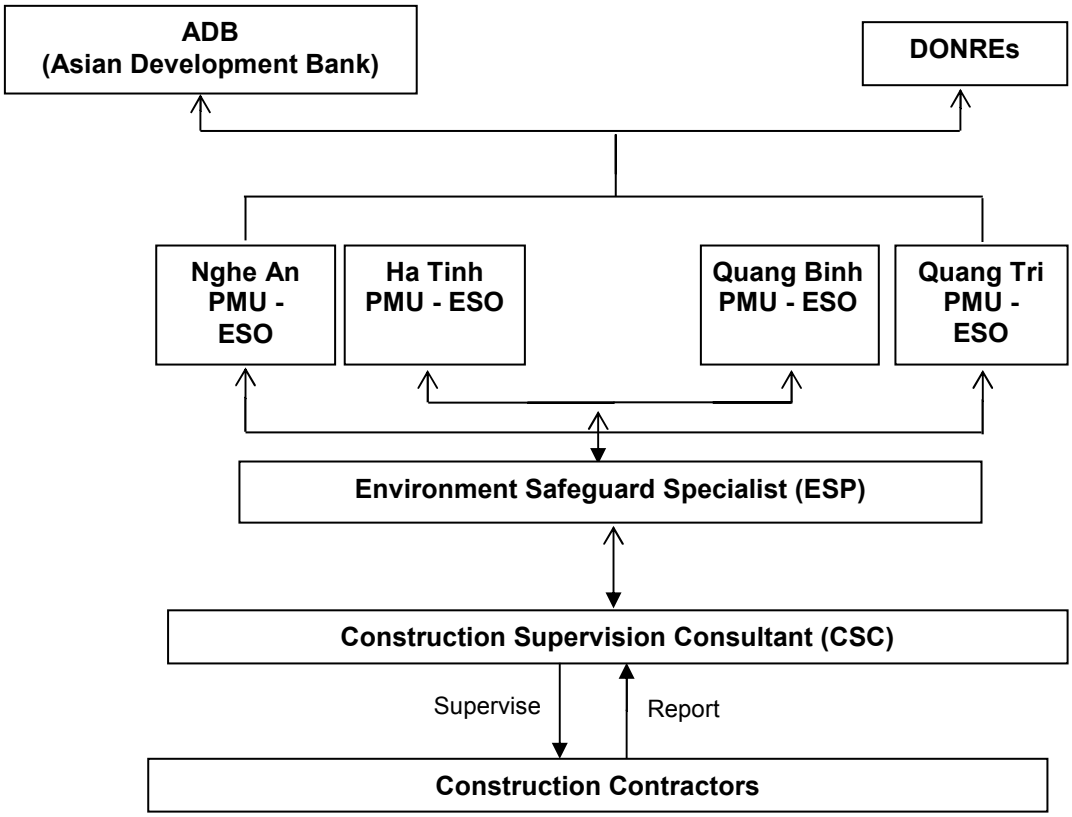
Table 16 – Responsibilities for EMP Implementation

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

	- Carry out all tasks allocated to the ESP in the EMP. - Work with the 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 any change in alignment that will result in further potential environmental impacts that are not within the scope of the originally prepared IEE. - Undertake environmental management capacity building activities for PMU as described in the IEE and EMP. - Engage international and national environment specialists to ensure proper implementation of EMP provisions. Through these specialists, the ESP shall: (i) ensure proper and timely implementation of ESP's tasks specified in the EMP, (ii) conduct environmental training as specified in the IEE/EMP for PMU, (iii) conduct workers' orientation on EMP provisions, (iv) undertake regular monitoring of the contractor's environmental performance, as scheduled in the EMP (v) conduct field measurements for surface/ground water quality, dust and noise as required in the EMP, and (v) prepare environmental baseline report and environmental semi-annual environmental monitoring reports , as specified in the EMP, for submission to ADB.
Construction Supervision Consultant (CSC)	- Provide the ESP relevant information as well as full access to the subproject site and all project-related facilities (such as construction yards, workers' camps, borrow and quarry areas, crushing plants, concrete mixing plants, etc.) to monitor contractors' implementation of the subproject EMP, assess environmental impacts resulting from on-going site works and operation related facilities, undertake environmental effects monitoring and orientation of workers on EMP implementation. - Undertake day-to-day subproject supervision to ensure that contractors properly implement the EMP. - Orient workers on EMP implementation, and health and safety procedures - Document and report to PMU on occupational accidents, diseases and incidents - As part of regular progress report submission to PMU, prepare reports on the status of the contractors' implementation of the EMP and health and safety issues - Engage an environmental staff to ensure proper implementation of the above tasks.
Contractors	- Recruit or appoint qualified individual to act as the contractor's environmental officer to ensure compliance with environmental statutory and contractual obligations and proper implementation of the Subproject EMP - Ensure full understanding of the EMP and resources required for its implementation when preparing the bid for the work. - Implement additional environmental mitigation measures, as necessary
Nghe An Department of Transportation (DOT)	-Responsible for operation and maintenance of Subproject road - Implement the EMP monitoring during operation
Nghe An Department of Natural Resources and Environment (DONRE)	Review and approve environmental assessment reports required by the Government. - Undertake monitoring of the subproject's environmental performance based on their mandate

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

Figure 3 – EMP Implementation Organization Chart



B. Environmental Mitigation

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

128. Table 17 shows that most mitigation activities during pre-construction are to be implemented by the ESP while during construction, measures shall be primarily implemented by the contractors. During the operation stage, DOT shall undertake environmental mitigation and monitoring requirements specified in the EMP. To ensure implementation of mitigation measures during construction, the EMP shall be included in the tender and contract documents for civil works. Contractors' conformity with environmental contract procedures and specifications shall be regularly monitored by PMU with assistance from CSC and results shall be reported semi-annually to ADB.

