



Initial Environmental Examination

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SRI: Integrated Road Investment Program

– Tranche 2, 3 and 4

Improvement, Rehabilitation and Maintenance of Kandy – Jaffna Road (A009) from Naula to Dambulla

Prepared by the Road Development Authority, Ministry of Highways for the Asian Development Bank.

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Asian Development Bank



MINISTRY OF HIGHWAYS
Road Development Authority



SRI: Integrated Road Investment Program

Road Management Contract

Rehabilitation of
Naula – Dambulla Section of Kandy – Jaffna (A009) Road

Initial Environmental Examination (IEE)

FINAL REPORT

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LIST OF ABBREVIATIONS

| | |
|--------|--|
| AC | Asphalt Concrete |
| ADB | Asian Development Bank |
| BIQ | Basic Information Questionnaire |
| BOQ | Bill of Quantities |
| CBO | Community Based Organizations |
| CEA | Central Environment Authority |
| CEB | Ceylon Electricity Board |
| DMC | Disaster Management Center |
| DOA | Department of Archaeology |
| FD | Forest Department |
| DO | Dissolved Oxygen |
| DS | Divisional Secretariat |
| DWLC | Department of Wildlife Conservation |
| EA | Executing Agency |
| EARF | Environmental Assessment and Review Framework |
| EIA | Environmental Impact Assessment |
| EMC | Environmental Monitoring Checklist |
| EMoP | Environmental Monitoring Plan |
| EMP | Environmental Management Plan |
| EPL | Environmental Protection License |
| ESDD | Environmental and Social Development Division |
| FGD | Focus Group Discussions |
| GN | Grama Niladari |
| GOSL | Government of Sri Lanka |
| GRC | Grievance Redress Committee |
| GRM | Grievance Redress Mechanism |
| IA | Implementing Agency |
| IEE | Initial Environment Examination |
| IML | Industrial Mining License |
| LHS | Left Hand Side |
| ME&WR | Ministry of Environment and Wildlife Resources |
| MFF | Multi Tranche Financing Facility |
| MOH | Ministry of Highways |
| NBRO | National Building Research Organization |
| NEA | National Environmental Act |
| NWS&DB | National Water Supply and Drainage Board |
| PAA | Project Approving Agency |
| PD | Project Director |
| PIC | Project Implementation Consultant |

| | |
|--------|--|
| PIU | Project Implementation Unit |
| PPE | Personnel Protective Equipment |
| RDA | Road Development Authority |
| REA | Rapid Environmental Assessment |
| RHS | Right Hand Side |
| RMC | Road Management Contracts |
| ROW | Right of Way |
| SAPE | Survey and Preliminary Engineering |
| SPS | ADB, Safeguards Policy Statement 2009 |
| SSEMAP | Site Specific Environmental Management Action Plan |
| TDS | Total Dissolved solids |
| TL | Team Leader |

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EXECUTIVE SUMMARY

1. **Background:** In Sri Lanka, roads are the main land-based transportation mode. Among South Asian countries, the densest road network is found in Sri Lanka which is comprised of expressways, class A, class B and rural roads. Expressways, class A and B roads are categorised as national roads which are under the governance of the Road Development Authority (RDA) of the Ministry of Highways. The rest are rural roads which are managed by the respective local authorities. National roads, especially class A and B roads interconnect administrative and commercial centres with semi-urban and rural areas directly or indirectly and are used for delivering goods and services to the interior areas of the country. Therefore, the socio-economic development of a given area of the country has direct contact with access to the road network, so that the development of rural roads and continuous maintenance of national roads is necessary.

2. The RDA, after considering this scenario, introduced an investment program where an efficient road transport system will be established between rural communities and socio-economic centres. The program is implemented under a Multi Tranche Financing facility (MFF) obtained from the ADB. The program is officially termed as 'Integrated Road Investment Program' or simply iRoad Program. The iRoad program has two stages; iRoad 1 and 2. Several national roads have also been selected to be rehabilitated and maintained under the iRoad program. The total length of these sections of the roads will be approximately 220km. These sections of the national road will be developed as road management contracts (RMC) where the rehabilitation and improvement work will be carried out for a period of around two (2) years and maintained for another five (5) years.

3. During the Survey and Preliminary Engineering (SAPE) work for iRoad, an Environmental Assessment and Review Framework (EARF) was prepared to guide the screening and selection of roads, environmental assessments and to monitor implementation of environment safeguards during project implementation. EARF complies with ADB safeguards policy statement (SPS), 2009 as well as the national laws and regulations with respect to environmental management and conservation such as the National Environmental Act (NEA) and Fauna and Flora Protection Act etc. As per the project classification on environment aspects in SPS, 2009, the RMC falls within the scope of category B. Thus, Initial Environment Examinations (IEE) should be carried out for each selected road. On the other hand, this is a non – prescribed project as per the NEA. Therefore, no further assessment is required for securing environmental clearance from CEA.

4. This is the executive summary of IEE conducted for the section of the road from Naula (58km) to Dambulla (72.71km) of the Kandy - Jaffna (A009) Road which is written based on the guidelines given in the EARF of iRoad by a team consultants appointed by the Institute for Participatory Interaction in Development (IPID).

5. The broad objective of this project is to improve the transport efficiency of the Kandy – Jaffna (A009) Road which ultimately assists socio – economic development of the area affected by the road while conserving nature.

6. The IEE report provides the baseline conditions of physical, biological and social environments found along the selected section of the road from Naula to Dambulla. Anticipated environmental and social impacts that will be generated due to the implementation of the project over the identified existing environments are assessed. Feasible mitigation measures in order to avoid, minimize or manage identified impacts are also provided in the IEE report. The IEE also presents an Environmental Management Plan (EMP) which is a summary of impacts and mitigation measures.

7. Under the methodology of the assessment, the existing Right of Way (RoW) is set as the primary impact zone. All road improvement activities will be within the existing RoW. A secondary impact zone is set as 100m from the centre line of the road to both sides which is defined as the study area. A survey was carried out on sample of Households (HH) selected from each Grama Niladari (GN) division crossed by the road. The sample of 20% of HHs in each GN division was provided by the RDA PMU. A total of 760 households were surveyed. In compliance with the EARF, the team conducted public consultations and eight Focus Group Discussions (FGD) in order to understand the views of the public and officers of stakeholder government agencies on the proposed project and to disclose information about the project. The assessments were conducted during the period from July to September of 2020. The environmental assessment and report preparation were carried out by a trained multidisciplinary team including environmental safeguards specialist, social safeguards specialist, field coordinators and a GIS and map production experts appointed by IPID.

8. The proposed section of the A009 road is located within the Matale District of the Central Province and passes through Naula and Dambulla Divisional Secretariat (DS) Divisions.

9. Under the alternative analysis, the project was justified because with the iRoad program, 14.7km section of the A009 road will be rehabilitated and maintained to the all-weather standard. Further adequate space will be introduced at the Dambulla Dedicated Economic Centre to ensure an undisturbed traffic flow. The proposed improvement will help to ensure increased transportation efficiency along the A009 road which will reduce travel time and cost of transportation. This will also facilitate socio-economic development of the project area. Therefore, the “with project” alternative is justified.

10. Proposed improvement: Under the RMC of iRoad, 14.71km length from Naula (58km) to Dambulla (72.71km) section of the A009 road will be rehabilitated and maintained. It has been proposed to divide the selected section of the A009 road into four different sections where four different cross sections shall be adopted as described below. Drainage of the road shall also be improved within the selected section of the road. The project will not involve acquisition of additional lands. All improvement activities will be restricted to the existing RoW. The proposed typical cross section for each section consists of carriageway, hard shoulder, soft shoulder and side drains where necessary as given below.

- i. From 58km to 70.75km = 14.4m
- ii. From 70.75km to 71.8km = 14.4m
- iii. From 71.8km to 72.025km = 22.0m
- iv. From 72.025km to 72.71km = 23.7m

11. The RoW of the selected section of the road varies between 14.45 and 25.1m at measured locations. Further modifications to the cross sections as given above shall be done based on location specific contexts, keeping the major components unchanged during the detail design stage of the project. It will be ensured that the proposed centre line of the road will be designed accordingly without acquiring additional lands on both sides of the road.

12. The scope of work proposed under the RMC include the following: clearing and grubbing; road excavation; channel excavation; excavation and backfill of structures, embankment construction, sub bases, capping layers, bases, shoulder construction, asphalt overlay, roadside and lead away drains, cleaning, de-silting and repairing of culverts.

13. Material required for construction will be sourced from the project area. Existing sites which are operated with relevant licenses and approvals will be used especially for extraction of soil, metal and sand.

14. **Existing land use along the road:** In general, the land use in the project area could be categorized in to home gardens, townships, agricultural lands and water bodies such as streams. Generally, the entire section of the road has a ribbon type development comprising of both residential and commercial buildings.

15. Based on major climatic zones of the country, the section of the A009 road to be rehabilitated under this project falls within the low country, intermediate, mid country, intermediate and low country dry zones of Sri Lanka.

16. Dambulu Oya (a stream) is the major surface water body found within the study area. Dambulu Oya comes alongside the road (about 80m away from the RS of the road) at around 64km and crosses the road at 66.2km over the bridge No. 67/1. It discharges to the Ibbankatuwa Reservoir which is located on the left of the A009 road around the Dambulla Township about 2km away from point the project.

17. The quality of air in the town areas such as Dambulla is generally observed to be very poor. This is mainly due to high levels in exhaust emission from idling vehicles and traffic congestions. Similarly, traffic flow along the road is a prominent source of noise in the area which further increases the existing level of noise. Noise is comparatively high in the townships such as Dambulla due to high traffic and commercial activities.

18. Three forest reserves are located within the area of the project. They are Dummalakele, Embulambe and Dambulu Oya forest reserves. Dummalakele forest reserve is found about 250m interior on the left side (LS) of the road from the starting point to 60.5km while Embulambe forest reserve is found around 63.9km on LS of the road. Dambulu Oya forest reserve is cut across by the A009 road from 64.3 to 65.1km. Other than these forest areas, there is no other protected area located within the study area which are declared under the Forest Ordinance and Fauna and Flora Protection Act of Sri Lanka.

19. Large trees on either side of the road is a specific characteristic of the A009 road. These trees have been in this location since the road was constructed during the colonial period

(public consultation). Rain trees (*Samanea saman*), Kolon (*Haldina cordifolia*), Tamarind (*Tamarindus indica*) and Neem (*Azadirachta indica*) are the most commonly found trees along the selected section of the road.

20. As the natural habitat alongside the road is highly influenced and changed by human activities, the faunal species found in home gardens, paddy lands and plantations are not unique or rare. Among the animals reported in this section of the road are monkeys, species of rats and squirrels. Bats are also found in all parts of this section. Lizards, many species of frogs and snakes are common in the area. Many varieties of indigenous bird species are also found.

21. Sporadic flooding is the natural disaster observed in the project area especially around the Dambulu Oya crossing at 66.2km. During the public consultations, it was noted that area around the Dambulu Oya crossing gets flooded during heavy rainy seasons (mostly from November to February). It was further highlighted that flooding occurs only if irrigation tanks in the upstream spills over which does not happen every year. Other than the area around Dambulu Oya crossing, there are several locations which get flooded as a result of poor drainage systems due to silted drains, inadequate opening sizes of drainage structures or blocking/absence of lead away drains. Residents living by the roadside highlighted that runoff from the road surface and drains flow into their premises, causing flooding of the houses due to poor drainage facilities. The area around the culverts 59/2, 59/6, 60/1, at 59.7km, 67km – 69km, 71km – 72km respectively, are the examples of locations of such floods.

22. Furthermore, it was highlighted during focus group discussions, that an irrigation tank was filled between 63km – 65km when the A009 road was constructed. Therefore, at present, the road surface gets frequently settled along the particular section.

23. According to the Department of Census and Statistics, the population in the district was 484,531 people and population density is recorded as 248 persons/km². Poverty headcount of the district is recorded as 3.9%. Around 80.7% population in the district are Sinhalese while 9.8% are Sri Lankan and Indian Tamils. Around 9.2% is Moor. In 2012, the total population in these DSDs were 103,190 persons.

24. The socio-economic survey was conducted selecting 760 houses located within the two DS divisions along the road. Out of 760 households most of the households have an average family size of 3-4 members. Around 72 households in Naula DSD and 392 households in Dambulla DSD come under this category. With regard to the age category of household family members, the highest number falls within the age limit of 15 to 59 years which is the economically active population of a country. The next highest percentage falls within the age limit of 0 to 14 years. With regard to ethnicity, the major ethnic group in the sample survey is Sinhalese, i.e. 745 households. This is followed by the Tamil population which are 12 households. Although, there is a Moor population in the district level data, there seems to be no Moor population living along the selected section of the road.

25. The world famous Dambulla Golden Temple and Dambulla Cave Temple are located within the project area on the left side from 70.7km to 71.7km.

26. The rock outcrop including the caves is a UNESCO World Heritage Site (1991). The minimum distance between the edge of the road and the edge of the UNESCO site is approximately 90m. The caves containing statues and paintings are located on the rock outcrop about 450m away from the edge of the road. The section of the A009 road to be rehabilitated under this project is outside the rock outcrop which is the World Heritage Site (about 90m from the edge of the rock outcrop) but within the buffer zone as declared by DOA.

Anticipated Environmental and Social Impacts

27. Following impacts on the existing environment and social setup during pre-construction, construction and operational stages could be anticipated from the work of the project.

28. **Pre-construction phase:** Impacts to archaeologically protected monuments and sites of the Dambulla Golden Temple and Dambulla Cave Temple located on the left side from 70.7km to 71.7km, shifting of temporary structures (23 temporary huts) on the existing RoW, impacts due to implementation of the project within the forest reserve, felling of trees by the sides of the road, natural hazards aggravated by the project and impacts to the road, alteration of surface water bodies and relocating of utility supply lines are the possible impacts to be considered during the pre-construction phase.

29. **Construction phase:** Impacts to archaeologically protected sites of the Dambulla Golden Temple and Dambulla Cave Temple, loss of trees and vegetation, adverse impacts on terrestrial fauna, impact on aquatic fauna and flora, ecological disturbances by workers and their camp operations, increase in local air pollution, noise and vibration, disruption to traffic flow, deterioration of surface and ground water quality due to silt runoff, emissions and spoil from labour camps, floods social and environmental impacts due to establishment of labour camps, measures to be adopted to fight against spreading of Coronavirus (COVID 19) and other pandemics in project sites, impacts due to extraction and transportation of construction materials, alteration of surface water hydrology of waterways, requirement of land for upgrading the road for temporary purposes, health and safety of labour force and public, loss of access to houses are the anticipated environmental and social impacts during the construction phase of the project.

30. **Operational phase:** Impacts on water resources, disposal of waste material generated during maintenance operations, extraction of material for repairing and maintenance work, pedestrian and commuter safety and impacts due to traffic noise are the possible impacts in this phase.

31. **Climate change adoption:** Rehabilitation of the road from the Naula - Dambulla section of the A009 road will facilitate 161.07 tons of CO₂ reduction per year within the particular section.

Institutional Arrangement, Environmental Management Plan and Grievance Redress Mechanism

32. The Ministry of Highways is the Executing Agency (EA) for the program. The Secretary to the Ministry is responsible for decisions on overall approvals and operational policies of

the project. RDA is the Implementing Agency (IA). This project will be implemented through the PIU which is already established for RMC of iRoad. The Project Director (PD) of RMC will be responsible for carrying out road maintenance contracts. The PD is assisted by a staff of engineers, environment and social safeguards officers and other administrative staff. The PIU is assisted by a separate Project Implementation Consultant (PIC) who will be responsible to review and approve designs, supervise civil work, review and certify bills submitted by the contractor. A team of experts including engineers, quantity surveyors, environment and social experts work in the PIC headed by a Team Leader (TL).

33. The safeguard team of PIU, PIC and the contractor are primarily responsible for the safeguard compliance of all activities carried out for rehabilitation and maintenance of the selected section of the A009 road. Their specific roles and responsibilities are given in chapter VI of the EARF.

34. Environmental Safeguard Manual of the RDA and the ADB SPS, outlines the requirements for an EMP which is presented as a matrix, developed based on best practices for environmental management. This IEE report includes EMP prepared for rehabilitation of the Naula – Dambulla section of the A009 road. This EMP covers all impacts and mitigation measures identified within the project. However the contractor will be responsible for the preparation of SSEMAP based on the EMP given in this IEE. SSEMAP is supposed to include site specific impacts, related site specific construction activities and relevant mitigation measures proposed to particular locations in order to minimize relevant impacts. Separate SSEMAPs will be prepared for each contract package if the proposed section of the A009 road will be contractually subdivided. All costs for implementing the mitigation measures must be included in the bill of quantities (BOQ) by the contractor as implementation of the SSEMAP will be the responsibility of the contractor. The PIU will oversee the effectiveness of the implementation with the assistance of the PIC. In addition, in compliance with the EARF, the Environmental and Social Development Division (ESDD) of RDA is also responsible for monitoring the implementation of the SSEMAP bi-annually.

35. Contractors who implement the package will be responsible to keep the road in operational condition for a period of 5 years after rehabilitation. Therefore, the EMP has been modified accordingly, paying more attention to the environmental impacts and mitigation measures during the operational and rehabilitation stages.

36. Monitoring of EMP implementation will be carried out during the pre-construction, construction, operation and maintenance stages of the project. Based on the EMP, Environmental Monitoring Check list (EMC) will be prepared by the PIC for each of these stages. The EMC monitors the degree of compliance of the mitigation measures proposed in the EMP in all three stages. In addition there will be an EMOP based on the project cycle to monitor EMP implementation by measuring environmental parameters.

37. Grievance Redress Mechanism: Grievances from the affected people on social and environmental issues during project implementation will be addressed mainly through the Grievance Redress Mechanism (GRM) as recommended in the EARF (Chapter V – C) which is to be formed using the existing local administrative system.

Public Consultation and Information Disclosure

38. One on one interviews and Focus Group Discussions were conducted with the stakeholders living alongside the proposed section of the A009 road.

39. The key stakeholders of the project were consulted during the field survey. This included Divisional Secretaries of Naula and Dambulla, Grama Militaries, Officers of the Departments of Irrigation, Archaeology, Forest and the Executive Engineer of the Road Development Authority.

40. The FGDs were conducted to get the ideas of the community. Eight (8) FGDs were conducted with public living alongside the road.

Conclusions and Recommendations

41. This IEE report discusses various aspects of the proposed rehabilitation and maintenance of nearly 14.71km of the section of the road from Naula (58km) to Dambulla (72.71km) of the Kandy - Jaffna (A009) road under the iRoad program implemented by RDA and funded by the ADB. Under the RMC package, contractors are liable to keep the roads in operational status for approximately 5 years after rehabilitation.

42. As discussed, the selected section of the A009 road will be rehabilitated and maintained under the project and all construction and maintenance activities will be restricted to the available ROW. Therefore, no land acquisition shall be required. The road will be improved to a two lanes status with hard shoulders, drains and other road furniture from 58 to 71.8km while four lane and five lane configurations are proposed from 71.8 to 72.025km and 72.025 to 72.71km respectively.

43. The selected section of the A009 road does not cross or is located adjacent to the protected wildlife areas. However, the section of the road is located across Dambulu Oya forest reserve which provides a unique land use along the road. In addition, there are shady trees located throughout the selected section of the road. Therefore, these trees will be protected by the project. The selected section of the A009 road traverses adjacent to the Dambulla cave temple which is a UNESCO World Heritage Site. Although the selected section of the road is not located within the World Heritage Site, it crosses the buffer zone of the site which is declared by DOA. Therefore, the project shall be implemented with the prior approval of DOA. Construction activities shall be carried out under the direct supervision of the DOA.

44. The project induced social impacts are not significant as the project does not allow acquisition of land for the road rehabilitation work. However, the temporary huts of the road side vendors built within the RoW shall be shifted back with minimum impact to their livelihood. Indirect impacts to the environmental and social set up of the project area will be minimized with effective mitigation measures as given in chapter 5 of the report and EMP.

45. An EMP, EMC and EMOP have been prepared as part of this report. These are required to be updated, incorporated into tender documents and converted into contract package specific documents before the commencement of construction activities.

46. In compliance with the SPS, 2009 of ADB, this project is categorised as Category B and on the other hand this is a non – prescribed project as per the NEA. Therefore, no further assessments are required for securing environmental clearance.

47. The proposed improvement for the A009 Road will increase the efficiency of transportation and will also boost economic activities in the Dambulla and Naula areas including potential growth in industries, tourism and agriculture in lagging rural areas which will be a positive step towards the socio economic development of the country.

CHAPTER 1: INTRODUCTION

1.1. Background

48. In Sri Lanka, roads are the main land-based transportation mode. Among South Asian countries, the densest road network is found in Sri Lanka which comprises of expressways, class A class B and rural roads. Expressways, class A and B roads are categorised as national roads which are under the governance of road development authority (RDA) of ministry of highways and the rest is rural roads which are managed by respective local authorities. As per RDA, the current road network of the country comprises of around 217 km of expressways (in operation), 4,200 km of “A class” roads and 8,000 km of “B class” roads. National roads, especially class A and B roads interconnect administrative and commercial centres with semi-urban and rural areas directly or indirectly and responsible for delivering goods and services to interior areas of the country. Therefore, the socio-economic development of a given area of the country has a direct relationship with access to the road network so that the development of rural roads and continuous maintenance of national roads is necessary.

