

Summary Initial Environmental Examination

Central Region Transport Networks Sector Project in the Socialist Republic of Viet Nam

May 2005

SUMMARY INITIAL ENVIRONMENTAL EXAMINATION

CENTRAL REGION TRANSPORT NETWORKS SECTOR PROJECT

IN THE

SOCIALIST REPUBLIC OF VIET NAM

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ABBREVIATIONS

ADB	–	Asian Development Bank
dBA	–	decibel (audible) measure of audible noise
DONRE	–	department of natural resources and environment (provincial)
EIA	–	environmental impact assessment
EMOP	–	environmental monitoring plan
EMP	–	environmental management plan
IEE	–	initial environmental examination
MONRE	–	Ministry of Natural Resources and Environment
MOT	–	Ministry of Transport
PDOT	–	provincial department of transport
PMU1	–	Project Management Unit No. 1
PPIU	–	provincial project implementation unit
PPMU		provincial project management unit
SC	–	subcontract
SIEE	–	summary initial environmental examination
TCVN	–	designation for a legal standard
TL	–	provincial road

NOTE

In this report, "\$" refers to US dollars.

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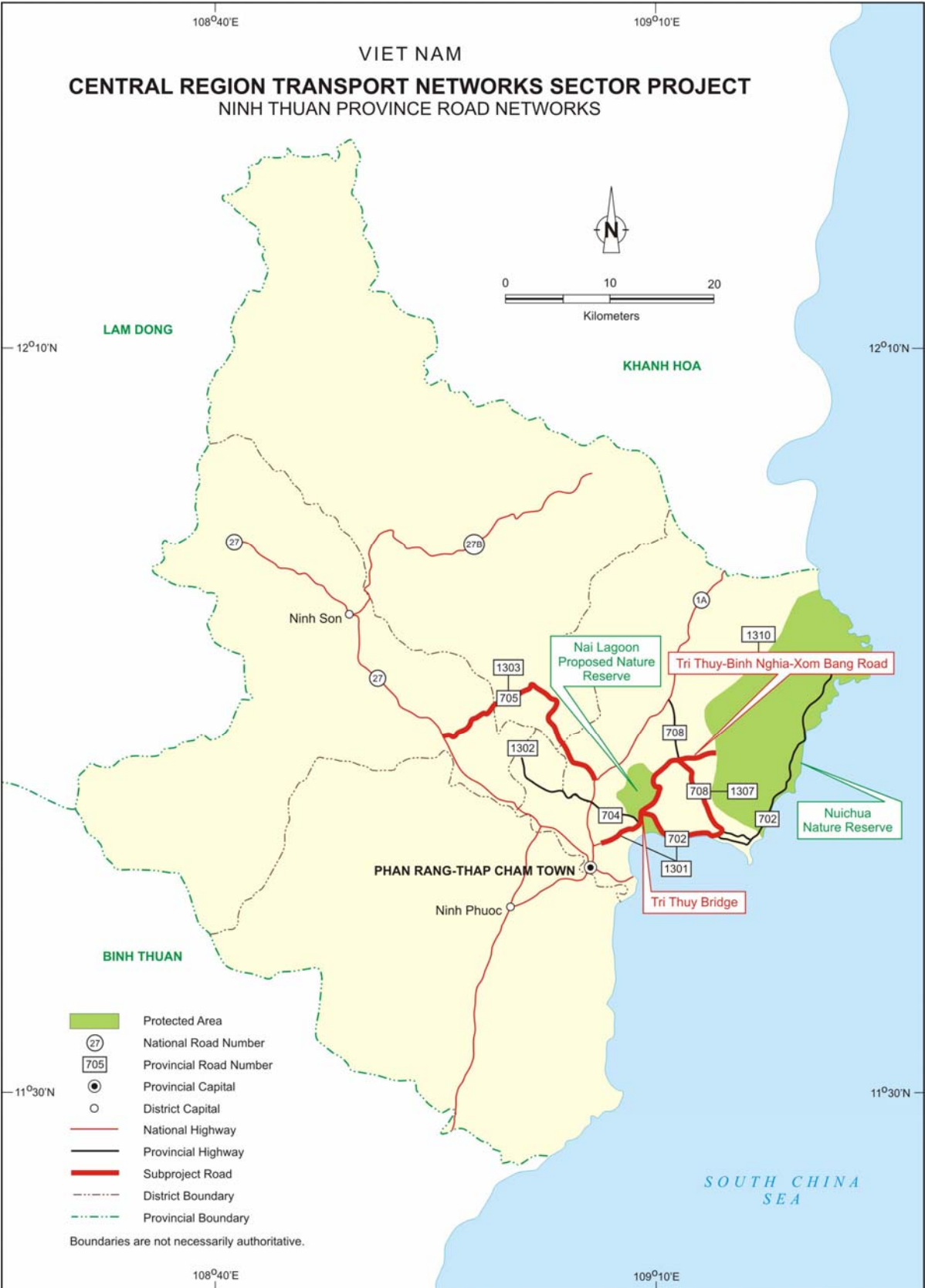
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VIET NAM
CENTRAL REGION TRANSPORT
NETWORKS SECTOR PROJECT
NGHE AN PROVINCE ROAD NETWORKS





I. INTRODUCTION

1. The Central Region Transport Network Sector Project will address the need to improve approximately 1,200 kilometers (km) of provincial and district roads in the 19 provinces of the Central Region of Viet Nam. This summary initial environmental examination (SIEE) was prepared for the Project to meet Asian Development Bank (ADB) requirements for environmental assessment of sector loans. Subprojects in Dak Nong, Nghe An, and Ninh Thuan provinces were selected as representative of the Project. The sample subproject assessments define the extent of environmental effects, both direct and indirect, associated with the Project during key periods of the work; list the extent, duration, and severity of the impacts; and specify the estimated cost of proposed mitigative actions.

2. The three provinces' road subprojects were selected to represent the environmental and sociocultural diversity of the 19 provinces for which road upgrading is being planned. The roads represent a mixture of remote access, semiurban, and extreme climatic conditions, as well as a wide range of conditions where environmental impacts are most likely to occur, e.g., high erosion-prone areas, coastal areas, and mountainous terrain. Mitigation and monitoring activities proposed in these assessments are also adequately representative of all the subprojects. The three assessments used a combination of field work, consultation with provincial and local officials, and secondary information from existing documents.

3. The SIEE summarizes the assessment findings in terms of key impacts and associated mitigation and monitoring actions; and ends with conclusions concerning the severity of the expected impacts and need for further study. Likely environmental impacts include surface water drainage impacts due to inadequate design and placement of culverts, filling in/drainage of roadside ponds during construction causing loss of property, removal of roadside trees, inadequate control of erosion and siltation, poor site maintenance by contractors related to disposal of sewage and waste at work camps, and of stagnant water providing breeding grounds for mosquitoes carrying disease. Mitigative actions are provided in detailed environmental management plans (EMPs). Since the Project road networks are spread out across Central Viet Nam area, with limited extent in each province, likely cumulative impacts are deemed minimal.

II. DESCRIPTION OF THE PROJECT

4. Prepared by an ADB technical assistance (TA), the Project uses a sector lending modality to fund improvement to provincial and district roads in 19 provinces in the Central Region of Viet Nam. The Executing Agency will be Project Management Unit No 1 (PMU1) under the Ministry of Transport (MOT). Provincial departments of transport (PDOTs) through provincial project management units (PPMUs) will supervise the civil works. Preparatory work involved selecting subproject networks in nine provinces (comprising 28 roads with a length of 544 km) for phases 1 and 2 of the Project. The cost estimate for these phase 1 and 2 roads is estimated at \$52 million.

5. Existing roads are mostly narrow gravel roads; some are impassible during the wet season. Selection of roads for inclusion in the Project was based on their likely importance in reducing poverty, providing economic value to the province, and creating/improving the provincial road network. The improvements proposed are combinations of embankment widening, improvements in side- and cross-drainage, and upgrading to single- or two-lane sealed carriageways with granular or sealed shoulders. A number of short bridges will be

reconstructed and most culverts will be replaced. No significant realignments or removal of vegetation beyond a few meters of the existing road embankment will be permitted.

6. Three road subproject networks were selected as representative of the Project:

- (i) Dak Nong province : TL¹ 684, 82.7 km;
- (ii) Nghe An province : TL033, 34 km; TL 598a, 34 km; TL 598b, 23.8 km; and
- (iii) Ninh Thuan province : TL 702, 15.9 km; and Tri Thuy Bridge; TL 708, 15 km; Tri Thuy to Xom Bang Road, 11.3 km; and TL 705, 24.1 km.

7. Generally the construction will be completed within 2 years with work taking place almost simultaneously in all provinces. Phase 1 comprises networks in four provinces (Binh Thuan, Lam Dong, Nghe An, and Thua Thien Hue) is planned to start after project approval in 2005, while phase 2 (Dak Lak, Dak Nong, Ha Tinh, Ninh Thuan, and Quang Tri) should begin within 3–4 months of phase 1.

8. The Central Region, while rich in resources and local agricultural production capacity, lacks infrastructure to get products to markets; provision of adequate basic services to rural areas is difficult due to poor road networks. The Project is expected to improve living conditions, educational opportunities, and health care for hundreds of rural communities within the 19 project provinces (including the three for which initial assessments were completed).

III. DESCRIPTION OF THE ENVIRONMENT

9. The three provinces are located in distinctly different ecological regions, all within the subtropical and tropical latitudes, with Ninh Thuan being the furthest south, located at around 11° 30" north latitude, and Nghe An the most northern at about 19° north latitude (Map 1).

A. Physical and Ecological Resources

1. Dak Nong

10. Over 1,000 km to the south, Dak Nong province is mostly mountainous and generally cooler than Nghe An. The single subproject road passes through tree-covered mountainous and rolling hill terrain with mostly laterite soils (Map 2). The area through which the project road passes is mostly cut over, cleared, or replanted forestland, plus roadside plantation.

11. Dak Nong air quality and noise levels along the subproject road represent clean air and low noise conditions commonly found in rural agricultural settings. Since the existing road has a gravel/sand surface, creating large amounts of dust with each passing vehicle, its upgrading to a sealed surface will greatly improve air quality conditions along it.

12. The road passes over three headwater streams, which are important sources of water for the Krong Po River.

13. The ecosystem through which the road passes is mostly mountainous and forested terrain, and in some sections considerably degraded by slash-and-burn agriculture. No measurable ecosystem degradation will result from road widening (maximum of 3 m), surface

¹ TL is the Vietnamese designation for provincial road

improvements to a sealed carriageway, and drainage improvements. Improvements will not require additional land or diversions. Construction-related noise and air quality within 50 m of the alignments may occur.

14. No known rare or endangered species have been reported within a 2 km wide ecological impact corridor along the project road; mostly because this zone has been quite heavily utilized and is frequented by people.

15. The project area has two protected areas: Nam Ca and Nam Nung nature reserves, the former is located in Dak Lak province and its buffer zone border is about 5 km from the road and separated from it by the Krong Po River. The Nam Nung Nature Reserve's buffer zone boundary is located about 20 km west and north of the road, and is accessible by an unmaintained seasonal track. Discussions with DONRE officials indicate that neither of these reserves would be negatively affected by construction or operation of the upgraded road. A field survey along the road confirmed their observations.

2. Nghe An

16. Nghe An, 419 km long and with an area of 16,649 square kilometers (km²), is the third largest province in Viet Nam (Map 2). It has a monsoon tropical climate affected by both northern and southern climatic events. Habitats vary from montane to coastal and marine areas. The average temperature is about 23°C, ranging from 20–40°C and annual rainfall averages 1.8–2 meters (m). Mountains along the western and northern borders result in many drainage channels from west to east, emptying into the South China Sea. These waters, mostly perennial rivers, are minimally polluted with inorganic chemicals, but seriously contaminated with sewage and other organic pollutants making them unsuitable for use by humans without treatment.

17. Groundwater resources are located from 40–100 m below the surface of all sample subproject roads, with none traversing known groundwater recharge areas. Construction work will penetrate no more than 3 m below ground level, and not affect groundwater. Participants at the consultation sessions did not identify any wells that may be affected by the Project, nor were any found during the field visits. Surface drainage from the roads is into nearby watercourses, none interferes with local wells.

18. Air pollution and noise along the two subproject roads passing through rural farming areas are all within Government standards for rural agricultural and rural residential conditions, i.e., clean air and low noise, conducive to outdoor activity without concern for health impacts.

19. Nghe An is covered by tropical and subtropical monsoon evergreen forests, along with secondary forests such as bamboo and scrub forests, and rocky areas between large mounds of boulders. In the project area, the forest is a secondary growth of brush and some evergreens. Many deforestation sites are visible. Roadside trees are nearly all eucalyptus and casuarina pine, which were introduced. Large expanses of sugarcane border TL 598 in particular.

20. According to the latest survey, the province has 612 plant species of which 32 are rare and noted in Viet Nam's fauna Red Book; none are along project roads. Based on consultation with Nghe An provincial authorities with the departments of agriculture, and natural resources and environment (DONRE); examination of Birdlife International, Forest Inventory and Planning

Institute;² and national Ministry of Natural Resources and Environment (MONRE) databases, no protected areas or known rare or endangered species are found within the 2 km wide ecological impact corridor of the project roads. This was confirmed during the field survey since the roads pass through agricultural production lands with various crops including sugarcane, pineapple, longan, and peanuts on both sides of the road.

21. The Pu Mat Natural Protection Area is located more than 40 km from the nearest road (TL 33). A second protected area, Pu Huong, is located some 45 km west of the western end of TL 598 where it joins national highway 48.

3. Ninh Thuan

22. Ninh Thuan is a coastal subtropical province (Map 4). It lies in the driest region of Viet Nam with an average annual rainfall of less than 800 millimeters (mm); increasing westward and northward to higher elevations. It is dominated by the western hills, which slope to the sea, creating many valleys. The four subproject roads are in the dry coastal plain and low hill area; three pass through coastal semidesert ecosystems with extensive prickly pear cactus colonies along the roadside. This zone is dominated by flash-flood events; road design and construction planning will need to specifically address these conditions. All the rivers crossed by the roads are intermittent, flowing after rains and during the monsoon period.

23. Ninh Thuan surface water has no inorganic pollution, but has high levels of household and agricultural sewage and waste contamination.

24. Since all subproject roads are in rural settings with a few passing through small villages, both air and noise quality are well within permissible standards (Viet Nam TCVN³ 5937/1995) for outdoor activity in rural agricultural settings. With the upgrading and sealing of many of the roads and rapid (legislated) improvements in 4-wheel and 2-wheel engine pollution control technology, ambient air quality is expected to improve along all rural roads.

25. Based on traffic data, ambient noise levels were estimated to be well within the standards for rural residential areas (TCVN 5949/1995), namely around 50 decibels (audible) (dBA) during the day and 45 dBA during the night.

26. The two protected areas close enough to subproject roads to warrant more detailed examination are Nui Chua Nature Reserve and the Nai Lagoon. The Tri Thuy to Xom Bang subproject road (SC1310) ends at the village of Xom Bang located at the border of the Nui Chua Nature Reserve's buffer zone. The area on both sides of the existing road is either overgrazed and eroding scrubland or old paddy land. Prickly pear cactus (a colonizing alien species) is spreading throughout the area. TL 708 passes from 1–1.5 km of the western border of the Nui Chua Reserve's buffer zone boundary. The area between the road and the buffer zone boundary is heavily used by area residents, including a large commercial composting operation with extensive truck traffic. A total of 24,546 (likely growing by 15% since the 2000 census) people live in the buffer zone and another 28,863 live in the reserve's core area. The majority are extremely poor and experience an annual average of 6 months of food shortages.