Table 17 – Detailed Environmental Mitigation Plan

		Impact Mitigation				
Environmental Concern	**Objective**	**Proposed Mitigation Measures**	**Responsible to Implement**	**Timing**	**Locations**	**Mitigation Cost**
Design and Pre-construction Phase						
1. Land acquisition and resettlement	Control the impact of land acquisition and resettlement	Monitor the compensation process to ensure it is suitable with the Land Acquisition and Resettlement Report	ESP	Before construction	N/A	Included in the contract with ESP
2. Unexploded Ordnance	Avoid accidents due to any kind of UXO	1. Coordinate with appropriate agencies at the design stage to identify if UXO is a potential threat to works 2. Based on the findings, engage an authorized UXO clearing contractor, as necessary. 3. Ensure that the contractors shall only commence site works after the UXO clearing firm has certified that the subproject areas are already cleared.	ESP	Before bidding	N/A	Included in the contract with ESP
Construction Phase						
1. Encroachment the forest	Avoid and minimize the encroachment to the forest	1. Minimize clearance of vegetation cover. 2. All replanting works to utilize locally available non-invasive species. 3. The contractors will not use or permit the use of wood as a fuel for the execution of any part of the works, including but not limited to the heating of bitumen and bitumen mixtures, and to the extent practicable shall ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 4. Contractors shall not buy or use wood or other forest products from illegal sources (that come from illegal logging) 5. No construction camps, bitumen heating machine, 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	Throughout construction phase	Along the subproject road; forest areas; worker camps area	Included in the contract with contractors

2. Streams/ Rivers protection and bridge/culvert construction	Protect Streams/ Rivers and maintain flows	In sections along and near Khe Xan, Keh Dat streams and water bodies: 1. No construction waste, including excavated material, to be placed in rivers or streams. 2. Work in streams at bridge repair sites will be scheduled during dry season and work duration shall be as short as possible. 3. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to control release of silt during excavation and boring operations within or near streams. 4. Other erosion control measures above and covering open surfaces with grasses and creepers to reduce runoff will be implemented as early as possible in construction.	Contractors	Throughout construction phase	2 stream crossing points with Khe Xan and Khe Dat stream	Included in the contract with contractors
3. Deterioration of surface water quality	To minimize impact from sanitary wastes and prevent potential impact on water quality due to subproject activities	1. Provide adequate drainage facilities at construction sites and worker camps to avoid stagnant water. 2. Store lubricants, fuels and wastes in dedicated secure buildings with impervious floors at least 50 m from water bodies, controlled by authorized personnel 3. Solid waste from construction activities and workers camps will not be thrown in streams, the Lam River or other water bodies. 4. Construction storage/stockpiles shall be provided with bunds or silt fences to prevent silt run-off. 5. Stockpiles containing fine materials will be covered to reduce wind erosion. 6. Materials stockpiles or borrow sites to be at least 20m from water bodies. 7. Washing of machinery and vehicles in surface waters shall be prohibited. 8. Inform 2 CPCs and Anh Son DCP in advance construction schedule and scope. 9. Work with relevant Division of 2 DPCs to find out suitable water block/ water cut schedule, avoid impact to downstream users of the Lam River	Contractors	Throughout construction phase	Throughout construction sites; Khe Xan and Khe Dat streams and other water bodies, material storage sites, temporary waste disposal area	Included in the contract with contractors

4. Noise, dust and vibration	To minimize negative impacts from noise, dust and vibration during construction period	1. Restrict works to daylight hours within 500 m of residential settlements 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; propose alternative mitigation measures. 4. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emissions. 5. On rainless days undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials storage sites, construction sites, access roads, quarry areas, borrow sites and other subproject areas where residential sites are located nearby. 6. Clean up road surfaces after work. 7. To protect buildings and structures from vibration, non-vibrating rollers shall be used in construction sites near buildings and structures. 8. Structures, which are damaged due to vibration caused by the construction activities, shall be repaired immediately as directed by ESP/PMU. 9. Machinery shall be turned off when not in use. 10. Pile driving to be schedule for daytime if construction site is near residential areas or approved by DONRE, CPCs and ESP/PMU. 11. Impose speed limits on construction machines and transportation vehicles to minimize dust emission along areas where residential areas are located.	Contractors	Throughout construction phase	Throughout construction site	Included in the contract with contractors
5. Traffic Management	Minimize disturbance of traffic	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience due to	Contractors	Throughout construction phase	Throughout construction sites; at start and end points of the road; at the junction with the road to Con Cuong	Included in the contract with contractors

		subproject operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold ups and congestion 3. In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up. 4. Provide safe vehicle and pedestrian access around construction areas. 5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. 6. Provide sufficient lighting at night within and in the vicinity of construction sites. 7. Designate traffic officers in construction sites.			town; at the bridge construction sites.	
6. Health and safety precautions for workers and public safety	Ensure worker safety	1. Establish safety measures as required by law and by good engineering practice and provide first aid facilities that are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, earplugs, gloves, etc. at no cost to the employee. 5. Where worker exposure to traffic cannot be completely eliminated, protective barriers shall be provided to shield workers from traffic vehicles. 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	Contractors	Throughout construction phase	Throughout construction sites	Included in the contract with contractors

		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.				
7. Large influx of construction worker	Construction camps and worker camps not to cause any negative impact to surrounding environment (forest area, water bodies, wild animal); control of infectious diseases.	1. Construction and workers' camp location and facilities to be at least 500m from settlements and agreed with local communities and facilities approved by ESP and managed to minimize impacts. 2. Hire and train as many local workers as practicable. 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. Toilet facilities to be kept clean at all times. 5. Provide separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supplies for male and female workers. 6. Borrow pits and natural depressions with pre-laid impervious liners will be used to dispose of scarified/scraped asphalt, and then covered with soil. This will check potential groundwater contamination. 7. As much as possible, food shall be provided from farms nearby and bush meat supplies will be banned to discourage poaching. 8. Camp site will be cleaned up to the satisfaction of and local community after use. 9. Solid and liquid waste will be managed in line with Waste Management Plan 10. All waste materials shall be removed and disposed to disposal sites approved by local authorities 11. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned. 12. Register temporary stay for workers with police.	Contractors	Throughout construction phase	Throughout construction sites and worker camps	Included in the contract with contractors

Operation Phase						
1. Traffic and road safety	Minimize road accident	1. Undertake road safety awareness campaigns for local residents and other road users of District Road 349. 2. Install and maintain road warning signs and markings. 3. Monitor road accidents and implement necessary preventive measures (awareness campaigns, provision of appropriate road furniture to enhance road safety and control traffic).	Nghe An DOT	Throughout operation phase	Along the proposed road	Included in operation and maintenance cost

C. Environmental Monitoring

1. Compliance Monitoring

129. Table 18 below shows the program for monitoring the compliance with various provisions of the EMP during the pre-construction, construction and operation phases. The ESP needs to implement a number of measures during detailed design phase (e.g., incorporation of environmental design measures into the detailed design, update EMP, etc.) and this will be confirmed by PMU to ADB. During construction, most of the mitigation the contractors shall implement measures and CSC and ESP shall monitor their environmental performance, in terms of implementation of such measures. The timing or frequency of monitoring is also specified in Table 15. During operation EMP implementation shall be the responsibility of Nghe An DOT.