49. RDA after considering this scenario, introduced an investment program where an efficient road transport will be established between rural communities and socio-economic centers. During the initial studies for the program it was agreed that around 1,000 rural communities would be connected to socio-economic centers. The program includes rehabilitation and upgrading of both rural and national roads. The program is implemented under a multi tranche financing facility (MFF) obtained from ADB. The program is officially termed as “Integrated Road Investment Program” or simply iRoad Program. The investment program will deliver two outputs: (i) improved road conditions between rural communities and socioeconomic centres, and (ii) enhanced capacity of RDA in inclusive road operation and development.

48. The iRoad program has two stages; iRoad 1 and 2. iRoad 1 targeted the development of rural, provincial and national roads in the Southern, Central, Sabaragamuwa, North Central, North Western Provinces and Kalutara District in the Western Province. Currently, the construction work is nearing completion. Under iRoad 2, it is expected to develop rural, provincial and national roads in the rest of the provinces of the country and subsequently civil work is ongoing in the Uva and Eastern Provinces while construction work has been recently started in the Northern and Western Provinces.

49. Simultaneously, several national roads have also been selected to be rehabilitated and maintained under the iRoad program of which the details are given in the table below. The total length of these sections of the roads will be approximately 220km.

Table 1.1: Sections of the National Road which are Proposed for Development

| No. | Road | Section of the Road | Package Name | Length of the Section of the Road (Km) |
|------------|---|--|---------------------|---|
| 01 | Colombo – Kandy (A001) Road | Nittambuwa (39.71km) to Kadugannawa (100.0km) | RMC-01 | 60.29 |
| 02 | Maradankadawela – Habarana – Tirikondiadimadu (A011) Road | Maradankadawala to Habarana Section (0.0km to 25km) | RMC-03 | 25.0 |
| 03 | Pelmadulla – Ambilipitiya – Nonagama (A018) Road | Pelmadulla to Padalangala section | RMC-04 | 66.0 |
| 04 | Thalawa – Kekirawa – Dachchahalmillewa | | RMC-05 | 90.22 |
| 05 | Galle Package Roads | Karapitiya – Labuduwa – Wanduramba – Nagoda – Udugama – Hiniduma – Thawalama | RMC/SP-01 | 51.9 |
| 06 | Kandy – Jaffna (A009) road | 58.00 – 72.71km | RMC - 07 | 14.71 |

Source: PIU, iRoad

50. These sections of the national roads will be developed as road management contracts (RMC) where the rehabilitation and improvement work will be carried out for a period of around two (2) years and maintained for another five (5) years. This type of contract significantly expands the involvement and responsibility of private sector civil contractors in infrastructure development, from a simple execution of civil work to management and conservation of national assets (in this case, road infrastructure).

51. During the period of contract, the contractor is responsible for environmental and social safeguards compliances as specified in the contractual agreements and necessary mitigation measures should be implemented to minimize any adverse impacts resulted due to road rehabilitation and maintenance activities.

52. During the survey and preliminary engineering (SAPE) work for iRoad, an Environmental Assessment and Review Framework (EARF) was prepared to guide screening and selection of roads, environmental assessments and to monitor implementation of environment safeguards during the project implementation. EARF complies with ADB safeguards policy statement (SPS), 2009 as well as the national laws and regulations with respect to environmental management and conservation such as the National Environmental Act (NEA) and Fauna and Flora Protection Act etc...

53. As per the project classification on environment aspects in SPS, 2009, the RMC falls within the scope of category B (please refer rapid environmental assessment (REA) checklist attached in appendix 1.1). Thus, initial environment examinations (IEE) should be carried out for selected road.

54. This document presents the findings of the initial environmental examination (IEE) conducted for the road section from Naula (58km) to Dambulla (72.71km) of the Kandy - Jaffna (A009) Road. This IEE report also discusses the possible impacts that would arise due to the proposed development and maintenance work on the proposed section of the A009 road. The IEE Report is prepared based on the guidelines given in the EARF of iRoad. The IEE is prepared by a team of consultants appointed by the institute for participatory interaction in development (IPID).

1.2. Objectives of the Proposed Project

55. The broad objective of this project is to improve the transport efficiency of Kandy – Jaffna (A009) Road which ultimately assist socio – economic development of the area affected by the road while conserving the nature.

56. Specific objectives of this project are;

- To improve, rehabilitate, and maintain the Naula (58km) to Dambulla (72.71km) section of the A009 road
- To improve cross and side drainage of the road
- To ease the traffic flow near the Dambulla Golden Temple and Dambulla Dedicated Economic Centre
- To rehabilitate the selected section of the road ensuring sustainable development

1.3. Objectives of the Initial Environmental Examination

57. This IEE is prepared for the proposed improvement, rehabilitation and maintenance of the Naula (58km) to Dambulla (72.71km) section of the A009 road. The IEE report provides the baseline conditions of physical, biological and social environments found along the selected section of the road from Naula to Dambulla. Anticipated environmental and social impacts that shall be generated due to the implementation of the project over the identified existing environments are assessed. Feasible mitigation measures in order to avoid, minimize or manage identified impacts are also provided in the IEE report. The IEE also presents an environmental management plan (EMP) which is a summary of impacts and mitigation measures. The EMP shall guide the project implementation unit (PIU), project implementation consultant (PIC) of iRoad and respective Contractors to comply with environmental and social safeguards during the period of the project. The environmental monitoring plan (EMoP) is also an appendix of the IEE which assess the effectiveness of the implementation of the EMP. This report also proposes a grievance redress mechanism (GRM) to address public grievances resulted due to implementation of the project.

1.4. Approach, Methodology and Personnel Involved

58. As mentioned above, a REA checklist (appendix 1.1) was prepared for the rehabilitation project of the Naula - Dambulla section of the A009 Road in order to determine the category of the project. Accordingly, the project is categorised under category B. Subsequently, an IEE is required to assess the impacts resulted by the project and to propose mitigation measures. This IEE report while complying with the requirements stipulated in the EARF, also follows the environmental and social safeguards manuals of RDA.

59. Under the methodology, the existing Right of Way (ROW) is set as the primary impact zone. All road improvement activities will be within the existing ROW. A secondary impact zone is set as 100m from the centreline of the road to both sides which is defined as the study area in order to identify;

- Presence of any environmentally sensitive sites
- Hydrological aspects
- Sensitive receptors to environmental and social impacts
- Presence of archeologically protected sites
- Presence of areas prone to natural disasters

60. In compliance with the EARF, an environmental checklist (EC) was first prepared compiling above aspects of the primary and secondary impact zones of the selected road section and the same were elaborated in the IEE report. EC prepared for the Naula – Dambulla section of the A009 Road is presented in appendix 1.2.

61. A survey was carried out for sample of households (HH) selected from each Grama Niladari (GN) division crossed by the road. The sample of 20% of HHs in each GN division was provided by the RDA PMU. During data collection, locations were recorded by using the global positioning system (GPS) for future reference. Household data were collected using the GPS-enabled online data collection application using mobile telephones. Data storage was in a secure server accessible to IPID. Special precautions were taken to ensure data privacy and loss. A total of 760 households were surveyed.

62. In compliance with the EARF, the study team conducted public consultations and focus group discussions (FGD) in order to understand the views of the public and officers of stakeholder government agencies over the proposed project and to disclose information about the project. FGDs were conducted as follows;

Table 1.2: FGDs Conducted Along the Road

| Item No. | Date | Location | Target Group | Total number of participants | Males | Females |
|-----------------|-------------|-----------------|---------------------|-------------------------------------|--------------|----------------|
| 1 | 27.06.2020 | Serudhandatota | Community members | 19 | 16 | 3 |
| 2 | 26.07.2020 | Dambulla Town | “ | 14 | 12 | 2 |
| 3 | 27.07.2020 | Kapuwaththa | “ | 12 | 9 | 3 |
| 4 | 27.07.2020 | Kiralagolla | “ | 14 | 6 | 8 |
| 5 | 27.07.2020 | Moragollewa | “ | 12 | 11 | 1 |
| 6 | 26.07.2020 | AmbulAmbe | “ | 16 | 7 | 9 |
| 7 | 26.07.2020 | Yapagama | “ | 8 | 5 | 3 |
| 8 | 27.07.2020 | Pannampitiya | “ | 11 | 8 | 3 |

63. The assessments were conducted during the period from May to September of 2020.

64. The environmental assessment and report preparation were carried out by a trained multidisciplinary team including an environmental safeguards specialist, social safeguards specialist, field coordinators and a GIS and map production experts appointed by IPID. The support and guidance given by the Project Director, Deputy Project Director, Senior Project Engineer, Project Engineer and the Safeguard Officers of the iRoad Project is highly appreciated.

CHAPTER 2: DESCRIPTION OF THE PROJECT

2.1. Location of the Project

65. The proposed section of the A009 road is located within the Matale District of the Central Province. The administrative divisions including Divisional Secretariat (DS) Divisions falling within this particular section of the A009 road is presented below while the location map of the selected road section is presented in appendix 2.1.

| | |
|-----------------------------------|--------------------|
| Province: | Central |
| District: | Matale |
| Divisional Secretariat Divisions: | Naula and Dambulla |

2.2. Need of the Project

66. Originating from Kandy, the A009 Road traverses along the centre of the Northern part of the country up to Jaffna providing the back bone of the road network. Both national and rural roads branch off from the A009 Road throughout, providing access to the interior areas of the Central, North Western, North Central, Eastern and Northern Provinces of the country. On the other hand, A009 is the main road which provides land-based access to the Northern and Eastern Provinces which were affected by 30 years of civil unrest and recently gone under an accelerated development programme. Therefore, the A009 road plays a major role in providing road transportation for the country. The condition of this road has a high effect on the efficiency of transport. RDA after taking this in to consideration, has rehabilitated most of the sections of the A009 road. However, several sections especially from Kandy to Dambulla need to be rehabilitated. This situation badly affects the smooth transportation along the A009 Road, which is a negative impact to the socio-economic status of the country.

67. The Naula – Dambulla section of the A009 Road is one of the sections that need to be rehabilitated in order to ensure an efficient road transportation along the A009 Road. This particular section of the road is currently at a two lanes status without hard shoulders. The soft shoulders at most of the locations are eroded. Therefore, drivers find it difficult to overtake slow moving vehicles which increases the travel time. This situation gets worsen as lorries transporting vegetables to the Dambulla Dedicated Economic Centre frequently use this section of the road and these slow-moving vehicles occupy the road during peak hours (afternoon and night). This affects the smooth flow of other vehicles. A long queue of such vehicles can be observed waiting to enter the Dambulla Dedicated Economic Centre during the peak hours. Further traffic congestions are observed near the Dambulla Golden Temple and Cave Temple because of the pilgrims. In addition, passenger transport busses, long vehicles and trucks carrying sand also largely occupy this road. The absence of hard shoulders disturbs the easy movement of other vehicles as well as affect the safety of the road users such as pedestrians and cyclists.

68. On the other hand, side drains at most of the sections are earthen and almost silted which results overflowing of rain water. Several locations of the road get overtopped due to poor drainage across the road.

69. The miscellaneous foreign aided project (MFAP) of the RDA has already commenced the rehabilitation of the section of the road of the A009 Road up to 58km. Therefore, rehabilitation of the rest of the section up to Dambulla is urgently required in order to continue the smooth traffic flow. Therefore, rehabilitation of the Naula to Dambulla section of the road with hard shoulders, proper drainage provisions, parking facilities especially for the Dambulla Dedicated Economic Center and Dambulla Golden Temple and Cave Temple and adequate maintenance is a timely requirement in order to ensure transport efficiency along the A009 road.

2.3. Analysis of Alternatives

2.3.1. No Project Alternative

70. If the selected section of the of the A009 road is left as it is, the road will not be able to serve the increasing traffic flow. Therefore, the efficiency of transportation will be further reduced resulting in the increase in travel time and transportation cost. This situation will badly affect the socio-economic status of the affected DS Divisions. Therefore, the no project alternative is not viable. Further, the present road surface has now deteriorated and requires urgent overlaying. If such an intervention is not done, the road surface will deteriorate further, slowing the movement of traffic to unacceptable limits.

2.3.2. With Project Alternative

71. With the iRoad program, 14.7km section of the A009 road will be rehabilitated and maintained to an all-weather standard. Further, adequate space shall be provided at the Dambulla Dedicated Economic Centre to ensure an undisturbed traffic flow. The proposed improvement shall help to ensure increased efficiency in transportation along the A009 Road which will reduce travel time and cost of transportation. This will also facilitate socio-economic development of the project area. Therefore, with project alternative is justified.

72. Development of an alternative route for this section of the road was not considered as an alternative since this is a section of an existing road.

2.4. Magnitude of Operations

2.4.1. Proposed Improvement

73. Under RMC of iRoad, 14.71km length from Naula (58km) to Dambulla (72.71km) section of the A009 Road will be rehabilitated and maintained. It has been proposed to divide the selected section of the road of A009 into four different segments, where four different cross sections shall be adopted as described below. Drainage of the road will also be improved within the selected section of the road. The project will not involve acquisition of additional land. All improvement activities will be restricted to the existing ROW. The proposed typical cross section for each sections consists of a carriageway, hard shoulder, soft shoulder and side drains where necessary as given below.

i. From 58km to 70.75km

74. A two-lane cross section as presented in table 2.1 shall be applied for the section from 58 – 70.75km of the A009 road.

Table 2.1: Cross Section to be Applied from 58 – 70.75km

| | | |
|---|---------|---------------|
| Carriageway | 3.7 x 2 | 7.4 m |
| Hard shoulder | 0.5 x 2 | 1.0 m |
| Total asphalt | | 8.4 m |
| Soft shoulder | 1.5 x 2 | 3.0 m |
| Drains and services | 1.5 x 2 | 3.0 m |
| Total flexible width | | 6.0 m |
| Total width of the cross section | | 14.4 m |

ii. From 70.75km to 71.8km (In front of the Dambulla Golden Temple and Cave Temple)

75. Similar cross section which is presented in table 2.1 will be adopted to the section of the road in front of the Dambulla Golden Temple and Cave Temple as well. This will avoid possible negative impacts to the facilities related to the Dambulla Cave Temple which is located adjacent to the road on left.

76. However, the Department of Archaeology shall be consulted in advance of finalizing the cross section within this section during the detail design. Their recommendations will be incorporated.

iii. From 71.8km to 72.025km

77. A four-lane configuration is proposed for this section in order to ease the traffic flow towards the Dambulla Township.

Table 2.2: Cross Section to be Applied from 71.8 to 72.025km

| | | |
|---|---------|---------------|
| Carriageway | 3.5 x 4 | 14.0 m |
| Hard shoulder | 1.4 x 2 | 2.8 m |
| Total asphalt | | 16.8 m |
| Centre median | 1.2 | 1.2 m |
| Foot walk and drains | 2.0 x 2 | 4.0 m |
| Total width of the cross section | | 22.0 m |

iv. From 72.025km to 72.71km

78. Within this section, the Dambulla Dedicated Economic Centre is located on right side of the road. Vehicles transporting vegetables need space to queue up and for parking. Therefore, the cross section has been determined accordingly as given below.

Table 2.3: Cross Section to be Applied from 72.025 to 72.71km

| | | |
|---|---------|---------------|
| Carriageway | 3.5 x 4 | 14 m |
| Queue up lane | 3.5 | 3.5 m |
| Hard shoulder | 0.5 x 2 | 1.0 m |
| Total asphalt | | 18.5 m |
| Centre median | 1.2 | 1.2 m |
| Foot walk and drains | 2.0 x 2 | 4.0 m |
| Total width of the cross section | | 23.7 m |

79. Further modifications to the cross sections as given above shall be done based on the location specific contexts, keeping the major components unchanged during the detail design stage of the project. And also, it will be ensured that the proposed centre line of the road will be designed accordingly without acquiring additional lands on both sides of the road.

80. At present, the cross section of the A009 road consists of a dual carriageway of 7m and soft shoulders of around 1m each on average. The existing RoW of the road at measured locations during the assessment are given in following table.

Table 2.4: Measured Width of the Existing Carriageway and RoW

| Location | Width of the Carriageway (m) | Width of the RoW (m) |
|----------|------------------------------|----------------------|
| 59km | 7 | 14.45 |
| 59.5km | 7 | 20.12 |
| 60km | 7 | 17.8 |
| 64km | 7 | 17.5 |
| 66.5km | 7 | 21.1 |
| 70.3km | 7 | 21.6 |
| 71.7km | 7 | 16.7 |
| 72.4km | 7 | 25.1 |

2.4.2. Project Activities

81. The scope of work proposed under the RMC under the road rehabilitation include the following: clearing and grubbing; road excavation; channel excavation; excavation and backfill of structures; embankment construction; sub bases, capping layers, and bases; shoulder construction, asphalt overlay; roadside and lead away drains; cleaning, de-silting and repairing of culverts.

82. In addition, the selected section of the road will be maintained to all weather standards during the period of maintenance by the RMC.

83. All improvements are limited to the available RoW and no land acquisition is necessary. During stakeholder interviews the officials of the Department of Archaeology highlighted the need of conservation of the green belt within the Dambulla Golden Temple area (green belt available within the existing RoW of the road). Therefore, as mentioned above, they shall be consulted in finalizing the cross section within this particular stretch.

84. The proposed pavement is Asphalt Concrete (AC) with the following criteria:

- The surface will be overlaid by asphalt concrete.
- Base correction will be carried out if base failures are found along the road.
- Build-up drains have been provided for town areas or other required areas. Otherwise, the earth drain will be provided.
- The earth work will be carried out in required areas.
- Finally, road marking and providing necessary road furniture shall be carried out.

85. In addition, improvement to cross and side drainages will be considered in locations where structures have been badly damaged or rectification of the drainage is significantly required. Special consideration will be paid at locations where local inundations occur due to poor drainage along the road. The opening sizes of cross drainage structures, surface treatment and road finished level will be determined with necessary hydrological studies which will be carried out during detailed designs.

86. The following specific design standards will be the key components of the RMC of the iRoad project:

87. The applicable design standards and guidelines are:

- (a.) Road Design Manual and Bridge Design Manual—RDA's standards (b) AASHTO—Geometric Design of Highways and Streets 5th edition (2004); (c) TRL—Overseas Road Note 6, A Guide to Geometric Design (1988), and (d) Austroads—Rural Road Design (2003). Bridges: RDA's Sri Lanka Bridge Design Manual of 1997, based on the British Standards Code of Practice for Bridge Design (BS5400:1990). Road Pavement: (a) Transport Research Laboratory's Road Note 31, 4th Edition (TRL-RN31), basis of RDA's pavement design process; (b) AASHTO Pavement Design Guide, and (c) design life for new pavements: 10-year life span with provision for overlays during or at the end of this period to extend the life span to 15–20 years. Drainage: RDA's standards incorporating relevant standards from AASHTO and the British Standard Design Manual for Roads and Bridges.
- **Alignment and Traffic Facilities:** In general, the proposed improvements follow the existing horizontal and vertical alignment. The only minor changes are those applied to the horizontal alignment for very short sections to enhance road safety, ease the radius of curves or minimize blind spots (within the RoW). The road safety aspects relate mostly to localized sections of the road alignments. In densely populated areas, roads, bridges and associated sidewalks are made accessible for all, including the disabled.
- **Road Safety:** The road safety aspects are related mostly to localized sections of the alignments. Based on the road safety inspections carried out on the sections of the road during the field evaluation, the detailed design, wherever possible, incorporates improvements to road width and alignment including installing

precautionary sign boards, direction boards and speed signs to slow down at oncoming curves or low speed areas.

- **Road Side Drains.** To minimize storm water flooding or ponding, roadside drains are reconstructed to direct surface flows away from pavements and divert it to streams or watercourses. Built up drains are provided for urban and sub-urban areas and for rural areas, earth drains are provided. For existing built up drains which can be retained with minor repairs (retained or repaired), the waterways are restored by removing sediment materials and debris.
- **Culverts and Bridges.** Improvements comprise of repairing and or replacing existing structures of culverts and bridges depending on hydraulic and structural requirements. These interventions include structural renovation of substructure and superstructure elements together with installation or repair of guardrails. Depending on the terrain and outcome of hydrological studies, few new culverts may be introduced to improve drainage. Materials and construction methods are in accordance with Technical Specifications, Part 1 Standard Specification for Construction and Maintenance of Roads and Bridges 1989 (Sri Lanka), modified to suit project requirements. Details of the existing culverts within the selected road section are presented in appendix 2.2.
- **Earth Retaining Structures.** When the road is in embankment, retaining walls are introduced to get required additional road widths. Gabions, random rubble masonry and reinforced concrete retaining walls are used. Materials and construction methods are in accordance with Technical Specifications, Part 1 Standard Specification for Construction and Maintenance of Roads and Bridges 1989 (Sri Lanka), modified to suit project requirements.
- **Road Pavement.** Pavements are constructed in accordance with Technical Specifications, Part 1 Standard Specification for Construction and Maintenance of Roads and Bridges 1989 (Sri Lanka). Pavements consists of granular soil sub base, aggregate base course and Asphalt concrete wearing course.

88. RMC will cover the periodic, routine and emergency maintenance of the rehabilitated section of the road. Periodic maintenance work consists of specific types of major interventions designed to ensure the residual pavement and surfacing lives are provided to RDA by the contractor at the end of the period of contract. Routine maintenance services are all interventions on the roads which are to be carried out by the contractor in order to achieve and maintain the road performance standards defined by the service levels included in these specifications and all activities related to the management and auditing of the road contract performance measures. Emergency work are activities needed to reinstate the roads and reconstruct their structure or their RoW which has been damaged as a result of natural phenomena such as strong storms, floods and earthquakes.

2.4.3. Extraction of Construction Material

89. Material required for construction will be sourced from the project area. Existing sites operating with relevant licenses and approvals will be used especially for extraction of soil, metal and sand.

90. Potential locations which are currently used for iRoad program in the North Western, North Central and Central Provinces as well as for other operated road development projects are given priority in selecting sites for material extraction for the project.