² The Forest Inventory and Planning Institute is involved in park and environmental protection area inventory, planning, and mapping. It often has extensive datasets on natural protection areas and is involved in the national biodiversity conservation program, community forest management, etc.

³ TCVN, is the designation for a Vietnamese standard.

In 2000, more than 600 hectares (ha) of wet rice land, 2,500 ha of shifting cultivation, and 750 ha of industrial crop land were within the nature reserve boundary.

27. Nai Lagoon, a salt water embayment of approximately 1,000 ha, is completely encircled by dwellings, structures, and industry—all without any waste management, thus all such materials end up in the lagoon. This has been the case since the early 1990s. The Tri Thuy Bridge, which will be repaired as part of the Project, crosses the lagoon at its narrowest point. On the seaward side, the shore is taken up by shrimp farming ponds, which decades ago required the removal of all mangroves. This area was proposed as a candidate for protection in a 1999 ADB study⁴ but still has only candidate status, and therefore remains unprotected. In the following 6 years, shoreline development, including construction of more shrimp ponds and building of structures along the lagoon's shore has continued unabated.

B. Socioeconomics and Quality of Life

28. The subproject roads were selected because they complete a road network that will benefit the remote and poorer segments of the population. All roads are located in areas where poverty levels exceed those found in the specific province and where basic services are, for the most part, below those of the province and in some cases the nation.

29. In all three provinces, life along the roads to be upgraded is difficult. Issues such as the availability of potable water, adequate sanitation, reliable access to health care facilities, and year-round movement to bring farm goods to markets, are constant concerns. During consultations local people identified these as the major problems they hoped the road improvements would mitigate.

30. Of particular concern is the pattern of teachers leaving their jobs during the rainy season in areas where roads become impassable, thereby interrupting the school year, sometimes for many months. This pattern has led to declining enrolment and loss of interest among students. Improvement to the subproject roads will assist in addressing this problem.

31. A further measure of the poor living conditions is that about 55% of the households are semipermanent with another 10–30% having only temporary homes. This means that less than 15% have permanent houses. Most local people within the road corridor have lived in the area for an average of 10–15 years.

32. The roads within the three sample provinces have fewer health services located within the road right-of-way than the average for the phase 1 and 2 provinces. One health center is located along TL 684 in Dak Nong province, two along the four Ninh Thuan roads, and one along the three Nghe An roads. Common diseases are prevalent in these poorly serviced areas, as reflected in the relatively high infant and child mortality rates. Many health problems appear to stem from lack of adequate food since nearly 40% of children under 5 years in the three provinces are reported to be underweight. Malaria and other insect-borne diseases remain at or near epidemic levels (Nghe An is the exception). Access to antimalarial drugs and preventative methods are marginally available. Based on a 2003 United Nations survey HIV/AIDS⁵ cases per 100,000 were 54 in Nghe An, 27.6 in Dak Nong, and 21 in Ninh Thuan. These values are very high in comparison with the Viet Nam national average of 16 per 100,000.

⁴ ADB. 1999. Draft National Coastal and Marine Protected Areas Plan, Manila.

⁵ human immunodeficiency virus/acquired immunodeficiency syndrome

33. Aside from two cement plants and a large composting facility located along the Tri Thuy to Sam Bang road and TL 708 in Ninh Thuan, and a sugarcane processing facility on TL 598 in Nghe An, no other industrial sites that could possibly contribute to negative health impacts were found along the roads. These facilities employ mostly local people. At present, these plants are largely serviced by seasonal roads or ones where conditions during the wet period make transportation unreliable. The upgraded roads will assure an efficient and reliable transportation network, permitting raw materials to reach plants and output to leave on time, and thereby reduce the seasonal variations in employment.

IV. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATIVE MEASURES

34. Specific impacts, mitigative measures, and monitoring actions were identified for each subproject. Subproject-specific EMPs and environmental monitoring plans (EMOPs) for the 3 sample provinces are attached to this SIEE. The following is a summary of these plans, providing details of the relative low-level impacts, severity, and relative ease with which preventative measures can be applied to virtually eliminate negative effects for the eight subprojects in the 3 sample provinces.

A. Dak Nong

35. TL 684, is now a gravel and earth track, which is extremely dusty during the dry season and a muddy impassable track during the rainy season. The road will be widened from a less than 3.5 m wide track to a 3.5 m carriageway with 1.5 m gravel shoulders. The vertical alignment will be elevated to facilitate good drainage assuring year-round usability. For some sections, this will require the cutting of a number of trees.

36. Location restrictions should be prepared by the road designers working with the DONRE as well as the PDOT and commune officials, and then added to the checklist prepared for use when undertaking water-crossing work. At these work sites, equipment and material storage areas will be located at least 200 m from any water body and on higher ground.

37. Culvert replacement along TL 684 must take into account an assessment of drainage requirements, since several existing culverts are too small and positioned in the wrong location.

38. The existing alignment passes through many stretches of forest, where trees and vegetation are very close to the road. Construction will require some clearing. To prevent unnecessary clearing, the designers will identify a construction width of no more than 10 m on either side of the road, which will constitute the boundary of the contractor working area. These boundaries will be marked on the design drawings.

39. PMU1 will ensure that these items are included in the bidding package put out to tender.

40. During construction, seven impacts are likely, which if anticipated, can be almost totally avoided or kept at a level where no lasting impacts are seen. Construction impacts will, for the most part, mirror the ones described for Nghe An (para. 43), and are specified in the Dak Nong EMP and EMOP (Appendix 1). The overriding impact relates to tree removal and replanting, which must be dealt with promptly and in close consultation with local communities and the provincial forestry office; and the crossing of a number of headwater rivers, needing careful planning and avoidance of water pollution due to sedimentation and vehicles in the water.

41. Three key impacts and preferred mitigative actions during operation were focus on (i) failure of the road operator to maintain mitigation measure undertaken during construction, such as watering and caring for newly planted trees and vegetation, and maintenance of drainage structure and culverts after storms; (ii) management of traffic noise by periodic monitoring and taking action if noise levels exceed acceptable Government standards; and (iii) management of air pollution due to increasing traffic, and periodic air pollution monitoring through mobile source testing from a sample of vehicles as defined in the EMP and EMOP.

B. Nghe An

1. TL 033/SC0204, 34 km

42. This road will be upgraded to a 3.5 m wide sealed road with 1.5 m gravel shoulders, without any realignment. Four bridges will be repaired and many culverts replaced. The design will leave fords in place, but upgrade erosion protection measures at the crossing sites. Environmentally sensitive planning of the four bridge repairs/reconstruction activities will minimize impacts during construction. All efforts should be made to use the existing piers, repair where needed and increase height by adding sections, instead of demolishing and replacing. The design of culverts to be replaced must be done with knowledge of the drainage requirements. Planning for the protection of irrigation and aquaculture ponds used by roadside communities and farmers along this road, followed up by close implementation during construction will be important. Road construction near these structures must prevent catastrophic losses of water and community resources. Consultations with the owners to determine the ponds' use(s) and follow the steps as defined in the IEE will avoid serious losses and maintain good community relations.

43. During construction, seven key impacts and associated mitigative measures are (i) the excessive removal of trees and vegetation prevented by providing the contractor with a strict work area boundary and a replanting requirement using native species; (ii) accidental or purposeful avoidance by contractors of bridge and culvert design and construction guidelines, avoided by maintaining regular inspections; (iii) inadequate erosion control and earth-work management, leading to increased rain and wind erosion, resulting in soil loss and air pollution with dust; prevented mainly by minimizing the disturbed area and using nonintrusive construction methods, as defined in the IEE; access roads and construction sites kept clean and as dust free as possible, including the use of watering trucks when work is undertaken in settlement areas, or where vehicles pass through settlements; (iv) poor site maintenance by contractors at work sites, work camps, and access roads, due to poor compliance and inadequate monitoring and inspection by PMU1, avoided by assuring that inspection and compliance monitoring take place; and enforcing of immediate cleanup after construction is complete in one area and not waiting until the end of the construction period; (v) excessive construction noise near and through settlements, mitigated by setting working hours between 0600 and 1730 and limiting construction-related truck traffic through settlements to the same hours; and (vi) failure to protect living (planted vegetation) fences during construction and not providing assistance with replanting of those damaged/destroyed. Along TL033 there are a number of sections (>1km) of live fences that keep animals contained. These fences are visually important and provide fodder and fuel for local people. Contractors will be required to avoid damaging these fences and if this is not possible, then to consult with local farmers and undertake a replanting program.

44. Key impacts and associated mitigative actions during operation will be (i) noise level increases within 50 m of the pavement edge for 10 communes along TL 033 requiring a noise

sampling program and appropriate compensation as needed (details in EMP and EMOP, Appendix 2); (ii) possible increase in local air pollution due to increased road traffic, requiring relocation of sensitive receptors beyond the 50 m right-of-way, to be monitored by periodic testing; and (iii) failure of the road operator to follow a regular maintenance schedule such as watering and caring for newly planted trees and vegetation, and maintenance of drainage structure and culverts. To help avoid this, the contractor will be required to provide an end-of-construction mitigation checklist defining actions taken, their location, and requirement for maintenance. This will be passed on to the PDOT for use as a maintenance checklist and the inspector for use as a monitoring form.

2. TL 598a and 598b, 57.8 km

45. The first section of TL 598 (34 km) will be improved to a 3.5 m wide sealed road with gravel shoulders. One bridge should be replaced as it is narrow and in bad condition. One concrete floodway is in bad condition; 24 culverts need to be replaced or repaired.

46. The second section of TL 598 (23.8 km) will be improved to a 3.5 m wide sealed road with gravel shoulders. Two bridges need minor repairs. Three concrete causeways appear to be in fairly good condition. A large number of culverts will need at least some significant repairs.

47. Four issues dominate along this road. The first is the many water crossings using culverts and fords, which during rehabilitation will need to be designed to avoid future chronic flooding and erosion problems. The second is the ponds and lakes very close to the road, some actually bisected by the road. Construction in these areas will need to be done with great sensitivity and always include close consultation with local people. The third is roadside noise, since more than 30 settlements are within 10 m of the road's edge. Finally all tree cutting will need to be controlled and dust managed during construction. Impacts and mitigative actions are detailed in the EMP and EMOP (Appendix 2).

C. Ninh Thuan

1. TL 702, 15.9 km

48. TL 702 begins at national highway 1A in the urban area of Phan Rang, the provincial capital, and links it with coastal areas to the north. The road will be improved to a 6 m wide carriageway with 1.5 m wide gravel shoulders. These improvements will not require significant additional land. Two culverts need to be replaced; all bridges except the Tri Tuy are in good condition. Participants at the consultation workshop indicated that the bridge would likely have to be replaced, but that no other alignment or major repairs were anticipated. PMU1 will discuss this recommendation further.

49. Environmentally insensitive planning of Tri-Thuy bridge reconstruction over the Nai Lagoon, such as planning for extensive periods when equipment will be in the water, or channel blockages due to pier reconstruction, could lead to impacts from construction. The appropriate mitigative action will be to consider construction methods that do not require dewatering, e.g., installation of piles or sinking footings, and placement of precast piers. Thus, potential adverse impacts can be minimized. In addition, since the section of TL 702 that passes along the seaward shore of Nai Lagoon is separated from the coast by shrimp ponds and development, no particular impact is anticipated and no mitigative actions required.

50. The design of culverts to be replaced on TL 702 must be done with knowledge of the drainage requirements since it passes through seasonally wet coastal areas and drainage on the existing road has been substandard.

51. Of the six likely impacts, none are considered serious or lasting. The most serious impact could result from the failure of the contractor to follow instructions re bridge and culvert design and construction specifications, leading to chronic flooding and erosion. A set of clauses specifying construction methods, as well as a guideline on culvert design and placement, is provided for use by the contractors. The need for good site maintenance by contractors will be monitored using the EMOP (Appendix 3). Given that Ninh Thuan is a malaria area, ensuring construction site ponds, puddles, and debris that can collect water are cleaned up, is crucial to reduce the risk of disease outbreaks among construction workers and local communities.

52. Where the upgraded TL 702 will pass through the villages of Khan Hoi, My Tan, My Turong, and Van Son noise and air quality may degrade. To alert the PDOT that compensation measures are needed, noise monitoring at the end of years 1, 3, and 6 after commissioning will be required; air quality will be assessed via vehicle emission testing of a stratified random sample of vehicles. All details are provided in the EMP and EMOP (Appendix 3).

2. TL 708, 15 km

53. The existing road is a 3.5 m wide carriageway, where a penetration macadam road surface was applied. Flash-flooding and overloaded vehicles traveling from the cement factory and a large composting facility have resulted in many pavement failures; large-scale reconstruction will be necessary. Some sections are still in good condition, as is the ford/bridge. About 22 of the 24 culverts will be repaired and will improve drainage during the rainy season. This road will be upgraded to a 3.5 m wide sealed road with gravel shoulders; not affecting the pavement width, but strengthening the shoulders and raising the vertical alignment. No horizontal alignment alterations will be made.

54. The most serious potential construction impact of any consequence will be the flooding and erosion from improperly designed and placed culverts at 22 locations. Careful adherence to guidelines defined in the IEE should eliminate this impact. Secondly, excessive construction noise when work passes through settlements, namely Lang Me, Lang Mo, My Phong, and Nhon Hai may become an issue; adherence to work hour restrictions and truck movement limitations should eliminate these concerns. Another potential impact is the failure of contractors to maintain good site maintenance practices, such as proper work camp sewage and garbage management, as well as carefully controlling machinery wastes. Adherence to the EMP and EMOP prepared with the IEE should all but eliminate this impact.

55. Noise during operation and air quality degradation may become an issue as traffic increases. A sampling program, identical to the ones for other roads has been specified and PDOT will purchase noise and air sampling equipment to periodically monitor noise levels and vehicle emission rates from a sample of vehicles using the road.

3. TL 704-Tri Thuy to Xom Bang, 11.3 km

56. This road will be upgraded to a 3.5 m wide sealed road with gravel shoulders from a highly degraded condition, which makes this road unusable during the rainy season. Most (22 of 27) culverts will be replaced, and the almost totally degraded ford traversing a predominantly

dry streambed near Xom Bang Village will be replaced. No bridges need to be replaced or repaired. No alignment alterations are needed.

57. The planning issues surrounding TL 704 involve proper design of culverts, an environmentally acceptable replacement process, and rapid revegetation and stabilization of all exposed soil in this highly erosion-prone area (due to flash-flooding), starting at km 7.

58. As with the other project roads, a construction area boundary of 20 m, centred over the road centerline, will be the work limits. Restrictions regarding side borrowing will be placed in the design documents, especially for road sections between km 7 and 11.3. Prior to the completion of the road design and decision on culvert size, flood volumes and storm data will be assessed and the design specifications adjusted accordingly, thus preventing road-related flooding and erosion.

59. The design of the 22 culverts must consider drainage requirements. This is a special concern for this road as it passes into the foothills, at 1.5km to the northwest of the Nui Chua Nature Reserve where flash floods can quickly cause road washouts.

60. Replacement of the ford near Xom Bang village will require careful consideration of dimensions and shore stabilization features to prevent washouts as floodwaters rush over it.

61. The upgraded road will provide better year-round access for forest protection officers to reach Xom Bang, the boundary of Nui Chua Nature Reserve, and conduct more regular enforcement duties. From about km 9–11.3 this road is near the buffer zone boundary of Nui Chua Nature Reserve. Road design will include provision for a fence along both sides of the road, as well as livestock grates on the road to prevent livestock from straying onto nature reserve lands to graze.