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

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

2. Environmental Effects Monitoring

132. Table 19 below displays the parameters to be measured before during and after construction, to monitor effects on the environment and detect emerging problems to elicit appropriate action.

Table 18 – Environmental Monitoring Compliance

Performance and Impact Monitoring					
Environmental Concern	**Parameter to Monitor**	**Location**	**Frequency & Verification**	**Responsible to Monitor**	**Monitoring Cost**
Design and Pre-construction Phase					
1. Land acquisition and resettlement	Compensation documents	N/A	Only one time before the construction commencement	Nghe An 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
3. Designs of river and stream crossings	Adequate to handle extreme flooding events	Stream and river crossings	Once	PMU	Design cost
4. Road safety features	Inclusion of appropriate safety features in the design	Entire alignment	Once	PMU	Design cost
Construction Phase					
1. Encroachment to the forest	Measures to ensure encroachment on the forest by workers does not occur	Along the subproject road; worker camps area	Before construction commencement and throughout construction phase. Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
2. River/ stream protection and bridge/culvert construction	Protection measures in place	Crossing points with Khe Xan and Khe Dat stream	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
3. Water resources and water quality	Requirement to control silt release and runoff	Throughout construction sites, the Lam River and 2 stream crossing points with stream, material storage sites, temporary waste disposal areas	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
4. Noise, dust and vibration	Check of implementation	Throughout construction site	Bi-weekly and spot checks Part of daily construction supervision	ESP/ PMU	Included in the operation budget of PMU/ ESP CSC

5. Traffic Management	Check of implementation	Throughout construction sites; at start and end of the road and junctions; residential areas	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
6. Safety precautions for workers and public safety	Check of implementation. Check compliance to Labor Code of Vietnam and other relevant Decision, Decree and Circular under Government requirements	Throughout construction sites	Bi-weekly Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
7. Large influx of workers. Construction and worker camps, sanitation and diseases	Check of implementation	Throughout construction sites and worker camps	Before establishment of the facilities and throughout the construction phase Part of daily construction supervision	ESP/ PMU CSC	Included in the operation budget of PMU/ ESP/ CSC
Operation Phase					
1. Road safety	Check of implementation	Along the route	Semi-annual	Nghe An DOT	Included in the operation budget of DOT

Table 19 – Environmental Effects Monitoring

Performance and Impact Monitoring					
Environmental Concern	**Parameter to Monitor**	**Location**	**Frequency & Verification**	**Responsible to Monitor**	**Monitoring Cost**
Construction Phase					
1. Water resources and water quality	Surface water quality	3 sampling points at 20m downstream of the two crossing stream and the Lam River at Cay Chanh bridge.	1 time before construction start and semi-annually during 2 years construction time (5 times in total)	ESP	6,000 USD
	Ground water quality	2 sampling points near the 2 bridge construction sites.	1 time before construction start and semi-annually during 2 years construction time (5 times in total)	ESP	4,000 USD[16]
2. 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 of the road; 2 points at Cay Chanh bridge T-junction and junction with the road to Con Cuong town; 4 points at Thanh Son commune centers, Hung Thanh, Lang Mai and Truong Thanh villages	1 time before construction start and semi-annually during 2 years construction time (5 times in total)	ESP	2,400 USD[17]

[16] Figures have been estimated base on environmental monitoring cost norm of Nghe An Province issued under Decision No. 61/2015/QD-UBND of Nghe An PPC dated 20 October 2015.

[17] Figures have been estimated base on environmental monitoring cost norm of Nghe An Province issued under Decision No. 61/2015/QD-UBND of Nghe An PPC dated 20 October 2015.

D. Reporting

133. The PMU will submit the following reports to ADB:

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

Table 20 – 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	ESP/ PMU	ADB/ DONRE
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.	Nghe An DOT	Nghe An DONRE

Table 21 – Estimated Cost for EMP Implementation (2-year construction/ 4-year in total)

Item	Estimated cost (US$)
1. Environment Safeguard Specialist (ESP)	***21,240***
1 National ESP - 06 man-months (intermittent in the first 2 years;) – 2,000 US$/month	12,000
Per diem for ESP: 48 US$ x 30 days x 6 months	8,640
Travelling cost for 2 round trips: 300 US$ x 2 trips	600
2. Environmental effects monitoring (implemented by ESP)	***12,400***
Ambient air quality: 8 monitoring locations x 5 times x 60 US$/sample[18]	2,400
Ground water quality: 2 monitoring locations x 5 times x 400 US$/sample[19]	4,000
Surface water quality: 3 monitoring locations x 5 times x 400 US$/sample[20]	6,000
3. Training/orientation, local transportation, supplies (by ESP)	***3,000***
a) Training/orientation: 1 formal training course for PMU, CSC, Contractors and DOT office of Anh Son district and other "on the job" training	2,000
b) Local transportation and supplies	1,000
4. Printing Environmental monitoring report by ESP (4 reports)	***600***
Subtotal (1+2+3+4)	**37,240**
5. Contingency	**2,760**
Total (1+2+3+4+5)	**40,000**

E. Capacity Building

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

135. The most significant challenge is the lack of human and financial resources and necessary infrastructure. To address this constraint, Nghe An 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 (ESP) during subproject implementation as "on the job" training or by a formal training course in roles and responsibilities for EMP implementation.

[18] Figures have been estimated base on environmental monitoring cost norm of Nghe An province.
[19] Figures have been estimated base on environmental monitoring cost norm of Nghe An province.
[20] Figures have been estimated base on environmental monitoring cost norm of Nghe An province.

Table 22 – Detail Capacity Building Program

Objective	1. Build capacity and procedures in undertaking systematic environmental assessments in accordance with Government regulations and ADB guidelines 2. Provide training on international best practice on environmental management, monitoring and reporting. 3. Provide guidance on how to effectively incorporate environmental measures into project design and how to incorporate EMP provisions into tender and contract documents.
Tasks/Scope of Work	1. Undertake training needs analyses and review prevailing government regulations and donor guidelines governing the assessment and management of environmental impacts for road development. 2. Review the skills of PMU and Nghe An 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, CSC, Contractors and Nghe An DOT who responsible for environmental management
Staff resources	National environmental specialist with at least 7 years experience on environmental management of road projects and must possess relevant graduate degree in civil engineering, environmental management and other relevant courses.

X. CONCLUSIONS AND RECOMMENDATIONS

136. 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.

