

# ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT (ESIA) FOR NATIONAL ROAD 13 NORTH (NR13 NORTH) IMPROVEMENT AND MAINTENANCE

## EXECUTIVE SUMMARY

## DRAFT REPORT

December, 2017

Revision 1.0

Lao People's Democratic  
Republic

MINISTRY OF PUBLIC  
WORKS AND  
TRANSPORT

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# EXECUTIVE SUMMARY

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## 1. INTRODUCTION

1. The Government of Lao PDR (GoL) has a program to improve National Road 13 North (NR13 North) on an Output and Performance-Based Road Contract (OPBRC) basis. The Project is designed to improve transport connectivity by rehabilitating and upgrading the road forming the main road network of Lao PDR, thereby improving connectivity and fostering inclusive economic growth. The Project is to be implemented by the Ministry of Public Works and Transport (MPWT) through its Department of Roads (DoR).

2. This Environmental and Social Impact Assessment (ESIA) is part of the process of compliance with the World Bank Safeguard Policies in relation to the Project.

3. The ESIA provides a road map to the environmental measures needed to prevent and/or mitigate negative environmental effects associated with the project. More specifically, the ESIA:

- Describes the existing socio-environmental conditions within the Project area;
- Describes the extent, duration and severity of potential impacts;
- Analyzes all significant impacts; and
- Formulates the mitigation actions and presents it all in the form of an Environmental and Social Management Plan (ESMP).

4. Based on the existing World Bank Operational Policy for Environmental Assessment (OP4.01), this Project falls under the World Bank's project **Category A**.

## 2. DESCRIPTION OF THE PROJECT

5. National Road 13 (NR13) is the most important core road in Lao PDR and its upgrade, rehabilitation, and maintenance can result in extremely large benefits for the country. NR13 is a North-South corridor (1,500 km) that connects Lao with China in the North and with Cambodia in the South, and links 10 of the 17 Lao provinces. The main sections of the road were completed in 1997 and have not been rehabilitated since, receiving only periodic and emergency maintenance. The road comprises NR13 South from Vientiane Capital to the Cambodian border (829 km), and NR13 North (671 km) from Vientiane Capital to Boten, on the border with China.

6. Strong economic growth and trade expansion have been accompanied by a rapid increase in traffic volume and transit traffic on NR13, particularly in stretches near Vientiane Capital, some of which are expected to reach full capacity in the next 5 years. A detailed feasibility study financed by the World Bank in 2015 identified several critical sections on both NR13 North and NR13 South. The study indicated that improvements in these sections would result in reduced vehicle operating costs and travel time, increased accessibility of enterprises, increased labor productivity, and reduced road fatality rates. MPWT will use a phased approach to the improvement of NR13. To start, it has prioritized the section from km 12 to km 70 on NR13 North, as this stretch serves the highest traffic volume. The improvement of other critical sections will follow as financing becomes available.

7. The Project road is located within two provinces (Naxaithong and Phonhong) commencing at Sikeut Junction, approximately four kilometers north of Wattay International Airport in Vientiane and ending approximately 58 kilometers north of Vientiane in Phonhong.

8. Project works are divided into two sub-sections:

- Sub-section 1 - Vientiane-Ban Dong (km 12 to km 31)
- Subsection 2 - Ban Dong-Phonhong (km 31 to km 70)

9. Project works will include:

- Upgrade sub-section 1 from two to four-lane with 23m right-of-way (with either asphalt concrete pavement or Portland cement concrete pavement).
- Improve sub-section 2, a two-lane with 16m right-of-way (with either asphalt concrete pavement or Portland cement concrete pavement).
- Upgrading of seven bridges (mostly single span).
- Improve the geometry of the Project road.
- Heighten embankments in areas of flood risk.
- Provide adequate road safety measures, including pedestrian crossings.
- Cleaning and upgrading of existing culverts and installation of new culverts where required.
- Construction of ten intersections.
- Operation and Maintenance (O&M) of the Project road over a 10 year period.

10. The works and maintenance will be carried out through the implementation of an Output and Performance-Based Road Contract (OPBRC). The main features of the OPBRC approach for the project include:

- A share of the improvement cost of the project will be reimbursed to the contractor over the initial 3-year estimated construction period through milestone payments based on completion of nominated proportions of the works, financed by IDA and NDF.
- The rest of the contractor's financing of the improvements works and the O&M cost over a 10-year period will be paid through performance-based quarterly payments (adjusted for inflation) based on the contractor's performance in meeting or exceeding the contracted service levels for the road. The quarterly payments over the 10-year period will come from the RMF.
- Bidders would be assessed on their technical and financial proposals. The financial offers will include O&M costs and amortization of the capital expenditures (improvement works) that were not covered by the construction payments to the contractor during the initial construction period.