91. For the sand requirement, offshore sand could also be used for construction subjected to confirmation of quality. If new material extraction sites will be opened for this project, necessary licenses and approvals will be obtained from the relevant agencies. As per the estimations prepared for the proposed project, approximate quantities of material required are provided below:

Table 2.5: Material Requirement for the Naula – Dambulla Section of the A009 Road

| Description | Amount Required |
|-----------------------------|------------------------|
| Aggregate (m ³) | 45,000 |
| Soil (m ³) | 5,000 |
| Sand (m ³) | 5,000 |
| Reinforcement (MT) | 200 |
| Bitumen (MT) | 300 |

CHAPTER 3: POLICY AND LEGAL FRAMEWORK

3.1. Legal Framework

3.1.1. National Environmental Act and Other Applicable Regulations

92. The national environment act (NEA) No. 47 is the key environmental policy framework which is administered through the central environment authority (CEA) of the ministry of environment and wildlife resources. NEA No. 47 was enacted in 1980 and NEA amendment Act No. 56 of 1988 stipulated the regulations for assessing and managing environmental impacts and obtaining the environmental clearance in a timely and systematic manner. It also provides guidelines for environment management, management of natural resources, fisheries, wildlife, forest, soil conservation, environment quality, environment protection and approval of projects. The environmental clearance process is implemented through the designated project approving agency (PAA) as prescribed by the Minister under section 23 Y of the NEA. The procedure that should be followed for obtaining environmental clearance is described under section 23CC and 32 of the NEA.

93. The environmental clearance process should be initiated by submitting the completed basic information questionnaire (BIQ) to CEA with preliminary information about the project including exact locations of the project components, extent and environmental sensitivity related to project activities. Based on this, CEA decides whether the project is a “Prescribed Project”¹ or not and who the PAA will be for administering the IEE or EIA process to obtain environmental clearance if the proposed project is a prescribed project. For a pprescribed project CEA or the designated PAA will issue a TOR for the IEE or EIA required.

94. The scope of the RMC includes rehabilitation of existing national roads with no widening. According to the Gazette Extra-ordinary No. 772/22 of 24th June 1993 and subsequent amendments, all rehabilitation work for existing highways and roads do not fall within the category of Prescribed Projects. Hence, it is likely that the project roads under the investment program will not be required to prepare an IEE or EIA for securing an environmental clearance. However, further amendments to the NEA on requirements for material extraction, emissions, noise and vibration levels that are relevant for the project will need to be followed. Necessary revisions will need to be made within the project to meet the new requirements if there are any.

95. If a project road falls within the boundary or inside a protected area, necessary clearance will need to be sought from the Department of wildlife conservation (DWLC) even if there will be no widening of the RoW of the road. Depending on the sensitivity of the protected area, the DWLC may require conduction of an IEE or EIA study for the respective road. No work is allowed in project roads which are inside National Parks and Strict Nature Reserves.

¹Under the NEA, a prescribed project means that the project requires a full Initial Environmental Examination or Environmental Impact Assessment (EIA) study depending on the TOR issued by CEA for securing the environmental clearance

However, the section of the road from Naula to Dambulla of the A009 Road does not fall within or near any protected area declared by DWLC.

96. While the NEA is the key environmental legislation under GOSL there are a number of other environmental laws and regulations that are applicable to the investment program as given in Table 3.1 below.

Table 3.1: Applicable National Laws and Regulations for the Investment Program

| Legislation | Relevance and main content | Authorizing Institution |
|---|--|-------------------------------------|
| National environmental protection and quality regulations under Extraordinary gazette notification No. 1534/18 and No. 1533/16 of 2008 under NEA section 32 & 23A, 23B | This regulates the discharge and deposit of any kind of waste or emission into the environment and stipulates requirements for an environmental protection license (EPL) depending on the project activity. Examples of activities requiring and EPL are: asphalt processing plant, concrete batching plants, treatment plants, sewerage networks, mechanized mining activities etc. | CEA |
| National Environmental (Protection and Quality) Regulation No. 1 of 1990 published in Gazette Extraordinary No. 595/16 of February, 1990 | Provides standards for discharging effluents into inland surface water during proposed project activities. | CEA |
| National Environmental (Ambient Air Quality) Regulations, 1994, published in Gazette Extraordinary, No. 850/4 of December, 1994 and amendment gazette No. 1562/22 of 2008 | Provides standards for emissions to the air during proposed project activities. | CEA |
| National Environmental (Noise Control) Regulations No.1 of 1996 and its amendments | Regulates maximum allowable noise levels for construction activities during proposed project activities | CEA |
| National Environmental (Vehicle Horns) Regulations, No. 1 of 2011 | Regulates maximum allowable noise emanating from vehicular horns on a highway or road any motor vehicle uses during project construction activities | CEA |
| National Environmental (Municipal Solid Waste) Regulations, No. 1 of 2009 | Regulates dumping municipal solid waste alongside any national highway or at any place other than places designated for such purpose by the relevant local authority during proposed project activities | CEA |
| Fauna and Flora Protection Act No.2 of 1937 amended in 1993 and 2009 | The act specifies that any development activity taking place within one mile from the boundary of a National Reserve declared under the Ordinance requires an | Department of Wildlife Conservation |

| Legislation | Relevance and main content | Authorizing Institution |
|---|---|--|
| | EIA/IEE which provide for the protection and conservation of fauna and flora of Sri Lanka and their habitats; for the prevention of commercial and other misuse of such fauna and flora and their habitats for conservation of biodiversity of Sri Lanka; and to provide for matters connected there with. | |
| Forest Act No. 34 of 1951 | This act is to consolidate and amend the law relating to the conservation, protection and management of forest and forest resources for the control of felling and transport of timber and Forest and for matters connected therewith or incidental thereto. | Forest Department |
| Felling of Trees Control Act No. 9 of 1951 as amended through Act No. 30 of 1953 | This Act sought to prohibit and control felling of specified trees (mainly intended to stop indiscriminate felling of specified trees) in the country. | Forest Department |
| Water Resources Board Act, No. 29 of 1964 and (Amendment) Act, No. 42 of 1999 | The act controls and regulates developments (including conservation and utilization) of water resources; prevention of pollution of rivers, streams and other water resources; formulation of national policies relating to control and use of water resources. | Water Resources Board |
| Soil Conservation Act, No. 25 of 1951 and Amended No. 24 of 1996 | This Act makes provisions for the enhancement of productive capacity of soil; to restore degraded land for the prevention and mitigation of soil erosion; for the conservation of soil resources and protection of land against damage by floods, salinity, alkalinity, water logging; and to provide for matters connected therewith or incidental thereto | Department of Agriculture |
| Explosives Act No. 36 of 1976 | To provide control of explosions and regulations of matters connected with explosive activities related with the project. | Ministry of Defence |
| Municipal Councils Ordinance No. 29 of 1947, the Urban Councils Ordinance No. 61 of 1939 and the Pradeshiya Sabha Act No. 15 of 1987 as amended in 2010 | Regulates and control actions pertaining to socioeconomic development such as roads, culverts, bridges, ferries, waterways and other means of local transport and related site clearance for constructing worker camps, site offices etc. and methods taking place within the command area relevant to government laws and regulations. | Ministry of Local Government and Provincial Councils |

| Legislation | Relevance and main content | Authorizing Institution |
|---|---|--|
| Flood Protection Ordinance No. 04 of 1924, No 22 of 1955 | An ordinance for protection of areas subjected to damage from floods. This includes declaration of flood areas, preparation of schemes for flood protection and other rules and regulations regarding flood in the country | Department of Irrigation |
| Crown Land Ordinance Act No. 1947 | An ordinance to make provision for the grant and disposition of crown lands in Sri Lanka; for the management and control of such lands and the foreshore; for the regulation of the use of the water of lakes and public streams; and for other matters incidental to or connected with the matters related to proposed project | Department of Land Commissioner General's |
| Agrarian Development Act No. 46 of 2000 (Section 32) | This act regulates using paddy land for a purpose other than agricultural cultivation without the written permission of the Commissioner General. | Department of Agrarian Development |
| Land development statuette No. 7 of 2002 the western province provincial council, amendment No. 1287/26 of 2003 | A statute for regularizing utilization of state lands situated within the Western Province either by state or the provincial council, for regulating the distributing of the aforesaid lands and lands in possession of the provincial council, for augmenting productivity of lands and for matters connected with or incidental to them this statute is in compliance with the crown lands ordinance no. 08 of 1947 (chapter 454) and the land development ordinance no.19 of 1935 chapter 464 as amended by land development (amendment) acts, no. 16 of 1969 no.27 of 1981, no 22 of 1998, no, 22 of 1995 1996. Of divesting of state lands, no. 07 of 1979 | Governor _ Western Province Provincial Council and Department of Land Commissioner General's |
| Sri Lanka Land Reclamation and Development Corporation Act 15 of 1968 as amended by Act No 52 of 1982 | This act established Sri Lanka Land Reclamation and Development Corporation which grants permission for the public to fill marshy land subject to provision of storm water drainage. | Sri Lanka Land Reclamation and Development Corporation |
| National Thoroughfares Act, No. 40 of 2008 | This act is known as RDA act which provide for planning, design construction, development, maintenance and administration an integrated public road network in Sri Lanka. | Road Development Authority |

| Legislation | Relevance and main content | Authorizing Institution |
|--|--|--|
| Urban Development Authority (UDA) Law No 41 of 1978 and Urban Development Projects (Special Provisions) Act No 2 of 1980 | <p>This law provides for the establishment of an UDA to promote integrated planning and implementation of economic, social and physical development of certain areas as may be declared by the minister to be urban development areas and for matters connected with the relevant project activities.</p> <p>Urban Development Projects (Special Provisions) Act No 2 of 1980 is an act to provide for the declaration of lands urgently required for carrying out urban development projects and to provide for matters connected with relevant project activities.</p> | Urban Development Authority (UDA) |
| Town and country planning ordinance No. 13 of 1946 and The Town & Country Planning (Amendment) Act, No. 49 of 2000 | This regulates the National Physical Plan with transport as the main component | Department of National Physical Planning |
| Buddhist Temporalities Ordinance No. 19 of 1931 | This act provides necessary assistance to administer and protect the property of Viharas, interventions to settle disputes regarding property of Viharas and makes recommendations to release money to be paid as compensation in respect of property of Viharas acquired by government for any development project | Department of Buddhist Affairs |
| Cemeteries and Burial Grounds ordinance No. 9 of 1899 and amendments | The act regulates any disturbance, removal of burial, monuments and use of such areas for development project | Local Government Authority |
| Antiquities Ordinance No. 9 of 1940 and amendments | The act regulates activities of projects located in close proximity of any archaeological reserves | Department of Archaeology |

97. Under the NEA (No). 47 and some of the laws and regulations listed in Table 3.1 above, there are specific requirements for clearances, permits and licenses required for road projects as listed in Table 3.2 below.

Table 3.2: Applicable Approvals Required for the Project

| Project Stage | Approvals | Project Related Activity | Relevant Agency |
|--|---|--|---|
| Pre-Construction Stage Note: Although clearances and approval should be obtained during the preconstruction stage, it is valid throughout the project cycle. However, this should be renewed before the date of expire. | Environment clearance | Implementation of the project | Central Environment Authority |
| | Industrial mining license (IML) | Operation of quarries, burrow areas and other material extraction sites | Geological Survey and Mines Bureau |
| | Environmental protection License (EPL) | Operation of material extraction site including operation of asphalt plants, treatment plants etc. | CEA |
| | Local Government Authority Trade license and machinery permits | Deciding waste disposal sites, material storage and sites for worker camps and other project stations Trade license should be obtained for asphalt plants, batching plants, quarries etc. | Respective Provincial Council, Local authorities and respective Pradeshiya Sabha |
| | Explosive Permits | Blasting activities | Ministry of Defence |
| | Approval for removal of trees | Road clearance for construction | Forest Department, CEA and local authorities |
| | Filling of paddy lands located within the ROW | Ground preparation for RoW and side drains | Commissioner of Agrarian Services |
| | Consent of Department of Archaeology | Construction activities near archeologically protected monuments | Department of Archaeology |
| | Consent of National Building Research Organization (NBRO) | Project activities within landslide prone areas | NBRO |
| | Approval from Forest Department | For road rehabilitation within Dambulu Oya forest reserve | Forest Department |
| Construction stage | Consent from relevant government agencies | Construction of bridges, culverts and other drainage systems, land filling, dredging activities | Departments of Irrigation and Agrarian services, Local Government Authority, Land Reclamation and Development Cooperation |
| | Approval from relevant state /local agencies for the removal/ temporary disturbances for existing utilities | Surfacing, construction of bridges and side drains, embankment filling work | NWSDB for water lines, Ceylon Electricity Board for electric cable/poles, Sri Lanka Telecom for land line telephone cables, poles, Pradeshiya Sabha, other local authorities for drainage, sewer systems etc. |

Environmental Protection License (EPL)

98. The environmental protection license (EPL) is a regulatory/legal tool under the provisions of the NEA No: 47 of 1980 amended by Acts No 56 of 1988 and No 53 of 2000. Industries and activities which required an EPL are listed in Gazette Notification No 1533/16 dated 25.01.2008. Industries are classified under 3 lists i.e. List and "C" depending on their pollution potential.

99. Part "A" comprises of 80 significantly high polluting industrial activities and Part "B" comprises of 33 numbers of medium level polluting activities. EPL for industries in lists "A" and "B" have to be obtained from the relevant Provincial Offices or District Offices of the CEA.

100. Part "C" comprises of 25 low polluting industrial activities which have been delegated to Local Government Authorities, namely Municipal Councils, Urban Councils and Pradeshiya Sabhas. EPL for the industries in List "C" has to be obtained from the respective Local Authorities. The Local Authorities carry out issuing of EPLs and related functions such as follow up, monitoring and law enforcement.

101. Objectives of the EPL

- To prevent or minimize the release of discharges and emissions into the environment from prescribed (industrial) activities in compliance with national discharge and emission standards.
- To develop an approach to pollution control that considers discharges from prescribed (industrial) processes to all media (air, water, land) in the context of the effect on the environment.
- To contain the burden on industry, in particular by providing guidance on pollution control for polluting processes.
- To ensure that the system responds flexibly both to changing pollution abatement technology and to new knowledge such as cleaner production, waste minimization etc.

3.1.2. International Agreements and Conventions

102. Sri Lanka is also a signatory to a number international agreements and conventions related to environmental conservation. Those relevant for this investment program are provided below:

- Conventions on Wetlands of International Importance Especially as Water Fowl habitats (Ramsar)
- Convention concerning the protection of the World Cultural and Natural Heritage
- Convention on International Trade in Endangered Species of Wild Fauna & Flora (CITES)

- Convention on the Conservation of Migratory Species of Wild Animals (CMS 1979)
- United Nations Framework Convention on Climate Change
- Convention on Biological Diversity
- Plant Protection Agreement for Asia and the Pacific region

The road under the project from Naula to Dambulla of the A009 Road is located adjacent to the Dambulla Cave Temple which is a UNESCO World Heritage Site (Please refer section 4.6 of this report for more information).

3.2. Policy Framework

3.2.1. ADB Safeguards Policy Statement (SPS), June 2009

103. ADB's safeguard policy framework consists of three operational policies on the environment, Indigenous people and involuntary resettlement. All three safeguard policies involve a structured process of impact assessment, planning, and mitigation to address the adverse effects of projects throughout the project cycle. The safeguard policies require that (i) impacts are identified and assessed early in the project cycle; (ii) plans to avoid, minimize, mitigate, or compensate for the potential adverse impacts are developed and implemented; and (iii) affected people are informed and consulted during project preparation and implementation. The policies apply to all ADB financed projects, including private sector operations and all project components.

104. The objective of the environment safeguards policy is to ensure environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision-making process.

105. Proposed projects are screened according to type, location, scale and sensitivity and the magnitude of their potential environmental impacts, including direct, indirect, induced, and cumulative impacts.

106. Projects are classified into the following four categories:

- **Category A.** A proposed project is likely to have significant adverse environmental impacts that are irreversible, diverse or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical work. An environmental impact assessment (EIA), including an environmental management plan (EMP), is required.
- **Category B.** The proposed project's potential adverse environmental impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An IEE, including an EMP, is required.
- **Category C.** A proposed project is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required, although environmental implications need to be reviewed.

- **Category FI.** A proposed project involves the investment of ADB funds to or through a financial intermediary. The financial intermediary must apply and maintain an environmental and social management system, unless all of the financial intermediary's business activities have minimal or no environmental impacts or risks.

107. **Policy Principles:** Use a screening process for each proposed project, as early as possible, to determine the appropriate extent and type of environmental assessment so that appropriate studies are undertaken to commensurate with the significance of potential impacts and risks.

108. Conduct an environmental assessment for each proposed project to identify potential direct, indirect, cumulative, and induced impacts and risks to physical, biological, socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues), and physical cultural resources in the context of the project's area of influence. Assess potential transboundary and global impacts, including climate change. Use strategic environmental assessment where appropriate.

109. Examine alternatives to the project's location, design, technology and components and their potential environmental and social impacts and document the rationale for selecting the particular alternative proposed. Also consider the no project alternative.

110. Avoid, and where avoidance is not possible, minimize, mitigate, and/or offset adverse impacts and enhance positive impacts by means of environmental planning and management. Prepare an EMP that includes the proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators. Key considerations for EMP preparation include mitigation of potential adverse impacts to the level of no significant harm to third parties, and the polluter pays principle.

111. Carry out meaningful consultation with affected people and facilitate their informed participation. Ensure women's participation in consultation. Involve stakeholders, including affected people and concerned nongovernment organizations, early in the project preparation process and ensure that their views and concerns are made known to and understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation as necessary to address issues related to environmental assessment. Establish a grievance redress mechanism to receive and facilitate resolution of the affected people's concerns and grievances regarding the project's environmental performance.

112. Disclose a draft environmental assessment (including the EMP) in a timely manner, before project appraisal, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. Disclose the final environmental assessment, and its updates if any, to affected people and other stakeholders.

113. Implement the EMP and monitor its effectiveness. Document monitoring results, including the development and implementation of corrective actions, and disclose monitoring reports.

114. Do not implement project activities in areas of critical habitats, unless (i) there are no measurable adverse impacts on the critical habitat that could impair its ability to function, (ii) there is no reduction in the population of any recognized endangered or critically endangered species, and (iii) any lesser impacts are mitigated. If a project is located within a legally protected area, implement additional programs to promote and enhance the conservation aims of the protected area. In an area of natural habitats, there must be no significant conversion or degradation, unless (i) alternatives are not available, (ii) the overall benefits from the project substantially outweigh the environmental costs, and (iii) any conversion or degradation is appropriately mitigated. Use a precautionary approach to the use, development, and management of renewable natural resources.

115. Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges, including direct and indirect greenhouse gases emissions, waste generation, and release of hazardous materials from their production, transportation, handling, and storage. Avoid the use of hazardous materials subject to international bans or phase outs. Purchase, use, and manage pesticides based on integrated pest management approaches and reduce reliance on synthetic chemical pesticides.

116. Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities.

117. Conserve physical cultural resources and avoid destroying or damaging them by using field-based surveys that employ qualified and experienced experts during environmental assessment. Provide for the use of "chance find" procedures that include a pre-approved management and conservation approach for materials that may be discovered during project implementation.

CHAPTER 4: DESCRIPTION OF EXISTING ENVIRONMENT

4.1. Existing Land Use along the Road

118. In general, the land use of the project area could be categorized in to home gardens, townships, agricultural lands and water bodies such as streams. Generally, the entire road section has a ribbon type development comprised of both residential and commercial buildings. Specific land uses observed within the selected section of the road is summarized below.

58km to 64km

119. Proposed rehabilitation work under RMC for A009 Road to be started at 58km post where rehabilitation activities are currently carried out under MFAP are terminated (figure 4.1). The land use around the starting point (58km) can be described as home gardens. Houses here are sparsely located and gardens are rich with tree species which are typically found in the intermediate and dry zones of Sri Lanka. From 58km to 64km similar land use can be observed along the road while commercial buildings (retail shops, hardware shops, small tea shops and small-scale restaurants) are built beside the road. Rain trees (*Samanea saman*) located adjacent to the soft shoulder of the road is a common sight in this section of the road. These trees provide shade for pedestrians and host habitats for epiphytes and other fauna species living on trees (figure 4.2). Few schools are located along this section of the road. Lenadora Primary School at 59.4km, Maliyadeva Primary School and Pannampitiya School at 62.8km are located on the left side (LS) of the road. Two temples are found at 58km and 62.3km again on the LS.



Figure 4.1: Starting point of the proposed road rehabilitation



Figure 4.2: Rain tree alongside of the road

64km – 66km

120. The A009 road cuts across the Dambulu Oya Forest Reserve from 64.3km to 65.1km. This is a small forest patch and consists of mostly rain trees (*Samanea saman*) on either side of the road which form a thick canopy cover above the road (figure 4.3). Therefore, good shade is observed along this section so that commuters stop for rest at this section.

Vendors by the roadside who sell king coconuts, maize and fruit juices to these commuters are observed within the forest patch.

121. Immediately after the forest patch, a temple is located on LHS at 65km while another is found at 67.9km on the right side (RS).



Figure 4.3: Section of the road across the forest patch



Figure 4.4: Vendors by the roadside within the forest patch

66km – 72.7km

122. The Kiralagolla Primary School is located within this section at 65.7km on the RS of the road while Dambulu Oya (a stream) is crossed by the road at 66.2km over a bridge (No. 67/1). The Regional Educational Office and Thiththawellagolla Primary School are located on RS around 68.2km.