62. Implementation of standard construction measures, such as erosion control and earthworks management, noise and air quality protection, and environmentally acceptable contractor operations, will eliminate negative effects. Use of the EMP and EMOP specifically prepared for roads in Ninh Thuan will help the contractors with scheduling, executing, and monitoring impact mitigation progress.

63. The EMP and EMOP (Appendix 3) will be included in the contract documents to help with both mitigation and monitoring of the work.

64. During operation, noise and air quality degradation could become a problem. Noise and vehicle emission levels will be sampled according to the fixed schedule defined in the IEE. Any regular exceeding of standards will result in immediate action: noise barriers will be constructed or affected people could be relocated away from the road. Any vehicle failing the emission test will be required to have repairs. If emission test failures increase, the testing and mandatory vehicle repairs will be stepped up.

4. TL 705, 24.1 km

65. This subproject consists of four distinct sections. The first section through An Hoa will receive only minor upgrading, while the second of about 7.8 km, from the outskirts of An Hoa to Tham Du, mostly an ill-defined track through sandy areas, will be upgraded to a 3.5 m wide sealed road with gravel shoulders.

66. The two remaining sections between Phuoc Trung and My Son will be rehabilitated from a seasonal track to a 3.5 m wide all-weather sealed road with 1.5 m wide gravel shoulders. More than 19 culverts and fords need to be replaced. One bridge (km 0.9) is still in good condition; another (km 2.8) is in fair condition, but is narrow and railings need to be added. No alignments will be altered.

67. The planning issues surrounding TL 705 involve proper placement of the roadbed, which has practically vanished in the sandy desert conditions between km 2–10. The design of culverts and an environmentally acceptable replacement process, as well as a rapid revegetation and stabilization of all exposed soils in this highly erosion-prone area (due to flash flooding) starting at km 10 will be essential as more than 30 water-crossing structures (culverts and fords) are along this road.

68. A construction area boundary of 30 m, centred over the road centerline, will be the work limits. Restrictions regarding side borrowing will be included in the design documents; and will be particularly true for road sections between km 10 and 24, which sit on an incline from north to south, with small hills to the north. Prior to the completion of the road design and decision on culvert and ford size, flood volumes and storm data will be assessed and the design specifications adjusted accordingly, thus preventing road-related flooding and erosion.

69. The EMP and EMOP (Appendix 3) will be included in the contract documents to help with both mitigation and monitoring of the work.

70. Excessive construction noise when work passes through the following locations: km 1.1 People's Committee school, km 1.4 health center, km 1.5 School, km 10.0 Phuoc Trung village and a number of smaller villages along the road may become a problem unless work hour restrictions and construction haul vehicle travel restrictions are put in place according to the EMP and EMOP. Noise and air quality could be slightly degraded by future traffic; a sampling program is proposed.

V. INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MANAGEMENT PLANS

A. Institutional Requirements

71. Each province has a full set of government institutions, including a DONRE responsible for implementing all laws, regulations, and standards pertaining to the environment. Under a state transport management board, each PDOT and its director are responsible for day-to-day planning, administration, and operation of the provincial road system, including dealing with any environment items. In 2000, MONRE defined a future national environment strategy, including the recommendation that major line agencies such as MOT manage their own environmental affairs. By 2002, the Government approved this strategy and advised its ministries that they would be held responsible for environmental management, including environmental assessment. Since 2002, MOT has had its own environmental management guidelines. This has meant that MOT and by extension the PDOTs and their internal provincial project management units (PPMUs) are responsible for implementing any environmental management actions related to the subprojects. However, as of September 2004 none of the PDOTs or the PPMUs in the three provinces included in this SIEE had any capability to plan, interpret, or implement environmental mitigative and monitoring instructions.

72. During the design and construction phases of the Project, elementary capacity building, supported by qualified consultants, will be essential. At present, PDOTs hire consultants for all

the environment work. This is acceptable if the PDOTs have the capacity to assess the quality of the consultants' output.

73. At the beginning of the design phase, staff from PMU1 and the PDOTs will attend a training workshop on environmental assessment and follow-up activities, using a case study format. The workshops need to be followed up during the design phase with on-the-job training while the detailed design and contract preparation is ongoing.

B. Environmental Monitoring

74. EMPs were prepared for the road networks in the 3 sample provinces (Appendixes 1–3). Given the low level impacts, monitoring should only involve checking compliance to assure that designers have incorporated mitigative actions into the road designs and contractors follow the specifications and mitigative measures defined for them in a subproject-specific EMP. Inspectors will be required to report compliance, based on contractor certifications.

75. During project design, monitoring will focus on confirming the PDOTs' commitment to adjusting the design and construction methods to prevent negative environmental impacts from occurring and complying with all mitigative actions and monitoring requirements defined in the IEE. During construction, monitoring will comprise regular compliance monitoring and inspection, to ensure work is being conducted in an environmentally responsible manner, e.g., waste is collected and disposed of properly instead of being dumped into the nearest river, and that culverts are rebuilt only with local advice on location and size. During road operation, the PDOTs will be responsible for ensuring that any mitigative measures are maintained and, should ADB request, provide evidence that maintenance and compliance monitoring activity is being undertaken. Since project-level air quality monitoring during operation has been shown to be of minimal value as taking actions involve very slow broad-based regulatory and administrative changes, emission testing is recommended. A mobile emission testing kit will be purchased by each PDOT and used to initially test 100 vehicles (in proportions related to the composition of the fleet) per year, requiring any noncompliant vehicles to be repaired or taken off the road. If successful, this program will be expanded. A noise meter will also be purchased and used to sample noise levels according to a specific schedule defined in the EMOP.

C. Mitigation and Monitoring Costs

76. Since environmental impacts are minimal and mitigative actions deal mainly with contractors following acceptable and environmentally responsible work practices, estimated costs for mitigation and monitoring remain low, in relation to other projects of this size (Table 1). Total mitigation, monitoring, and training costs for the eight sample roads over 1 year of preconstruction activities, 2 construction years, and 3 operating years, is estimated at \$1.02 million. This includes nearly \$610,000 in revegetation, replanting of trees, and erosion control measures, costs usually included with the engineering budget. To avoid double accounting, the estimated total costs shown in the three IEEs will be reduced by the following amounts:

(i)	Dak Nong	\$132,000
(ii)	Nghe An	\$156,000
(iii)	Ninh Thuan	\$321,000

77. As is typical for road rehabilitation projects, the largest percentage of the mitigation and monitoring costs will be incurred during the 2 years of construction. To derive an estimate of environmental mitigation and monitoring costs for the entire Project, these estimates were

scaled up to estimate total costs for all 19 provinces. After taking into account economies of scale and rationalizing use for resources, a budget of \$4.32 million is estimated for the entire Project. This estimate is likely to be an overestimate as about 50–65% of the subprojects may generate minimal impacts with only very specific and low-cost mitigative actions, and as such the projections described should be used as a general indicator of costs. For example, for Lam Dong one 50 km road has a number of environmental issues to be addressed and a large gap in technical capacity, thus costs could be considerably higher than the average, whereas for the 6 Ha Tin subprojects, 3 might need a fraction of the average since no substantial negative impacts are anticipated.⁶ During the specific assessment of these projects a more precise budget will be defined.

Table 1. Mitigation and Monitoring Costs for Three Sample Provinces

(\$)			
Province and Project Phase	Mitigation	Monitoring	Total
Dak Nong			
Preconstruction (6–8 months)	19,640	1,960	20,600
Construction (24 months)	1,060	183,750	184,810
Operating Period (36 months)	610	11,035	11,645
Major Expenses			9,875
Training (Plan, Preparation, and Delivery)	Included in pre-construction costs		
Subtotal	21,310	196,745	226,930
Nghe An			
Preconstruction (6–months)	19,640	1,960	20,600
Construction (24 months)	2,120	229,500	231,620
Operating Period (36 months)	610	21,070	21,680
Major Expenses			9,875
Training (Plan, Preparation, and Delivery)	Included in pre-construction costs		
Subtotal	22,370	259,170	283,775
Ninh Thuan			
Preconstruction (6–8 months)	21,140	1,960	23,100
Construction (24 months)	4,240	438,600	442,840
Operating Period (36 months)	610	31,105	31,715
Major Expenses			9,875
Training (Plan, Preparation, and Delivery)	Included in pre-construction costs		
Subtotal	25,990	471,665	507,530
Total mitigation and monitoring(over 6 years)			1,018,235
Total minus revegetation and erosion control			409,235

Source: TA4034-VIE: Central Region Transport Networks Sector Project

D. Environmental Management Plans for the Three Sample Provinces

1. Dak Nong Province Roads

78. The EMP (Appendix 1) contains a set of specific actions to be taken during all three road development periods. During construction, the 10 mitigative measures largely deal with preventative actions to be taken by the contractor to avoid costly repairs, and or specify immediate actions such as with erosion prevention, replanting, and rehabilitation of headwater streams crossings.

⁶ None of the 20 remaining subprojects in phases 1 and 2 involve any deviation of the road outside the existing right-of-way, and indeed within a 14–18 m distance centered over the carriageway.

79. During operation, five mitigative tasks, actually monitoring, reporting, and maintenance of past mitigative measures, are specified. Nine noise monitoring sites are located by km mark using the strip map records (to be provided to the PDOT), and are listed in the EMP. Measurements will be taken at these locations. Emission testing using a portable tailpipe meters is indicated for a sample of 100 vehicles for 3 operating years will be completed. For each mitigative measure, the EMP includes information on location, time frame, and responsibility.

2. Nghe An Province Roads

80. The EMP (Appendix 2) contains a set of highly specific actions to be taken during the three road development periods. During preconstruction, seven actions are proposed, nearly all planning initiatives to try and avoid/prevent any negative effects. One specific measure for TL598a and four for TL598b are defined.

81. For construction, nine mitigative measures are identified, plus one for TL598a and three for TL598b. Most deal with preventative actions to be taken by the contractor to avoid costly repairs, and or specifying immediate actions such as with erosion prevention, replanting, and irrigation canal repairs.

82. For operation, five mitigative tasks, actually monitoring, reporting, and maintenance of past mitigative measures, are listed. Air and noise monitoring sites are located by km marking, using the strip map records. Noise monitoring and emission testing will also take place. For each mitigative measure, the EMP includes information on location, time frame, and responsibility.

3. Ninh Thuan Province Roads

83. The EMP (Appendix 3) and contains a set of specific actions to be taken during all three road development periods. During preconstruction seven mitigative measures are defined for all four roads, as well as well as special mitigative measures for three (TL 702, 708, and Tri-Thuy to Xom Bang Road). For construction, nine mitigative measures are identified and one each for two of the project roads (TL 708 and Tri-Thuy to Xom Bang Road). For operation, five mitigative, actually monitoring tasks, reporting, and maintenance of past mitigative measures, are listed. An additional measure is defined for the Tri Thuy-Sam Bang Road. For each mitigative measure the EMP includes information on location, time frame, and responsibility.

VI. PUBLIC CONSULTATION AND DISCLOSURE

84. For each of the 3 sample provinces a workshop was held to inform stakeholders of the Project components and to gather comments from these stakeholders. The information disclosed included a description of the proposed work, the environmental requirements, both in terms of the Government and ADB, and the responsibility of the province. A summary of predicted effects/environmental issues and a general schedule for the engineering work were presented. The presentation was followed by discussion and comments by participants. A summary of the results of the public consultations for each of the 3 sample provinces is given in Appendix 4.

VII. ENVIRONMENTAL ASSESSMENT AND REVIEW PROCEDURES

85. To establish the scale of potential environmental issues, the appropriate mitigative actions, monitoring requirements, costs, and institutional capacity to undertake mitigation and monitoring, the three initial assessments of 8 sample subprojects were conducted. Based on these assessments, an environmental assessment and review procedure (EARP) process was defined for use with the remaining subprojects as set out below. This EARP has been prepared to meet the requirements of ADB's Environmental Policy.

A. Type of Subprojects to be Assessed

86. The subprojects to be assessed, including the sample 8 subprojects, are all improvement to existing provincial or district road. The proposed improvements typically consist of: raising the road level to prevent flooding, replacement of culverts to improve drainage and reduce erosion damage, to provide a sealed road surface to assure all weather use and to reduce dust, and finally to provide adequate road shoulders. Typical roads will be improved from gravel surfaced tracks to a 3.5 m wide sealed road with 1.5 m gravel shoulders. Based on a preliminary engineering inventory of phase 1 and 2 roads, none will have alignment deviations or be widened more than 3.5 m in total.

B. The Project Management Unit and Review Process

87. The PDOTs and PPMUs are legally responsible for preparing Project documents, and for implementing and maintaining environmental requirements. The PDOTs and PPMUs will participate in preparing IEEs. The PPMUs will be directly responsible for day-to-day monitoring of all environmental requirements, while the PDOTs have overall responsibility for enforcing and reporting to ADB and others.

88. For projects involving foreign funds, Viet Nam requires an impact assessment, and depending on the total monetary value this can be handled at the national or provincial level, with provincial people's committees being involved. IEEs are prepared by consultants and submitted to a provincial committee or MONRE for review and approval. The format and content of the Government's environmental impact assessment (EIA) is generally the same as for an ADB document, although the approach is more remedial with little emphasis on alternatives, public consultation, stakeholder involvement, or linkage to socioeconomic factors. This EARP is based on project categorization (as opposed to a strictly Vietnamese methodology) and requires a more comprehensive approach and shift in emphasis to prevention of impacts from occurring instead of repairs to the environment once impacts have occurred.

89. Viet Nam's environmental regulations and standards are adequate and meet most international conditions. This is particularly true for air quality, emission, noise, and surface and groundwater quality. More recently forest and natural area protection was strengthened.

C. Specific Executing Agency Procedures for Subprojects

90. Under Vietnamese law, the executing agency, in this case PMU1, is responsible for project implementation. PMU1 will be responsible for ensuring that all environmental assessments and necessary follow-up activities are undertaken at both the central and

provincial levels. PMU1 is ultimately responsible and will be the point source for all communication with ADB. PMU1 will be assisted by MONRE who can provide advice on process and unusual conditions, as well as the provincial DONREs.

91. The PPMUs, in consultation with the PDOTs, manage the day-to-day PMU1 work, through a consultant. The PDOTs and their PPMUs will be responsible for all environmental assessment needed for each subproject. The PDOTs can request assistance from DONREs, although a DONRE can undertake an environmental inspection at any time if it suspects a problem.

92. For this EARP, the assignment of responsibility will remain the same except that during the period when the PPMU and PDOT capacity is being built, the consultant will provide on-the-job training to at least one person assigned by each PDOT. Secondly, PMU1 will have overriding powers to ensure that the PDOTs adhere to environmental requirements.

D. Environmental Criteria for Subproject Selection

93. Initially, a long-list of over 290 road subproject was screened using engineering, economic, financial, social, and environmental criteria. The environmental criteria carried an exclusion/inclusion condition and are to be applied to all future subprojects. Therefore, the first level screening for any potential subproject would be to determine if any of the following four criteria apply. If any are found to apply then that subproject would be excluded from the Project:

- (i) direct permanent degradation of any designated protected area as identified in Birdlife International and Forest Inventory and Planning Institute databases and maps; including such impacts as blockage of wildlife travel routes, permanent removal of territory, pollution through indirect means such as air quality degradation, excessive noise, surface water quality loss, and loss due to soil and ground destabilization by cutting, filling, and storage of earthworks materials;
- (ii) any significant loss of natural/primeval forest;
- (iii) any permanent negative effect on a known rare or endangered species; and
- (iv) any permanent damage to irreplaceable cultural relics and archeological sites.