Figure ES-I: Project Location

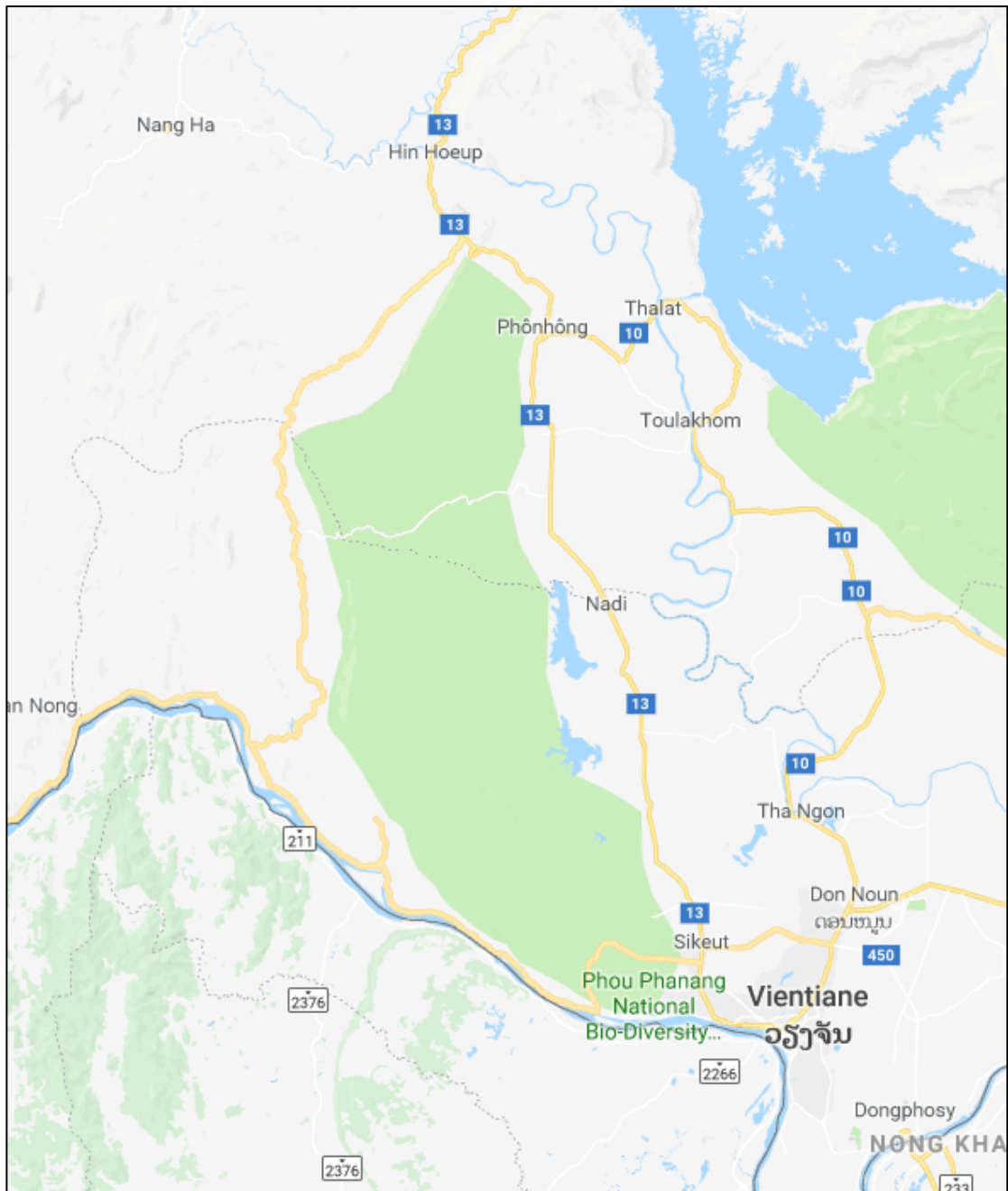
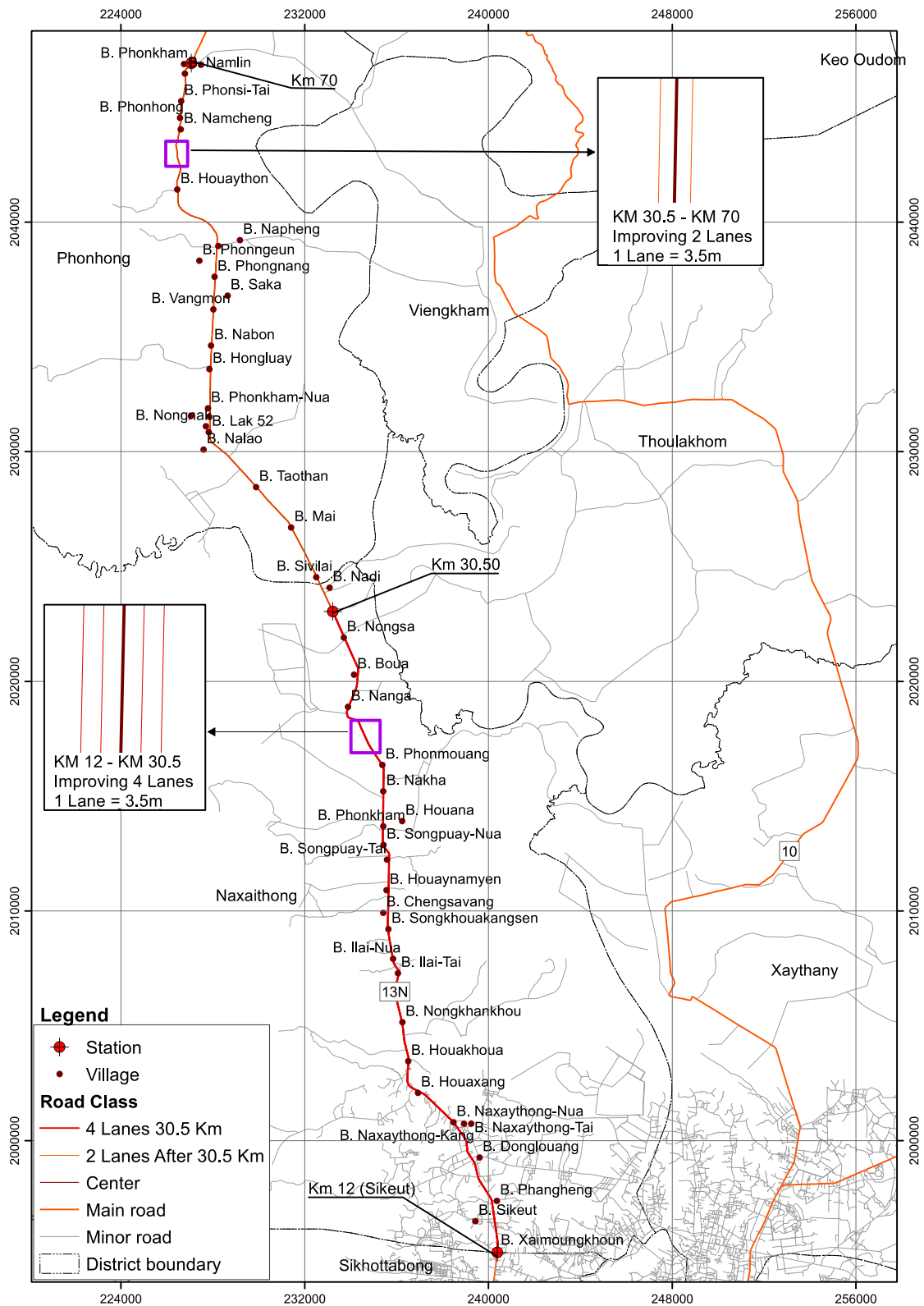