123. The Dambulla Golden Temple comes to the vicinity at 70.7km and associated facilities with the temple are observed on either side of the road. Around 71km, an herbal garden is located on LHS while parking facilities for vehicles coming to the temple are located on RS. The museum of the Dambulla Golden Temple is located around 71.1km on the left while the golden statue of the Lord Buddha is located on the left at 71.3km. The world famous Dambulla Cave Temple is found on the Dambulla rock outcrop and the historical caves are located about 450m interior from the A009 road to its left side on the rock outcrop. The premises of the Temple end at 71.7km of the road.

124. After 72km, the A009 road enters the Dambulla town and the buildings on the right side of the road have been shifted back. Dambulla Dedicated Economic Centre is located starting at 72.4km on the right side. At 72.7km, the proposed road rehabilitation ends. The A009 road beyond this particular location is already improved to a four lanes status with wider parking facilities on both sides.

4.2. Physical Environment

4.2.1. Climate, Land Use, Terrain and Soil

125. Based on major climatic zones of the country, the A009 section of the road to be rehabilitated under this project falls within low country – intermediate, mid country – intermediate and low country - dry zones of Sri Lanka. The climatic environment of the project area is further categorized into agro – ecological zones which are categorized based on climate, altitude, soil, natural vegetation and land use pattern of an area. The selected section of the A009 road is located within IL3, IM1b and DL1b agro-ecological zones. However only 800m of the road falls within the IM1b zone. Therefore, the typical characteristics of the particular zone might not be observed along the relevant section of the road. The specific characteristics of the particular zones are presented in Table 4.1 below.

Table 4.1: Climatic Characteristics of the Candidate Section of the Road

| Agro-ecological Zone | 75% expectancy value of rainfall (mm) | Description (Land use, Terrain, Soil groups) |
|-----------------------------|--|---|
| IL3 | > 1100 | Coconut, paddy and home gardens Undulating NCB, RBE and LHG soils |
| IM1b | > 2000 | Natural forests, mixed home gardens, paddy, grasslands Hilly, rolling, undulating RBE, RBL, LHG, mountain regosols and lithosol soils |
| DL1b | > 900 | Rain fed upland crops, paddy, scrub, mixed home gardens, forest plantations Undulating RBE and LHG soils |

NCB – non calcic brown, RBE - reddish brown earth, LHG – low humic gley, RBL – reddish brown latosolic

Source: National Atlas of Sri Lanka, second edition, 2007

126. The most important element of the climate of Sri Lanka is rainfall which is influenced by monsoon winds from the Indian Ocean and the Bay of Bengal. The monsoon winds create two distinctive rainy seasons, which are the South-West Monsoon and North-East Monsoon. In addition to these rainy seasons, two inter monsoon rains are also experienced during March to April and October to November. As presented in the figure 4.5 below, the Dambulla area under which the selected section of the road falls, gets rains during November to February when the North East Monsoon is in effect. However, the period from May to September is generally dry compared to other months. The project area also experiences intensive rainfall during the second inter monsoonal rains (October - November) when minor cyclones could also be possible. The average monthly temperature is fairly stable, while the annual average temperature lies around 25°C- 27.5°C. Reddish brown earth (RBH) and Low Humic Gley (LHG) are the predominant soil types found in the project area (Source: National Atlas of Sri Lanka, second edition, 2007).

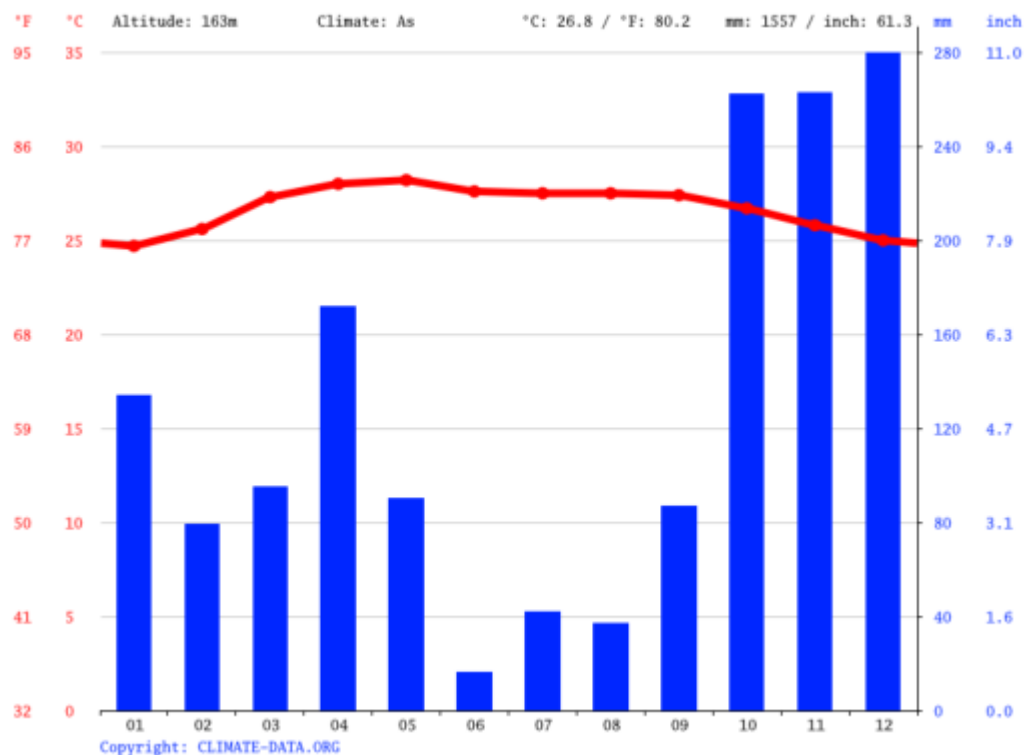


Figure 4.5: Rainfall and temperature variation of Dambulla

(Source: <https://en.climate-data.org/asia/sri-lanka/central-province/dambulla-26411/#climate-graph>)

4.2.2. Hydrology

Surface Water Resources

127. Dambulu Oya (a stream) is the major surface water body found within the study area. Dambulu Oya originates from the Lenadora area and flows close to the selected section of the road on RS. Dambulu Oya comes to the road side (about 80m away from the right side of the road) at around 64km and crosses the road at 66.2km over the bridge No. 67/1. Dambulu Oya discharges to the Ibbankatuwa Reservoir which is located on left of the A009 road around the Dambulla town about 2km away from point the project ends. Other than Dambulu Oya, no major stream is found within the study area. Minor streams which collect runoff of the area are located within the study area. These streams cross the road section at culverts which are presented in appendix 2.3.

Ground Water Resources

128. Dug wells are observed in home gardens. Protected dug wells are used by residents of most of all the DS divisions crossed by the section of the road. However, these dug wells dry up during the months of May to September due to low rainfall in the area. Therefore, several tube wells have been constructed for residential use during the dry spells. However, most of these tube wells are not in use after the introduction of pipe borne water.

Air Quality and Noise

129. Air quality in the town areas such as Dambulla is generally observed to be in a very poor condition mainly due to high levels in exhaust emission coming from idling vehicles and traffic congestions. Therefore, the major source of atmospheric pollution in the area is from road traffic, especially heavy vehicles that emit diesel and petrol fumes. However, no baseline measurements are available for the project area.

130. Similarly, traffic flow along the road is a prominent source of noise in the area. Noise is comparatively high in the townships such as Dambulla due to the high flow of traffic and commercial activities.

131. The following table presents sensitive receptors to degraded air quality, higher noise and vibration which takes place along the selected section of the A009 Road.

Table 4.2: Sensitive Receptors to Degraded Air Quality, High Noise and Vibration

| S/N | Chain age (km) | Type of common/Government Property | Side of the Road |
|-----|----------------|------------------------------------|------------------|
| 1 | 58.0 | Temple | LS |
| 2 | 59.4 | Lenadora Primary school | LS |
| 3 | 61.0 | Pre School | RS |
| 4 | 62.3 | Anularamaya Temple | LS |
| 5 | 62.8 | Maliyadeva Primary School | LS |
| 6 | 62.8 | Pannampitiya Maha Viddyalaya | LS |
| 7 | 65.1 | Subhoddaramaya Temple and Shrine | LS |
| 8 | 65.7 | Kiralagolla Primary School | RS |
| 9 | 67.0 | Sri Anandaramaya | RS |
| 10 | 68.8 | Thiitawelgolla Primary School | RS |
| 11 | 71.0 | Dambulla Golden Temple | LS |

4.3. Ecological Environment

4.3.1. Existing Habitats with Respect to Flora and Fauna and Protected Areas Forest Areas

132. Three forest reserves are located within the study area of the project. They are the Dummalakele, Embulambe and Dambulu Oya forest reserves.

133. Dummalakele forest reserve is found about 250m interior on the LS of the road from the starting point to 60.5km (figure 4.6). This forest has the Menikdena Archaeological reserve and Arboretum which are about 2.5km inwards from the road. Embulambe forest reserve also touches LS of the road around 63.9km. However, the road side at this location has been converted into home gardens as result of human encroachments into the forest lands.

134. Dambulu Oya forest reserve is cut across by the A009 road from 64.3 to 65.1km. Along this section, a thick vegetation comprising of mostly rain trees (*Samanea saman*) are located along the sides of the road and the canopies of the trees of either side generate a good overhead cover to the road, providing shade. The section of the road across the forest is a clam and quiet place where commuters stop to rest. As a result, several vendors have established temporary huts by the roadside to sell king coconut, fruits, juices etc. to commuters.

135. Dambulu Oya forest reserve is bordered by Dambulu Oya on its east. Therefore, animals tend to cross the road for the water in the stream. Arboreal animals such as monkeys use the tree canopy to cross the road. However, reptiles, amphibians and other small mammals cross the road to reach the stream for water which possibly result in vehicle - animal coalitions.

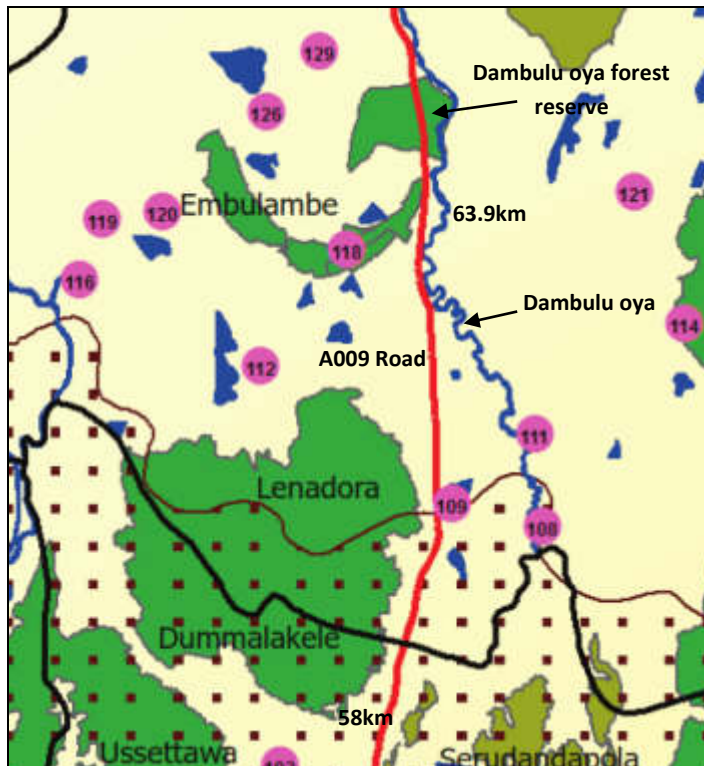


Figure 4.6: Forest areas within the selected section of the road (Source: CEA)

136. Other than the forest areas mentioned above, there is no other protected area located within the study area which are declared under the Fauna and Flora Protection Act of Sri Lanka.

Home gardens

137. Home gardens in the project area are important for feeding, resting and breeding grounds of faunal species. They support the survival of several species of ornamental plants, plants with medicinal value, fruit trees, vegetables, medicinal plants and palm trees. This ecosystem is unique in the high level of functional plant diversity they contain. This system comprises of several perennial food crops such as fruits, vegetables, roots, tubers, medicinal plants, tuber, timber and spice crops. Home gardens provide key ecosystem services and habitats for a range of floral and faunal species. These habitats provide connectivity and linkages to other agricultural and natural landscapes.

Paddy Lands and Upland Crop Cultivations

138. The sides of the road do not have large paddy fields. However, paddy fields in larger extents are observed in interior areas. These paddy fields provide habitats for both fauna and flora. Several species of weeds could be observed in the paddy fields. Some abandoned

paddy fields serve as grazing grounds for cattle. Different stages with different farming practices of paddy creates distinct habitats for variety of animal species. Small canals, which run through the paddy fields, provide habitats for several species of freshwater fish. Therefore, the paddy fields provide provisioning services and regulating services. Also, paddy fields provide regulating services by increasing water storage of the catchment, trapping of sediments, percolation from help to recharge ground water. Cultivated paddy fields provide cultural services because there are many traditional and religious practices associated with the cultivation and harvesting of this crop. Also, the paddy fields are valued for their scenic beauty.

Trees by the Roadside

139. The location of large trees by the roadside is a specific characteristic of the A009 Road. These trees have been there since the road was constructed during the colonial period (Public consultation). Rain trees (*Samanea saman*), Kolon (*Haldina cordifolia*), Tamarind (*Tamarindus indica*) and Neem (*Azadirachta indica*) are the most commonly found trees along the selected section of the road. Except from within the forest area from 64.3km to 65.1km, there are about 70 well grown roadside trees located on the soft shoulder or beyond on either side of the road. These trees have well spread canopies and therefore, are significant in serving many useful purposes. Providing shade, improving air quality, enhancing aesthetic element of the area, conserving soil and providing habitats for fauna and flora are especially useful (figure 4.7). Therefore, the protection of these trees is highly required in order to increase the quality of the road even after rehabilitation.



Figure 4.7: Location of trees by the roadside

Water Bodies

140. Streams which were found in the project area were mostly associated with several species of native, introduced aquatic and associated floral species. Some of the aquatic bird species commonly observed in association with the paddy fields were cormorants, herons, egrets, water hens, stilts, king fishers and storks. Thus, this habitat provides supporting services for the biodiversity in the project area and also adds scenic beauty, thus providing cultural services too. Water bodies in the project also provide regulating service by controlling floods.

Fauna

141. As the natural habitat along the road side is highly influenced and changed by human activities, the faunal species found in home gardens, paddy fields, and plantations are not unique or rare. Among the animals reported to be seen on this section of the road are monkeys, species of rats and squirrels. Bats are also found in all parts of this section. Lizards, many species of frogs and snakes are common in the area. Many varieties of indigenous bird species are also found.

4.4. Occurrence of Natural Disasters in the Project Area

142. Sporadic flooding is the natural disaster observed in the project area especially around the Dambulu Oya crossing at 66.2km. During the public consultation, it was noted that the area around the Dambulu Oya crossing gets flooded mostly during heavy rainy seasons (November to February). The area has chance of getting sporadic rain events even during other months of the year due to local convections. It was further highlighted that floods occur only if irrigation tanks upstream spill over which does not happen every year.

143. Other than the area around the Dambulu Oya crossing, there are several locations which get inundated as a result of poor drainage due to silted drains, inadequate opening sizes of drainage structures or blocking/absence of lead away drains. Residents living by the sides of the road highlighted that runoff from the road surface and drains flows into their premises causing their houses to be flooded due to poor drainage facilities. The area around the culverts 59/2, 59/6, 60/1, around 59.7km, 67km – 69km, 71km – 72km are the example locations of such local floods.

144. The area around the culvert 59/2 is overtopped with the runoff flows from Dummalakele rock out crop which is on left side of the road (figure 4.8).



Figure 4.8: Overtopping the Culvert 59/2 in July 2020 (captured by a member of the survey team)

145. Furthermore, it was highlighted during focus group discussions that an irrigation tank was filled between 63km – 65km when the A009 road was constructed. Therefore, at present, the road surface gets frequently settled along the particular section.

4.5. Socio - Economic Environment

4.5.1. Description of Socio-economic Features of the Project Area

146. The Naula – Dambulla section of the A009 road traverses through the Matale district. According to the Department of Census and Statistics, the population in the district was 484,531 people and the population density is recorded as 248 persons/km². The poverty headcount of the district is recorded as 3.9%. Table 4.3 below summarizes this information.

Table 4.3: A Summary of Population, Population Density and Poverty Head Count Ratio

| District | Population (Census 2012) | Population Density (person/ km ²) | Poverty Head Count (2016) |
|----------|--------------------------|---|---------------------------|
| Matale | 484,531 | 248 | 3.9% |

Source: Department of Census and Statistics, 2012/2016

147. Population distribution by ethnicity in the district is presented in table 3.2 below. Around 80.7% population in the district is Sinhalese while 9.8% are Sri Lankan and Indian Tamils. Around 9.2% is Moor.

Table 4.4: Distribution of Population by Ethnicity

| District | Sinhala | Sri Lankan Tamil | Indian Tamil | Moor | Burgher | Other |
|----------|---------|------------------|--------------|--------|---------|-------|
| Matale | 391,305 | 24,279 | 23,238 | 44,786 | 386 | 537 |

Source: Department of Census and Statistics, 2012

148. The road impacts two Divisional Secretariat divisions in the district. The DS divisions are identified as Naula and Dambulla. In 2012, the total population in these DSDs were 103,190 persons. The highest population is reported from Dambulla DSD and which was 72,306 persons.

Table 4.5: Distribution of Population of the Project Located DSDs by Gender

| DS Division | Male | | Female | | Total |
|-------------|--------|------|--------|------|---------|
| | No. | % | No | % | |
| Naula | 15,088 | 29.4 | 15,796 | 30.5 | 30,884 |
| Dambulla | 36,307 | 70.6 | 35,999 | 69.5 | 72,306 |
| Total | 51,395 | 100 | 51,795 | 100 | 103,190 |

Source: Department of Census and Statistics, 2012

4.5.2. An Analysis of the Sample Socio-Economic Survey

149. The socio-economic survey was conducted selecting 760 houses located within the two DS divisions along the road. The sample is distributed in all GNDs as presented in table 4.6.

Table 4.6: Names of the DSDs through which the Section of the A009 Road is Located and the Number of Households Surveyed

| District | Name of DSD | GND | No. of Households Surveyed |
|----------|-------------|----------------|----------------------------|
| Matale | Naula | Serudandapola | 50 |
| | Dambulla | Dambulla Town | 127 |
| | | Embulambe | 45 |
| | | Kapuwatta | 61 |
| | | Kiralagolla | 54 |
| | | Lenadora North | 53 |
| | | Lenadora South | 63 |
| | | Moragollewa | 99 |
| | | Pannampitiya | 71 |
| | | Yapagama | 137 |
| | | Total | 760 |

Source: Sample HH survey, July 2020

150. Findings of the household survey are presented below. The results are discussed under sub-topics on key demographic features, housing condition, sanitary and energy, vulnerable groups and gender, connectivity to Socio-Economic Centres and perception of the community towards the project.

Key Demographic Features of the Sample Households Surveyed

151. **Distribution of households by family size and age:** Distribution of family size and ages of family members in each district and DS are presented below in table 4.7 and 4.8.

Table 4.7: Distribution of Family Size of the Sample Households

| District | DSD | Family size (No. of members) | | |
|----------|----------|------------------------------|-----|-------------|
| | | 1-2 | 3-4 | More than 5 |
| Matale | Naula | 13 | 25 | 12 |
| | Dambulla | 185 | 392 | 133 |

Source: Sample HH survey, July 2020

152. Out of 760 households, most of the households have an average family size of 3-4 members. Around 72 households in Naula DSD and 392 households in Dambulla DSD come under this category.

Table 4.8: Age Distribution of Sample Household Members

| District | DSDs | Age group (Years) | | | | | | Total |
|----------|--------------------|-------------------|--------|-------|--------|----------|--------|-------|
| | | 0-14 | | 15-59 | | Above 60 | | |
| | | Male | Female | Male | Female | Male | Female | |
| Matale | Naula/ Dambulla | 263 | 255 | 952 | 753 | 162 | 230 | 2615 |

Source: Sample HH survey, July 2020

153. With regard to the age category of household family members, the highest number falls within the age limit of 15 to 59 years, which is the economically active population of a country. Next highest percentage falls within the age limit of 0 to 14 years.

Table 4.9: Population by Ethnicity

| DSD | Total | Sinhala | Tamil | Other |
|--------------|------------|------------|-----------|----------|
| Naula | 50 | 48 | 0 | 2 |
| Dambulla | 710 | 697 | 12 | 1 |
| Total | 760 | 745 | 12 | 3 |

Source: Sample HH survey, July 2020

154. With regard to ethnicity, the major ethnic group in the survey sample is Sinhalese, i.e. 745 households. Next highest ethnic group is Tamil, i.e. 12 households. Although, there is a Moor population in the district level data, there seems to be no Moor population living along the selected section of the road.

155. **Educational Achievements:** Table 1 of appendix 4.1 presents the level of educational achievements of the sample population.

156. According to data, the majority of population, i.e. 731 persons in the sample have studied up to G.C.E O/L. A considerable number of people, i.e. 401 persons have studied up to G.C.E Advanced level and 523 persons have studied between grades 5-10. This is a positive factor for the project if labour is to be secured from the project area. Giving guidance and handling the work force will be easy. However, it is also recorded that around 70 persons have not attended school.

157. Please refer appendix 4.1 for educational levels, occupations of households and land areas belonging to households of the sample population surveyed under this assessment.

4.6. Archaeological and Cultural Sites Located in the Project Area

158. The World famous Dambulla Golden Temple and Dambulla Cave Temple are located within the project area on the left side from 70.7km to 71.7km.