137. The implementation of the subproject "District Road 349 from Dinh Son at Km0 to Cay Khe Junction at Km8+000.71, Anh Son District, Nghe An Province" will form a thorough traffic network from communes in the left bank of Lam River, Anh Son and Tan Ky districts to the arterial routes such as QL7, Ho Chi Minh on the East-West Economic Corridor to merge with the main roads in provinces to the important economic/industrial zones in and out the province and to neighbor countries in Southeast Asia region; then create favorable conditions for developing agriculture, rural area and exploiting the potential of the areas which it passes, particularly in forestation, production and agricultural and forest products processing. Several actions are required during the detailed design stage to minimize impacts to acceptable levels. The negative environmental impacts from the upgrading works will mostly take place during the construction stage. All of the impacts during construction phase should be very predictable and manageable and with appropriate mitigation and few residual impacts are likely. Additional human and financial resources will be required to improve environmental capability and to progress and achieve necessary statutory compliance and environmental clearance certification for the subproject or associated activities that also require environmental permits under the environmental laws of Viet Nam – LEP 2014.

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

XI. APPENDIX

A. Appendix 1: Photos of the Subproject Road and the Vicinity

Start point at Cay Chanh Junction

End point at Cay Khe Junction

The Existing Cay Chanh Bridge

The Existing Khe Dat Bridge

Current Khe Xan spillway & bridge for motorbike

Khe Xan stream

Cassava and sugar cane plantation

A bad road section

Damaged asphalt road section

A km post at Cay Khe - 8km to Cay Chanh

B. Appendix 2: Source of Reference Information

1. *Nghe An Status of Environmental Report 2015*
2. Natural and Socio-economical Status of Anh Son district, provided by Anh Son DPC
3. *Feasibility Report of the Subproject*
4. http://ngaynay.vn/van-hoa/di-chi-khao-co-hoc-dong-truong-nghe-an-lieu-co-chim-vao-quen-lang-2610.html
5. *Electronic portal of Anh Son district*

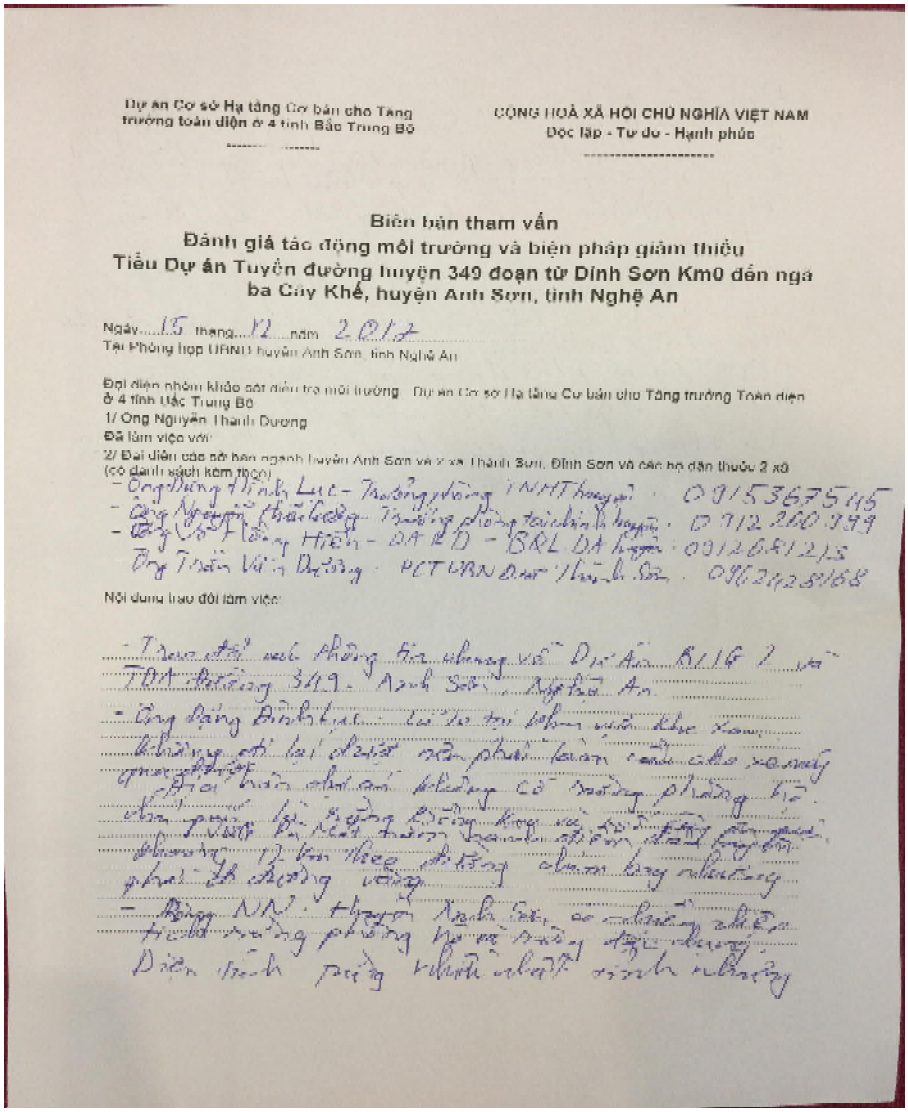
C. Appendix 3: Environmental Mitigation Measures to Include into Bidding Documents

1. Encroachment the forest	1. Minimize clearance of vegetation cover. 2. All replanting works to utilize locally available non-invasive species. 3. The contractors will not use or permit the use of wood as a fuel for the execution of any part of the works, including but not limited to the heating of bitumen and bitumen mixtures, and to the extent practicable shall ensure that fuels other than wood are used for cooking, and water heating in all camps and living accommodations. 4. Contractors shall not buy or use wood or other forest products from illegal sources (that come from illegal logging) 5. No construction camps, bitumen heating machine, material storage site is 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. Streams/ Rivers protection and bridge/culvert construction	In sections along and near streams and water bodies: 1. No construction waste, including excavated material, to be placed in rivers or streams. 2. Work in streams at bridge repair sites will be scheduled during dry season and work duration shall be as short as possible. 3. Cofferdams, silt fences, sediment barriers or other devices will be used as appropriate based on the design to control release of silt during excavation and boring operations within or near streams. 4. 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.
3. Deterioration of surface water quality	1. Provide adequate drainage facilities at construction sites and worker camps to avoid stagnant water. 2. Store lubricants, fuels and wastes in dedicated secure buildings with impervious floors at least 50 m from water bodies, controlled by authorized personnel 3. Solid waste from construction activities and workers camps will not be thrown in streams, the Lam River or other water bodies. 4. Construction storage/stockpiles shall be provided with bunds or silt fences to prevent silt run-off. 5. Stockpiles containing fine materials will be covered to reduce wind erosion. 6. Materials stockpiles or borrow sites to be at least 20m from water bodies. 7. Washing of machinery and vehicles in surface waters shall be prohibited. 8. Inform 2 CPCs and Anh Son DCP in advance construction schedule and scope. 9. Work with relevant Division of 2 DPCs to find out suitable water block/ water cut schedule, avoid impact to downstream users of the Lam River
4. Noise, dust and vibration	1. Restrict works to daylight hours within 500 m of residential settlements. 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; propose alternative mitigation measures. 4. Tightly cover trucks transporting construction materials (sand, soil, cement, gravel, etc.) to avoid or minimize spills and dust emissions. 5. On rainless days undertake watering, at least twice per day, on dusty and exposed areas at construction yards, materials storage sites, construction sites, access roads, quarry areas, borrow sites and other subproject areas where residential sites are located nearby. 6. Clean up road surfaces after work. 7. To protect buildings and structures from vibration, non-vibrating rollers shall be used in construction sites near buildings and structures. 8. Structures, which are damaged due to vibration caused by the construction activities, shall be repaired immediately as directed by ESP/PMU. 9. Machinery shall be turned off when not in use. 10. Pile driving to be schedule for daytime if construction site is near residential areas or