94. By conducting the first level screening the chances of having to undertake a complete EIA on any of the subprojects is remote. The IEE process to be applied will confirm this or recommend necessary work. IEE steps and documentation will be prepared in accordance with the requirements of ADB's Environmental Policy.

95. The second level screening involves determining the need for a full EIA, IEE, or only a mitigation and impact statement. A screening form has been prepared for use with all subprojects subject to the EARP. The criteria exercise must take place at the start of the PMU1 process in the province and involves, as a minimum, the PDOT, PPMU, DONRE, and PMU1. Any subproject with a possibility of needing a full EIA will not be included as candidate subproject.

E. Preparation of the IEEs

96. The PDOT or its PPMU will prepare the IEE, with assistance of a consultant and input from PMU1 and either MONRE or DONRE. Preparing individual subproject IEEs will be the responsibility of the respective PPMU, under supervision by each PDOT, and be reviewed by PMU1 before submission to ADB. EMP implementation during preconstruction and operation is the responsibility of the PDOTs. During construction, the contractor is responsible, but the PDOT or PPMU undertakes the necessary compliance monitoring. EMOP implementation

follows the same procedure, except that the PDOT and PMU1 are more closely involved in reporting and completion report transfer from preconstruction to construction and operation.

97. Once the IEE, EMP, and EMOP are complete, they must be distributed to the PPMU in quantities adequate for distribution to contractors, and other stakeholders, such as commune leaders

98. The PDOT/PPMU must prepare an action plan of tasks, based on the EMP and EMOP to be completed during the preconstruction phase, then prepare a short record of completion to be passed on to the construction team. The contractor will be required to prepare mitigation progress and monitoring checklists every 4 months, showing progress on mitigative actions defined in the EMP and EMOP; and at the end of the construction, a summary report and verification that mitigative actions as defined were completed and any listing of work to be continued by the PDOT during the operating period. The PDOT will be required to undertake monitoring of operation, and file monitoring reports every year for years 1, 3, and 6, focusing on identifying the success of mitigative measures as well as assessing the results of noise and emission monitoring.

99. Of considerable importance and less familiar to Vietnamese practitioners is the public consultation and information disclosure requirements, where PMU1 must demonstrate that consultation with local officials and the public was undertaken and indicate any useful inputs to subproject design.

F. The Environmental Management Plan and Environmental Monitoring Plan

100. For both EMPs and EMOPs, actions are usually required during both subproject construction and operation. To monitor compliance (and in some cases effectiveness), a monitoring plan needs to be added to all subprojects as part of the IEEs. Three completed EMOPs were prepared for use as a template for the remaining subprojects. The EMOP template is designed to be used as is, without further interpretation, for the mitigation and monitoring to be undertaken immediately once the detailed design stage of a subproject begins. Therefore, any future EMPs and EMOPs should provide the same level of detail as a minimum. The process requires a costed EMP. The examples completed for the three sample provinces should be used as a template for the remaining subprojects. Examples of EMOPs are also included.

G. Monitoring Environmental Performance

101. The EMOP defines how mitigative measures prescribed in the EMP are to be tracked during the course of planning, construction, and operation of any subproject. The EMOPs completed for the three pilot IEEs were designed to be used as monitoring checklists and match the mitigative measures defined in the EMPs. Therefore EMPs are prepared first, followed by the EMOPs.

102. Usually EMOPs are prepared by the PMU1 consultant or the proponent during the completion of the IEE. In keeping with the preventative nature of the PMU1 process, EMOPs are prepared prior to any work being started, and contains information on the location, timing, and sampling and recording details for each monitoring task. The EMOP should specify responsibility for undertaking each monitoring activity.

H. Documentation

103. Documentation of mitigation and monitoring activity is essential. The EARP is incomplete without a reporting process agreed to by the units responsible for the work during the three key subproject development stages. Generally three monitors will be involved:

- (i) PMU1 or the PPMU during detailed design/preconstruction;
- (ii) the contractor or a consultant during construction; and
- (iii) the operator of the road, likely the PDOT or its PPMU, during operation.

104. The content and frequency of mitigation and monitoring reports will be agreed to by PMU1 and the PDOTs. At least semiannually, EMP implementation and EMOP reports will be submitted based on the ADB's Environmental Policy. General good practice indicates that an IEE a monitoring report will be completed according to the following schedule:

- (i) one report at the end of project design,
- (ii) one report every 4 months during construction, and
- (iii) annually during operation for as long as the monitoring is specified in the EMP.

105. Based on the agreement between PMU1 and the PDOTs, the monitoring report may also contain effects monitoring, i.e., observations on whether and to what extent the completed mitigative actions had or were reducing the predicted negative impacts to the acceptable level, as defined in the EMP by Government standards.

106. The format of the monitoring report for the three periods is largely the same, with the focus on the description of what actions were taken, when they were taken, and where they were taken, in relation to the instructions provided in the EMP and EMOP. The report format should be standardized for each period, PMU1 making final decisions. General monitoring reports are highly focused; providing a combination of text, tables, and relevant photos, addressing each mitigative action as defined in the EMP. The EMOP will define how frequently any particular mitigative actions should be monitored, e.g., the requirement for air quality testing and water quality sampling and testing.

I. Public Consultation and Information Disclosure

107. For any subproject subject to the EARP and where an IEE is required, formal and documented public consultation and information disclosure must take place. For IEEs this will be done once at the start of the IEE to inform stakeholders of the project components and to encourage input to identify overlooked environmental issues. The information disclosed and feedback provided at the consultation sessions must be summarized, attendance recorded, and the entire document attached as an annex to the IEE.

108. Attendance for IEE consultations should include government agencies, people's committee members, community representatives, as well as nongovernment organizations. Organization of such sessions should allow for at least 3 weeks lead time.

J. Reviews

109. Any assessment documents prepared as part of this Project using the EARP process must be reviewed and approved by both the Government and ADB. The process should be as follows:

- (i) Draft PDOT document is submitted to PMU1 for processing, i.e., distribution to relevant province, assembly of comments, provision of a coordinated response, and finally approved by PMU1 as representative of the Government.
- (ii) The approved PMU1 document is submitted to ADB for review and compliance-check against ADB's Environmental Policy.

110. This circulation and approval process can be adapted to specific conditions and should be established at the start of the assessment. For example, ADB and the Government can choose to undertake their reviews in parallel, thereby saving time and permitting the assessment authors to revise the documentation at one time. Once both parties have completed the review, the final document is signed off jointly by ADB and the Government.

K. Staffing and Equipment Requirements

111. An important up-front cost will be the training of PDOT and PPMU staff in PMU1 and related management issues. In addition critical equipment such as a noise meter, emission testing kit, and related training will be essential. The PDOTs will need to assign at least one, preferably two people, to be responsible for environmental matters with the department.

112. The budget needed for the completion of a single network IEE will be 1.5 person-months of environmental specialist input and 5 of a technical specialist. At least two field visits to each subproject road, plus at least one public consultation at which project information and maps need to be distributed, and a presentation for PDOT, PPMU, DONRE, Forest Department, commune, and other stakeholders, are necessary. Therefore adequate travel and per diem budgets must be provided.

L. Summary

113. The EARP for subprojects is to be undertaken as follows:

- (i) PMU1 with the PDOT, or PPMU, reviews the subprojects and organizes a scoping meeting at which the screening of the subproject(s) is conducted using the environmental criteria in paragraph 93. PMU1 or the PDOT must include the general public as well as DONRE in the scoping session.
- (ii) For each subproject included as candidate subproject, an IEE will be undertaken, that meets the requirements of ADB's Environmental Policy.
- (iii) The completed draft PMU1 document must be reviewed by the PDOTs and PMU1; and, at the same time, by ADB. Comments are returned to the authors and a revised document submitted to PMU1 for submission to ADB as the final version.
- (iv) After final approval by ADB and the Government, the PMU1 document becomes a binding set of actions for PMU1 and PDOT.

VIII. FINDINGS AND RECOMMENDATIONS

114. All of the impacts identified for the subproject roads in the 3 sample provinces are considered minimally significant and all are identified as either preventable through careful planning or could be mitigated such that the residual impacts would be negligible. The road networks in these provinces are considered to be representative of the Project as a whole.

115. Overall, the environmental effects of the road rehabilitation are predicted to occur during construction. Traffic growth for the next 10 years or so is not enough to trigger significant air pollution and noise. The improvements (sealed carriageway) could actually contribute to air quality and noise level improvements as they will result in quieter, less dusty traffic movement.

116. The environmental effects identified for all roads are (i) surface water drainage impacts due to inadequate design and placement of culverts, since nearly all of the existing culverts will need to be repaired or replaced; (ii) filling in/drainage of roadside ponds during the road construction causing loss of property and food (fish resources in ponds); (iii) excessive and unnecessary removal of roadside trees; (iv) inadequate erosion and siltation control during the earth-work activity; (v) poor site maintenance practices by the contractors, particularly as related to sewage and garbage at worksites and work camps; and (vi) failure to clean up stagnant water and thereby providing excellent breeding grounds for mosquitoes carrying diseases such as malaria and dengue fever.

117. During operation, the most serious potential impact is predicted to be a failure of the road operators (PDOTs) to maintain mitigative measures initiated during construction or to carry out the necessary monitoring and reporting as defined in the SIEEs.

118. A set of mitigative actions to deal with these and other potential impacts are suggested in three detailed EMPs, which will be incorporated into contract clauses, further assuring that basic environmental work-site maintenance takes place throughout the Project. The mitigative actions are defined in concert with a compliance monitoring program, describing steps to be taken and the reporting needed during the three project phases.

119. The PDOTs have serious shortcomings in their ability to manage their environmental affairs or to implement mitigative measures defined in this and other SIEEs. To fill this gap an environmental assessment and management workshop will be held in each province, before construction, and will be followed up with on-the-job training as the design work progresses, by both PMU1 and the design consultant. Recent work such as the PMU1 handbook prepared for MOT will provide useful guidance. The workshops need to be followed up during the design phase with on-the-job training, while the detailed design and contract preparation is ongoing. To achieve this, each PDOT will need to appoint one person to work with the design consultant team's environmental specialists as required, for the duration of the design phase.

120. Since none of the road work is outside the existing right-of-way, most is minimally beyond the existing carriageway width and based on the Birdlife International maps, no irreplaceable resources will be used or impacted. Only four protected areas are near the roadwork. Consultation with the Ninh Thuan DONRE, examination of Birdlife International's survey reports and mapping, plus field surveys established that the Nui Chua Nature Reserve and the Nai Lagoon will not be damaged by the road improvement work, since the work would be small-scale, minor, and confined to a narrow existing roadway. In Ninh Thuan, TL 708 was located 1–1.5 km from the buffer zone of the Nui Chua Nature Reserve, with considerable settlement and agricultural activity separating the two boundaries, as well as a many people living in the buffer zone. TL 702 passes over the Nai Lagoon at its narrowest point via the Tri Thuy bridge. Present plans call only for repair work to the deck, thus minimizing construction impacts. Provincial officials advised that assuming mitigative actions as defined in the EMPs are adequately undertaken, road rehabilitation will result in few impacts and many more significant benefits. In Dak Nong province, the Nam Nung Nature Reserve was found to be too far (20 km) from the road work for any impacts to occur and the Nam Ca Nature Reserve in Dak Lak province was separated from the Dak Nong roadwork by the Krong Po River, a distance of 5 km. Since TL 684 parallels the river then turns to the southwest at its closest point to Nam Ca (the Nam Ca Reserve being 5–6 km to the west), this reserve will not be affected by road

rehabilitation work. At the Dak Nong consultation session, DONRE indicated that since the Project involves the modest improvement of an existing road and no change to access to the reserve, no significant effects will be experienced by Nam Ca.

IX. CONCLUSIONS

121. Based on the results of the IEEs for 3 sample provinces, potential impacts are considered to be minor and of shorter term duration, and with careful implementation of mitigative actions, only minor residual impacts will remain.

122. Both an EMP and EMOP were prepared for each road network of the sample provinces. Each EMP provides a detailed listing of the actions needed during the implementation, i.e., from design through operation. Each EMP includes the suggested mitigative action, when and where it is to be undertaken, and who is responsible for undertaking each action. Each of the three EMOPs defines how compliance monitoring is to be undertaken in relation to the three project phases, i.e., design, construction, and operation. Both the EMP and EMOP for each network are included in Appendixes 1–3.

123. The three road networks will not require any further survey or a full environmental assessment, beyond execution of the EMP and EMOP, during the design, construction, and for specific time intervals during operation. With the necessary training and equipment as defined in the IEE, the PDOTs will be able to meet all necessary mitigation and monitoring requirements, fulfilling their obligations as environmentally responsible units of the Government.

124. The IEE studies conclude that environmental assessment training workshops have to be completed during the project design phase if actions defined in the EMPs and the monitoring plans are to be credibly carried out. Together with environmentally committed PDOTs and cooperative contractors, the subprojects will bring considerable sustained benefits to the now remote and disconnected communities in the subproject provinces.

125. The overall finding of the IEE is that the proposed works are unlikely to cause any significant adverse environmental impacts, provided that adequate mitigation measures are implemented. The proposed mitigation measures are prescribed conceptually in the Project IEE and its summary. IEEs will be prepared for each subproject using the EARP procedures described in the Project IEE and each will include a detailed EMP and EMOP. No further study of environmental impacts is required for approval of the Project.

ENVIRONMENTAL MANAGEMENT PLAN AND ENVIRONMENTAL MONITORING PLAN FOR DAK NONG PROVINCE ROADS

Table A1.1: Environmental Management Plan for Dak Nong Province Roads : TL684/SC 1701

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
1. PRE-CONSTRUCTION PERIOD (DESIGN PHASE)					
Lack of any capacity to understand and implement environmental mitigative measures	Organize, prepare and deliver Environmental Assessment (PMU1) and PMU1 implementation training to PMU1 as well as Dak Nong PPMU and PDOT, using both on-the-job training and a workshop method. Main delivery mechanism will be case studies developed from road project(s). At that time, the IEE will be distributed to units listed above and all those attending the IEE workshops.	Gia Nghia, capital of Dak Nong	Within 2 months of start of design phase: one workshops, each lasting about 1.5 days	PMU1 and PPMU and design consultant. Paid byPMU1	PMU1 and PDOT
Failure to consider local drainage, storm and soil conditions when designing culvert and small bridge replacement program	Culvert design will be a carefully evaluated in terms of sighting, based on drainage and flood conditions. Three design elements will be identified for each culvert: a) culvert location, shape and diameter, b) placement slope u/s to d/s c) design of erosion protection measures at inflow and outflow. A checklist for proper culvert design and construction will be prepared	As part of the design exercise to be completed in Hanoi by PMU1, working with the Dak Nong PPMU and PDOT in Gia Nghia	During the design stage	PMU1,design consultant, working with PPMU and PDOT	PMU1 and PDOT
No actions taken to make design environmentally friendly not implemented	The environmental team working with the road designers will review the environmental recommendations in the IEE relating to road design and, in consultation with PPMU, help to incorporate as many design changes which help to prevent negative environmental effects from taking place; e.g. damage to headwater streams and unnecessary loss of trees.	As part of the design exercise taking place at PMU1 and the provincial PPMU	During the design period	Design consultant's environmental specialist(s)	PMU1 and PDOT
Failure to use the EMP	Joint effort of the environmental and contracting specialists to prepare environmental contract clauses based on mitigative measures defined in the EMP, or the inclusion of the full EMP as a part of the conditions of particular application, section of contracts, to be signed between the government and the contractors. Prepare loan covenant that requires EMP implementation and monitoring and legally binds PMU1 to implement and show proof that environmental mitigation was completed.	PMU1 and design consultant offices	Before construction begins	Design consultant's environmental specialists and contract specialist, in consultation with PPMU and PDOT	Design consultant and PMU1