Dambulla Cave Temple

159. Dambulla is the largest and best-preserved cave temple complex in Sri Lanka. The rock towers 160 m over the surrounding plains. There are more than 80 documented caves in the surrounding area. Major attractions are spread over five caves, which contain statues and paintings. These paintings and statues are related to Lord Buddha and his life. There is a total of 153 Buddha statues, three statues of Sri Lankan kings and four statues of gods and goddesses. The latter include Vishnu and Ganesha. The murals cover an area of 2,100 square metres (23,000 sq. ft). Depictions on the walls of the caves include the temptation by the demon Mara, and the Lord Buddha's first sermon.

160. Prehistoric Sri Lankans would have lived in these cave complexes before the arrival of Buddhism in Sri Lanka as there are burial sites with human skeletons about 2700 years old in this area, at Ibbankatuwa near the Dambulla cave complexes. The temple consists of five caves of varying size and magnificence. The caves, built at the base of a 150m high rock during the Anuradhapura (1st century BC to 993 AD) and Polonnaruwa times (1073 to 1250), are by far the most impressive of the many cave temples found in Sri Lanka.

161. The rock outcrop hosting the historical caves which is under the ownership of the Asgiriya Chapter of Buddhist monks, has been declared a Protected Monument under the legal protection of the department of archaeology (DOA) of the Government of Sri Lanka, which administers the Antiquities Ordinance of 1940 (rev. 1998) at the national level. No interventions to the property are allowed without the permission of the DOA. Conservation and monitoring of the paintings and polychrome objects are the responsibility of the DOA. The area extending up to the edge of the entire rock outcrop has been designated a buffer zone under the purview of the DOA. The religious character of the property is further safeguarded by the declaration of the whole area around the rock outcrop as a sacred area by the National Physical Planning Department (Please refer the map of DOA attached in figure 4.8).

162. The rock outcrop including the caves is a UNESCO World Heritage Site (1991). The minimum distance between the edge of the road and the edge of the UNESCO site is approximately 90m. The caves contain statues and paintings are located on the rock outcrop about 450m away from the edge of the road.

163. As presented in figure 4.9, the section of the A009 road to be rehabilitated under this project is outside the rock outcrop which is the World Heritage Site (about 90m from the edge of the rock outcrop). However, it is within the buffer zone as declared by DOA.

164. In addition, a newly built Buddha Shrine and Pagoda are located adjacent to the road on the left side at 71.35km while an herbal garden is found immediately before 71km on the left side. The Dambulla museum is located on the left at 71.1km while parking facilities are observed on the right side of the road along this section.

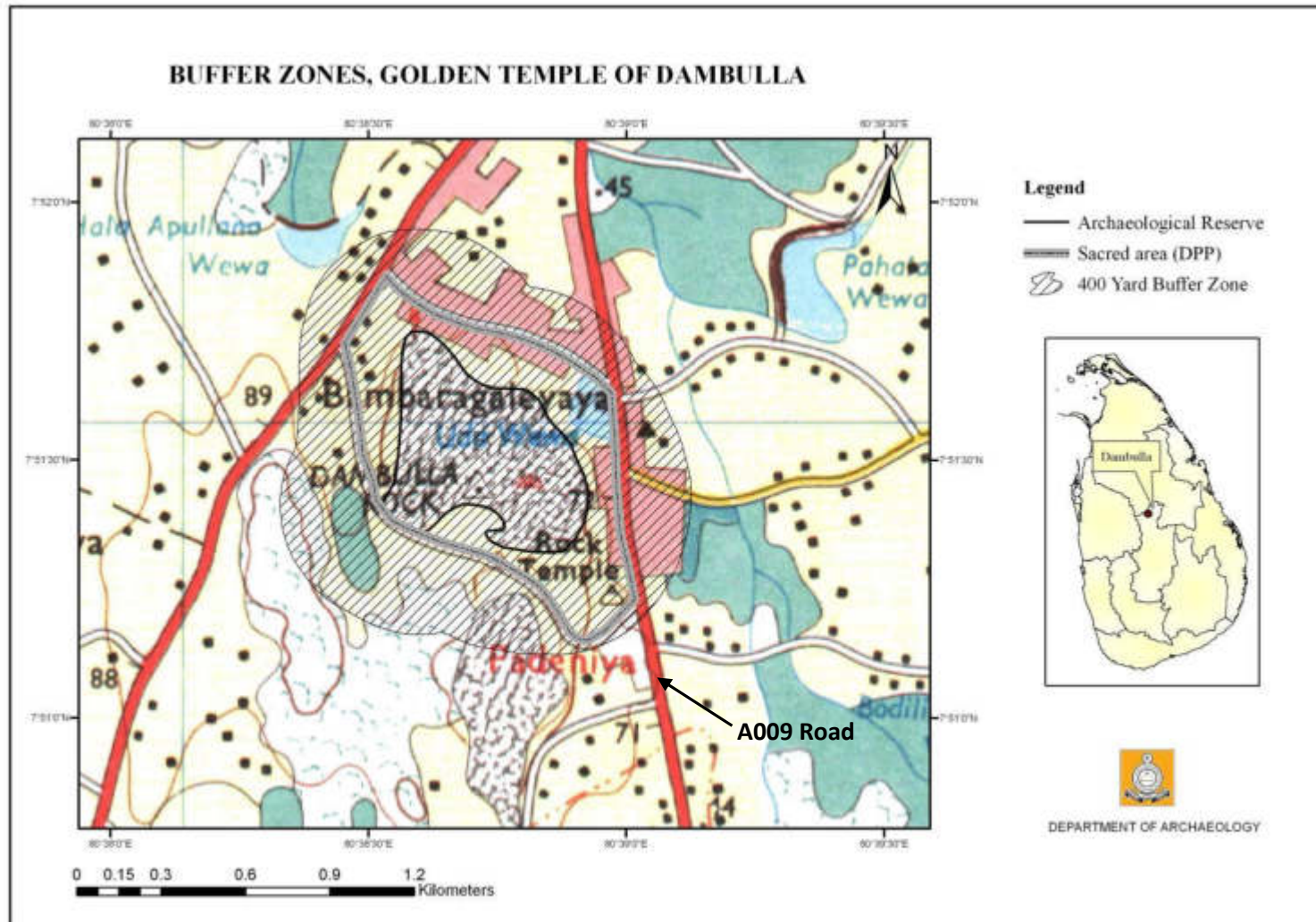


Figure 4.9: Dambulla Golden Temple and Cave Temple and Buffer Zones

CHAPTER 5: ANTICIPATED ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES

165. This chapter describes the anticipated impacts on the existing environment and social setup during the pre-construction, construction and operational stages. Feasible mitigation measures were designed based on environment best practices to minimize the adverse impacts or manage to acceptable limits, while enhancing the beneficial impacts of the project. Impacts identified here are applicable for improving, rehabilitating and maintaining the A009 Road under RMC package of iRoad. In addition, impacts during the operational phase have been identified mostly based on activities to be undertaken by the contractors during the period of maintenance.

5.1. Pre-Construction Phase

5.1.1. Impacts to Archaeologically Protected Monuments and Sites

166. The proposed road rehabilitation project will not fall within the Dambulla cave temple World Heritage Site. However, implementation of the project within the buffer zone as declared by DOA shall only be done with the prior approval from DOA. Necessary assessments shall be conducted if recommended by the DOA in order to furnish their approval. Further, the proposed improvement/ activities within the buffer zone shall be presented to the DOA for their concurrence prior to implementation.

5.1.2. Shifting of Temporary Developments on the Existing RoW

167. All proposed road rehabilitation activities along the selected section of the road including the section in front of the Dambulla Golden Temple and Cave Temple and the proposed four lane and five lane sections near the Dambulla Dedicated Economic Centre shall be within the existing RoW. However, vendors who have constructed temporary huts by the sides of the road within the existing RoW will need to be shifted back and this will result in negative impacts to public such as loss of income etc. During the field study, 23 of such vendors were identified who have established temporary huts on either side of the road which need to be shifted.

168. Shifting of the temporary huts and other developments shall be done with advance notifications. Therefore, their livelihood activities shall not be disturbed adversely.

The following steps shall be under taken in shifting the vendors to new locations.

Step 1. Identification of impacted vendors by the resettlement Officers after the detailed designs are in place.

Step 2. Notify vendors at least 30 days in advance, followed by a reminder in 7 days and again, 24 hours in advance.

Step 3. Identify alternative locations in close proximity for affected vendors to continue their businesses.

Step 4. Assistance by the contractor to shift to new locations. RDA will make sure that there will be no disruption to the income of vendors during this time.

Step 5. Assistance to return to original location after construction works complete

5.1.3. Implementation of the Project within the Forest Reserve

169. Dambulu Oya forest reserve which is cut across by the section of the road from 64.3km to 65.1km is one of the key lands uses located along the A009 road. Therefore, the implementation of the project within the forest is to be started only after obtaining approval from the Department of Forest (DoF). This project has to be carefully handled without felling any tree within the forest reserve or disturbing the existing canopy. Several non-government organizations (NGOs) have already requested not to cut any of the trees within the particular stretch during road rehabilitation work. Therefore, special attention shall be paid in the detailed design stage to protect every tree which provides large canopy and shade within the forest reserve. In addition, DoF and/or the department of wildlife conservation (DWLC) shall be consulted to confirm the requirement of introducing animal under passes within the forest reserve in order to facilitate safe animal crossing. This will be incorporated to the design if recommended by DoF and/or DWLC.

5.1.4. Removal of Trees by the Roadside

170. As mentioned above, there are approximately 40 well grown trees by the roadside which provide shade, aesthetic values and habitats for fauna and flora along the road section and it will be a significant loss to the environment as well as to the society if these trees are felled as a result of road rehabilitation. Therefore, necessary measures shall be incorporated to the detail design to protect these trees (especially rain trees) unless they create safety issues to road users.

5.1.5. Natural Hazards Aggravated by the Project and Impacts to the Road

171. As highlighted by the public, drainage structures along the section of the road function poorly. As a result, localized floods occur during periods of heavy rains especially at the Dambulu Oya crossing at 66.2km and areas around the culverts 59/2, 59/6, 60/1, around 59.7km, 67km – 69km, 71km – 72km. Therefore, this aspect shall be addressed in the design and opening sizes of the drainage structure shall be modified. Side drains and lead away drains shall be established based on a proper hydrological analysis.

172. Close coordination with the department of irrigation and the disaster management center (DMC) is necessary in order to obtain information on high flood levels, their return periods, respective retention periods and other recommendations in order to support the final design. Public consultations will also be used to verify the findings.

5.1.6. Alteration of Surface Water Bodies

173. All water bodies crossing or located adjacent to the road shall not be disturbed other than at the following locations.

174. In order to construct four lane and five lane configurations in front of the Dambulla Cave Temple and Economic Centre respectively, existing minor waterways shall be shifted as required. Provisions shall be kept in the design in order to restore the particular waterways.

175. Further, consent from third party agencies such as the Department of Agrarian Services shall be obtained for the proposed improvement to the canal if such an agency gets involved.

5.1.7. Relocating of Utility Supply Lines

176. For the road upgrading and improving work electricity power lines, telephone lines and water supply mains located within the proposed cross section will need to be shifted.

177. The exact number of utilities to be shifted will be identified during the detailed design stage and will be included in the site-specific environmental management action plan (SSEMAP). Proper co-ordination with relevant line authorities such as the Ceylon electricity board (CEB), Sri Lanka Telecom and national water supply and drainage board (NWS&DB) and community based organizations (CBO) which are responsible for community based water supply schemes in advance, will help to reduce the disruptions caused from temporary blockades and service interruptions of these utility supply lines. Risks of accidental disruption can be reduced by ensuring that machinery such as excavators are operated by trained personnel and that operations are adequately supervised. Water supply should be restored as soon as possible in the event of such accidental disruption occurs. Advanced notice to the public about the times that the utility supplies will be disrupted helps the public to adjust to the situation beforehand, and thereby minimize the difficulties that they will face in the event of the sudden disruption of these services.

5.1.8. Preparatory Facilities to Manage Communicable Diseases

178. Necessary arrangements shall be incorporated to the project to fight against any occurrence of communicable diseases that have higher epidemic potential within the project sites such as Coronavirus Disease 2019 (COVID 19), Dengue and Chicken Pox etc... For example, establishment of all sites of the project including labour camps, office facilities, yards and other accommodations shall comply the requirements as specified in the Gazette No. 2197/25 of 15th Oct 2020 issued under Quarantine and Prevention of Disease Ordinance of Sri Lanka in order to control spreading of COVID 19. In addition, the project shall comply with the guidelines of ADB on adopting COVID 19 health and safety measures issued on 29th July 2020 and other guidelines related to the project such as FIDIC COVID 19 Guidance Memorandum to users of FIDIC Standard Forms of Works Contract, April 2020.

179. Furthermore, Medical Officer and Public Health Inspector (PHI) of the area shall be consulted well in advance in planning stage in order to arrange precautionary measures for other diseases such as Dengue and Malaria and their recommendations shall be incorporated to the project. In addition, adequate budgetary provisions shall be allocated in

the project to undertake required tests such as PCR, antigen tests etc. and also, for provision of personnel protective equipment (PPE) as required.

5.2. Construction Phase

5.2.1. Impacts to archaeologically protected sites

180. Insensitive excavations, excessive vibration levels and noise generated due to operation of machineries, compaction and other construction activities will damage archaeological monuments and sites located from 70.7km to 71.7km. Further, improper handling of machineries, dumping of debris and material can also damage such sites as they are located adjacent to the RoW. On the other hand, stealing and damaging artifacts of the protected monuments by the worker will also be possible if not properly monitored. Devotees to such sites will face inconveniences if the access will be disturbed due to road improvement activities. Following measures shall be implemented by the Contractor to ensure the safety of archaeological monuments and sites.

- All construction activities at the site mentioned above shall be implemented under the direct supervision of DoA
- Vibration shall be controlled using low vibration rollers, small compactors and other measures as recommended by DoA.
- Dumping of debris, soil and any other material at the particular site will be avoided.
- Machinery operators and other workers shall be made aware about the importance of the site in order to minimize accidental damages
- The roadside (ROW) at these sites shall be properly barricaded
- Labor force shall be monitored continuously to ensure safety of artifacts at these locations
- Temporary safe access to the above-mentioned sites shall be maintained for the convenience of devotees
- The Contractor shall immediately inform DoA through PIU if he finds any artifact during the period of construction. Activities at the particular location shall be stopped immediately until DoA confirms to proceed.

5.2.2. Biological impacts

Loss of Trees and Vegetation

181. Due to the construction activities, clearing of vegetation, felling and/or trimming of trees will be required. This may in turn result in loss of soil moisture, reduction of air quality, reduction of aesthetic value and loss of shade and habitats.

182. Following measures shall be adopted in order to mitigate this impact.

183. Unnecessary clearing of vegetation and felling of trees will be prevented by felling only the demarcated trees as per the design. Special attention shall be paid to protect well grown shady trees along the section of the road and will be felled only if the PIC instructs to do so.

All trees that are marked will be handed over to the State Timber Corporation for cutting and removal. Moving of construction vehicles and machineries will be restricted only to designated areas in order to save vegetation beyond the proposed project area. Weedicides will not be recommended as it causes many damages to the environment. Presence of nests, habitats for species such as epiphytes on the trees to be felled should be carefully assessed before felling. If such species or nests are found, they should be relocated to a similar habitat. A compensatory tree replanting program should be implemented by the Contractor to compensate the loss of trees. Suitable native tree species should be selected for the replanting purpose at 1:3 ratio. Replanting of threatened/endemic species should be given priority.

184. The replanting program will be carried out within the RoW and at locations with public importance (such as schools and other government institutes) according to the necessity. Planting 'bole rooted' plants are not recommended, since it destroys another habitat to make this habitat good. After the field is established, continuous supervision and maintenance during the operational stage will be needed in order to ensure proper survival of trees for at least 2 years.

Adverse impacts on terrestrial fauna

185. Animal crossing structures shall be constructed as per the design especially within the forest reserve (64.3 – 65.1km). Further, free movement of both wild and domestic animals shall be facilitated during the construction phase across the road. Also, care should be taken with strict labour supervision to ensure not to harm any animals in the project area.

Impact on Aquatic Fauna and Flora

186. There will be soil erosion from stockpiles, excavation, oil and grease from construction vehicles. Accumulation of these materials in water bodies will cause increase in turbidity level and lower the water quality. This will lead to reduction of light penetration and make it an undesirable place for aquatic fauna and flora. Further, due to the reduced light penetration to the water body, the primary productivity of the biota in the water body will be reduced resulting in increased mortality of aquatic organisms. In addition, when these particles settle, it will affect the breeding ground of aquatic animals.

187. This impact could be mitigated by; location of all hot mix plants, crushing plants, workshops, depots and temporary worker camps and storing of toxic and hazardous materials at approved locations (well away from Dambulu Oya), recycling and dumping of solid waste matter at locations approved by local authorities, maintenance of vehicles and equipment in good operable condition, ensuring no leakage of oil or fuel and the fitting of proper exhaust baffles. No solid waste should be dumped into water bodies.

Ecological Disturbances by Workers and their Camp Operations

188. Several adverse impacts such as dumping of refuse, sanitary waste and sewage into waterways, clearance of vegetation for worker camp sites, hunting of animal species and collection of firewood from forests may be particularly intense at camp sites. This may cause pollution of waterways. Open dumping of garbage at these sites could also increase threats of mosquitoes, flies and the spread of rats and crows. Such garbage dumps can attract wild fauna, posing some threats to both humans and wildlife.

189. Local labour will be recruited as much as possible in order to minimize this impact. Strict labour supervision, provision of labour camps with electricity or LP gas for cooking to eliminate using firewood from surrounding vegetation. Fishing and poaching will not be allowed within the project area. Solid waste and sanitary waste from labour camps and other sites shall be properly collected and disposed. Accepted sanitation methods (e.g. mobile toilets) with proper sewage disposal facilities should be provided. Under no circumstances should such waste be released untreated into the water bodies, near forest areas. Further no labour camps shall be located within any of the Dummalakele, Embulambe and Dambulu Oya forest reserves as mentioned in section 4.3.1 of this report.

5.2.3. Increase of Local Air Pollution, Noise and Vibration

190. Excavation for shoulders and other earthwork, pavement improvement operations, quarry operations, operation of asphalt plant, batching plant, operation of construction vehicles during construction period will release aerial contaminants (dust and fumes) increasing local air pollution. Heavy machinery used for construction work will create noise and vibration which will cause disturbances to residents in settlements. Animals and excessive vibration can damage buildings located close to the trace. Locations such as schools and places of worship as given in table 4.6 above are particularly vulnerable to disturbance from noise.

191. Archaeologically protected sites as mentioned in section 4.6 above are especially vulnerable to high vibration levels. Damages to such sites can be possible if heavy construction activities which result high vibration levels will be carried out at such sites.

192. The table below gives the identified noise levels of various construction equipment and machinery at a distance of 7 m from the source.

Table 5.1: Typical Construction Equipment Used in Road Construction, Unobstructed at Obstructed Noise Level 7m from the Source

| Equipment | Noise Level at 7 m in DB(A) | Predicted Noise 10m from Source, Unobstructed | Predicted Noise 10m from Source, Obstructed by 1.5m Movable Barrier |
|--------------------------|-----------------------------|---|---|
| Compressor | 109 | 81 | 45.2 |
| Truck, scraper or grader | 94 | 66 | 30.2 |
| Pneumatic drill | 85 | 57 | 21.2 |
| Excavator | 112 | 84 | 48 |
| Loader | 112 | 84 | 48 |
| Roller vibrator | 108 | 80 | 44.2 |

| | | | |
|---|-----|----|------|
| Poke vibrator | 113 | 85 | 49.2 |
| Sound reduced jack Hammers and lock drills | 82 | 54 | 46.2 |

193. The impact of construction noise, vibration and emissions at sensitive areas shall be mitigated by;

- Limiting operations to times when there is least impact in settlement areas, especially near schools, hospitals, places of worship and other sensitive locations as presented in the table 4.2.
- Ensuring that construction plant and equipment is maintained to high operable standards, and that exhaust baffles are fitted and maintained a high serviceable condition.
- Vibration should be controlled with the agreement of the Project Implementation Consultant (PIC) at locations where sensitive receptors are found.
- Regular sprinkling of water to dampen the construction surface will reduce the emission of dust.
- Implementation of all construction activities in compliance with acceptable levels of noise which are specified in the National Environmental (Noise Control) Regulations 1996 stipulated by C amendments act 924/12 to mitigate the noise impact.
- A property condition survey will be conducted along the trace within a corridor as specified by PIC. The survey shall record all details related to cracks and construction failures existing in structures along this corridor.
- Buildings cracked due to construction activities should be compensated or repaired to the satisfactory level (which is agreed by the PIC) of the affected person through a third – party insurance. Here, a precondition survey conducted for surrounding buildings located within an agreed area and a corridor with the PIC will be helpful in differentiating cracks caused by construction activities.
- All machinery, plants and vehicles used for the project shall be well maintained and regularly monitored in order to keep their emissions below the threshold levels (as specified in NEA) in order to minimize degradation of air quality
- At archaeologically protected sites and monuments, the recommendations given by DOA shall be adhered to avoid any damages to such sites. Precautionary measures such as using small compactors without vibration, avoiding use of heavy machinery and maintaining the air quality below the standards at such sites should be practiced in order to avoid adverse impacts.

5.2.4. Disruption to Traffic Flow

194. A009 road generally caters to a heavy traffic flow throughout the day. Therefore, closure of lanes and diversion of traffic to facilitate road rehabilitation work will severely affect the traffic flow creating heavy traffic congestions. This will delay the day to day activities of the commuters such as schooling, attending work on time etc.... Further, emergency vehicles such as ambulances which use the road very often will also be in the traffic congestions.