Figure ES-2: Project Area



### **3. ALTERNATIVES**

11. Several alternatives were considered as part of the ESIA. The “No Action” Alternative would result in the continued deterioration of the road, bridges and drainage structures along the ROW, thereby impeding the economic development of the Project Area and the region. All positive benefits would be foregone and as such this alternative is not deemed prudent.

12. Minor changes to the alignment have been assessed, the most significant of which is the re-adjustment of curve at Ban NaNga. The alternative has been incorporated into the Detailed Design (DD) as it will reduce accidents in a location where many were previously recorded.

13. Three bridges located within sub-section I were also assessed to determine if alternative locations for bridge widening should be adopted instead of the assumed symmetrical widening to accommodate four lanes of traffic. After consultations with the ESIA team and the DD Consultant it has been determined that asymmetrical widening will be undertaken to lessen environmental and social impacts associated with symmetrical widening.

14. A review of alternative pavement types is still on-going by the DD Consultants.

### **4. EXITING CONDITIONS**

15. The Project Area is generally flat, the topography of the Project road ranges from 170 meters above mean sea level to a maximum of 205 meters above mean sea level.

16. The road is located in the Vientiane plain, a floodplain area bordering the Mekong River, and it features a tropical savanna climate with distinct wet season and dry seasons. The dry season usually starts late in October or very early in November and runs through the end of March or later.

17. The Project area, is subject to occasional tropical depressions that typically start out as tropical storms or typhoons in the western Pacific Ocean or the South China Sea, and then move westward across the coast of Vietnam and into Laos. These storms frequently deliver torrential rains that can last for several days. While the rainfall can be very heavy, the winds are rarely at typhoon strength after a storm crosses the Annamite Mountains and enters Laos. During a typical year, about 1-4 of these tropical depressions may reach Vientiane, usually between June and December.

18. The Project area tends to be hot and humid throughout much of the year, with the lowest temperatures generally occurring between November and February and the hottest temperatures between March and May.

19. Lao PDR is one of the world’s most vulnerable countries to climate change. According to the recent (USAID)-funded Mekong Adaptation and Resilience to Climate Change Project, precipitation levels around Vientiane could increase as much as 10%. Another report funded by the World Bank indicated that the mean annual temperatures in Lao PDR are projected to increase by 1.4°C to 4.3°C by 2100, with similar projected rates of warming for all seasons.

20. Dust is currently the most significant air quality pollutant within the corridor, especially during the dry season. Ambient air quality monitoring was carried out as part of the ESIA at five different locations during July 2017 to characterize the current air quality within the Project corridor.

- Ambient carbon monoxide is well below Lao and WBG guidelines.
- Ambient PM<sub>10</sub> complies with both Lao PDR standards and United States Environmental Protection Agency (UESPA) standards. However, two locations had ambient PM<sub>10</sub> levels higher than WBG guidelines.
- Ambient SO<sub>2</sub> levels are within Lao PDR and European Union (EU) standard limits.
- Ambient levels of NO<sub>2</sub> are within the limits set by Lao PDR standards and WBG guidelines.
- Ambient levels of TSP are within the limits set by Lao PDR standards.