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
Failure to complete survey of roadside trees not to be cut	To prevent excessive tree cutting during construction and to assure adequate replanting, a rapid roadside survey will be conducted by PPMU to mark all trees, larger than 10cm diameter (1.5m from, ground) within the construction zone (20m-wide). PPMU to use 'strip-map forms developed by TA consultant.	Along all four roads:	Within 2 months of start of construction	PPMU or contracted worker from Forestry Dept.	PMU1 and PPMU
Lack of reporting on Design Phase Mitigative Actions Taken	AS part of the on-the-job training, PMU1 or its consultant will demonstrate how mitigation reports are prepared; i.e, a short summary report on the mitigative actions taken during the preconstruction period and follow-up needed once construction starts.	Covering the project and focusing on the preconstruction period, in Hanoi and the nine provinces	Submitted to PMU1 two months before start of construction	PMU1 and PPMU staff	PMU1
Inadequate or no design plan for headwater stream crossings in design documents	At least three headwater streams crossings between km 56 and 60 , for Dak Rung, R'Mang and R'Ha will need new culverts, and the design team will prepare a checklist to prevent damage to the waters by contractors	At PMU1, working with PPMU and Dak Nong PDOT	During design stage	PMU1,PDOT and its PPMU also working with local community	PMU1 and bridge designers, PDOT
2. CONSTRUCTION PERIOD¹					
Failure of Contractor to use the EMP	At the pre-mobilization meeting with contractors PMU1 and PPMU will underscore the need for contractors to understand and adhere to EMP (additional copies in Vietnamese to be provided at that time)	A mobilization meetings in Phan Rang	At start of construction period	PMU1 and Contractor	PMU1 and PPMU
Careless placement of culverts and bridge reconstruction	Culvert design, removal and replacement will need to be specified in design documents, as per the discussion in this IEE. Contractor will need to use the checklist prepared by PMU1	At all worksites where culvert replacement and bridge repairs take place, and particularly at headwater streams	Throughout construction period	Contractor	Contract Supv. Engineer
Inadequate Erosion protection	Since the major problem with erosion will be the under-design and mis-placement of culverts, contractors will be required to confirm that all such reconstructions and replacements will be done according to the engineering drawings and in relation to the 'design storm' as defined by the engineer. care in the placement of erosion protection feature will be essential.	At any water crossing/culvert site	Throughout construction period	Contractor	Constr. Supv. Engineer

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
Excessive Removal of Trees, followed by inadequate replanting	Before any ground is broken the contractor, working with the PPMU, must ensure that the cutting and replanting scheme has been agreed to and that any trees marked as 'to stay' (as defined in the pre-construction inventory) will not be cut down, This inventory will be checked for such 'to stay' designations. The contractor, under the supervision of PPMU might consider initiating a community-based replanting program, supplying and paying local communities to replant and maintain the plantings during the 2-construction years.	Based on the Pre-construction survey, but more or less the RoW width of ≈ 20 m plus any other areas to be cleared as part of the work.	During the construction period with replanting as soon after cutting as possible	Contractors and Const. Supv. Eng. after consultation with PPMU and DONRE	Constr. Supv. . PDOT Engineer and DOF staff-as needed
Inadequate maintenance of all haul roads	Contractor will be responsible for maintaining and repairing all roads used as access to worksites, or to materials production and storage areas, this will include cleaning, dust control and repair of surface, degraded by heavy truck uses.	As identified by contractor, when identifying access road and haul road needs	Throughout construction period	Contractor	Constr. Supv. Engineer and PPMU
Failure to properly protect cut area slopes	A number of cuts will be required to reduce the road grades to more acceptable levels for large truck and bus traffic. Cuts will need to be protected from erosion and slope slippage (as has already been experienced along TL684)	At any cuts as defined in the design plans for the road	Immediately after a cut has been made and sideslope established	Contractor	Constr. Supv. Engineer and PPMU
Excessive construction noise in settlement areas	Within 300m of any settlement along the road, construction work involving equipment and trucks and any other noisy activities, will be limited to the hours of 0600 to 1730; this also applied to roads through settlement areas used by trucks hauling good to a construction site more than 300m from a settlement. In this situation contractors will either have to plan ahead or haul during the daytime. Outside the settlement areas construction will be permitted at any time.	At all locations where road is <10m from a dwelling which is at sensitive sites along both sides of the road at 11 sites.	Throughout construction period	Contractor	Constr. Supv. Engineer and PPMU
Operation of Asphalt, batch, rock crushing plants too close to settlements	Any plants operated or used by the contractor must be a licensed and legally operating plant (according to Vietnamese law). The contractor must provide written proof that this is so and if not, either corrects the non-compliance, or find a legal supplier.	Throughout the construction area	At all times	Contractor	Constr. Supv. Engineer and PMU1 and DONRE

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
Careless construction related housekeeping tasks	Contractor will adhere to standard good housekeeping practices as defined in the contract terms and conditions and Conditions of Particular Application. Special consideration will be given to management of construction waste, water, equipment lubricants and fuel and construction/road related dust. This will be done in accordance with Government regulations and standards, which the contractor will be expected to be knowledgeable about.	Any construction site or activity which is the responsibility of the contractor	Throughout construction period	Contractor	Constr. Supv. Engineer
No or inadequate Contractor's Final Monitoring Report	Contractor will prepare a final monitoring report, in the form of a matrix table, defining the mitigative actions taken, when and where these were taken, the benefits achieved and the future actions needed during the operating period.	Contractor's office	At end of Construction period	Contractor working with supv eng, team.	Constr. Supv. Engineer and PMU1, with input from PPMU
3. OPERATIONAL PERIOD					
No contractor's Monitoring Report & preparation of a Operational Period Mitigation Schedule	PMU1 and the PPMU will actively obtain the monitoring report from the contractor(s); and based in that, prepare the implementation timetable for mitigation and monitoring during operating stage of the project	To cover all areas defined in the EMP	At or just before road commissioning	PMU1 working with PDOT	PDOT
New but blocked culverts	PPMUs or consultant to check all culverts and bridges to make sure that size, placement and stabilization are in place and will not lead to future erosion problems. PPMU will be required to assemble a digital photo record of each replaced culvert	All water crossing sites	Within first 6 months of operations	PPMU or consultant	PDOTs
Revegetation program & tree plantings not maintained	PPMU or PDOT to renegotiate replanting and maintenance agreement with local communities as defined in the IEE. PPMU to inspect replanting program and prepare a progress report.	Inspection for the entire tree replanting program along all road corridors	Start of operating stage and continuously as part of grounds maintenance program	PPMUs or consultant	PDOTs

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
Operating Period air pollution as traffic grows	Dak Nong has adopted national emission standards for vehicles registered in the province and will need to consistently enforce them by conducting spot/random mobile emission tests thereby helping to keep emissions within permitted levels. Testing will be random but according to a general schedule used for the noise measurements. There will be at least 100 vehicles tested: 75% motorbikes, 20% trucks and buses and 5% other vehicles.	At any location along the road	For Years 1,3, and 6 of the operating period, but with a reevaluation after the 2nd set of measurements have been collected and examined.	PPMU with advice from DONRE or a consultant	PPMU and PMU1
Excessive Operating Period Noise; especially within 50m of road	Road improvements the flow of traffic will improve and use of horns will be reduced, there will be some increase above the existing noise level. Where the road passes through sensitive sites defined in the IEE Sections: 4 . and this EMP, noise monitoring at the end of Year 1, 3 and 6 after commissioning, will be required. It will be conducted once over two 24-hr periods at a selected building closest to the new road in the designated villages. At the end of year 2 noise data will be re-examined to determine future need and frequency. Noise levels exceeding the Government standards, will have to be mitigated through the construction of barriers or provision of noise insulating features or relocation of facilities seriously affected	Settlement km2.7, school km3.6, health center km6.5, settlements km 11 and 15.1, schools at km 21.6 and 22.5, settlements at km33.4 & 52.2, school at 68.1 and settlement at 80.0 km	For Years 1,3, and 6 of the operating period, but with a re-evaluation after the 2nd set of measurements have been collected and examined.	PPMU with advice from DONRE or a consultant	PPMU and PMU1
4. ENVIRONMENTAL MONITORING					
Environmental Monitoring	Monitoring will be conducted as defined in Table 10 in IEE, & update of implementation timetable prepared during the design phase, by the consultant and the PPMU; Implemented during the design, construction and for 3 operating years	Defined in Table 10	For three project phases of IEE, the EMOP.	As defined in the EMOP	PDOT and PMU1

1. The Project Site covers areas beyond the RoW, such as borrow areas, access roads, service roads and equipment storage sites, as defined in the IEE and re-examined during the project design phase. ;

2. Time frame refers to when the mitigation measures will be taken.

Table A1.2: Environmental Monitoring Plan for Dak Nong Province Roads

Sub-project work Stage	Mitigative Measure	Monitoring Required	Frequency	Date Required	Completion Date	Responsibility
DESIGN PERIOD						
	Culvert and bridge environ. considerations	1. Details included in design specifications and contracts	Once, per subcontract	Before start of Construction stage	Before end of design stage	Design Consultant with PMU1 and PDOT
	Earth works planning	2. Include details on Contract Specs	Once per subcontract	Before start of Construction stage	Before end of design stage	Design Consultant with PMU1 and PDOT
	Identification of trees and roadside vegetation to be protected, as marked on chainage map	3. Confirm that protective measures are referenced in design specs and/or contract docs.	Once per subcontract	Before start of Construction stage	Before end of design stage	Design Consultant with PMU1 and PDOT
	Environmentally friendly mitigative measures designed in	4. Examine design and contract documents to confirm inclusion of environmental clauses, and design element, record in checklist				Design Consultant with PMU1 and PDOT
	Pre-construction Mitigative Action completion checklist	5. Confirm with PDOT that actions were undertaken written down	Once per subcontract	Before bidding begins	Before end of design stage	PMU in consultation with PDOT
CONSTRUCTION PERIOD						
	Contractors have EMP and are aware of its required use	6. Confirm that Vietnamese translation of IEE, EMP and EMOP are in hand	Once just prior to Contractor mobilization	4 weeks before contractor starts	Within 7 days of monitoring action	PMU1, PDOT and PPMU
	Culvert and ford work according to specifications	7. Compare work with design specs.; report and act to adjust if needed	On all contracts 2 times /year	Within 6 months of start of construction & every 6 months	End of every 6 months	PPMU and PDOT
	Earth works undertaken to avoid excessive side borrow ,etc.	8. Inspect earth works activity , report and act to adjust if needed	On all contracts 2 times /year	Same as above	Same as above	PPMU and PDOT
	Contractor good housekeeping practices	9. Inspect work camps with focus in waste disposal and management of ponded water and that they practice worksite noise control, haul road cleaning and dust control	On all contracts 2 times /year	Same as above	Same as above	PPMU and PDOT

Sub-project work Stage	Mitigative Measure	Monitoring Required	Frequency	Date Required	Completion Date	Responsibility
	Revegetation as identified and being undertaken	10. Inspect revegetation activity and completion, especially at side borrow and cut and full areas where erosion is most likely	On all contracts 2 times /year	Same as above	Same as above	PPMU and PDOT
	Road-related Noise control in settlement areas	11. Check the specified noise control measures are installed; namely noise restrictions in settlements between 17:30 and 0600	As part of construction inspection; i.e. monthly	monthly	within one week of month end	PPMU and PDOT
OPERATING PERIOD						
	Clean up and maintenance of culverts, revegetated slopes and borrow areas	12. Confirm that measures are in place and functioning. Enforce if needed	once/year, within the 1 st MN of Op. for 2 years	Annual reporting, for two years	Within 4 wks of end of two operating years	PDOT
	Control measures for Air pollution	13. Undertake emission testing, in cooperation with provincial DONRE, plus training from Hanoi or HCM environment offices.	Mobile tests of motorbikes, vehicles and trucks for one week each year, using a 100 vehicle sample with allocations to each vehicle category as defined in the EMP.	Emission Testing: annually for years 1,3 and 6	Within two weeks after end of the year Annually	PPMU or PDOT working with DONRE
	Control of Noise level during Operations	14. Undertake and noise level measurement program at the sensitive site identified in the IEE and EMP	As per the IEE and EMP at nine locations as specified in the EMP and once per year for two continuous 24-hr periods. in cooperation with DONRE	By end of Yr 1,3, and 6—with a major review once 2-yrs data are in	Within two weeks after end of the year Annually	PPMU or PDOT working with DONRE

ENVIRONMENTAL MANAGEMENT PLAN AND ENVIRONMENTAL MONITORING PLAN FOR NGHE AN PROVINCE ROADS

Table A2.1: Environmental Management Plan for Nghe An Province Roads

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
1. PRE-CONSTRUCTION PERIOD (DESIGN PHASE)					
MEASURES APPLIED TO ALL PROJECT ROADS IN NGHE AN					
Lack of any capacity to understand and implement environmental mitigative measures	Organize, prepare and deliver Environmental Assessment (PMU1) and PMU1 implementation training to PMU1 as well as PPMU and PDOT in Nghe An Province; using both workshop and on-the-job training techniques. Main delivery mechanism will be case studies developed from road. At that time, the IEEs will be distributed to units listed above.	Generally, the capital city of the province	Within 2 months of start of design phase: one workshops, each lasting about 1.5 days	PMU1 and design consultant	PMU1 and PPMUs
Failure to consider local drainage, storm and soil conditions when designing culvert and ford replacement program	Culvert design will be a carefully evaluated in terms of sighting, based on drainage and flood conditions. Three design elements will be identified for each culvert: a) culvert location, shape and diameter, b) placement slope upstream to downstream c) design of erosion protection measures at inflow and outflow. In TL 598-Section 2, 12 fords will need special attention	As part of the design exercise to be completed in Hanoi by PMU1, working with the Nghe An PPMU and PDOT in Vinh	During the design stage	PMU1,design consultant, working with PPMU and PDOT	PMU1 and PDOT
No actions to make design environmentally friendly implemented	The environmental team working with the road designers will review the environmental recommendations in the IEE relating to road design and in consultation with PPMU help to incorporate as many design changes which help to prevent negative environmental effects from taking place; e.g. damage to irrigation systems, loss of ponds and trees	As part of the design exercise taking place at PMU1 and the provincial PPMU	During the design period	Design consultant's environment team	PMU1 and PDOT
Failure to use the EMP	Joint effort of the environmental and contracting specialists to prepare environmental contract clauses based on mitigative measures defined in the EMP, or the inclusion of the full EMP as a part of the Conditions of Particular Application, section of contracts, to be signed between the government and the contractors.	PMU1 and design consultant offices	Before construction begins	Design consultant's environment team and contract specialist, in consultation with PPMU and PDOT	Design consultant and PMU1
Failure to complete survey of roadside trees not to be cut	To prevent excessive tree cutting during construction and to assure adequate replanting, a rapid roadside survey/inventory will be conducted to mark all trees, larger than 10cm diameter (1.5m from, ground). PPMU to use 'strip-map forms developed by TA consultant.	Along all four roads:	Within 2 months of start of construction	PPMU or contracted worker from Forestry Dept.	PMU1 and PPMU