195. Following measures shall be implemented to minimize the impacts on existing traffic;

- Preparation of a traffic management plan in collaboration with the Police and implementation during the construction phase with the help of Police. The traffic management plan shall be updated as necessary. Assistance of the Police shall be obtained to ensure that traffic will comply with the measures as per the traffic management plan.
- Providing information in advance to the public about the planned construction work.
- Providing properly marked by-passes and one-way sections including barriers, reflectors and night illumination.
- Use of well-trained flagmen to control the traffic flow at constricted sites, including safe crossing for pedestrians especially near town areas and schools.
- Public shall be made aware about alternative roads that can be used to bypass construction areas using media and sign boards.
- Flagmen shall be instructed to pay especial attention to emergency vehicles in order to cross the construction sites without delay.

5.2.5. Deterioration of Surface and Ground Water Quality Due to Silt Runoff, Emissions and Spoil from Labour Camps

196. In order to improve roads and the rehabilitation work of clearing vegetation near the edge of the existing road, excavation and removal of unsuitable soil will be required. Such activities may cause temporary piles of soil and debris along the road edge.

197. All these activities could cause temporary erosion and thereafter, siltation of surface water bodies Dambulu Oya, other minor streams and ground water resources such as wells in close proximity. If un-compacted earth surfaces or soil dumps are left exposed to rain or placed near water bodies and paddy fields, soil erosion will be possible. Sediments could drift away and get silted up in the side drains, adjoining streams, wells and irrigation canals causing deterioration of water quality.

198. Run off contaminated with oil, grease, and leaked fuel from construction vehicles, equipment and material stores, wastewater and solid waste from worker camp sites, wastewater from concrete batching plants and asphalt plants will contain pollutant materials. Such materials have the potential to cause deterioration of surface and ground water resources in the project area if they are released to adjacent water bodies.

199. Following measures shall be adopted to mitigate deterioration of surface water quality due to silt runoff, emissions and spoils from construction and labour camps;

- Reuse of soil removed for filling sites if any, as much as possible while unsuitable materials can be used to refill burrows pits with the approval of the PIC.
- Where earthwork takes place adjacent to surface water bodies and wells, drainage of storm water should be managed in order to minimize the soil erosion to water bodies in close proximity. This should be planned prior to the commencement of earthwork activity.

- All temporary unsuitable soil dumps and debris should be removed from the site to disposal sites which are approved by the relevant local authority as early as possible. The Contractor should present a method stating how the environmental and social impacts that can be generated are managed at disposal sites in advance for approval.
- All disposal sites should be sited in locations which are not affected by floods or exposed to soil erosion.
- If temporary soil dumps are left at the site for a long period of time, proper remedial measures to minimize soil erosion should be carried out. (E.g.: Placing sandbags around the dump etc...)
- Temporary soil dumps should not be placed near water bodies or areas prone to floods.
- All fills, back fills and slopes should be compacted within the shortest possible time to reach the specified degree of compaction.
- Turfing of all embankment slopes with suitable turf material and establishment of suitable mulch to cover the slopes of embankments should be carried out.
- All materials (including toxic and hazardous material) required for construction shall be stored at secured and managed sites, sited away from water bodies,
- Construction vehicles and equipment will be maintained in good operable condition, ensuring no undue leakage of oil or fuel,
- Construction vehicles and equipment will be serviced only at properly managed and equipped workshops and waste oil will be collected and disposed at approved locations,
- Sanitation arrangements and an adequate water supply will be made at worksites and at any accommodation facilities provided for workers', ensuring that no open dumping of solid wastes or raw sewage is released into drains or water bodies.
- Adequate wastewater treatment methods shall be provided to concrete batching plants and asphalt plants
- Site specific mitigation measures such as silt fences and barriers shall be applied at wells located close to the road to minimize sedimentation of ground water. It shall be ensured that the wells are not contaminated by chemicals, lubricants and fuels used for the project.

5.2.6. Flood Impacts

200. Contractor's activities will not lead to flooding conditions as a result of blocked drainage paths and drains. The contractor shall take all measures necessary and as directed by the PIC to keep all drainage paths and drains clear of blockage at all times. If flooding or stagnation of water is caused by the contractor's activities, they shall provide suitable means to (a) prevent loss of access to any land or property and (b) prevent damage to land and property. Contractor's activities shall not lead to aggravate floods when working in areas prone to flooding. Further, any recommendations laid down by the hydrological studies, should be adopted at such areas. In addition, the contractor will pay special attention to avoid these areas in selecting disposal sites, locations for material stock piles, yards and other locations where chemicals and other construction material are stored.

5.2.7. Social and Environmental Impacts due to Establishment of Labour Camps

201. Labour camps may need to be established near the road alignment. Improper sanitation, lack of water supply, improper disposal of wastewater and solid waste will increase risk of contaminating surface water sources close to these camps. Stagnant water at the labour camp can create mosquito breeding and vector for communicable diseases such as Dengue to the workers and host communities. Social conflicts may arise due to use of illicit liquor and unpleasant behaviour which causes inconvenience to the local community.

202. Labour camps will be located at least 100m away from the major water resources such as Dambulu Oya. Site specific mitigation measures as agreed with the PIC will be strictly applied if camps are to be located close to a water body or other environmentally/socially sensitive location. Proper sanitary facilities will be provided to the labour camps. Any wastewater and other waste matter generated from the camps will be disposed in environmentally friendly manner as agreed with the PIC. All places where water can be accumulated creating favourable sites for mosquito breeding shall be avoided by the Contractor and other staff of the project.

203. Maximizing recruiting of local labour will minimize the need for migrant workers and avoid potential and health conflicts with the host community. Awareness programs should be conducted targeting workers and the local community in order to minimize and avoid such conflicts.

204. If local labour is not sufficient, labourers from locations outside of the project area shall be brought for construction activities. They will be provided with accommodation. Any spread of communicable disease within such accommodation will affect the labourers, infect staff who have contact with them and the public living close to such accommodation. The risk of spreading diseases from the community into the labour camp should also be considered. These risks shall be minimized through adopting the following measures.

- Compliance with National Institute of Occupational Safety and Health and IFC EHS Guidelines on Occupational Health and Safety and other guidelines on occupational health and safety issued periodically by other government institutes/ agencies of Sri Lanka.
- Prepare a comprehensive & site-specific Health and Safety Plan (H&SP) describing in detail how the health and safety of all site personnel (workers, staff and visitors) will be maintained at all times (including measures that would be taken in case of spread of a communicable disease within the site or project area). This is to provide guidance on establishing a management strategy and applying practices that are intended to eliminate, or reduce, fatalities, injuries and illnesses for workers performing activities and tasks associated with the project.
- Obtain a health (medical certificate) and character certificate (police report) from all staff and workers who are recruited to the office and sites (this shall be applicable for sub-contractors also).
- Upon returning for work (after a shutdown) all staff and workers shall inform the health and safety officer of any ailments they had during the vacation.

- Provide compulsory H&S orientation training (including awareness on both communicable/ non-communicable diseases, good health and hygienic practices) to all new workers to ensure that they are updated with the H&S Plan including rules of work, PPE and preventing injury to fellow workers.
- Location of labour camps shall be approved by relevant local authority and will avoid environmental and social sensitive areas such as forest reserves, schools etc...

5.2.8. Measures to be Adopted to Fight Against Spreading of Communicable Diseases in Project Sites

205. It is crucial to remain vigilant on the spread of communicable diseases such as COVID 19 and Dengue in all sites of the project including those of PIU, PIC, Contractors and Sub-Contractors etc. Since a large number of people occupy project sites, it is important to take necessary precautions to stop the spread of this virus among all staff of the project. Thus, it is strictly recommended to comply with the following measures in order to prevent the spread of coronavirus.

- All relevant guidelines issued by the Ministry of Health of Sri Lanka including Gazette No. 2197/25 of 15th Oct 2020 issued under Quarantine and Prevention of Disease Ordinance of Sri Lanka in order to control spreading of COVID 19 shall be strictly complied. In addition, the project shall comply with the guidelines of ADB on adopting COVID 19 health and safety measures issued on 29th July 2020 and other guidelines related to the project such as FIDIC COVID 19 Guidance Memorandum to users of FIDIC Standard Forms of Works Contract, April 2020 in all project sites.
- Necessary instructions to be obtained from Medical Officers and public health inspectors (PHI) of the area. All their recommendations shall be strictly followed and implemented in establishing and operating all project sites.
- Facilities as recommended by the medical staff (such as face masks and other PPE, hand washing facilities, sanitisers, regular disinfection of work sites, facilities to monitor body temperature etc...) shall be adequately provided to all staff of the project and visitors by the management of PIU, PIC and Contractor/s.
- Proper mechanisms shall be setup to inspect all sites of the project regularly by the respective PHI to monitor the progress.
- If any suspected case for any communicable disease such as COVID 19 or Dengue is reported, it should be immediately informed to the respective Medical Officers and PHI. Their recommendations shall be strictly followed and implemented.
- Necessary facilities shall be adequately allocated to test the occurrence of communicable diseases among the project staff.

5.2.9. Impacts Due to Extraction and Transportation of Construction Materials

206. Sources of construction materials such as soil/metal will be obtained from quarries and burrow sites. Extraction and transportation of materials from such sites will cause noise, vibration, dust, induced slope failure, negative visual impacts, creation of mosquito breeding

sites and damage to private properties and minor roads. Heavy trucks transporting materials to construction sites will cause disturbances to local traffic, damage minor roads, and increase dust and noise.

207. The above impacts could be mitigated by avoiding over exploitation, reuse of ABC, use of paver in laying ABC against using the grader (the conventional method). Further, quarry and burrow sites approved by the Geological Survey and Mines Bureau (GSMB) and the conditions (If any) laid down in the approval should be adhered. Provisions must be made for repairing and restoration of all properties damaged including the roads used for the transportation of construction materials by the contractor in the contractual agreement. Use of covers over transported materials to guard against dust blow and water spraying to dampen the gravel surfaces will mitigate the impacts due to transportation of construction material.

5.2.10. Alteration of Surface Water Hydrology of Waterways

208. The reconstruction of culverts may temporarily divert streams, disturbing the natural drainage pattern and create a flooding condition in the area. Improperly stored construction materials can also block the natural drainage pattern.

209. The contractor will take all measures necessary and as directed by the PIC to keep all drainage paths and drains clear at all times. Temporary storage of material will be made only in approved sites by the PIC, where natural drainage is not disturbed. All wastes will be disposed at locations approved by the Local Authority. If flooding or stagnation of water is caused by activities carried out by the Contractors, they shall provide suitable means to prevent loss of access to any land or property and prevent damage to land and property.

210. No material including excavated soil will be allowed to be disposed near water bodies or in paddy fields even on a temporary basis, to curtail any undue wash off of soil and debris to water bodies and agricultural lands in close proximity. The contractor will ensure not to damage or block any man made drainage canal even on a temporary basis. If blocked, the contractor will remove such debris without any delay.

5.2.11. Requirement of Temporary Use of Lands for Upgrading the Road.

211. Land acquisition has not been envisaged for this project expecting that available right of way will be adequate to carry out road improvement work. In case there is a need for land for temporary requirements, lands will be taken for use after negotiations with landowners with an involvement of a third party.

212. During construction, temporary occupation of privately owned land may be required for stock piling, use as yards etc. If such a necessity occurs, the contractor with the concurrence of project staff will sign a contract for temporary occupation with the owner in which a site restoration plan is specified.

5.2.12. Health and Safety of the Labour Force and Public

213. Construction activities pose potential hazards to both workers and public. Safety to workers and the public can be enhanced by;

- Proper briefing and training of workers on safety precautions and their responsibilities for the safety of themselves and others
- Provision of personnel protective equipment (PPE) to workers to be used whenever they are involved in construction activities. The use of high visibility jackets at night is essential.
- Ensuring that plant and vehicle operators are properly licensed and trained.
- Arranging for the provision of first aid facilities, readily available trained paramedical personnel and emergency transport to the nearest hospital.
- Arranging for regular safety checks of vehicles and material and allocation of responsibility for this purpose.
- Ensuring that quarry operations, particularly blasting, is carried out as per guidelines given in the relevant licences and approvals and supervised by trained personnel, explosives are stored in a secure location and that all due precautions are taken to ensure that blasting does not induce rock falls.
- Provision of hazard warning signals around construction sites and directing vehicle and pedestrian traffic away from work sites and proper maintenance of them to ensure their effectiveness.
- Provision of traffic management plans during construction including barricading of openings and lighting at night where required.

5.2.13. Loss of Access to Houses, Commercial Activities and Public Utilities

214. Loss of access to houses, commercial activities, office premises and other lands located along the road shall be possible due to excavations and other road improvement activities. To minimize the impact;

- Convenient and safety access to all existing residential and commercial lands located along this section of the road shall be ensured.
- Access to houses, commercial structures and public utilities should be clearly marked within the road reservation and safe temporary access will be maintained until the permanent solution is in place.
- If there is significant loss of access for houses and shops, compensation shall be paid for temporary evacuation of households and for loss of livelihood of commercial structures with the approval of the PIC and PIU.

5.3. Operational Phase

5.3.1. Impacts on Water Resources

215. Improvements to the road drainage system will result in improved storm water flows and reduce the tendency of blockages to occur in drains by the roadside. Risks to public health caused by such stagnant water bodies by acting as disease vector breeding places, will be reduced. By designing the drains to withstand storms will reduce the risk of any operational failure of the drainage system and regular maintenance will further reduce the chances of failure.

216. In addition, improper handling of chemicals used for maintenance works such as paints, pesticides, asphalt etc... will also degrade water bodies located close to the road. Proper handling of such chemicals under strict supervision will help to minimize water pollution during the period of maintenance.

5.3.2. Disposal of Waste Material Generated During Maintenance Operations

217. De-silting of drains, culverts and bridges, removal of vegetations by the roadside and removal of damaged/degraded road surfaces during the period of maintenance will generate unsuitable soil, vegetation and debris. If these materials are disposed to either sides of the road, agricultural land, areas susceptible to floods etc... there is a possibility of siltation of water bodies, agricultural land and blocking of drainage paths due to washing away by storm water. Proper disposal of all unsuitable material resulting from periodic and routine maintenance activities in the approved locations will minimize this impact.

5.3.3. Extraction of Material for Repairing and Maintenance Work

218. For repairing and maintenance of carriageway and other structures, material such as gravel, aggregates and sand will be required. Mitigation measures specified in 5.2.9 above (Impacts due to extraction and transportation of construction materials) could be adopted to minimize impacts due to maintenance activities of the roads.

5.3.4. Pedestrian and Commuter Safety

219. Improvements to the road surface will be conducive to safe vehicle travel at higher speeds. Such speeds may increase the occurrences of accidents. Incorporating the following measures could offset this negative impact;

- Provision of a centreline road marking where possible, edge delineation etc.
- Provision of clearly marked signs at townships, sensitive areas such as schools and temples
- Enforcement of speed limits and other traffic rules, especially within the town limits
- Placing of sign boards at animal crossings etc.

220. Furthermore, safety of road users could be ensured during repairing of carriageway and hydraulic structures by placing standard sign boards, barricading of the site being repaired etc.

5.3.5. Air Quality and Noise

221. With better road surface and passing lanes, e vehicles shall be able to maintain better speed reducing travel time through the area. Improved road surface conditions shall reduce the number of accelerations and decelerations in travelling thereby reduce the emissions to the air. The project is therefore expected to have a positive effect on overall air quality. Clear signage will be put in sensitive areas such as schools and temples to warn drivers to avoid honking.

CHAPTER 6: CLIMATE CHANGE ADAPTION

222. Increase in vehicle traffic and use of energy are indicators of people moving to better living conditions or poverty reduction. However, increase in vehicular traffic and use of energy will also lead to increased greenhouse gas (GHG) emissions, which directly affect global warming. According to “International Energy Outlook 2016” (IEO2016) prepared by U.S. Energy Information Administration, the energy used in the transportation sector includes energy consumed in moving people and goods by road, rail, air, water and pipelines. The transportation sector has accounted for 25% of the total energy consumption in the world in 2012. It is forecasted that energy used for transportation will increase by 1.4% per year from 2012 to 2040 according to the IEO2016 Reference case.

223. The evaluation study by ADB’s independent evaluation department (IED) in the year 2010 (evaluation knowledge brief, July 2010 – EKB) on reducing carbon emission for transport projects, has indicated the need of a shift in ADB’s investments on the transport sector into low carbon growth across Asia and the Pacific regions.

224. Improving the surface (pavement) of the existing Naula (58km) to Dambulla (72.71km) section of the Kandy - Jaffna (A009) Road under the road maintenance contract will bring about a change in vehicle operation speeds and traffic composition along the highway.

225. Such changes with respect to present conditions will have an impact on emission levels of the gases by vehicles travelling along the selected section of the A009 road. Most common types of vehicles that would drive along these two sections are bicycles, motor cycles, three wheelers, cars, vans, buses, light and heavy commercial vehicles. Thus, emission of Carbon Dioxide (CO₂) from motorized vehicles which is a GHG needs to be analysed to evaluate the overall contribution of this investment program in terms of the change in CO₂ emissions.

226. The EKB has developed a set of spreadsheet-based models to evaluate the CO₂ impacts of rural roads, urban roads, bikeway projects, expressways, light rail and metro rail transit (MRT) projects, bus rapid transit (BRT) projects and railways. These transport emissions evaluation models for projects (TEEMPs) consider passenger and freight travel activity, the shares of trips by different modes and types of vehicles (structure), fuel CO₂ efficiency (intensity) and fuel type, validated by more detailed emission factor models. The models directly estimate CO₂ emissions for a business-as-usual case (a no-action alternative) vs. one or more alternative modal investment interventions (including improvement to road pavement) and calculate scenario differences. The models consider induced traffic demand generated by changes in the generalized time and cost of travel by different modes, building on best practice analysis techniques.

227. The TEEMP model for urban roads was used for the analysis by using default parameters for base fuel consumption, emission and upstream emission percentage. Occupancy-loading, average length of trips of each type of vehicle, increase in the types of vehicles and roughness factors (before and after improvements) were fed to the model based on the details of traffic and economic analysis for the selected section of the A009

road. The selected road was sub divided in to three sections for running the model. The summary of these input parameters is presented below.

Table 6.1: Input Parameters for TEEMP Model for Two Sections of the A009 Road

| Parameter | Input values | | | | |
|---------------------------|-----------------------------|---------------------------------|----------------------------------|---------------------------------|--------------------------------|
| | Section I (58 – 62.17km) | Section II (62.17 – 65.02km) | Section III (65.02 – 66.72km) | Section IV (66.72 – 71.02km) | Section V (71.02 – 72.88km) |
| Occupancy/loading | | | | | |
| Two-wheeler | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| Three-wheeler | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| Passenger car | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| Light Commercial Vehicle | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Bus | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 |
| Heavy Commercial Vehicle | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| Cycle | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Roughness | | | | | |
| Before Improvement | 5.0 m/km | 5.0 m/km | 5.0 m/km | 5.0 m/km | 5.0 m/km |
| After Improvement | 3.0 m/km | 3.0 m/km | 3.0 m/km | 3.0 m/km | 3.0 m/km |
| Lane configuration | | | | | |
| Before | Two lane @ 3.5 m pavement | Two lane @ 3.5 m pavement | Two lane @ 3.5 m pavement | Two lane @ 3.5 m pavement | Two lane @ 3.5 m pavement |
| After | Two lane @ 3.7 m pavement | Two lane @ 3.7 m pavement | Two lane @ 3.7 m pavement | Four lane @ 3.5 m pavement | Four lane @ 3.5 m pavement |

Model Predicted CO₂ Emission Levels

228. Model output includes CO₂ emissions at business as usual (BAU) or without project; with project (i.e. with improvements) and with induced traffic; and with project and without induced traffic.

Table 6.2: CO₂ Emission at PAU, Project & Induced Traffic and Project Without Induced Traffic

| | Emission of CO ₂ in Ton/km/year (net change in emission) | | | | |
|---------------------------------|---|------------------------|------------------------|-----------------------|-----------------------|
| | Section I (4.17km) | Section II (2.85km) | Section III (1.7km) | Section IV (4.3km) | Section V (1.86km) |
| BAU | 822.63 | 562.23 | 335.36 | 848.26 | 366.92 |
| Project with induced traffic | 809.21 | 553.06 | 329.89 | 834.44 | 360.94 |
| Project without induced traffic | 809.21 | 553.06 | 329.89 | 834.44 | 360.94 |

229. As indicated in the model output and summarized in the table above, the proposed improvement to existing highway pavements will bring a reduction in CO₂ emission, even with an increase in traffic. However, this analysis is based on the assumption that the roughness of improved highway pavement surface will be maintained during the project life. Therefore, it is important that the road maintenance program is maintained throughout the span of the project. (i. e. during operational stage for seven years and beyond).

230. The net change in CO₂ emissions of each section of the road and respective CO₂ saving is presented in the following table.

Table 6.3: CO₂ Saving Due to Rehabilitation of the Naula – Dambulla Section of the A009 Road

| Section of the Road | Net Change in CO₂ Emission (Tons/km/year) | Total CO₂ Saving (Tons/year) |
|----------------------------|---|--|
| Section I (4.17km) | 13.21 | 55.09 |
| Section II (2.85km) | 9.17 | 26.13 |
| Section III (1.7km) | 5.47 | 9.30 |
| Section IV (4.3km) | 13.82 | 59.42 |
| Section V (1.86km) | 5.98 | 11.13 |
| Total | | 161.07 |

231. As per the table 6.3, the total CO₂ saving resulted from the improvement of the selected road section of A009 will be 161.07 tons per year.