21. The project area is located in the plain of Vientiane which is situated on the lower reaches of the Nam Ngum and Nam Lik Rivers. This area physiographically is part of the Mekong River floodplain that includes the floodplains of its larger tributaries. The Project road crosses seven small rivers and numerous irrigation channels. To confirm the status of water quality in the Project area monitoring was undertaken in July 2017. The results showed that surface water quality in the locations monitored is degraded by high levels of phosphate, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Dissolved Oxygen (DO). Five groundwater samples were collected and analyzed to determine the baseline groundwater quality levels in the Project area. The results show that groundwater quality in the locations monitored does not exceed any of the Lao PDR standards for drinking water. Several areas were identified by the Project FS that are currently affected by flooding.

22. Two protected areas are located within the region; Phou Khao Khoay (PKK) and Phou Phanang (PPN). At its closest point of approach to NR13 North, the PKK is more than 20 km to the east, and the Nam Ngum River also lies between NR13 North and the PKK. While the PKK includes large areas of natural habitat, and a number of IUCN Red List species are considered to occur in the area, it is far enough from NR13 North that the Project is expected to have no discernible impact on the protected area or its flora and fauna. PPN's main axis runs generally north-south and is roughly parallel to NR13 North for the entire length of the project area. The closest point of approach from the road to PPN occurs near the middle of the project area and is nearly 5 km distant. On average PPN is more than 10 kilometers from the road.

23. There are 27 Important Bird Areas (IBA) in Laos, and the closest one to NR13 North project area is about 30 km east of the road near PKK's southwestern boundary. Given its distance from NR13 North, the Project is expected to have no discernible impact on the IBA.

24. A wildlife survey conducted during July and August 2014 as part of the Project Feasibility Study (FS) identified 2 mammals, 13 birds, 2 reptiles, 5 amphibians, and 9 fish in the Project area. Of the 31 species, 30 are categorized as *Least Concern* or in the lowest risk category on the IUCN Red List, and only the falcon is listed as *Vulnerable* or at high risk of extinction in the wild, but falcons range over wide areas to hunt. A second wildlife survey conducted during September 2017 asked residents along NR13 North to identify what wildlife they had observed or knew of in the local area, including the NR13 North roadway and nearby areas. This survey identified many more species than did the one from the FS, including 14 mammals, 17 birds, 16 reptiles, 1 amphibian, and 23 fishes, for a total of 71 species. Of those species, 11 appear on the IUCN Red List: 1 mammal is critically endangered; 2 mammals are endangered; 1 mammal, 1 bird, 3 reptiles and 1 fish are vulnerable; and 1 bird and 1 fish are near threatened. Any of the listed species could be resident in PNN (except for the 2 carp species and the Nile tilapia) and it is doubtful that IUCN Red List species such as the slow



loris or gibbons would be observed outside of PPN unless they were poached and either kept as pets or sold into the illegal trade in wildlife.

25. Naxaithong district is one of 9 districts in the Vientiane Capital. It is located in the northern part of the Capital and covers an area of 90,800ha. The district has 54 villages a total number of 13,414 households and a population of 69,727 habitants, of which 34,850 are females (49.98%). Majority of them belong to Lao-Tai ethnic group and only a small part is non Lao-Tai ethnic including Hmong-lu-Mien (332 habitants), and Mone-Khme ethnic (158 habitants).

26. Phonhong district is one of the 13 districts of the Vientiane province, which is located in the northern part of the Naxaithong district and has the border with Naxaithong in the south and with Vangvieng district in the north. The district has 59 villages with 12,465 households and a population of 67,106 habitants, of which female are 33,441 habitants or 50% of the population. The main ethnic is Lao-Tai ethnic group with a total population of 51,382 habitants (76.6%) of which 25,607 are females. Mon-Khmer ethnic group is 4,012 habitants (6%). Hmong-lu-Mien ethnic group is 11,621 habitants (17.3%) and other people are only 91 persons (0.3%).

27. Land use within the Project corridor is dominated by a ribbon of residential / commercial / light industrial properties and patches of agricultural land between each village and town. Often it is difficult to determine when one village ends and another starts due to continuous development along the road. As the road continues further north to Phonhong, areas of natural vegetation can be noted (km 49 – 55), although within the ROW most portions are degraded by human activity.

28. The waste management situation in and around Vientiane and the Project area is poor. Most waste is sent to uncontrolled landfills meaning that waste is simply dumped without consideration of the types of waste or the potential for pollution of soils and groundwater, or indeed potential health and safety impacts to those living around the site. There appears to be no method to dispose of hazardous waste in the region according to international best practice.