	approved by DONRE, CPCs and ESP/PMU. 11. Impose speed limits on construction machines and transportation vehicles to minimize dust emission along areas where residential areas are located.
5. Traffic Management	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience due to subproject operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold ups and congestion 3. In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up. 4. Provide safe vehicle and pedestrian access around construction areas. 5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions. 6. Provide sufficient lighting at night within and in the vicinity of construction sites. 7. Designate traffic officers in construction sites.
6. Health and safety precautions for workers and public safety	1. Establish safety measures as required by law and by good engineering practice and provide first aid facilities that are readily accessible by workers. 2. Scheduling of regular (e.g., weekly tool box talks) to orient the workers on health and safety issues related to their activities as well as on proper use of personal protective equipment (PPE). 3. Fencing on all excavation, borrow pits and sides of temporary bridges. 4. Workers shall be provided with appropriate PPE such as safety boots, helmets, safety glasses, 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.
7. Large influx of construction worker	1. Construction and workers' camp location and facilities to be at least 500m from settlements and agreed with local communities and facilities approved by ESP and managed to minimize impacts. 2. Hire and train as many local workers as practicable. 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. Toilet facilities to be kept clean at all times. 5. Provide separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supplies for male and female workers. 6. Borrow pits and natural depressions with pre-laid impervious liners will be used to dispose of scarified/scraped asphalt, and then covered with soil. This will check potential groundwater contamination. 7. As much as possible, food shall be provided from farms nearby and bush meat supplies will be banned to discourage poaching. 8. Camp site will be cleaned up to the satisfaction of and local community after use. 9. Solid and liquid waste will be managed in line with Waste Management Plan 10. All waste materials shall be removed and disposed to disposal sites approved by local authorities 11. Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned.

	12. Register temporary stay for workers with police.
8. Environmental recovery	Contractors to reconfirm and implement recovery (e.g., landscaping, tree replanting) identified at the detailed design stage

D. Appendix 4: Meeting Minute and List of Attendance in Public Consultation



Dự án Cơ sở Hạ tầng Cơ bản cho Tăng trưởng toàn diện ở 4 tỉnh Bắc Trung Bộ

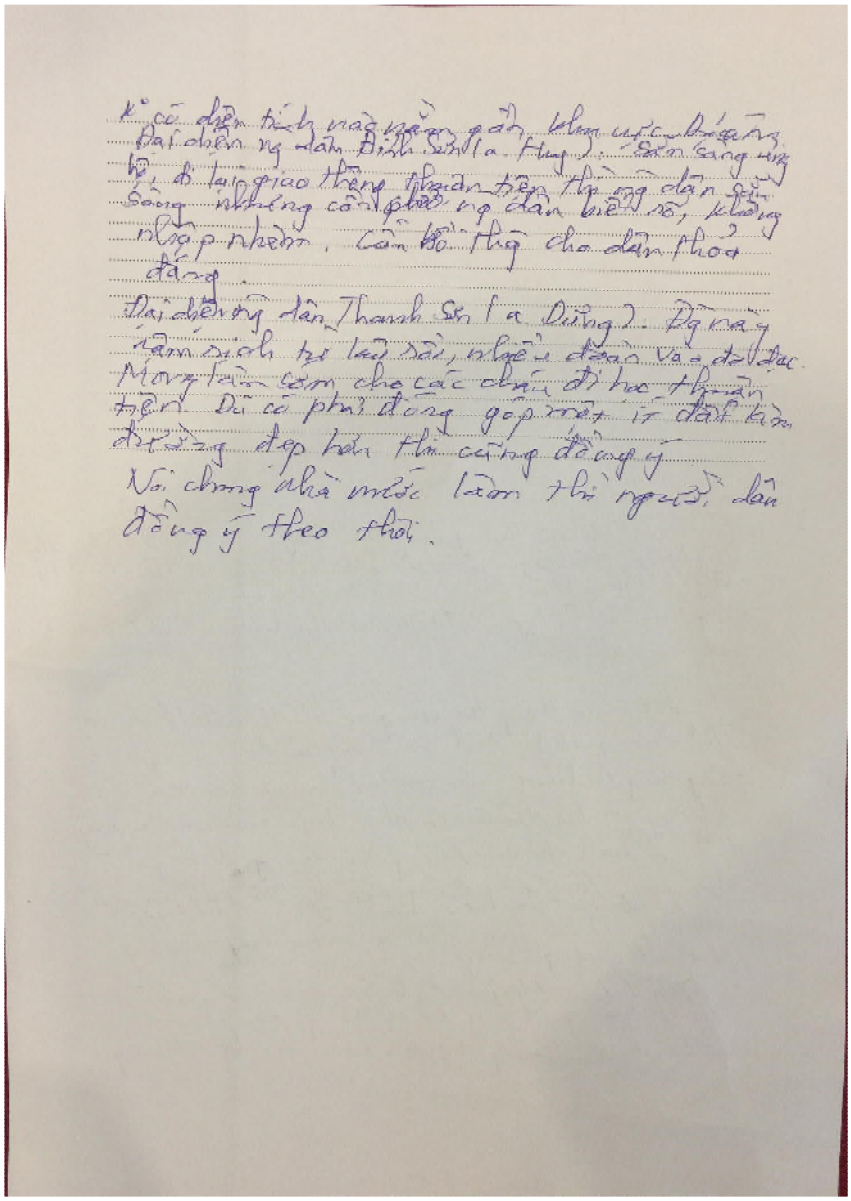
CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