CHAPTER 7: INSTITUTIONAL ARRANGEMENT, ENVIRONMENTAL MANAGEMENT PLAN AND GRIEVANCE REDRESS MECHANISM

7.1. Institutional Arrangements

232. The Ministry of Highways is the executing agency (EA) for the program and the Secretary to the Ministry is responsible for decisions on overall approvals and operational policies of the project. RDA is the implementing agency (IA). The Project Director (PD) appointed for RMC of the PIU which is currently in operation will be responsible for carrying out road maintenance contracts of this project. The PD is assisted by a staff of engineers, environment and social safeguards officers and other administrative staff. The project implementation consultant (PIC) who is already assigned for RMC will be responsible to review and approve designs prepared by the contractor, supervise civil work of the contractor and review and certify bills submitted by the contractor. A team of experts including engineers, quantity surveyors, environment and social experts are working in the PIC headed by a Team Leader (TL).

233. Safeguard team of PIU, PIC and the contractor is primarily responsible for safeguards compliance of all activities carried out for rehabilitation and maintenance of the selected section of the A009 road. The specific roles and responsibilities of each party are given in chapter VI of the EARF.

7.2. Environmental Management Plan and Monitoring

234. The Environmental Safeguards Manual of RDA and the ADB SPS, outlines the requirements for an EMP which is presented as a matrix, developed based on best practices of environmental management. This IEE report includes EMP prepared for rehabilitation of the Naula – Dambulla section of the A009 road which is given in Appendix 7.1. This EMP covers all impacts and mitigation measures identified within the project. However, the contractor will be responsible for the preparation of SSEMAP based on the EMP given in this IEE. SSEMAP is supposed to include site specific impacts, related site specific construction activities and relevant mitigation measures proposed to particular locations in order to minimize relevant impacts. SSEMAP will be supported by site plans in which proposed mitigation measures are presented. Separate SSEMAPs will be prepared for each contract package if the proposed selected section of the road of the A009 road will be contractually subdivided. All costs for implementing mitigation measures must be included in the bill of quantities (BOQ) by the contractor as the implementation of the SSEMAP will be the responsibility of the contractor. The PIU will oversee the effectiveness of the implementation with the assistance of the PIC. In addition, in compliance with the EARF, Environmental and Social Development Division (ESDD) of RDA is also responsible for monitoring the implementation of the SSEMAP bi-annually. ESDD also assists PIU in meeting safeguards compliances and will conduct training sessions to the safeguards staff of the contractor on the safeguards considerations of iRoad.

235. Contractors who implement RMC package will be responsible to keep the road in operational condition for a period of 5 years after rehabilitation. Therefore, the EMP has been modified accordingly, paying more attention to the environmental impacts and mitigation measures during the operational and rehabilitation stages. The EMP prepared for the section of the A009 road is attached in Appendix 7.1.

236. Monitoring of EMP implementation will be carried out during the pre-construction, construction, operation and maintenance stages of the project. Based on the EMP, an environmental monitoring checklist (EMC) will be prepared by the PIC for each of these stages. The EMC monitors the degree of compliance of the mitigation measures proposed in the EMP in all three stages. The Project must have at least one EMC completed during pre-construction, four² during construction and bi-annually during the periods of operation and maintenance. A sample EMC based on the EMP is provided in Appendix 7.2. Records of these completed monitoring checklists must be systematically maintained within the PIC and/or PIU office. Based on these records and site visits, monitoring reports will be prepared during the construction and operation stages on an annual basis and submitted to ADB for disclosure on the ADB website.

237. In addition there will be an EMOP based on the project cycle to monitor EMP implementation by measuring environmental parameters. During the pre-construction phase, baseline data on air, water quality and noise levels will need to be collected. This data will provide baseline information on the existing conditions, which could be used to compare the changes in quality levels during construction and operational phases. Such a comparison will reflect how effective the EMP is and help to revise it to rectify any shortcomings that will cause adverse impacts.

238. Appendix 7.3 presents the EMOP prepared for the selected section of the of the A009 Road. Based on the EMOP, the contractor will be required to prepare contract package specific EMOPs. Furthermore, the contractor, with the approval of PIC, will also be responsible for updating/modifying the EMP, EMC and EMOP if there are any significant changes in the project site, activities, conditions, engineering design or if any unpredicted impact may arise.

² The monitoring checklist during the construction stage will be completed three times when the progress of physical works is at 25%, 50%, 75% and 100% respectively.

7.3. Grievance Redress Mechanism

239. The grievance redress mechanism (GRM) is necessary to support the general public to resolve their problems due to project activities through mutual understanding and consensus with the relevant parties. The ADB Safeguards Policy 2009 also provides guidance to establish GRM to address the affected peoples' concerns, complaints and grievances about the project's environmental performance.

240. The proposed GRM for this project can be at two levels. Level one is at the grassroots level with a Grievance Redress Committee (GRC) comprising of the following members.

| | |
|--|-----------|
| Grama Niladari of the area | Chairman |
| Representative of PIU | Secretary |
| Representative of Supervision Consultant | Member |
| Representative of the Contractor | Member |
| A Community Member/Religious Leader | Member |

The Level two will be at the Divisional Secretariat level, involving the following members.

| | |
|---|-----------|
| Divisional Secretary of the area | Chairman |
| Representative of PIU | Secretary |
| Grama Niladari | Member |
| Representative of Supervision Consultant | Member |
| Representative of Contractor | Member |
| Representative of a Social Organization (NGO/CBO) of the area | Member |
| A Community Member/Religious Leader | Member |

241. Level one GRC meetings will be held at the GN office (Level one) and DS office (Level two) to which people who have lodged complaints will be invited and their complaints examined. The people will be informed about the GRC, seven (7) days prior to the meeting.

242. The Secretary of GRC is requested to coordinate with all relevant parties to get necessary information. In addition, the secretary should keep records of all complaints and reports. All complaints should be submitted in written form.

243. If the issue is resolved at GN level GRC, the decision taken should be informed by the Secretary to the Site Manager without any delay (in written form). If the issue cannot be resolved at this level, then it should be brought to the notice of the DS Level GRC without any delay.

244. Minutes of the committee meetings will be conveyed by the Secretary, the PIU representative. The Chairman of GRC is expected to take appropriate actions with the consultation of other committee members within three weeks and to immediately inform the affected people.

245. The issues that could not be resolved at level one GRC, will be forwarded to DS level two GRC within seven working days of the final decision of GN level GRC.

246. The flow chart of the GRM is presented in figure 6.1.

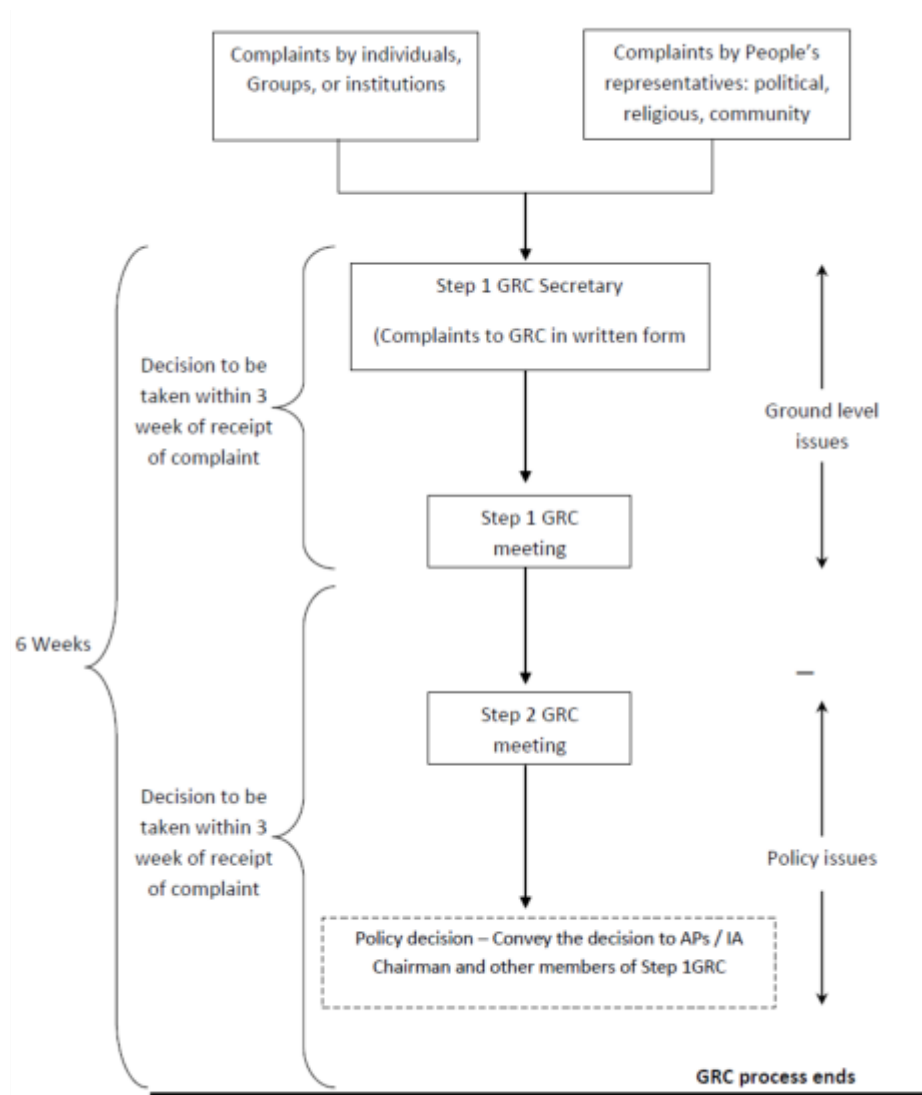


Figure 7.1: GRM process

247. For RMC roads, the contractor will be required to establish an information centre for receiving and addressing complaints or grievances and forwarding them to the PIU and PIC as necessary.

CHAPTER 8: PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

248. It is important to consult public and other stakeholders regarding project activities. This helps to understand viewpoints of stakeholders and to respond to their concerns and suggestions during the early stages of the project, thereby incorporating their valuable suggestions to the designs and reducing objections to the project. One on one interviews and Focus Group Discussions were conducted along the proposed section of the A009 road.

8.1. One on One Interviews



Figure 8.1: Consultations During the Household Survey

249. The key stakeholders of the project were consulted during the field survey. This included Divisional Secretaries of Naula and Dambulla, Grama Militaries, Officers of the Departments of Irrigation, Archaeology and Forest and the Executive Engineer of the Road Development Authority. The Divisional Secretaries and Grama Niladaris expressed that this development is good. They highlighted the need of a proper drainage system along the road with other concerns that need to be addressed during project implementation. The officers at the Dambulla Economic Centre highlighted the need of developing the road to a five-lane status close to the Economic Centre as there are many vehicles arriving to the Centre. Officers of the Departments of Archaeology, Forest and Irrigation raised their concerns on the development activities and advised to carry out the development work by incorporating their suggestions. Especially the officer of Forest Department highlighted the importance of saving the existing road side trees specifically within the forest reserves while officers of Department of irrigation pointed out to maintain the road side drains and lead-away drains to avoid flooding. Further the Officials at the Department of Archaeology highlighted the need of developing the road without affecting the green belt in front of the Dambulla temple. Public who attended the FGD at Dambulla town have suggested one-way traffic diversion to protect the green belt. A summary of views of stakeholders are given in table 8.1 below.

Table 8.1: Key points discussed with stakeholders

| Stakeholder | Key points discussed |
|---|---|
| Divisional Secretary, Dambulla | Development is good and there is no issue as there is no acquisition. It is good to have a meeting with all stakeholders and public prior to the road development close to the Dambulla town and near the temple. The drainage system at 72km and in front of the temple needs to be rehabilitated and storm water needs to be diverted to the Thammanna stream. |
| Divisional Secretary, Naula | The road has not been developed for many years. There are many heavy vehicles traveling along the A009 road, especially in transporting vegetables to the Economic Centre and transporting sand from Manampitiya and Mahiyangana. Between 59-60km, close to the Serudandapola temple, the bridge is narrow, and it gets flooded during the rainy season. |
| Irrigation Engineer Dambulla | There is one river crossing A009, which is Dambulu Oya belonging to the Mahaweli Authority. The road gets flooded due to lack of maintenance. |
| Zonal Officer, Department of Archaeology, Dambulla | The Dambulla temple is a world heritage site and it is located close to the A009 road. Thus, road development should be carried out without affecting the green belt in front of the temple. There needs to be an impact assessment, and this can be done prior to the construction of the road. The design should be submitted to the department with an application. Approval will be granted after discussions are held. |
| Site Forest Officer, Naula | The forest reserve is Dambulu Oya and it is a commercial plantation. There are no animal crossings. Waste should not be disposed on forest land. The RDA need to take the responsibility not to let laborers adversely impact the forest. |
| President, Chamber of Commerce, Economic Center, Dambulla | Around 15,000 people and around 1500 to 2500 vehicles come to the Economic Center daily. The parking area belongs to the UDA. It is important to develop the road in front of the Center to five lanes. There is sufficient space to do this. One lane should be dedicated to park vehicles coming to the Economic Center. The road development plan in the Dambulla town area needs to be discussed with the Officers of the Economic Center, prior to implementation. |
| Executive Engineer, RDA | There's enough RoW to develop the road. The central expressway and proposed railway projects will cross the road at Yapagama. |
| Grama Niladari, Dambulla Town | Developing a drainage system only is not enough for road development. Leader way canals should be provided in places where required. Accidents take place at Kandalama, and Kapuwatta junctions and close to the Yapagama temple. Most of the culverts should be replaced with more capacity. The drains along the road from Naula to Dambulla should be developed. |
| Grama Niladari, Naula | Consider about leader way canals as well as the drainage system along the road. Suggests cutting the trees by the road as the roots of one side is removed, the trees can easily fall. The road gets flooded when two lakes near Bibila junction overflows. |

250. One on one interviews were conducted with all the people contacted through the household survey. All most all the people welcomed the development project. A sample of ideas expressed are provided in Appendix 8.1. Many people highlighted the issue of not having a proper drainage system along the road. People also expressed the need of road safety features and issues that can arise during construction period.


8.2. Focus Group Discussions (FGDs)


251. The FGDs were conducted to get the ideas of the community. Eight (8) FGDs were conducted with public living alongside the road. The table 8.2 below presents the information on FGDs conducted with the number of people who participated according to gender whereas table 8.3 contains a summary of matters highlighted in the FGDs.



Table 8.2: The Summary of Attendance at FGDs



| Item No. | Date | Location | Target Group | Total Number of Participants | Males | Females |
|----------|------------|----------------|-------------------|------------------------------|-------|---------|
| 1 | 27.06.2020 | Serudhandatota | Community Members | 19 | 16 | 3 |
| 2 | 26.07.2020 | Dambulla Town | | 14 | 12 | 2 |
| 3 | 27.07.2020 | Kapuwaththa | | 12 | 9 | 3 |
| 4 | 27.07.2020 | Kiralagolla | | 14 | 6 | 8 |
| 5 | 27.07.2020 | Moragollewa | | 12 | 11 | 1 |
| 6 | 26.07.2020 | AmbulAmbe | | 16 | 7 | 9 |
| 7 | 26.07.2020 | Yapagama | | 8 | 5 | 3 |
| 8 | 27.07.2020 | Pannampitiya | | 11 | 8 | 3 |



Table 8.3: Summary of Key Points Discussed in FGDs with Photographs

| Location | Key points | Photographs |
|----------------|---|---|
| Serudhandatota | <ul style="list-style-type: none"> The section of the road between 58km up to the culvert near Sumanaramaya is on a higher elevation than the lands on both sides of the road. The capacity of the drainage system in this section is not sufficient. Due to this, the water flows onto land on both sides of the road. This needs to be considered when developing the road. The culverts in the above section of the road (4/59 and other culverts) need to be replaced as those lack the required capacity. Water flows onto lands in the vicinity causing soil erosion. The culverts need to be guarded with guard rails. Pedestrian crossings are needed in front of the temple and at the Mahaweli junction. Bus bays are needed on both sides at the Mahaweli junction and there is sufficient space for this. There need to be concrete slabs for the |  |

| Location | Key points | Photographs |
|---------------|---|--|
| | <p>access roads.</p> <ul style="list-style-type: none"> • Speed boards need to be incorporated in required places. • Prior to commencement of the road construction, it is good to inform community leaders and shops located on both sides of the road. • Road safety sign boards and nighttime visibility need to be considered during the period of construction. The unsafe trees along the road need to be felled. • RDA needs to coordinate with other organizations like the Water and Electricity boards regarding construction. • During construction, there can be traffic issues, dust and possible loss of income for vendors as vehicles do not stop. RDA needs to mitigate these issues. | |
| Dambulla Town | <ul style="list-style-type: none"> • Around 71-72km section, the culverts do not have sufficient capacity and water flows into houses of residents. This needs to be considered. • The drainage system along the road needs to be properly constructed and maintained. • When providing access, at least 15 feet concrete slabs need to be provided. • Residents in this section have deeds for their land. However, land belonging to Dambulla temple and lands are limited to 80p. Thus, if there's any acquisition, we do not like to give lands. • The section of the road between 71km-72km is narrow and accidents take place due to this. • The section of the road in front of the temple should provide parking for customers who come to shops established for the temple. • There need to be a guard rails and pedestrian crossings with sign boards in front of the temple. • During construction, there will be dust which will affect the businesses close to the road. Thus, control of dust is necessary. • The public should be aware of the road development and RoW. • The green belt can be protected if the road is developed for one-way traffic. New Padeniya road also can be considered. |  |

| Location | Key points | Photographs |
|-------------|--|---|
| Kapuaththa | <ul style="list-style-type: none"> • Kapuaththa village is around the 67-69km. point. • When the road was developed by a Korean company, the culverts have been changed and the culverts in this section do not have sufficient capacity. • The drainage system needs to be constructed properly and concrete slabs should be provided for the access roads. • The road gets flooded between 67-68km and the culvert between 68-69km overflows on rainy days. • The accidents take place around 67km. It is good if the bend at this km is straitened. Sign boards also need to be placed. • There are vendors by the roadside in this section. They can take back their structures for the development work. • When taking decisions on road construction, people in the area also need to be informed. • The road should not be damaged for other construction work after development. • The dust during the construction period will cause health problems to the residents and will impact shops. Dust need to be controlled properly. It is good if the period of construction can be shortened. |  |
| Kiralagolla | <ul style="list-style-type: none"> • The road in this village is around 65-67km. • Development of the road is necessary. The number of vehicles using this road has drastically increased compared to a decade ago. By developing the road, all users of the will benefit. • The drainage system should be constructed properly. The water flows onto the road on rainy days. • Some business places along the road have been constructed over 40 years ago. If land is acquired, compensation needs to be paid. • Accidents take place near the bridge in this section of the road. • There needs to be a system to control dust, manage traffic and discipline laborers during the period of construction. • It is good to provide opportunities for local people to get employment in the project. • Sign boards are required indicating narrow culverts. • It is important to inform public about road construction work. |  |

| Location | Key points | Photographs |
|-------------|--|---|
| Moragollewa | <ul style="list-style-type: none"> • The drainage system is not properly maintained. Due to lack of capacity in existing culverts, the water flows onto the road on rainy days. • There are five culverts between Dambullu Oya and Kapuwatta temple, which need to be replaced. • Some sections of the road get on rainy days (62km to Kapuwatta temple) • The road sign boards should be placed. • Road development is good. Pedestrians face lot of issues during the rainy season. Accidents will reduce once the road is widened. • Pedestrian crossings are required close to Kapuwatta Temple and the Polysac Company. • There will be traffic and dust during construction. These issues need to be mitigated. • Public needs to be informed about road construction work. • Electricity and Water Boards should not damage the road after the construction. • It is good if the project can provide opportunities to local laborers. • Vehicles transporting soil to the project should be covered. |  |
| Ambulambe | <ul style="list-style-type: none"> • Ambulambe village is located around 63-65km. • Heavy vehicles cannot get to the shoulder of the road, as it sinks. It is said that when the A009 road was constructed, a part of a lake was there and that is why it sinks. • The road is not properly maintained. • The drainage system of the road is not good. The culverts do not have sufficient capacity and water flows onto the road on rainy days. The water needs to be diverted to Meedanda Oya (63-64km). • The shops can be shifted back. However, the road needs to be developed with a shoulder to facilitate commercial activities. • Accidents take place close to the Timber Cooperation due to the bend. This needs to be straightened and road signs should be placed. • The road construction is important for daily and livelihood activities. • A pedestrian crossing is needed for the area where there are shops. • There will be traffic and dust during construction. This need to be controlled. • Tree replantation is important in place of the |  |

| Location | Key points | Photographs |
|--------------|--|---|
| | <p>trees that have been felled. The responsibility of maintaining trees can be provided to residents in the area.</p> <ul style="list-style-type: none"> • It is good if the project can provide sheltered bus stops near schools. • It is good to finish road construction activities within a short period. | |
| Yapagama | <ul style="list-style-type: none"> • This village is located within 70-71km. • The maintenance of this road is not good. Many culverts in this section are broken. • The drainage system along the road is not good. This needs to be considered when developing the road. • Concrete slabs should be provided for access. • Accidents take place at Idigolla junction. • The water that flows on the road needs to be diverted to Thammananna stream. • The shops can be shifted back if needed for the development work. • The road development is good. When the road is developed, the shops can be renovated. • Pedestrian crossings are needed at Sumangala junction, Mahaweli junction and close to the Ayurveda hospital. Road sign boards are also needed. • The dust during construction will have an adverse impact to the health of public and the items displayed in shops will also be affected. • The directions of water flow have been changed. Therefore, it is better to study this before commencing the construction work of the road. • Road construction should be monitored. |  |
| Pannampitiya | <ul style="list-style-type: none"> • This village is located around 62-64km. • The road between Lenadora Junction and the Timber Cooperation was built on a lake long time ago. Due to this, the road sinks at some locations. • The culverts and drains need to be reconstructed or renovated? • There are three lakes close to the road and when the lakes overflows, water flows along the road. This needs to be considered when developing the road. • Accidents take place between Pannampitiya junction and Athabandi Wewa road. • The bend in front of the Aramaya needs to be straightened. • Road sign boards and/or an overhead bridge is required near the school. |  |

| Location | Key points | Photographs |
|----------|---|-------------|
| | <ul style="list-style-type: none"> • The vendors by the roadside will be impacted during construction as people do not like to stop their vehicles. There will be dust as well. These impacts during construction need to be considered. • It is better to finish construction activities within a short period. • Priority should be provided to local laborers in the project. | |

CHAPTER 9: CONCLUSION AND RECOMMENDATIONS

252. This Initial Environmental Examination report discuss various aspects of the proposed rehabilitation and maintenance of nearly 14.71km of the section from Naula (58km) to Dambulla (72.71km) of the Kandy - Jaffna (A009) road under of iRoad program implemented by RDA under ADB funding. Under the RMC package, contractors are liable to keep the roads in operational status for approximately 5 years after rehabilitation.