29. Noise monitoring was undertaken in July 2017 at six locations along the road. The results of the noise monitoring show that noise levels in the Project corridor are considered moderate noise level according to national Leq 24 hrs limit (55 -70 dBA). Daytime and nighttime noise is elevated well above national and WBG standards for residential areas and sensitive receptors (but not for commercial / industrial areas). The Project corridor comprises hundreds of commercial and residential properties (often single properties serve both commercial and residential purposes). Many properties are within 10-20 meters of the Project road. In addition, surveys have identified more than 30 temples, 20 schools and 5 hospitals/health clinics within the Project corridor many of which are already exposed to elevated noise levels due to their proximity to the Project road (inventories of all of these sites have been provided in the ESIA report appendices). However, often school/health facility/temple buildings are set further back from the boundary wall of the facility even though the boundary walls are often very close to the Project road. Stakeholder consultations in Naxaithong and Phonhong (September, 2017) included specific questions about the issue of noise impacts. The majority of stakeholders (50% in Naxaithong and 90% in Phonhong) indicated that road noise was not currently a concern for them and they were not concerned about future noise levels.

## 5. IMPACT IDENTIFICATION

30. The following provides a summary of the potential impacts associated with the roads:

### Design / Preconstruction Phase

31. Air Quality – lack of foresight in the siting of construction camps, rock crushing plants, concrete batching plants and borrow pits in the pre-construction phase could lead to significant air quality impacts in the construction phase, especially to sensitive receptors.

32. Soils – By the same token, productive soils can also be impacted without due consideration of their value when locating borrow pits, access roads, camps, plant, etc. Soil erosion can also occur on embankments and around structures if adequate consideration of this issue is not taken into account in the design phase.

33. Hydrology - Inadequate assessment of the hydrological conditions in the Project Area and poor design could result in the failure of some of the Project structures, including bridges and culverts. This in turn would result in several impacts including cost to rebuild the structures, potential flooding of valuable agricultural lands and impacts to surface water quality.

34. Health safety – Failure to incorporate a full range of safety measures into the road design may result in accidents and even deaths on the road, especially close to schools.

35. Land Use – The road widening will result in impacts to land and structures which will require resettlement and compensation payments.

### Construction Phase

36. Air Quality - During construction of the road, air quality may be degraded by a range of operational activities including; exhaust emissions from the operation of construction machinery; open burning of waste materials; and dust generated from quarries, borrow pits, haul roads, unpaved roads, exposed soils, material stock-piles, etc. This can lead to health impacts to locals and impacts to ecology and crops.

37. Soils - Potential soil contamination is a possibility in the construction phase resulting from poorly managed fuels, oils and other hazardous liquids used during the project works. It is also possible, that without adequate protection measures soil erosion could occur on road and bridge embankments.

38. Surface and groundwater – Impacts to surface water and groundwater could occur through improper operation of construction camps, asphalt plants, etc. Poor construction management around bridges and close to surface watercourses could also lead to pollution incidents. Without due care temporary drainage structures may also fail, or get obstructed with construction debris, leading to flooding of property and access roads. Irrigation channels may also be negatively affected as culverts are rehabilitated in these areas. Water use during the construction phase is anticipated to be around 0.002 m<sup>3</sup>/s which is not considered a significant volume of water.

39. Flora – A number of trees have been identified within the four-lane section of the road that may need to be cut. Because the locations of the construction camps, staging areas and borrow pits have yet to be determined, it is not yet possible to inventory the trees that may have to be removed there.

40. Fauna - Project impacts on fauna are expected to be minimal along the roadway, as the loss of habitat due to additional land areas taken to permanently widen the road and to

facilitate construction are so small as to be inconsequential, and those areas already are heavily impacted by human development. Any species of wildlife commonly found along the roadway will be species with widespread distributions that have generally adapted to living in developed areas. The threat of being hit by a vehicle while crossing the roadway is a more significant long-term threat to wildlife than the temporary or permanent loss of habitat associated with Project construction.

41. Protected Areas - The closest point of approach from NRI3 North to PPN is about 3 km, and the closest point of approach to PKK is about 25 km. There is no known wildlife migration route between the two protected areas, largely due to the barrier presented by the Nam Ngum River that flows between them to the east of NRI3 North. Neither the proposed construction activities nor the normal traffic use along NRI3 North after project completion should have any significant impact on either PPN or PKK, largely due to the distances separating the road and the protected areas, and also the even greater distances to their core areas.

42. Infrastructure - Medium and low voltage power lines and water supply pipes are located within the Project corridor. It is possible that these utilities will need to be temporarily removed during construction. In addition, construction works will result in delays and detours on the Project road, thereby affecting business and people traveling along the road.

43. Waste - Road construction will inevitably generate solid and liquid waste products including inert waste (e.g. concrete, wood, plastics, etc.) and hazardous waste (e.g. waste oils, batteries, etc.). In addition, uncontrolled discharges of sewage and 'grey water' (e.g. from washrooms and canteens) from construction sites and worker's camps may also cause odors and pollute local water resources.

44. Community Health and Safety – Construction activities may result in an increase in road traffic accidents between vehicles, pedestrians and vehicles and livestock and vehicles. There will also be short term impacts to noise and air quality, which may impact upon health. Migrant workers may also increase community health and safety risks, for example, through the spread of sexually transmitted diseases.

45. Occupational Health and Safety - Workers' rights including occupational health and safety need to be considered to avoid accidents and injuries, loss of man-hours, labor abuses and to ensure fair treatment, remuneration and working and living conditions.