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
Lack of reporting on Design Phase Mitigative Actions Taken	As part of the on-the-job training, PMU1 or its consultant will demonstrate how mitigation reports are prepared; i.e, a short summary report on the mitigative actions taken during the preconstruction period and follow-up needed once construction starts.	Covering the project and focusing on the preconstruction period, in Hanoi and Ngh An Province	Submitted to PMU1 two months before start of construction	PMU1 and PPMU staff	PMU1
TL 598a/SC208 (Section 1): 34 km					
Inclusion of environmentally responsible steps for road construction near roadside ponds	Design team, focus on those road sections where ponds are located and present a set of steps that scope the situation and then propose a set of actions that will minimize all losses of pond area or water. Use of IEE Annex D is recommended	km 10.8-11.2, 13.1,15.5,19.2-19.5,28.7, 32.1-32.2, 33.0-33.5	During Design Stage	PMU1,PDOT and its PPMU	PMU1 and bridge designers
TL 598b/SC207 (Section 2): 23.8 km					
Instructions on reconstruction requirements for irrigation canals to be removed during construction	Design team to identify a set of steps to be followed by contractors to disassemble and reconstruct irrigation canal crossed or needing to be moved as part of the road widening	km19.1, 21.4 -22.0	During design stage	PMU1,PDOT and its PPMU	PDOT and Design Consultant
No environmental controls prepared for fords, ponds, and landslide area at km 22.5	Design of fords and culverts should demonstrate environmental considerations in terms of a set of steps of specific design adjustments. The ford design elements should have specific reference to erosion protection and ponds to consultation and protection of water bodies. The landslide area needs an assessment of slope stability and options. This items should be checked by PMU1 and included in a mitigation checklist	At PMU1, working with PPMU and Nghe An PDOT at reconstruction/replace ment sites as defined in the IEE and as shown on strip maps provided to PDOT	During design stage	PMU1,PDOT and its PPMU	PMU1 and bridge designers
Inclusion of environmentally responsible steps for road construction near roadside ponds	Design team, focus on those road sections where ponds are located and present a set of steps that scope the situation and then propose a set of actions that will minimize all losses of pond area or water. Use of IEE Annex D is recommended	km 0.9, 9.4, 11.0, 19.9-20.1	During Design Stage	PMU1,PDOT and its PPMU	PMU1 and bridge designers
Design of Hieu River crossing without documented environmental consideration given	The Hieu River crossing at km 18.3 will need a hydrological assessment to determine the best crossing approach, in order to avoid future flooding and washouts. Crossing structure is to be decided based on the model storm as defined in Government law for bridge design.	At PMU1, working with PPMU and Nghe An PDOT at Hieu River crossing	During design stage	PMU1,PDOT and its PPMU; also working with local community	PMU1 and bridge designers, PDOT

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
2. CONSTRUCTION PERIOD ¹					
MEASURES APPLIED TO ALL PROJECT ROADS IN NGHE AN					
Failure of Contractor to use the EMP	At the pre-mobilization meeting with contractors PMU1 and PPMU will underscore the need for contractors to understand and adhere to EMP (additional copies in Vietnamese to be provided at that time)	A mobilization meetings in Phan Rang	At start of construction period	PMU1 and Contractor	PMU1 and PPMU
Careless placement of culverts and bridge reconstruction	Culvert design, removal and replacement will need to be specified in design documents, as per the discussion in this IEE.	At all worksites where culvert replacement and bridge repairs take place.	Throughout construction period	Contractor	Contract Supv. Engineer
Erosion protection	Since the major problem with erosion will be the under-design and mis-placement of culverts, contractors will be required to confirm that all such reconstructions and replacements will be done according to the engineering drawings and in relation to the 'design storm' as defined by the engineer. Care in the placement of erosion protection feature will be essential.	At any water crossing/culvert site	Throughout construction period	Contractor	Constr. Supv. Engineer
Excessive Removal of Trees, living fences flowed by inadequate replanting	Before any ground is broken the contractor, working with the PPMU, must ensure that the cutting and replanting scheme has been agreed to and that any trees marked as 'to stay' (as defined in the pre-construction inventory) will not be cut down, This inventory should be checked on-the-ground for the presence of 'to stay' designations. The contractor, under the supervision of PPMU, will consider initiating a community-based replanting program, supplying and paying local communities to replant and maintain the plantings during the 2-construction years	Based on the Pre-construction survey, but more or less the RoW width of ≈ 20 m plus any other areas to be cleared as part of the work. There is >1 km of living fence to be removed.	During the construction period with replanting as soon after cutting as possible	Contractors and Const. Supv. Eng. after consultation with PPMU and DONRE	Constr. Supv. . PDOT Engineer and DOF staff-as needed
Maintenance of all construction access and haul roads	Contractor will be responsible for maintaining and repairing all roads used as access to worksites, or to materials production and storage areas, this will include cleaning, dust control and repair of surface, degraded by heavy truck uses.	As identified by contractor, when identifying access road and haul road needs	Throughout construction period	Contractor	Constr. Supv. Engineer and PPMU
Excessive construction noise in settlement areas	Within 300m of any settlement along the road, construction work involving equipment and trucks and any other noisy activities, will be limited to the hours of 0600 to 1730; this also applied to roads through settlement areas used by trucks hauling good to a construction site more than 300m from a settlement. In this situation contractors will either have to plan ahead or haul during the daytime. Outside the settlement areas construction will be permitted at any time.	At all locations where road is <10m from a dwelling which is at 32 settlements and sensitive sites along both sections of the road	Throughout construction period	Contractor	Constr. Supv. Engineer and PPMU

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
Operation of Asphalt, batch, rock crushing plants	Any plants operated or used by the contractor must be a licensed and legally operating plant (according to Vietnamese law). The contractor must provide written proof that this is so and if not, either correct the non-compliance, or find a legal supplier.	Throughout the construction area	At all times	Contractor	Constr. Supv. Engineer and PMU1 and DONRE
Careless construction related good housekeeping tasks	Contractor will adhere to standard good housekeeping practices as defined in the contract terms and conditions and Conditions of Particular Application. Special consideration will be given to management of construction waste, water, equipment lubricants and fuel and construction/road related dust. This will be done in accordance with Government regulations and standards, which the contractor will be expected to be knowledgeable about.	Any construction site or activity which is the responsibility of the contractor	Throughout construction period	Contractor	Constr. Supv. Engineer
Contractor's Final Monitoring Report	Contractor will prepare a final monitoring report, in the form of a matrix table, defining the mitigative actions taken, when and where these were taken, the benefits achieved and the future actions needed during the operating period.	Contractor's office	At end of Construction period	Contractor working with supervising engineering, team.	Constr. Supv. Engineer and PMU1, with input from PPMU
TL598a/SC 0208 (Section 1): 34.0 km					
Environmentally acceptable pond reconstruction	Contractors should follow guidelines prepared by PMU1 and in Annex D of this IEE	km 10.8-11.2, 13.1,15.5,19.2-19.5,28.7, 32.1-32.2, 33.0-33.5	During construction period	Contractor	PMU1, PDOT and its PPMU
TL598b/0207 (Section 2) 23.8 km					
Damage to Irrigation Systems	Contractor must, prior to demolition, consult with users and determine what needed to maintain flow during re-routing and proceed, based on a schedule agreed to with the users. Reconstruction must be as good or better than the original construction.	km19.1, 21.4 -22.0	During construction period	Contractor	PMU1, PDOT and its PPMU and Department of Agriculture and Water Resources if needed
No environmental controls prepared for fords, ponds, and landslide area at km 22.5	Compliance monitoring of contractors work at all fords and ponds to be recorded to make sure that environmentally acceptable steps are being followed	All culvert, ford and bridge sites	During construction period	Contractor	PMU1, PDOT and its PPMU
Poor construction at ponds	See above in pre-construction period listing	km 0.9, 9.4, 11.0, 19.9-20.1	See above in pre-construction period listing	See above in pre-construction period listing	See above in pre-construction period listing

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
3. OPERATIONAL PERIOD					
MEASURES APPLIED TO ALL PROJECT ROADS IN NGHE AN					
Receipt of Contractor's Monitoring Report and Preparation of a Operational Period Mitigation Schedule	PMU1 and the PPMU will actively obtain the monitoring report from the contractors working on the 4+1 contracts and, based in that, prepare the implementation timetable for mitigation and monitoring during operating stage of the project.	To cover all areas defined in the EMP	At or just before road commissioning	PMU1 working with PDOT	PDOT
New but blocked culverts	PPMUs or consultant to check all culverts and bridges to make sure that size, placement and stabilization are in place and will not lead to future erosion problems. PPMU will be required to assemble a digital photo record of each replaced culvert	All water crossing sites	Within first 6 months of operations	PPMU or consultant	PDOTs
Revegetation program & Tree plantings not maintained	PPMU or PDOT to renegotiate replanting and maintenance agreement with local communities as defined in the IEE. PPMU to inspect replanting program and prepare a progress report.	Inspection for the entire tree replanting program along all road corridors	Start of operating stage and continuously as part of grounds maintenance program	PPMUs or consultant	PDOTs
Operating Period air pollution as traffic grows	Nghe An has adopted national emission standards for vehicles registered in the province and will need to consistently enforce them by conducting spot/random mobile emission tests thereby helping to keep emissions within permitted levels. Air quality testing is to be undertaken at the sites as defined in Sections 4 of the IEE and a sampling design as specified in the same sections; to assure that standards are being maintained and air quality is not seriously degrading due to vehicular traffic. Should standards be exceeded, actions will be required based on advice from DONRE.	<u>Sect. 1:</u> 1-Primary and secondary schools at km 28.2, and settlements at km 12.5, 20.5 and 32.2 ; <u>Sect. 2:</u> Primary schools at Km 2, 21.3, a health care centert km 11.6 and settlements at km 15, 23.4 and 29.5 .	For Years 1,3, and 6 of the operating period, but with a re-evaluation after the 2rd set of measurements have been collected and examined.	PPMU with advice from DONRE or a consultant	PPMU and PMU1
Excessive Operating Period Noise; especially within 50m of road	Road improvements the flow of traffic will improve and use of horns will be reduced, there will be some increase above the existing noise level. Where the road passes through sensitive sites defined in the IEE Sections: 4 . and this EMP, noise monitoring at the end of Year 1, 3 and 6 after commissioning, will be required. It will be conducted once over two 24 hr periods at a selected building closest to the new road in the designated villages. At the end of year 2 noise data will be re-examined to determine future need and frequency. Noise levels exceeding the Government standards, will have to be mitigated through the construction of barriers or provision of noise insulating features or relocation of facilities seriously affected.	<u>Sect. 1:</u> 1-Primary and secondary schools at km 28.2, and settlements at km 12.5, 20.5 and 32.2; <u>Sect. 2:</u> Primary schools at Km 2, 21.3, a health care center at km 11.6 and settlements at km 15, 23.4 and 29.5.	For Years 1,3, and 6 of the operating period, but with a re-evaluation after the 2rd set of measurements have been collected and examined.	PPMU with advice from DONRE or a consultant	PPMU and PMU1

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
4. ENVIRONMENTAL MONITORING					
Environmental Monitoring	Monitoring will be conducted according the details as defined in of this IEE, supported by an implementation timetable prepared during the design phase, by the consultant and the PPMU. Draft prepared as; It will take place during the design, construction and for 2 years during the operating phase of each road.	Defined in Table 12	Throughout the three project phases of the Environmental Monitoring Plan (EMOP)	Pre-construct.: PPMUs and Design consultant Construction: contractor and PPMU Operation: PDOT	PDOT and PMU1

1. The Project Site covers areas beyond the RoW, such as borrow areas, access roads, service roads and equipment storage sites, as defined in the IEE and re-examined during the project design phase.

2. Time frame refers to when the mitigation measures will be taken.

Table A2.2: Environmental Monitoring Plan for Nghe An Province Roads

Sub-project work Stage	Mitigative Measure	Monitoring Required	Frequency	Date Required	Completion Date	Responsibility
DESIGN PERIOD						
	Monitoring Actions Needed on All Roads					
	Culvert and bridge environ. considerations	1. Details included in design specifications and contracts	Once, per subcontract	Before start of Construction stage	Before end of design stage	Design Consultant with PMU1 and PDOT
	Earth works planning	2. Include details on Contract Specs	Once per subcontract	Before start of Construction stage	Before end of design stage	Design Consultant with PMU1 and PDOT
	Identification of trees and roadside veg. to be protected, as marked on chainage map	3. Confirm that protective measures are referenced in design specs and/or contract docs.	Once per subcontract	Before start of Construction stage	Before end of design stage	Design Consultant with PMU1 and PDOT
	Environmentally friendly mitigative measures designed in	4. Examine design and contract documents to confirm inclusion of environmental clauses, and design element, record in checklist				Design Consultant with PMU1 and PDOT
	Pre-construction Mitigative Action completion checklist	5. Confirm with PDOT that actions were undertaken written down	Once per subcontract	Before bidding begins	Before end of design stage	PMU in consultation with PDOT
	Environmentally acceptable plans for pond – road interactions, and a construction plan checklist in place	6. Confirm availability of bridge demolition and construction environmental checklist	Once per subcontract	Before bidding begins	Before end of design stage	PMU in consultation with PDOT
CONSTRUCTION PERIOD						
	Monitoring Actions Needed on All Roads (2-year construction period)					
	Contractors have EMP and are aware of its required use	9. Confirm that Vietnamese translation of IEE, EMP and EMOP are in hand	Once just prior to Contractor mobilization	4 weeks before contractor starts	Within 7 days of monitoring action	PMU1, PDOT and PPMU
	Culvert and ford work according to specifications	10. Compare work with design specs.; report and act to adjust if needed	On all contracts 2 times/year	Within 6 months of start of construction & every 6 months	End of every 6 months	PPMU and PDOT
	Earth works undertaken to avoid excessive side borrow, etc.	11. Inspect earth works activity , report and act to adjust if needed	On all contracts 2 times /year	Same as above	Same as above	PPMU and PDOT

Sub-project work Stage	Mitigative Measure	Monitoring Required	Frequency	Date Required	Completion Date	Responsibility
	Contractor good housekeeping practices	12. Inspect work camps with focus in waste disposal and management of ponded water and that they practice worksite noise control, haul road cleaning and dust control	On all contracts 2 times /year	Same as above	Same as above	PPMU and PDOT
	Revegetation as identified and being undertaken	13. Inspect revegetation activity and completion, especially at side borrow and cut and full areas where erosion is most likely	On all contracts 2 times /year	Same as above	Same as above	PPMU and PDOT
	Road-related Noise control in settlement areas	14. Check the specified noise control measures are installed; namely noise restrictions in settlements between 17:30 and 0600	As part of construction inspection; i.e. monthly	monthly	within one week of month end	PPMU and PDOT
TL598/SC207 (Section 2):23.8 km						
	TL Hieu Bridge reconstruction proceeding according to a plan prepared during the design stage	15. Compliance monitoring	Every two months, using checklist prepared from EMP	Every two months	Within a week of each survey	Inspectors and PPMU
	Repair of Irrigation system(s) damaged during construction	16. Compliance monitoring	Every two months, using checklist prepared from EMP	Every two months	Within a week of each survey	Inspectors and PPMU
OPERATING PERIOD						
Monitoring Actions Needed on All Roads						
	Clean up and maintenance of culverts, revegetate slopes and borrow areas	18. Confirm that measures are in place and functioning. Enforce if needed	once/year, within the 1 st MN of Op. for 2 years	Annual reporting, for two years	Within 4 wks of end of 2 operating years	PDOT