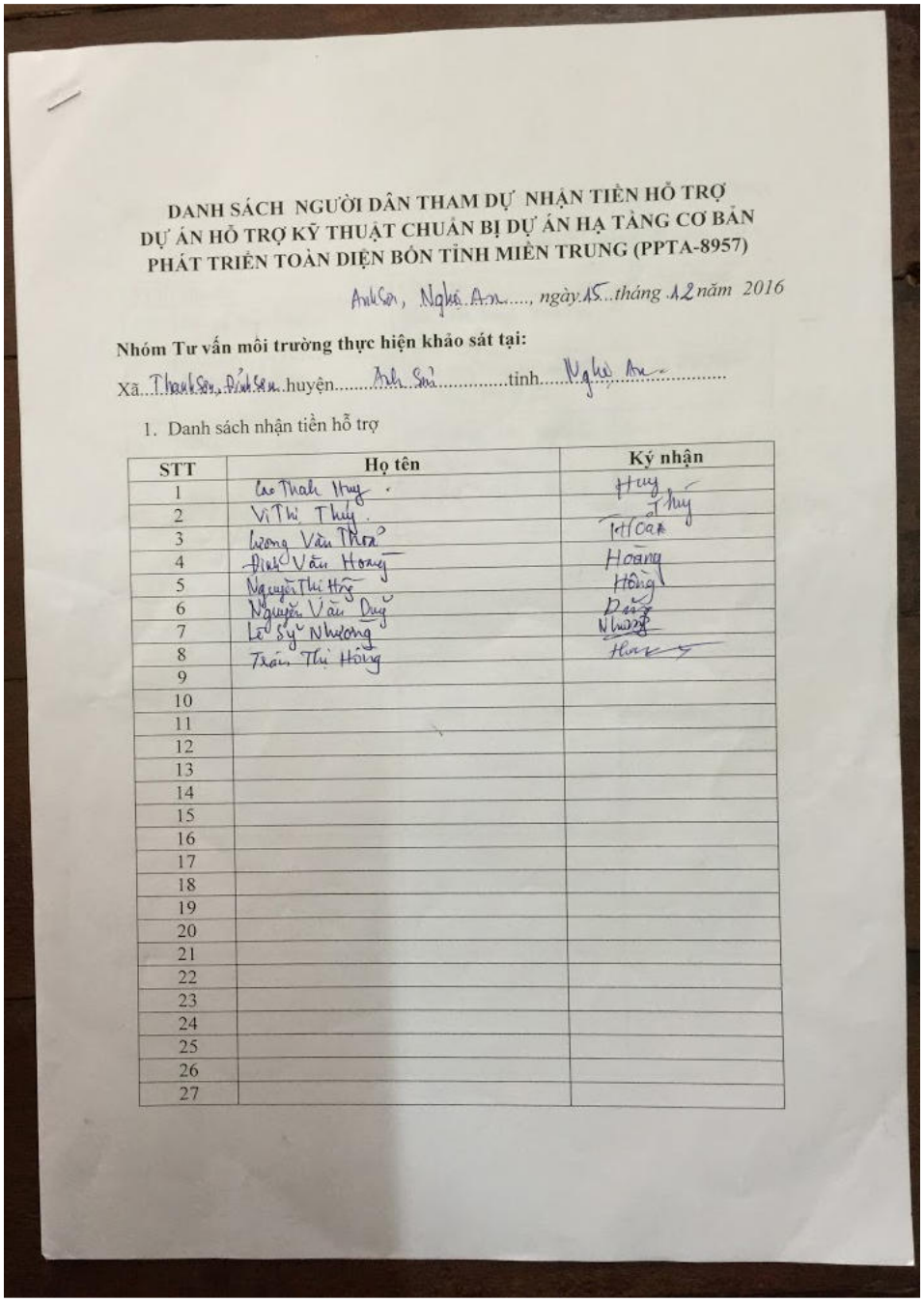
Biên bản tham vấn
Đánh giá tác động môi trường và biện pháp giảm thiểu
Tiểu Dự án Tuyến đường huyện 349 đoạn từ Đỉnh Sơn Km0 đến ngã ba Cây Khế, huyện Anh Sơn, tỉnh Nghệ An

Ngày 15 tháng 12 năm 2017
Tại Phòng họp UBND huyện Anh Sơn, tỉnh Nghệ An

Đại diện nhóm khảo sát điều tra môi trường: Dự án Cơ sở Hạ tầng Cơ bản cho Tăng trưởng Toàn diện ở 4 tỉnh Bắc Trung Bộ
1/ Ông Nguyễn Thanh Dương
Đã làm việc với:
2/ Đại diện các sở ban ngành huyện Anh Sơn và xã Thành Sơn, Đỉnh Sơn và các hộ dân thuộc 2 xã (có danh sách kèm theo)

Nội dung trao đổi làm việc:





DANH SÁCH NGƯỜI DÂN THAM DỰ NHẬN TIỀN HỖ TRỢ
DỰ ÁN HỖ TRỢ KỸ THUẬT CHUẨN BỊ DỰ ÁN HẠ TẦNG CƠ BẢN
PHÁT TRIỂN TOÀN DIỆN BỐN TỈNH MIỀN TRUNG (PPTA-8957)

Anh Sơn, Nghệ An, ngày 15 tháng 12 năm 2016

Nhóm Tư vấn môi trường thực hiện khảo sát tại:

Xã Thanh Sơn, Đỉnh Sơn huyện Anh Sơn tỉnh Nghệ An

1. Danh sách nhận tiền hỗ trợ

STT	Họ tên	Ký nhận
1	Cao Thanh Huy	Huy
2	Vi Thị Thúy	Thúy
3	Lương Văn Thoa	Thoa
4	Đinh Văn Hoàng	Hoàng
5	Nguyễn Thị Hồng	Hồng
6	Nguyễn Văn Duy	Duy
7	Lê Sỹ Nhương	Nhương
8	Trần Thị Hằng	Hằng
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E. Appendix 5: National Technical Regulations of Vietnam

NATIONAL TECHNICAL REGULATION

ON SURFACE WATER QUALITY

1. GENERAL PROVISIONS

1.1. Scope of Application

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

1.1.2. This regulation applies to assess and control the quality of surface water source, as a basis for the protection and use of water appropriately.

1.2. Explanation of Terms

Surface water referred to in this Regulation is water flowing through or stagnate on the ground, streams, canals, ditches, gullies, arroyos, lakes, ponds, swamps.