46. Physical and Cultural Resources - A number of cemeteries and temples have been identified within the Project area. At the current time the detailed design is on-going and it is not possible to state which sites will be impacted or to what extent. A Buddha tree was noted close to the road at a temple in Songeuay-Neua in Naxaithong District. However, the DD Consultants have move the road alignment slightly to the east to prevent the Buddha tree from being cut. Given Lao PDRs rich cultural heritage it is possible that chance finds could occur, although this is considered remote due to the fact that the works are confined to the already heavily disturbed right of way.

47. Noise - The road passes through several settlements. Road construction works may lead to noise levels elevated above Lao noise standards in these areas during working hours. In addition, significant noise impacts may result from long-term exposure to noise from static construction facilities such as rock crushing plants and quarries where operational activities may last for the entire construction period.

## **Operational Phase**

48. Climate Change – Increased precipitation resulting from climate change could result in a range of impacts including embankment stability, flooding, etc. Higher average temperatures could impact asphalt surfaces (if this material is chosen for the pavement).

49. Hydrology – Run-off from bridge decks could pollute the waterways beneath them.

50. Noise - Operational phase simple noise calculations indicate that operational noise levels in commercial areas are unlikely to increase above WBG and national standards. However, it is difficult to define exactly what areas are commercial and what are residential within the Project corridor as many people both live and work in properties along the road. Many sensitive receptors identified during the surveys such as schools/health facilities/temples are already exposed to elevated noise levels due to their proximity to the Project road. However, often school/health facility/temple buildings identified in the surveys are often set further back from the boundary wall of the facility even though the boundary walls are often very close to the Project road. Consultations with stakeholders indicate that road noise is not a significant issue for them.

50. Air Quality – Given the existing low levels of NO<sub>2</sub> and CO in the Project corridor, it is considered unlikely that they will rise above the national standards in the future. In addition, improvements to the pavement, shoulders and intersections should reduce the amount of dust currently found on the Project road.

51. Health and safety – Rehabilitation of the road will result in numerous beneficial health and safety impacts, including; reduced dust levels, faster emergency response times; improved pedestrian crossing facilities and improved road geometry. However, higher speeds on the road could give rise to more traffic accidents, especially if pedestrians attempt to cross the four-lane section of the road at unofficial crossing locations.

52. Induced Impacts – Potential induced impacts include:

- Conversion of agricultural land to commercial, industrial and residential property, this in turn may lead to:
  - Increased population living within the corridor which may lead to stress on social services, such as schools, hospitals, etc.
  - Required upgrading or expansion of utilities, such as electricity supply.
  - Stresses on water availability, specifically groundwater.
- Expansion of development towards the Phou Phanang Protected area.

## **6. MITIGATION ACTIONS**

53. The summary mitigation measures for the potential impacts identified above for the Roads include:

### **Design / Preconstruction Phase**

54. Site Specific Environmental Management Plan – To ensure that all of the potential mitigation measures are applied during the construction phase, the Contractor shall be responsible in the pre-construction phase for the preparation of his Site Specific Environmental Management Plans (SSEMP). The SSEMP shall include plans relating to air quality, waste management, traffic, spill response, etc. The Engineer shall be responsible for reviewing and approving the SSEMP.

55. Siting of Facilities – During the pre-construction phase the Contractor shall consult with the Engineer (Implementation Support and Construction Supervision Consultants), the PIU and PONREs, as well as local village committees to determine the locations of construction camps and ancillary facilities, such as concrete batching plants. To prevent impacts arising from asphalt plants, construction camps, batching plants and rock crushing plants, they will be prohibited within 500 meters of any urban area or sensitive receptor (school, hospital, etc.) and not within two kilometers of a protected area.
56. Permits – The Contractor shall be responsible for obtaining all of the required environmental permits prior to the start of construction. All permits will be reviewed by the Engineer before construction work commences.
57. Bridge Design - Bridge designs should ensure that drainage from bridge decks over 50 meters does not discharge directly to the watercourses beneath the bridges. In addition, the bridge design and layout must be aesthetically pleasing and in harmony with the existing environment.
58. Drainage Design - Consideration in the design phase has been given to the issue of drainage and culverts to ensure that drainage patterns are improved from the existing conditions and that increased run-off does not occur or result in flooding of areas previously undisturbed or in those areas identified as flood prone by the Project FS. During design, all drainage works have been designed based on the historical flood data and flood forecasting. A design discharge of 50 years return period is considered for culverts, and 100 years of bridges.
59. Health and Safety - Traffic safety issues shall be accounted for during the design phase of the Project to include; safety barriers, road crossings and speed limits. It is especially important to consider additional traffic safety measures close to schools, including reduced speed limits (maximum 50 kilometers per hour) and traffic calming measures such as speed bumps.
60. Loss of Land and Property - ARAP has been prepared to address loss of land, property and livelihoods during the construction and operational phases of the Project.