Sub-project work Stage	Mitigative Measure	Monitoring Required	Frequency	Date Required	Completion Date	Responsibility
	Control measures for Air pollution	19. Undertake air quality sampling and emission testing, in cooperation with provincial DONRE, plus training from Hanoi or HCM environment offices.	<u>Air Quality Sampling:</u> Yr 1,3,6 , 2 consecutive days per year at sites as defined in EMP <u>Emission Testing:</u> Mobile tests of motorbikes, vehicles and trucks for 1 week per road each year, using a sample equal to the vehicle fleet composition on that road	Air Quality: Yr 1,3,6 Emission Testing: annually for 1 week	Within two weeks after end of the year Annually	PPMU or PDOT working with DONRE
	Control of Noise level during Operations	20. Undertake and noise level measurement program at the sensitive site identified in the IEE and EMP	As per the IEE and EMP specifications, and adjusted according to any discussions with DONRE	By end of Yr 1,3, and 6—with a major review once 2-yrs data are in	Within two weeks after end of the year Annually	PPMU or PDOT working with DONRE
	TL 598/SC207 (Section 2): 23.8 km					
	Added noise monitoring due to excessive truck traffic on this road to and from the sugar mill operations	21. Undertake noise monitoring along this road, with focus on extensive tuck traffic that has created noise problems and significantly damaged the road due to overloading. Secondly, set up temporary weigh scales to monitor truck weights, etc.	Noise monitoring at same frequency as for all, but with two added daytime and night time sampling period	By end of Yr 1,3, and 6—with a major review once 2-yrs data are in	Within two weeks after end of the year Annually	PPMU or PDOT working with DONRE

ENVIRONMENTAL MANAGEMENT PLAN AND ENVIRONMENTAL MONITORING PLAN FOR NINH THUAN PROVINCE ROADS

Table A3.1: Environmental Management Plan for Ninh Thuan Province Roads

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Appendix 3

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
1. PRE-CONSTRUCTION PERIOD (DESIGN PHASE)					
MEASURES APPLIED TO ALL PROJECT ROADS IN NINH THUAN					
Lack of any capacity to understand and implement environmental mitigative measures	Organize, prepare and deliver Environmental Assessment (PMU1) and PMU1 implementation training to PMU1 as well as PPMU and PDOT in Ninh Thuan province., both workshop and on-the-job training. Main delivery mechanism will be case studies developed from road. At that time, the iees will be distributed to units listed above and all those attending the IEE workshops	One location in provincial capital	Within 2 months of start of design phase: one workshops, each lasting about 1.5 days	PMU1 and design consultant	PMU1 and PPMUs
Failure to consider local drainage, storm and soil conditions when designing culvert and ford replacement program	Culvert design will be a carefully evaluated in terms of sighting, based on drainage and flood conditions. Three design elements will be identified for each culvert: a) culvert location, shape and diameter, b) placement slope u/s to d/s c) design of erosion protection measures at inflow and outflow.	As part of the design exercise to be completed in Hanoi by PMU1, working with the Ninh Thuan PPMU and PDOT in Phan Rang	During the design stage	PMU1,design consultant, working with PPMU and PDOT	PMU1 and PDOT
No actions to make design environmentally friendly implemented	The environmental team working with the road designers will review the environmental recommendations in the IEE relating to road design and in consultation with PPMU help to incorporate as many design changes which help to prevent negative environmental effects from taking place; e.g. damage to irrigation systems, loss of ponds and trees	As part of the design exercise taking place at PMU1 and the provincial PPMU	During the design period	Design consultant's environment team	PMU1 and PDOT
Failure to use the EMP	Joint effort of the environmental and contracting specialists to prepare environmental contract clauses based on mitigative measures defined in the EMP, or the inclusion of the full EMP as a part of the conditions of particular application, section of contracts, to be signed between the PDOTs and the contractors.	PMU1 and design consultant offices	Before construction begins	Design consultant's environment team and contract specialist, in consultation with PPMU and PDOT	Design consultant and PMU1
Failure to complete survey of roadside trees not to be cut	To prevent excessive tree cutting during construction and to assure adequate replanting, a rapid roadside survey/inventory will be conducted to mark all trees, larger than 10cm diameter (1.5m from, ground). PPMU to use 'strip-map forms developed by TA consultant.	Along all four roads:	Within 2 months of start of construction	PPMU or contracted worker from Forestry Dept.	PMU1 and PPMU
Lack of reporting on Design Phase Mitigative Actions Taken	As part of the on-the-job training, PMU1 or its consultant will demonstrate how mitigation reports are prepared; i.e, a short summary report on the mitigative actions taken during the preconstruction period and follow-up needed once construction starts.	Covering the project and focusing on the preconstruction period, in Hanoi and the province	Submitted to PMU1 two months before start of construction	PMU1 and PPMU staff	PMU1

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
TL 702/SC1301:17.7 km					
No environmental controls in Tri-Thuy bridge design	Planning for extensive period of equipment in the water or channel blockages due to pier reconstruction could lead to construction period impacts, and needs to be prevented, Protection of coastline from construction and work camps pollution, equipment and accidental spills, prevented by specifying sites in design. Examine construction methods that do not require dewatering, e.g. installation of piles or sinking footings and placement of pre-cast piers or use the existing piers, repair where needed and increase height by adding sections, instead of demolition and replacement. Location of bridge contractor yard should be planned such that equipment and materials storage areas are at least 300m from the shore, on high ground to prevent flooding.	At PMU1, working with PPMU at Tri-Thuy Bridge reconstruction/replacement site	During design stage	PMU1 and PPMU	PMU1 and bridge designers (design consultant)
TL 708/SC1307:15.0 km					
Failure to plan for immediate erosion protection for all earthworks sites	TL 708 cuts across the foothill slopes of the mountains found in Nui Chua Nature Reserve, and as such is susceptible to rapid flash flooding and periodic high flows and winds from higher elevations. Designed into the rehabilitation of this road will be a mandatory requirement to stabilize all earthwork sites immediately after completion of construction, avoiding catastrophic washouts, erosion and property damage	At PMU1, working with PPMU	During Design Stage	PMU1 and PPMU	PMU1 and PPMU road designers
Tri Thuy to Xom Bang/SC1310:11.3 km					
No features designed into rehabilitation plan to protect NC Natn'l Park approaches	From about km 9-11.3 this road is near the buffer zone boundary of Nui Chua Nature Reserve. Road design will include provision for a fence along both sides of the road as well as livestock gates on the road, to prevent livestock from straying onto nature reserve lands to graze.	PMU1 in consultation with PPMU and Xom Bang Village officials	During Design Period	PMU1 and PPMU	PMU1
2. CONSTRUCTION PERIOD					
MEASURES APPLIED TO ALL PROJECT ROADS IN NINH THUAN					
Failure of Contractor to use the EMP & follow best environmental practices	At the pre-mobilization meeting with contractors PMU1 and PPMU will underscore the need for contractors to understand and adhere to EMP (additional copies in Vietnamese to be provided at that time)	A mobilization meetings in Phan Rang	At start of construction period	PMU1 and Contractor	PMU1 and PPMU
Careless placement of culverts and bridge reconstruction	Culvert design, removal and replacement will need to be specified in design documents, as per the discussion in this IEE.	At all worksites where culvert replacement and bridge repairs take place.	Throughout construction period	Contractor	Contract Supv. Engineer

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
Erosion protection	Since the major problem with erosion will be the under-design and mis-placement of culverts, contractors will be required to confirm that all such reconstructions and replacements will be done according to the engineering drawings and in relation to the 'design storm' as defined by the engineer. care in the placement of erosion protection feature will be essential.	At any water crossing/culvert site	Throughout construction period	Contractor	Constr. Supv. Engineer
Excessive Removal of Trees and inadequate replanting	Before any ground is broken the contractor, working with the PPMU, must ensure that the cutting and replanting scheme has been agreed to and that any trees marked as 'to stay' (as defined in the pre-construction inventory) will not be cut down, This inventory should be checked for such 'to stay' designations. The contractor, under the supervision of PPMU might consider initiating a community-based replanting program, supplying and paying local communities to replant and maintain the plantings during the 2-construction years.	Based on the Pre-construction survey, but more or less the RoW width of ≈ 20 m plus any other areas to be cleared as part of the work	During the construction period with replanting as soon after cutting as possible	Contractors and Const. Supv. Eng. after consultation with PPMU and DONRE	Constr. Supv. Engineer and DOF staff-as needed
Maintenance of all construction access and haul roads	Contractor will be responsible for maintaining and repairing all roads used as access to worksites, or to materials production and storage areas, this will include cleaning, dust control and repair of surface degraded by heavy truck uses.	As identified by contractor, when identifying access road and haul road needs	Throughout construction period	Contractor	Constr. Supv. Engineer and PPMU
Excessive construction noise in settlement areas	Within 300m of any settlement along the road, construction work involving equipment and trucks and any other noisy activities, will be limited to the hours of 0600 to 1730; this also applied to roads through settlement areas used by trucks hauling good to a construction site more tha 300m from a settlement. In this situation contractors will either have to plan ahead or haul during the daytime. Outside the settlement areas construction will be permitted at any time.	Anywhere that construction is taking place within 300m of a settlement	Throughout construction period	Contractor	Constr. Supv. Engineer and PPMU
Operation of Asphalt, batch, rock crushing plants	Any plants operated or used by the contractor must be a licensed and legally operating plant (according to Vietnamese law). The contractor must provide written proof that this is so and if not, either corrects the non-compliance, or find a legal supplier.	Throughout the construction area	At all times	Contractor	Constr. Supv. Engineer and PMU1 and DONRE
Careless construction related good housekeeping tasks	Contractor will adhere to standard good housekeeping practices as defined in the contract terms and conditions and Conditions of Particular Application. Special consideration will be given to management of construction waste, water, equipment lubricants and fuel and construction/road related dust. This will be done in accordance with Government regulations and standards.	Any construction site or activity which is the responsibility of the contractor	Throughout construction period	Contractor	Constr. Supv. Engineer

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
Contractor's Final Monitoring Report	Contractor will prepare a final monitoring report, in the form of a matrix table, defining the mitigative actions taken, when and where these were taken, the benefits achieved and the future actions needed during the operating period.	Contractor's office	At end of Construction period	Contractor working with supv eng, team.	Constr. Supv. Engineer and PMU1, with input from PPMU
TL708/SC 1307:15 km					
Damage to Irrigation Systems	Along stretches of TI 708 a new irrigation canal is being constructed/repairs. The road actually crosses this at around km 4. Contractor must make arrangement prior to construction with Dept of Agriculture or Water Resources to establish the best time and method to use	The Ba Canal and any others not accounted for in this EMP	Inventory before construction starts and repair before irrigation season starts –road section by section	Contractor	Contract Supv. Engineer or PPMU and local authority
Tri Thuy-Son Bang: 11.3 km					
No fencing near Nui Chua Nature Reserve	Contractor will be required to install a standard wire fence along both sides of the road starting at least at about km 8.5 or 9 km or as agreed to (between PPMU, DONRE and the Son Bang community) starting point. The fence will end at San Bong Village. This action will reduce illegal access and provide easier enforcement limits for conservation officers.	Once work had been completed at this section			
3. OPERATIONAL PERIOD					
MEASURES APPLIED TO ALL PROJECT ROADS IN NINH THUAN					
Receipt of Contractor's Monitoring Report and Preparation of a Operational Period Mitigation Schedule	PMU1 and the PPMU will actively obtain the monitoring report from the contractors working on the four road and one bridge contracts and, based in that, prepare the implementation timetable for mitigation and monitoring during operating stage of the project.	To cover all areas defined in the EMP	At or just before road commissioning	PMU1 working with PDOT	PDOT
New but blocked culverts	PPMUs or consultant to check all culverts and bridges to make sure that size, placement and stabilization are in place and will not lead to future erosion problems. PPMU will be required to assemble a digital photo record of each replaced culvert.	All water crossing sites	Within first 6 months of operations	PPMU or consultant	PDOTs
Revegetation program & Tree plantings not maintained	PPMU or PDOT to renegotiate replanting and maintenance agreement with local communities as defined in the IEE. PPMU to inspect replanting program and prepare a progress report.	Inspection for the entire tree replanting program along all road corridors	Start of operating stage and continuously as part of grounds maintenance program	PPMUs or consultant	PDOTs

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
Operating Period air pollution as traffic grows	Ninh Thuan has emission standards for vehicles registered in the province, and will need to consistently enforce them by conducting spot/random mobile emission tests thereby helping to keep emissions within permitted levels. Emission testing is to be undertaken at the locations as defined for noise below; and to assure that standards are being maintained and air quality is not seriously degrading due to vehicular traffic. A sampling design is specified in sections 4 of the IEE. Should standards be exceeded, actions will be required based on advice from DONRE.	At sensitive sites as defined in the IEE for each of the four roads. See details in next item below	For Years 1,3, and 6 of the operating period, but with a re-evaluation after the 2nd set of measurements have been collected and examined.	PPMU with advice from DONRE or a consultant	PPMU and PMU1
Excessive Operating Period Noise; especially within 50m of road	Due to the road improvements the flow of traffic will improve and use of horns will be reduced, there will be some increase above the existing noise level. It takes a doubling of regular traffic volumes to cause an audible increase (3dBA) in noise levels, and given that much of the increase will be in motorbikes audible changes in vehicular noise will take at least 5 years While not to health threat, noise is expected increase by as much as 6 dBA, to say 50-60 dBA during the day, by the 10th year of operation, since the technology to make quieter motorbikes is rapidly advancing, future noise levels will be kept down by this technological improvement. Where the road passes through sensitive sites defined in the IEE Sections: noise monitoring at the end of Year 1, 3 and 6 after commissioning, will be required. It will be conducted once over two 24-hr periods at a selected building closest to the new road in the designated villages. At the end of year 2 noise data will be re-examined to determine future need and frequency. Noise levels exceeding the Government standards, will have to be mitigated through the construction of barriers or provision of noise insulating features or relocation of facilities seriously affected.	At sensitive sites as defined in the IEE for each of the four roads: <u>TL 702</u> - villages of Van Son, Khan Hoi, My Turong and My Tan -, <u>TL 708</u> -, settlements of Lang Me, Lang Mo, Nhon Hai and My Phong; <u>TL 704</u> -settlements of Tri Thuy, Phuong Hai, Binh Nghia and Xom Bang; and <u>TL 705</u> -People's Committee school (km 1.1), health Center (km1.4), School (km 1.5) Phuoc Trung Village ,	For Years 1,3, and 6 of the operating period, but with a re-evaluation after the 2nd set of measurements have been collected and examined.	PPMU with advice from DONRE or a consultant	PPMU and PMU1
Tri Thuy-Son Bang: 11.3 km					
Fencing and signage ineffective from keeping access to Nui Chua Nature Reserve controlled	PDOT will be required to inspect the fencing and signage to be sure it is in place along at least the stretch of road from the intersection of this road and TH708 to Son Bang Village. PDOT will organize a meeting with DONRE and the Nature Reserve Management Committee, to have the boundary of the buffer zone clearly marked and if possible, fenced.	Meeting with DONRE and PDOT in Phan Rang. Inspection and work to take place along the last 3 km of the Tri Thuy-Son Bang road	Shortly after the upgraded road becomes operational	PPMU	PDOT and PPMU

Environmental Impact/Issue	Mitigative Measures	Location ²	Time Frame	Responsibility To	
				Implement	Supervise
4. ENVIRONMENTAL MONITORING					
Environmental Monitoring	Monitoring will be conducted according the the details as defined in Table 15 of this IEE, supported by an implementation timetable shown in Figure 3; It will take place during the design, construction and for 2 years during the operating phase of each road.	as defined in Table 15	Throughout the three project phases the Environmental Monitoring Plan (EMOP)	Pre-construct.: PPMUs and Design consultant <u>Construction:</u> contractor and PPMU <u>Operation:</u> PDOT	PDOT and PMU1

1.The Project Site covers areas beyond the RoW, such as borrow areas, access roads, service roads and equipment storage sites, as defined in the IEE and re-examined during the project design phase.