2. TECHNICAL REGULATIONS

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

Table 1 - Limit Values of the Surface Water Quality Parameters

No.	Parameters	Unit	Limit values			
			A		B	
			A1	A2	B1	B2
1	pH		6-8.5	6-8.5	5.5-9	5.5-9
2	Dissolved oxygen (DO)	mg/l	≥ 6	≥ 5	≥ 4	≥ 2
3	Total suspended solids (TSS)	mg/l	20	30	50	100
4	COD	mg/l	10	15	30	50
5	BOD_5 (20^0C)	mg/l	4	6	15	25
6	Ammonium (NH^+_4) (as N)	mg/l	0.1	0.2	0.5	1
7	Chloride (Cl^-)	mg/l	250	400	600	-
8	Fluoride (F^-)	mg/l	1	1.5	1.5	2
9	Nitrite (NO^-_2) (as N)	mg/l	0.01	0.02	0.04	0.05
10	Nitrate (NO^-_3) (as N)	mg/l	2	5	10	15
11	Phosphate (PO_4^{3-}) (as P)	mg/l	0.1	0.2	0.3	0.5
12	Cyanide (CN-)	mg/l	0.005	0.01	0.02	0.02
13	Arsenic (As)	mg/l	0.01	0.02	0.05	0.1
14	Cadmium (Cd)	mg/l	0.005	0.005	0.01	0.01
15	Lead (Pb)	mg/l	0.02	0.02	0.05	0.05
16	Chrom III (Cr^{3+})	mg/l	0.05	0.1	0.5	1
17	Chrom VI (Cr^{6+})	mg/l	0.01	0.02	0.04	0.05

18	Copper (Cu)	mg/l	0.1	0.2	0.5	1
19	Zinc (Zn)	mg/l	0.5	1.0	1.5	2
20	Nickel (Ni)	mg/l	0.1	0.1	0.1	0.1
21	Iron (Fe)	mg/l	0.5	1	1.5	2
22	Mercury (Hg)	mg/l	0.001	0.001	0.001	0.002
23	Surface-active substances	mg/l	0.1	0.2	0.4	0.5
24	Total oil & grease	mg/l	0.01	0.02	0.1	0.3
25	Phenol (Total)	mg/l	0.005	0.005	0.01	0.02
26	Organic chlorine pesticide					
	Aldrin + Dieldrin	µg/l	0.002	0.004	0.008	0.01
	Endrin	µg/l	0.01	0.012	0.014	0.02
	BHC	µg/l	0.05	0.1	0.13	0.015
	DDT	µg/l	0.001	0.002	0.004	0.005
	Endosunfan(Thiodan)	µg/l	0.005	0.01	0.01	0.02
	Lindan	µg/l	0.3	0.35	0.38	0.4
	Chlordane	µg/l	0.01	0.02	0.02	0.03
	Heptachlor	µg/l	0.01	0.02	0.02	0.05
27	Organic phosphorus pesticide					
	Parathion	µg/l	0.1	0.2	0.4	0.5
	Malathion	µg/l	0.1	0.32	0.32	0.4
28	Herbicide					
	2.4D	µg/l	100	200	450	500
	2.4.5T	µg/l	80	100	160	200
	Paraquat	µg/l	900	1200	1800	2000
29	Total radioactivity α	Bq/l	0.1	0.1	0.1	0.1
30	Total radioactivity β	Bq/l	1.0	1.0	1.0	1.0
31	E.coli	MPN/ 100ml	20	50	100	200
32	Coliform	MPN/ 100ml	2500	5000	7500	10000

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

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

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

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

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

3. METHOD FOR DETERMINATION

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

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

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

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

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

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

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

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

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

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

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

- TCVN 6494-1999 - Water quality - Determination of ions of fluoride, chloride, nitrite, Ortho-phosphorus, bromide, nitrate and soluble sulfate 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 GROUND 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 Ground Water Quality Parameters

No.	Parameters	Unit	Limit Values
1	pH	-	5.5 - 8.5
2	Hardness (as CaCO3)	mg/l	500
3	Total solids	mg/l	1500
4	COD ($KMnO_4$)	mg/l	4
5	Ammonium (as N)	mg/l	0.1
6	Chloride (Cl-)	mg/l	250
7	Fluoride (F-)	mg/l	1.0
8	Nitrite (NO^-_2) (as N)	mg/l	1.0
9	Nitrate (NO^-_3) (as N)	mg/l	15
10	Sulgreasee (SO_4^{2-})	mg/l	400
11	Cyanide (CN-)	mg/l	0.01
12	Phenol	mg/l	0.001
13	Asenic (As)	mg/l	0.05

14	Cadimi (Cd) Cadmium (Cd)	mg/l	0.005
15	Lead (Pb)	mg/l	0.01
16	Chromium VI (Cr6 +)	mg/l	0.05
17	Copper (Cu)	mg/l	1.0
18	Zinc (Zn)	mg/l	3.0
19	Manganese (Mn)	mg/l	0.5
20	Mercury (Hg)	mg/l	0.001
21	Iron (Fe)	mg/l	5
22	Selenium (Se)	mg/l	0.01
23	Total radioactivity α	Bq/l	0.1
24	Total radioactivity β	Bq/l	1.0
25	E.Coli	MPN/100ml	Not found
26	Coliform	MPN/100ml	3

3. METHOD FOR DETERMINATION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4. IMPLEMENTATION ORGANIZATION

This Regulation shall apply in substitution for TCVN 5944:1995- Water quality - underground water quality standards in the List of Vietnamese standards on environment which is mandatorily applied and issued together with Decision No. 35/2002/QD-BKHCNMT dated 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.	Parameter	Average 1 Hour	Average 8 Hours	Average 24 Hours	Annual Average
1	SO_2	350	-	125	50

2	CO	30,000	10,000	-	-
3	NO_2	200	-	100	40
4	O_3	200	120	-	-
5	Total Suspended Particle (TSP)	300	-	200	100
6	Dust PM_{10}	-	-	150	50
7	Dust $PM_{2.5}$	-	-	50	25
8	Pb	-	-	1.5	0.5
Note: (-) unspecified					

F. Appendix 6: Guidelines for Traffic Management Plan Preparation

I. Objectives of a traffic management plan

1. A traffic management plan should set out the measures required to ensure the safety of road users around work zones and to permit the flow of traffic, reducing impedance to the extent practicable. It should provide for as much protection as practicable to all people on the work site, consistent with minimizing disruption and risk to road users and minimizing the number of signs and devices used to achieve this. It should ensure that:

- Fixed work areas are marked by barrier boards and delineation devices
- Condition signs are used where the road surface at the work area is sufficiently different from the approach roads as to be hazardous to traffic.
- The needs of all non vehicular users (pedestrians, cyclists, school children, etc.) as well as drivers and passengers of vehicles and work crews are provided for.