### **Construction Phase**

61. Air Quality - Proper control, siting and maintenance of equipment, including concrete batching plants, shall mitigate emissions impacts. Spraying of roads with water during dry periods and covering of friable materials will also help prevent dust impacts.
62. Soils - Measures are outlined within the ESMP to reduce the impacts of potential spills and leaks. They include storing hazardous liquids in special storage areas within concrete bunds and the provision of spill kits in these areas. Erosion control measures and measures to preserve topsoil are also recommended within the ESMP.
63. Surface and groundwater – Proper design, siting and management of facilities (including construction camps and concrete batching plants) will help reduce impacts to water quality. Accidental spills could occur and provisions are recommended in the ESMP to manage such accidents. Temporary drainage in villages will be kept clear of construction debris to prevent flooding at work sites. A range of measures are provided in the ESIA to prevent impacts occurring at bridge construction sites, including for example; ensuring no waste materials are dumped in the river, including re-enforced concrete debris, ensuring that no hazardous liquids are placed within 10 meters of the river and providing portable toilets at bridge construction sites to prevent defecation by workers into the river. Water use is not

anticipated to result in significant impacts to water resources, however the Contractor will still be required to obtain all necessary permits and licenses for the abstraction of water during the construction phase.

64. Flora – To minimize the impact on flora to the greatest extent possible, all of the temporary construction facilities should be located on already heavily disturbed ground where secondary forest growth has not yet become well-established. Tree cutting shall follow the formal procedures of the GoL.

65. Fauna - The bridges that will be replaced or renovated along NR13 North can be designed with dry paths under the bridge on either side of the streams to facilitate movements of people, livestock and wildlife, the latter primarily at night when people are not around.

66. In areas where livestock occasionally must be moved from one side of the road to the other, warning signs should be posted to alert drivers to the possibility of encountering livestock on the roadway, and lower speed limits also may be posted. Awareness raising programs for both villagers and road users should to be initiated by PTRI/DOR/traffic safety division of DOT.

67. Protected Areas -Project facilities will not be located within 2 kilometers of a protected areas wherever possible, to minimize their potential impacts on the flora and fauna of protected areas. This is especially important for the worker camps in order to limit worker access to protected areas, and thereby limit the possibilities that the workers would engage in hunting and collecting wildlife inside the protected area. In addition, project facilities will be located on land that already is heavily impacted by human activities, and avoid clearing land where good vegetative ground cover or secondary forest has been established.

68. Infrastructure - Before the removal of utilities or other infrastructure (such as irrigation channels), the Contractor shall notify the general public of the potential disruption and arrangements will be made between the Contractor and those affected to minimize the disruption. Implementation of the approved traffic management plan will reduce traffic disruptions.

69. Waste Management - The Contractor will be responsible for the safe collection and removal of all waste materials from his site. Accordingly, he shall prepare waste management plan, including measures to re-use and recycle wastes to be approved by engineer before construction start. Contractor will also prepare contracts with a suitably waste management contractor for the removal of all wastes from his sites and maintain waste disposal records. Engineer will perform a due diligence review of the waste management contractors facilities to ensure that they are in compliance with Lao PDR regulatory requirements.

70. Socio-economic Aspects - To avoid disruption to road-side vendors the Contractor, in coordination with the DoR and the Provincial government, shall set aside a specific area for road vendors to continue to operate throughout the construction phase. Access to businesses must be maintained at all times throughout the construction period. This means that the contractor must prepare dedicated temporary pathways to all businesses that might otherwise be cut off from the road during the construction phase. The Contractor will be obliged to keep a record of all workers staying overnight in a village, including within construction camps in that village, this information will be relayed to village authorities on a weekly basis. In addition, an Ethnic Groups Development Plan (EGDP) has been prepared as part of the Project which shows that the concerns of the ethnic Hmong are the same as other affected stakeholders in the Project area.

71. Asphalt Plants, Concrete Batching Plants and Construction Camps – The ESMP provides a range of detailed mitigation and management measures for these facilities. All of these measures are based on international best practice.

72. Community Health and Safety – It will be the responsibility of the Contractor to provide safe access at all times through the construction site to people whose residences/shelters and routes are temporarily severed by road construction. During the construction phase, specific attention will be given to the many schools that are located adjacent to the Project road. The Contractor will place warning signs outside of each school to alert construction vehicles of their locations and to be aware of children crossing the road in these areas. In addition, at least two weeks before construction starts within the vicinity of a school, the Contractor will be responsible for informing the School of the works program and schedule so that the school can inform pupils of the impending works and to be vigilant throughout the construction program.

73. Occupational Health and Safety - Health and safety plans, training and HIV/AIDS and vector borne disease awareness programs will be provided by the Contractor. In addition, the Contractor shall prepare traffic management plans to reduce potential impacts to villagers during construction periods. The Contractor shall also be responsible for providing adequate Personal Protective Equipment for all workers, including sub-contractors and site visitors.

74. Physical and Cultural Resources - The ESIA provides a procedure for chance finds and procedures to limit impacts to Buddha trees.

75. Noise - Noise levels from construction equipment and vehicles can be reduced by introducing activity time constraints and by ensuring proper siting and maintenance of equipment.

### **Operational Phase**

76. Hydrology – If, during the operational phase of the Project, the rehabilitated road does result in increased run-off and flooding, the Contractor will be responsible for rectifying this issue during the defects liability period and the DoR will be responsible after this period.