2. Time frame refers to the duration or instant in time when the mitigation measures will be taken. u/s= upstream, d/s=downstream

Table A3.2: Environmental Monitoring Plan For Ninh Thuan Province Roads

Sub-project work Stage	Mitigative Measure	Monitoring Required	Frequency	Date Required	Completion Date	Responsibility
DESIGN PERIOD						
		Monitoring Actions Needed on All Roads				
	Culvert and bridge environ. considerations	1. Details included in design specifications and contracts	Once, per subcontract	Before start of Construction stage	Before end of design stage	Design Consultant with PMU1 and PDOT
	Earth works planning	2. Include details on Contract Specs	Once per subcontract	Before start of Construction stage	Before end of design stage	Design Consultant with PMU1 and PDOT
	Identification of trees and roadside veg. to be protected, as marked on chainage map	3. Confirm that protective measures are referenced in design specs and/or contract docs.	Once per subcontract	Before start of Construction stage	Before end of design stage	Design Consultant with PMU1 and PDOT
	Environmentally friendly mitigative measures designed in	4. Examine design and contract documents to confirm inclusion of environmental clauses, and design element, record in checklist				Design Consultant with PMU1 and PDOT
	Pre-construction Mitigative Action completion checklist	5. Confirm with PDOT that actions were undertaken written down	Once per subcontract	Before bidding begins	Before end of design stage	PMU in consultation with PDOT
	TL 702/SC1301: 17.7 km					
	Environmentally acceptable bridge demolition and construction plan checklist in place	6. Confirm availability of bridge demolition and construction environmental checklist	Once per subcontract	Before bidding begins	Before end of design stage	PMU in consultation with PDOT
	TL 708/SC1307: 15 km					
	Plan for rapid erosion protection measures as construction proceeds in place	7. Confirm that such a plan, or at least a checklist is in place	Once per subcontract	Before bidding begins	Before end of design stage	PMU in consultation with PDOT
	Tri Thuy-Xom Bang Road/SC1310: 11.3 km					
	Plan for fencing and signage for NC Nature Reserve, with agreement from NC management board at DONRE and Xom Bang Village	8. Confirm that these actions were done and that fencing plan or one agreed to among the three stakeholders is settled.	Once per subcontract	Before bidding begins	Before end of design stage	PMU in consultation with PDOT and Nui Chua Nature Reserve Management Board

Sub-project work Stage	Mitigative Measure	Monitoring Required	Frequency	Date Required	Completion Date	Responsibility
CONSTRUCTION PERIOD						
	Monitoring Actions Needed on All Roads (2-year construction period)					
	Contractors have EMP and are aware of its required use	9. Confirm that Vietnamese translation of IEE, EMP and EMOP are in hand	Once just prior to Contractor mobilization	4 weeks before contractor starts	Within 7 days of monitoring action	PMU1, PDOT and PPMU
	Culvert and Bridge work according to specifications	10. Compare work with design specs.; report and act to adjust if needed	On all contracts 2 times /year	Within 6 months of start of construction & every 6 months	End of every 6 months	PPMU and PDOT
	Earth works undertaken to avoid excessive side borrow ,etc.	11. Inspect earth works activity , report and act to adjust if needed	On all contracts 2 times /year	Same as above	Same as above	PPMU and PDOT
	Contractor good housekeeping practices	12. Inspect work camps with focus in waste disposal and management of ponded water and that they practice worksite noise control, haul road cleaning and dust control	On all contracts 2 times /year	Same as above	Same as above	PPMU and PDOT
	Revegetation as identified and being undertaken	13. Inspect revegetation activity and completion, especially at side borrow and cut and full areas where erosion is most likely	On all contracts 2 times /year	Same as above	Same as above	PPMU and PDOT
	Road-related Noise control in settlement areas	14. Check the specified noise control measures are installed; namely noise restrictions in settlements between 17:30 and 0600	As part of construction inspection; i.e. monthly	monthly	within one week of month end	PPMU and PDOT
	TL 702/SC1301:17.7 km					
	Tri Thuy Bridge demolition and reconstruction proceeding according to a plan prepared during the design stage	15. Compliance monitoring	Every two months, using checklist prepared from EMP	Every two months	Within a week of each survey	Inspectors and PPMU
	TL 708/SC 1307: 15 km					
	Repair of Irrigation system(s) damaged during construction	16. Compliance monitoring	Every two months, using checklist prepared from EMP	Every two months	Within a week of each survey	Inspectors and PPMU
	Tri Thuy-Xom Bang Road/SC 1310:11.3 km					
	Fence and signage being installed along road and NC Nature Reserve Buffer zone boundary marked	17. Compliance monitoring and consultation with DONRE and Nui Chua Nature Reserve Management Committee.	Two times during last 6-months of construction	Before last construction month has started	At least 2 months before construction is finished	Inspectors from PPMU and/or PDOT

Sub-project work Stage	Mitigative Measure	Monitoring Required	Frequency	Date Required	Completion Date	Responsibility
OPERATING PERIOD						
	Monitoring Actions Needed on All Roads					
	Clean up and maintenance of culverts, revegetated slopes and borrow areas	18. Confirm that measures are in place and functioning. Enforce if needed	once/year, within the 1 st MN of Op. for 2 years	Annual reporting, for two years	Within 4 wks of end of two operating years	PDOT
	Control measures for Air pollution	19. Undertake emission testing, in cooperation with provincial DONRE, plus training from Hanoi or Ho Chi Minh environment offices.	Emission testing: Yr 1,3,6 , at sites as defined in EMP Mobile tests of motorbikes, vehicles and trucks for one week per road each year, using a sample equal to the vehicle fleet composition for road.	Air Quality: Yr 1,3,6 Emission Testing: annually for 1 week	Within two weeks after end of the year Annually	PPMU or PDOT working with DONRE
	Control of Noise level during Operations	20. Undertake and noise level measurement program at the sensitive site identified in the IEE and EMP	As per the IEE and EMP specification as defined in The EMP, and adjusted according to any discussions with DONRE	By end of Yr 1,3, and 6—with a major review once 2-yrs data are in	Within two weeks after end of the year Annually	PPMU or PDOT working with DONRE
	TL 708/SC1307: 15 km					
	Added noise monitoring due to excessive truck traffic on this road	21. Undertake noise monitoring along this road, with focus on extensive tuck traffic that has created noise problems and significantly damaged the road due to overloading. Secondly, set up temporary weigh scales to monitor truck weights, etc.	Noise monitoring at same frequency as for all, but with two added daytime and night time sampling period	By end of Yr 1,3, and 6—with a major review once 2-yrs data are in	Within two weeks after end of the year Annually	PPMU or PDOT working with DONRE

SUMMARY OF PUBLIC CONSULTATION AND DISCLOSURE FOR THREE SAMPLE PROVINCES

1. **Dak Nong.** One workshop was held in Gia Nghia, the capital of Dak Nong province on 21 October 2004. It was held in the PDOT offices and lasted for about 4.0 hours (details in the IEE). Nineteen participants attended, representing the Dak Nong PDOT, PPMU, districts, communes, and DNORE. The meeting began with the vice director of the Dak Nong PDOT introducing the workshop and participants. One week prior to the session, Dak Nong PDOT was alerted that a workshop would be held and a suggested list of attendees and a program was provided.

2. The information disclosed included a description of the proposed work, the environmental requirements, both in terms of the Government and ADB, and the responsibility of the province. A summary of predicted effects/environmental issues was presented and participants were asked to comment. Finally a general schedule for the engineering work was presented. The presentation was followed by discussion and comments by participants. Key among the comments received were the following:

- (i) The DONRE expressed concerns related to road projects, focusing on construction and contractor-related effects and the importance of strict compliance monitoring, warning that without strict monitoring, compliance by contractors would not occur. DONRE indicated willingness to participate in compliance monitoring at surface water crossings.
- (ii) Stakeholders participating were generally in favor of the proposed road improvements, acknowledging the economic development benefits that arise from improved transportations links.
- (iii) Commune leaders were quick to point out that along the road (within 100 m of the alignment), much of the area has been degraded, and serious environmental impacts are unlikely unless contractors are left uncontrolled. Therefore, communes would like to become a part of the compliance monitoring activity.
- (iv) Commune leaders suggested that they should be involved in the monitoring of EMP implementation, since they would be on-site at all times. They should be involved with supervising mitigative measures of subprojects. They concluded by asking how citizens would be able to participate during both design (preconstruction) and construction.
- (v) Affected communes appreciated the opportunity to participate in the public consultation workshop, but wondered about resettlement and compensation for such losses as coffee plantation encroachment.
- (vi) Two key environmental impacts repeatedly mentioned were dust during construction and protection of water resources, requiring careful road rehabilitation through these areas and knowledgeable design and placement of culverts.
- (vii) DONRE expressed an interest in participating in the monitoring of the stream crossings identified during the workshop presentation.

3. The meetings highlighted the positive role of stakeholders in assessing the potential negative impacts of the proposed road improvements and in suggesting related mitigation measures.

4. Since the presentations of each of the 8 participants took several hours, few questions were possible. The key question posed by the consultant dealt with the status of the Nam Ca

and Nam Nung nature reserves. The DONRE representative answered that Nam Ca is in Dak Lak province and is separated from the road by the Se Re Po (Krong Po) River (5 km), thus the road will have no effect on it.

5. Nam Nung is about 20 km from the road and its buffer zone is separated from the road by the 20 km wide plantation forest. DONRE indicated that while Nam Nung has road access, the bridges across a number of streams had collapsed. DONRE advised that Nam Nung would not be negatively affected by the road construction work on TL 684.

6. The following actions were taken to incorporate participants' comments into the IEE:

- (i) Suggestions regarding mitigation, monitoring, and pinpointing of engineering and geological problems along TL 684, as well as hydrological issues regarding culverts were incorporated into the Dak Nong IEE and EMP.
- (ii) The points regarding the interest of DONRE, as well as communes to be a part of the monitoring function were incorporated into the EMP and EMOP, and Dak Nong PDOT will follow up, keeping DONRE involved.
- (iii) Existing problems with culvert locations, sizing, and present condition, and the need to repair these problems are highlighted in the IEE.

7. As stated during the Nghe An workshop, the consultant informed the participants that once completed and translated the IEE and its EMP and monitoring program will be available at the PDOT office in Dak Nong and copies can be requested by participants for their use in monitoring progress and implementation of mitigative actions. The PDOT agreed to ensure copies were made available. PMU1 will ensure this happens.

8. **Nghe An.** One workshop was held in Vinh, the capital of Nghe An province, on 24 September 2004. It was held in the PDOT office and lasted for about 3.5 hours. Details are provided in the IEE. Of the 27 participants, 7 gave lengthy presentations, followed by an extensive question and answer session.

9. The workshop was delivered by the TA consultant's national environmental specialists and began with the vice director of the Nghe An PDOT introducing the workshop and participants. Vietnamese consultants followed by introducing themselves and describing the workshop content and then making the full presentation. Two weeks prior to the session, Nghe An PDOT was alerted that a workshop would be held and a suggested list of attendees and a program was provided. The information disclosed included a description of the proposed work, the environmental requirements, both in terms of the Government and ADB, and the responsibility of the province. A summary of predicted effects/environmental issues was presented and participants were asked to comment. A schedule for the work was presented.

10. The following key comments/issues were tabled:

- (i) The affected Nghe An communes appreciated the opportunity to participate in the public consultation workshop on the environmental impacts, proposed mitigative measures, EMP, as well as environmental monitoring. The meetings highlighted the positive role of stakeholders in assessing potential negative impacts of the proposed road improvements and in suggesting related mitigation measures.
- (ii) Stakeholders were generally in favor of the proposed road improvements, acknowledging the economic development benefits that arise from improved transportations links.

- (iii) Commune leaders suggested that they should be involved in monitoring EMP implementation since they are on-site. They should be involved with supervising mitigative measures of subprojects. They concluded by asking how commune citizens could participate, during both design (preconstruction) and construction.
11. Of the many comments on road issues, the most common focused on the following:
- (i) If the contractors are to comply with mitigation measures, most important being, noise, dust, and traffic management, they will have to be monitored all the time. Local commune officials can do that [assuming they are funded].
 - (ii) Planning of the rehabilitation work, including culverts, fords, and bridges, needs to be done in consultation with the PDOT as well as local communes, since they know what they need. This has not been the practice in the past.
 - (iii) Along the alignments, known problems exist with erosion, flooding, and unstable soils. Here designers need to be extra careful. Specific sites were named.
 - (iv) DONRE should be utilized in the mitigation effort, and by provision of an IEE and EMP could help with some of the planning particularly the replanting and erosion control measures, as well as future noise and emission testing.
12. Suggestions regarding mitigation, monitoring, and pinpointing of engineering and geological problems on TL 33, as well as hydrological issues regarding culverts have been incorporated into the Nghe An IEE and EMP. The points regarding landslide-prone areas have been factored into design considerations and care will be taken when working in that area. A suggested realignment is being considered by PMU1 in collaboration with the PDOT. Existing problems with culvert locations, sizing, and present condition, and the need to repair these problems are stressed in the IEE.
13. Finally, the consultants informed the participants that once completed and translated, the IEE and its EMP and monitoring program will be available at the PDOT and PPMU offices in Nghe An. Copies can be requested by the participants for use in monitoring progress and implementation of mitigative actions. The Nghe An PDOT agreed to facilitate this distribution.
14. **Ninh Thuan.** The single workshop was held in Phon Rang, the capital of Ninh Thuan province, on 18 August 2004. It was held in the PDOT offices for 3.5 hours with 27 people attending including representatives from the PDOT, PPMU, DONRE, and the communes along the project roads.
15. Key comments and suggestions by participants include the following:
- (i) Culvert design, to accommodate all uses, must be determined not just by PMU1 but have local input.
 - (ii) Drainage design must meet needs of local conditions, thus needs PDOT and local inputs.
 - (iii) If the upgraded road is to be maintained, Ninh Thuan needs a road maintenance fund for the next 10–20 years
 - (iv) Tri Thuy bridge over the Nai Lagoon should not be repaired but totally replaced. During such a rebuilding process, the process of demolishing old piles needs to be specified, with minimal environmental loss. The bridge at present is so low that sometimes large sea surges/swells inundate it.
 - (v) In relation to the Nui Chua Nature Reserve, TL708 and Tri Thuy to Xom Bang road are not issues since the roads will only be modestly upgraded and no area

will be disturbed. TL 708 lies a long way from the reserve border and the Tri Thuy to Xom Bang Road ends at the border of the reserve.

- (vi) The Nai Lagoon is not a serious issue as any work near it will only take place at the bridge, where mitigative measures can be easily applied. DONRE was asked to supply the PDOT with more information about these two sites [this was completed between August and October 2004, since for example Nui Chua boundaries are now known].
- (vii) Ninh Thuan is prepared to deal with environmental costs but these need to be calculated accurately [not including the engineering costs such as tree replanting and erosion control].

16. In conclusion, the team thanked the participants for their valuable inputs and underscored that any further inputs would be welcome and that the completed SIEE would be available for them at the PDOT offices once it is completed later in 2004 [at the time of the meeting a specific date was not known].

17. The comments and issues raised by the participants have been extensively incorporated into the project design requirements and particularly into the EMP for action during the design and construction stages as well as the operating period. Considerable special emphasis was given to culverts, draining the Tri Thuy Bridge, as well as protection of the Nui Chua Nature Reserve.

18. The province has agreed to follow up on the request of commune officials to involve them in culvert placement and design, and will pursue this with PMU1, to establish an effective process for participation. This process will be in place during the detailed design phase..

19. The overall objectives of the public consultation were to identify stakeholders, make them aware of the subprojects, receive their feedback on design, location, construction, and operating specifications and incorporate these comments in the SIEEs. Details of each consultation session including complete attendance sheets are included in the IEE.