2. To be able to achieve this a traffic management plan should:

- Provide clear guidance to drivers, cyclists and pedestrians as they approach and travel through temporary traffic control zones
- Ensure the staff who operate the traffic control systems are adequately trained
- Keep the public well informed and
- Make appropriate arrangements for property owners, residents, businesses, emergency services and schools in the work zones.

3. Traffic Management Plans should comply with the Law on Road Traffic (2008).

II. Control Measures

A. Signs and Signals

4. All signs used in traffic management plans must be compliant with the National Standards on Traffic Signs (November 2016).

5. Cones and bollards should be used to define the traffic path past or through work areas and must have reflective bands if required for night use.

6. Signs include warning signs, such as "roadworks ahead" signs or those indicating road conditions such as "loose gravel", and instructions such as "prepare to stop". Signs should be clearly read from a vehicle, be in local language and use reflective lettering and backgrounds.

7. The placement and spacing of signs should be designed, taking into account the likely length of traffic queues, estimated by considering the expected delay in minutes, hourly volumes at the time of the work and type or mix of traffic (longer queues where there are heavy vehicles). Signs should cover the estimate queue length plus 10% to allow for some greater demand.

8. Figure 1 below provides guidance for the layout of signage for a worksite that occupies half of the carriageway.

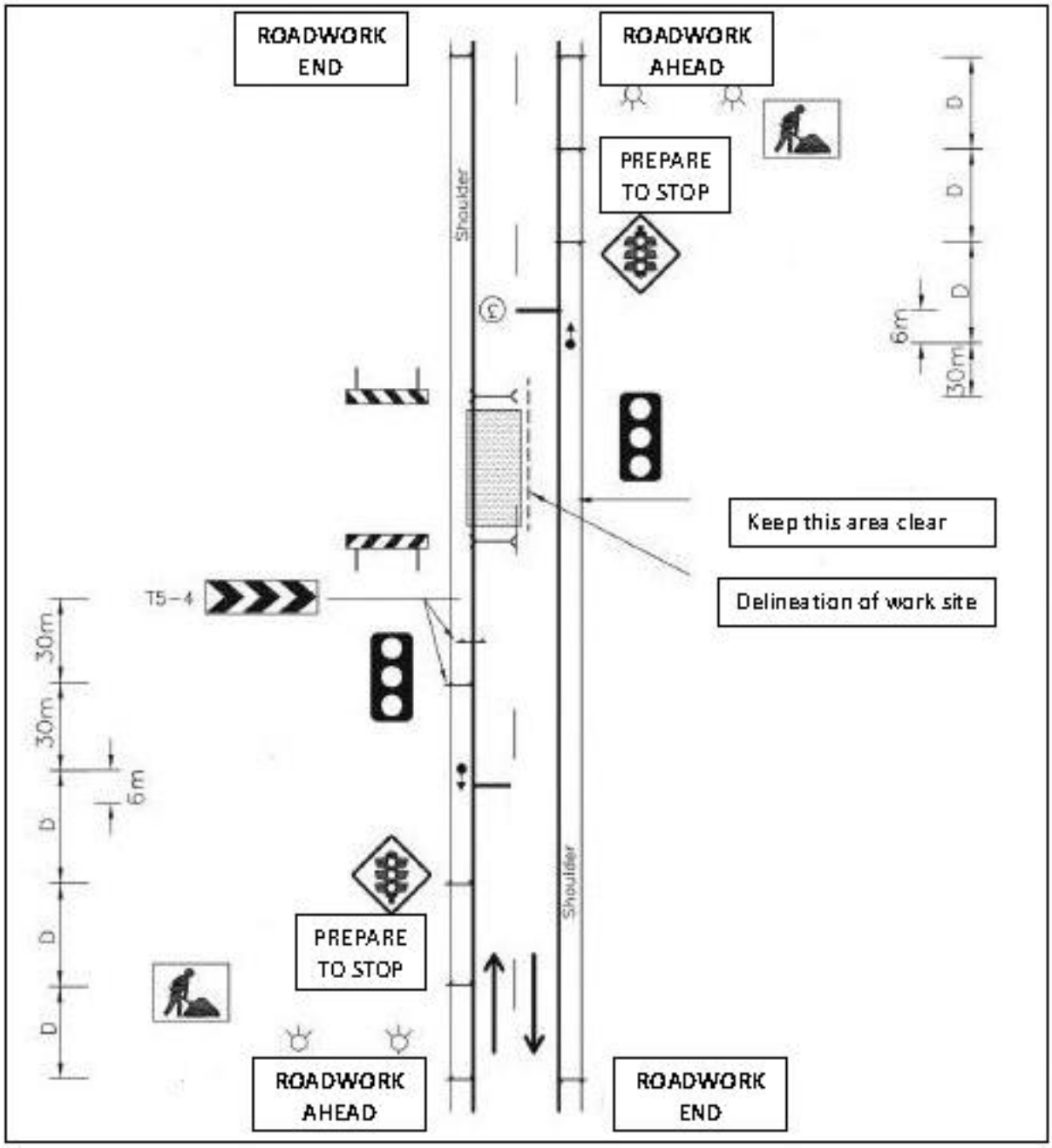

Figure 1: Specimen layout design for traffic signs at a work site occupying half of the carriageway

B. Traffic Controllers

9. Individuals employed to control traffic must be trained, equipped with high visibility clothing. In most situations, shift work will be necessary to ensure protection during night hours. Traffic controllers should only manage traffic in one lane and one direction.

III. Public Information

10. The public should be kept continuously informed by providing prior notification and regular updates. Public meetings should be held prior to the works both to inform local residents of the works program and methods and to obtain feedback and suggestions. Noticeboards should be established to provide updates on matters such as work schedules and any service disruptions. The project Grievance Redress Mechanism is applicable for issues that arise over traffic management.

11. Local traffic police should be consulted during management plan preparation and the plan should reflect requirements and advice given

IV. Steps in Traffic Management Plan Preparation

1. Review of construction schedule and methods
2. Identify routes for traffic diversions, where available and practicable
3. Assess requirements for traffic control measures and detour routes
4. Conduct community consultation and information meetings
5. Identify areas for temporary parking
6. Consult with local traffic police
7. Place signs and control systems as the work