77. Noise - Operational phase simple noise calculations indicate that operational noise levels in commercial areas are unlikely to increase above WBG and national standards. However, it is difficult to define exactly what areas are commercial and what are residential within the Project corridor as many people both live and work in properties along the road. Consultations with stakeholders indicate that noise from the road is not a significant issue for them. However, the following recommendations are made to address the issue of operational noise levels:

- I. DoR undertakes a program of consultation with stakeholders within the Project corridor to determine:
  - a) If noise is a significant issue? Does it affect sleep or work? Does it have any health impacts?
  - b) Are stakeholders concerned about an increase in noise levels?
  - c) Would stakeholders like noise to be reduced?
  - d) If so, what measures would they consider?

2. If stakeholders do not think noise is a significant issue and they are not concerned about increases in noise levels no further actions should be considered during this stage of the Project. However, routine monitoring of noise levels along the road should be undertaken annually to assess how noise levels are changing year or year. The noise monitoring should also include surveys with stakeholders to continue assessing their thoughts on noise levels. If noise levels rise more than 3 dBA over the next ten years, and if stakeholders become more sensitive to the noise issue the DoR should investigate concrete methods to reduce noise levels through the potential mitigation measures proposed in the ESIA.
  3. If stakeholders feel that noise is a significant issue and that they are concerned about increases in noise levels the DoR should prepare a noise model to determine the exact nature and extent of any noise levels increase over the next 25 years. The model should be part of a report that recommends precise mitigation measures, or a combination of measures, to reduce noise levels. The model should clearly define what areas of the corridor are commercial and which are residential / sensitive locations so that mitigation measures can be applied accordingly. The DoR would then have to consult with the stakeholders to confirm that they are willing to accept the proposed mitigation measures and then implement the noise mitigation measures.
78. Induced Impacts – Although the ESMP contains provisions controlling direct impacts of land takings for both the road and ancillary functions (asphalt plants, construction camps, etc.), control of the induced impacts is largely beyond the scope of the Project.

## **7. MONITORING ACTIONS**

79. To ensure that all of the above mitigation actions are completed according to the requirements of this ESIA, monitoring shall be undertaken of Project works by the Engineer and by independent monitoring specialists. Specifically, both observational monitoring and instrumental monitoring shall be undertaken as follows:

80. Instrumental Monitoring – This shall be completed by independent specialists and will include routine air quality, water quality and noise monitoring during the construction phase. Schedules, parameters, locations are indicated by the ESMP. The Engineer shall be responsible for contracting the independent monitoring specialists.

81. Observational Monitoring – The Contractors actions shall be continually monitored by the Engineer throughout the Projects Construction phase. This will be achieved through weekly inspections of the Contractors environmental performance and his SSESMP by national and international environmental specialists engaged by the Engineer throughout the construction period. The Engineer shall have the right to suspend works if the Contractor is in violation of any of his obligations under the ESMP and this ESIA.

## **8. CONSULTATIONS**

82. Stakeholder consultations were undertaken throughout the Project corridor. They included 'scoping' consultations in Naxaithong and Phonhong in June 2017 (comprising 115 people), consultations on the draft ESIA in Naxaithong and Phonhong in September 2017 (comprising 556 people) and 68 Focus Group Discussions (FGD) in 44 locations.

83. The consultations with villagers, local officials and government representatives revealed broad support for the Project. However, a number of issues were raised, such as increased noise levels, degraded air quality, decreased safety levels and reduced access to



property. All of the issues identified in the consultations have been included within the impact assessment portion of the ESIA and where practical, measures have been proposed to reduce the significance of, or mitigate impacts. **Section 7** of the Report provides details of the consultation procedures and the main comments received.

## **9. IMPLEMENTATION**

84. The ESMP, its mitigation and monitoring programs, contained herewith will be included within the Project Bidding documents for project works. This ensures that all potential bidders are aware of the environmental requirements of the Project and its associated environmental costs.

85. The Bid documents will state that the Contractor will be responsible for the implementation of the requirements of the ESMP through his own Site Specific Environmental and Social Management Plan (SSESMP) which will adopt all of the conditions of the ESMP and add site specific elements that are not currently known, such as the Contractors final list of borrow pit locations.

86. The ESMP and all its requirements will also be added to the Contractors Contract, thereby making implementation of the ESMP a legal requirement according to the Contract. He will then prepare his SSESMP which will be approved and monitored by the Engineer. Should the Engineer, through routine monitoring by his national and international environmental and social specialists, note any non-conformance with the SSESMP the Contractor can be held liable for breach of the contractual obligations of the ESMP. To ensure compliance with the SSESMP the Contractor will employ a national environmental and social manager to monitor and report Project activities throughout the Project Construction phase.

87. A grievance redress mechanism (GRM) has also been prepared as part of the Project. The GRM provides a structure for stakeholders to make complaints and a mechanism for the complaints to be resolved both locally and centrally. The GRM applies to both this ESIA and the RAP.

## **10. IMPLEMENTATION COSTS**

88. The total estimate costs of the environmental mitigation and monitoring has been calculated at approximately \$293,590 or approximately 0.3% of the total project cost of \$90m.