253. As discussed, the selected section of the A009 road will be rehabilitated and maintained under the project. All construction and maintenance activities will be restricted to the available RoW. Therefore, no land acquisition shall be required. The road will be improved to a two lanes status with hard shoulders, drains and other road furniture from 58 to 71.8km while four lane and five lane configurations are proposed from 71.8 to 72.025km and 72.025 to 72.71km respectively.

254. The selected section of the of A009 road does not cross or is located adjacent to protected wildlife areas. However, the road is located across Dambulu oya forest reserve which provides unique land use along the road. The canopy cover within the forest is significant with respect to the comfort of the road users, as well as habitats for fauna and flora. In addition, there are shady trees located along this section which also serve in a similar manner. Therefore, these trees shall be protected under the project.

255. The selected section of the A009 road traverses adjacent to the Dambulla Cave Temple which is a UNESCO World Heritage Site. Although this section of the road is not located within the World Heritage Site, it crosses the buffer zone of the site which is declared by DOA. Therefore, the project shall be implemented with the prior approval of DOA. Construction activities shall be carried out under the direct supervision of DOA. Further, special considerations as mentioned in the Chapter 5 will need to be taken to reduce the indirect impacts such as vibration at these locations.

256. The project induced social impacts are not significant as the project does not allow acquisition of land for the road rehabilitation work. However, the temporary huts belonging to vendors built within the ROW shall be shifted back with minimum impact to their livelihood. Indirect impacts to environmental and social set up of the project area will be minimized with effective mitigation measures as given in Chapter 5 of the report and EMP.

257. An EMP, EMC and EMOP have been prepared as part of this report. These are required to be updated and incorporated into tender documents and converted into contract package specific documents before the commencement of construction activities.

258. In compliance with the SPS, 2009 of ADB, this project is categorised as Category B and on the other hand this is a Non – Prescribed project as per the NEA. Therefore, no further assessments are required for securing environmental clearance.

259. The proposed improvement for A009 Road will increase the efficiency of transportation and also will boost economic activities in the Dambulla and Naula areas, including potential growth in industries, tourism and agriculture in lagging rural areas. This will be a positive step towards the socio-economic development of the country.

RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

Instructions:

- (i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES), for endorsement by the Director, RSES and for approval by the Chief Compliance Officer.
- (ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Project Title:

Integrated Road Investment Program (iRoad) - Road Management Contract (RMC) package

Sub project:

Rehabilitation and maintenance of the Naula (58km) – Dambulla (72.71km) section of the Kandy – Jaffna (A009) Road

Sector Division:

Roads & Highways

Project Location:

Administrative divisions which are crossed by the Naula – Dambulla section of the Kandy - Jaffna (A009) Road are given below.

Province: Central
 District: Matale
 Divisional Secretariat Divisions: Naula and Dambulla

| Screening Questions | Yes | No | Remarks |
|---|-----|----|---------|
| A. Project Siting Is the project area adjacent to or within any of the following environmentally sensitive areas? | | | |

| Screening Questions | Yes | No | Remarks |
|--|-----|----|--|
| ▪ Cultural heritage site | ✓ | | The Naula – Dambulla section of the A009 road traverses adjacent to the Dambulla Cave Temple which is a UNESCO World Heritage Site. This temple is located on the left side of the road around 70.7km – 71.7km. However, the boundary of the site is approximately 90m away from the edge of the road. The proposed road rehabilitation activities do not involve the heritage site. |
| ▪ Protected Area | ✓ | | The proposed section of the A009 Road crosses Dambulu Oya forest reserve from 64.3km to 65.1km. However, the forest will not be impacted as all road rehabilitation work are restricted to the existing right of way (ROW). |
| ▪ Wetland | | ✓ | |
| ▪ Mangrove | | ✓ | |
| ▪ Estuarine | | ✓ | |
| ▪ Buffer zone of protected area | | ✓ | |
| ▪ Special area for protecting biodiversity | | ✓ | |
| B. Potential Environmental Impacts Will the Project cause... | | | |
| ▪ Encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills and quarries? | | ✓ | |
| ▪ Encroachment on precious ecology (e.g. sensitive or protected areas)? | | ✓ | |
| ▪ Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site? | ✓ | | Altered drains and canals shall be restored within the existing right of way (ROW). Site specific mitigation measures shall be applied to minimize siltation impact to water bodies. |

| Screening Questions | Yes | No | Remarks |
|--|-----|----|--|
| <ul style="list-style-type: none"> Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction? | ✓ | | Establishment of silt traps, silt trenches to minimize siltation impact, providing adequate facilities for sanitary management to labor camps and storing of chemicals in sealed containers will mitigate these impacts. |
| <ul style="list-style-type: none"> Increased local air pollution due to rock crushing, cutting and filling work, and chemicals from asphalt processing? | ✓ | | <p>Activities such as cutting and filling, rock blasting etc... will not be carried out under the RMC package. Therefore, impact due to above activities will not be experienced.</p> <p>However temporary impact due to asphalt processing will be possible at asphalt plants. These impacts are restricted to such plant sites. Erection of noise and dust barriers, dampening the surfaces which can emit dust, using the exact amount of chemicals for bitumen processing and most importantly, siting the asphalt plants well away from protected areas and sensitive sites such as settlement areas, temples and schools will mitigate the impact from asphalt plants.</p> |
| <ul style="list-style-type: none"> Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation? | ✓ | | It is proposed to prepare a separate health and safety plan to be implemented during the period of road maintenance. A regular monitoring schedule is to be proposed under close supervision and coordination of a professional Occupational Health & Safety Officer of the Project Implementation Consultant. |
| <ul style="list-style-type: none"> Noise and vibration due to blasting and other civil work? | ✓ | | Site specific measures to minimize noise and vibration resulted due to civil work with special attention to archaeological sites along the road will mitigate this impact. |
| <ul style="list-style-type: none"> Dislocation or involuntary resettlement of people? | | ✓ | |
| <ul style="list-style-type: none"> Disproportionate impacts on the poor, women and children, indigenous people or other vulnerable groups? | | ✓ | |

| Screening Questions | Yes | No | Remarks |
|---|-----|----|---|
| <ul style="list-style-type: none"> Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress? | | ✓ | |
| <ul style="list-style-type: none"> Hazardous driving conditions where construction interferes with pre-existing roads? | ✓ | | <p>This impact is possible during transportation of asphalt concrete to the site through existing roads.</p> <p>Adequate awareness will be made among the construction staff including drivers. They will be educated in order to minimize hazardous driving conditions along such roads.</p> <p>The Contractor will be advised to use alternative roads to avoid roads which are heavily used by the public.</p> |
| <ul style="list-style-type: none"> Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations? | ✓ | | <p>During the construction phase, using local labour to the possible extent, briefing the workers on sanitation, communicable diseases, providing proper sanitary facilities and providing a proper waste disposal system at worker camps are measures to mitigate this impact. Site specific environmental management action plans will be necessary in order to mitigate specific impacts to such labor camps.</p> <p>Further, it will be ensured that labor camps, yards or any other site which emit solid waste or wastewater will not be located within or adjacent to the protected areas as given in section A.</p> |
| <ul style="list-style-type: none"> Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents? | | ✓ | |

| Screening Questions | Yes | No | Remarks |
|--|-----|----|---|
| <ul style="list-style-type: none"> Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials? | ✓ | | <p>Using sign boards, barricades and other safety measures along the road during overlaying, informing the public on possible hazards in advance and using PPE for the staff engaged in maintenance activities will minimize this impact.</p> <p>Storing of toxic material will be required only in asphalt plants and they should be stored in well secured containers with labels. Necessary first aid facilities and firefighting equipment should be available at these sites.</p> |
| <ul style="list-style-type: none"> Increased noise and air pollution resulting from traffic volume? | ✓ | | <p>Adaptation of speed limits for construction vehicles. Timely servicing and maintaining these to the given standards will reduce the volume of emissions and noise levels to the surroundings. Frequent monitoring of noise levels and air quality will support to review the effectiveness of the mitigation measures.</p> <p>Smooth and steady flow of traffic along the road during the operational phase will ensure that the emissions and noise is kept below the maximum permissible levels.</p> |
| <ul style="list-style-type: none"> Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road? | | ✓ | |
| <ul style="list-style-type: none"> Social conflicts if workers from other regions or countries are hired? | | ✓ | |
| <ul style="list-style-type: none"> Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)? | | ✓ | |
| <ul style="list-style-type: none"> Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? | | ✓ | |

| Screening Questions | Yes | No | Remarks |
|--|-----|----|---------|
| <ul style="list-style-type: none"> Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning. | | ✓ | |

A Checklist for Preliminary Climate Risk Screening

Project Title : Road Management Contract (RMC) Package of iRoad Project of Sri Lanka
Naula – Dambulla section of the Kandy – Jaffna (A009) Road

Sector : Roads & Highways

| Screening Questions | | Score | Remarks ¹ |
|---------------------------------------|--|-------|--|
| Location and Design of Project | Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather-related events such as floods, droughts, storms and landslides? | 1 | Including Dambulu Oya crossing at 66.2km, there are several locations which get flooded during heavy rainy periods along this road. The area around the culverts 59/2, 59/6, 60/1, around 59.7km, 67km – 69km, 71km – 72km are examples of locations of such local floods. |
| | Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)? | 1 | Project design will need to consider locations which are prone to floods and necessary mitigation measures need to be incorporated. |
| Materials and Maintenance | Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)? | 0 | |
| | Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)? | 0 | |
| Performance of project outputs | Would weather/climate conditions and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time? | 0 | |

¹ If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Options for answers and corresponding score are provided below:

| Response | Score |
|-------------|-------|
| Not Likely | 0 |
| Likely | 1 |
| Very Likely | 2 |

Responses when added that amount to a score of 0 will be considered a low-risk project. If adding all responses will result in a score of 1-4 and that no score of 2 was given to a single response, the project will be assigned as a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or 2 in a single response will be categorized as a high-risk project.

Result of Initial Screening: Medium Risk

Project Classification:

Proposed Environmental Classification: **B**

Remarks

A009 Road is an existing trunk road and will be rehabilitated and maintained to the given standards during the t period of the project under the Road Management Contract (RMC) package of iRoad of the Road Development Authority (RDA). The scope of the project includes improvement of the road surface with asphalt concrete, improvement of drainage where necessary and maintaining the road to the given standards. All activities related to rehabilitation and maintenance will be restricted to the existing right of way (ROW) of the road. Therefore, it is obvious that the proposed project will not encroach onto the protected sites or cause significant environmental issues as mentioned in the section A of the checklist.

In addition, site specific mitigation measures shall be implemented under the project adjacent to archaeological sites and forest areas in order to avoid/minimize adverse impacts in collaboration with the Departments of Archeology and Forestry.

Therefore, it is proposed that the project can be classified as Category B.

Prepared by:

Environmental Specialist
Institute for Participatory Interaction in Development

ENVIRONMENTAL CHECKLIST

INTEGRATED ROAD INVESTMENT PROGRAMME (iROAD)

Road Name: Improvement, rehabilitation and maintenance of the Naula (58km) to Dambulla (72.71km) section of the Kandy – Jaffna (A009) road

Road ID: A009

District Name: Matale

Divisional Secretary Divisions: Naula and Dambulla

Total Length of the Road: 14.71km

Climatic Conditions

| | |
|--------------------------|---|
| Temperature | Mean annual temperature: 25 – 27.5°C |
| Humidity | High: 90% Low: 64% |
| Rainfall Rainy Season | Mean annual rainfall: 1500 - 2000 mm/year Main rainfall season: November to February |

(Source: National Atlas, Second Edition, Department of Survey, Sri Lanka, 2007)

A. Location of the Road and Generic description of Environment

| No: | Type of Ecosystem | Yes | No | Explanation |
|-----|--|-----|----|---|
| 1. | Type of Terrain (Plain/ Undulating/ Hilly/ Mountainous etc.) (Explain the topography of the area and how many km of the road are located in the hilly area) | √ | | Altitude: In general, the road traverses along a flat terrain and elevation of the trace varies between 120 - 170m MSL. |
| 2. | Forest Area / Mangrove / Other natural habitats (Explain whether the road passes through forest areas or located along the forest areas and distance from shoulder to the forest area)? | √ | | Dummalakele forest reserve is found about 250m interior on the LS of the road from the starting point to 60.5km (figure 4.6). This forest has the Menikdena Archaeological reserve and Arboretum which are about 2.5km inwards from the road. Embulambe forest reserve also touches LS of the road around 63.9km. |
| 3. | Inhabited Area | √ | | The road runs through a residential area. |
| 4. | Agricultural Land | √ | | Agricultural lands are found in between residential areas of along the road. |
| 5. | Barren Land | | √ | |

B. Specific description of the Road Environment

| No. | Parameter/ Component | Yes | No | Explanation |
|-----|--|-----|----|--|
| 1. | Are there any areas with landslide or erosion problems along the road? (If yes, indicate the location whether Right or Left side and the chainage) | | √ | |
| 2. | Are there any Tanks/streams /rivers etc. along/crossing the road or any lakes/swamps beside the road? (If yes, list them indicating the location Right/ Left or crossing and the chainage) | √ | | Dambulu Oya comes to the road side (about 80m away from the right side of the road) at around 64km and crosses the road at 66.2km over the bridge No. 67/1 |
| 3. | Is the area along the project road prone to flooding or any problems of water stagnation and other drainage issues? (If yes, mention chainage, flood level and frequency) | √ | | Following locations are prone to floods during heavy rain season (Nov to Feb); <ul style="list-style-type: none"> • Dambulu Oya crossing at 66.2km • The area around the culverts 59/2, 59/6, 60/1, around 59.7km, 67km – 69km, 71km – 72km |
| 4. | Are there any trees with a girth of 600mm or more at breast height within the existing ROW (within two fences on either sides) or within 2 m corridor from the edge of the carriageway on either side (if the existing ROW is not clear)? (If yes attach list of trees indicating the location (Right or Left side) and the chainage) | √ | | 70 trees were observed within the existing ROW during the field reconnaissance as given in DV. Tree replanting with suitable native species as specified in Environmental Management Plan (EMP) is recommended to compensate the impact due to trees removal. |
| 5. | Along the road and within 100 m of the road shoulder, are there any Faunal habitat areas, Faunal breeding ground, bird migration area, or other similar areas? (If yes, specify details of habitat with chainage) | √ | | Forest reserves as mentioned in A.2 above, act as habitats for flora and fauna species of the area. |
| 6. | Along the road and within 100m of the road shoulder is there any evidence of Flora and Fauna species that are classified as endangered / threatened species? | | √ | During the field reconnaissance, such species were not observed along the study corridor and further, no secondary information is available and local community is not aware of this matter |

| No. | Parameter/ Component | Yes | No | Explanation |
|-----|---|-----|----|---|
| 7. | Are there any utility structures ¹ within 2 m on either side from the centre line of the road alignment or within the existing ROW of the road? (If yes, attach list with chainage) | √ | | 46 electrical poles on RHS while 51 on Left Hand Side (LHS) were observed within the ROW. |
| 8. | Are there any religious, cultural or community structures/buildings ² within 50 m on either side from the centre line of the road alignment? (If yes attach list with chainage) | √ | | Community structures as given in DII are observed along the road. |

C. Public Consultation

| No. | Consultation Activities | Yes | No | Remarks |
|-----|---|-----|----|--|
| 1. | Consultation with local community was conducted before finalizing the alignment. (Attach list of people met and dates) | √ | | Please refer the Chapter 8 of the IEE Report. |
| 2. | Any suggestion received in finalizing the alignment and road related environmental issues | √ | | |
| 3. | If suggestions received, were they incorporated into the design? | √ | | Particular suggestions will be incorporated to the project during the detail design. |

D. Please attach the following:

- I. List of utility structures located within the study area (within exiting ROW or within 2m corridor of either sides of the road from the edge of the carriageway if the ROW is not clear) indicating location and side of the road (Right Side (RS) or Left Side (LS)) as required under B.7.

| Location (km) | Utility type | Side of the road | |
|---------------|------------------|------------------|----|
| | | LS | RS |
| 58 – 60 | Electrical poles | 6 | 8 |
| 60 - 65 | Electrical poles | 15 | 21 |
| 65 - 70 | Electrical poles | 17 | 18 |
| 70 – 72.71 | Electrical poles | 8 | 4 |

- II. List of community structures indicating location (left or right side of the road) and chainage (as required under B.8)

¹ Water tap, hand pump, electric pole, telephone pole, pipe lines and other similar structures

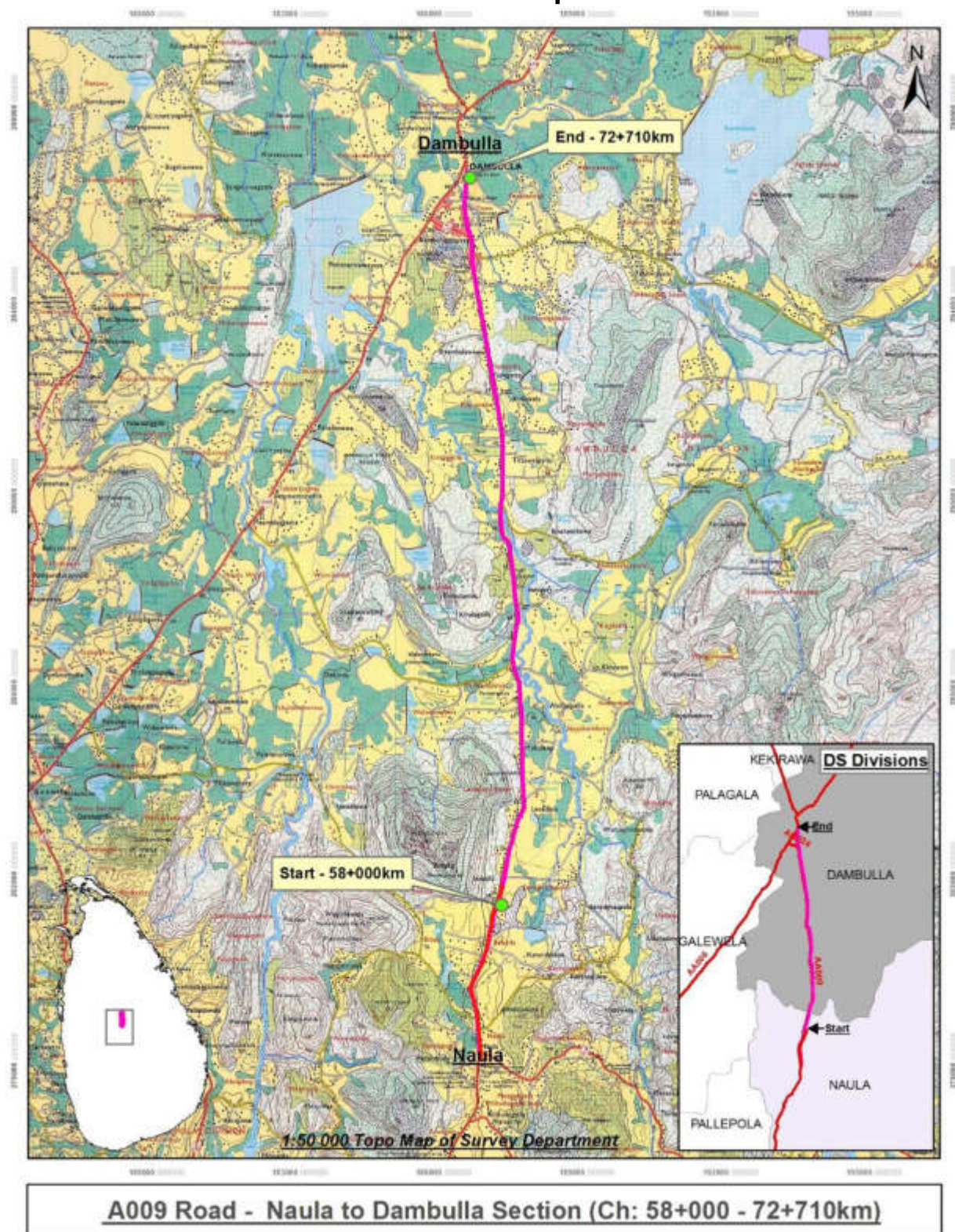
² Religious/cultural/historical monuments, school, health centre, public toilet and other similar structures

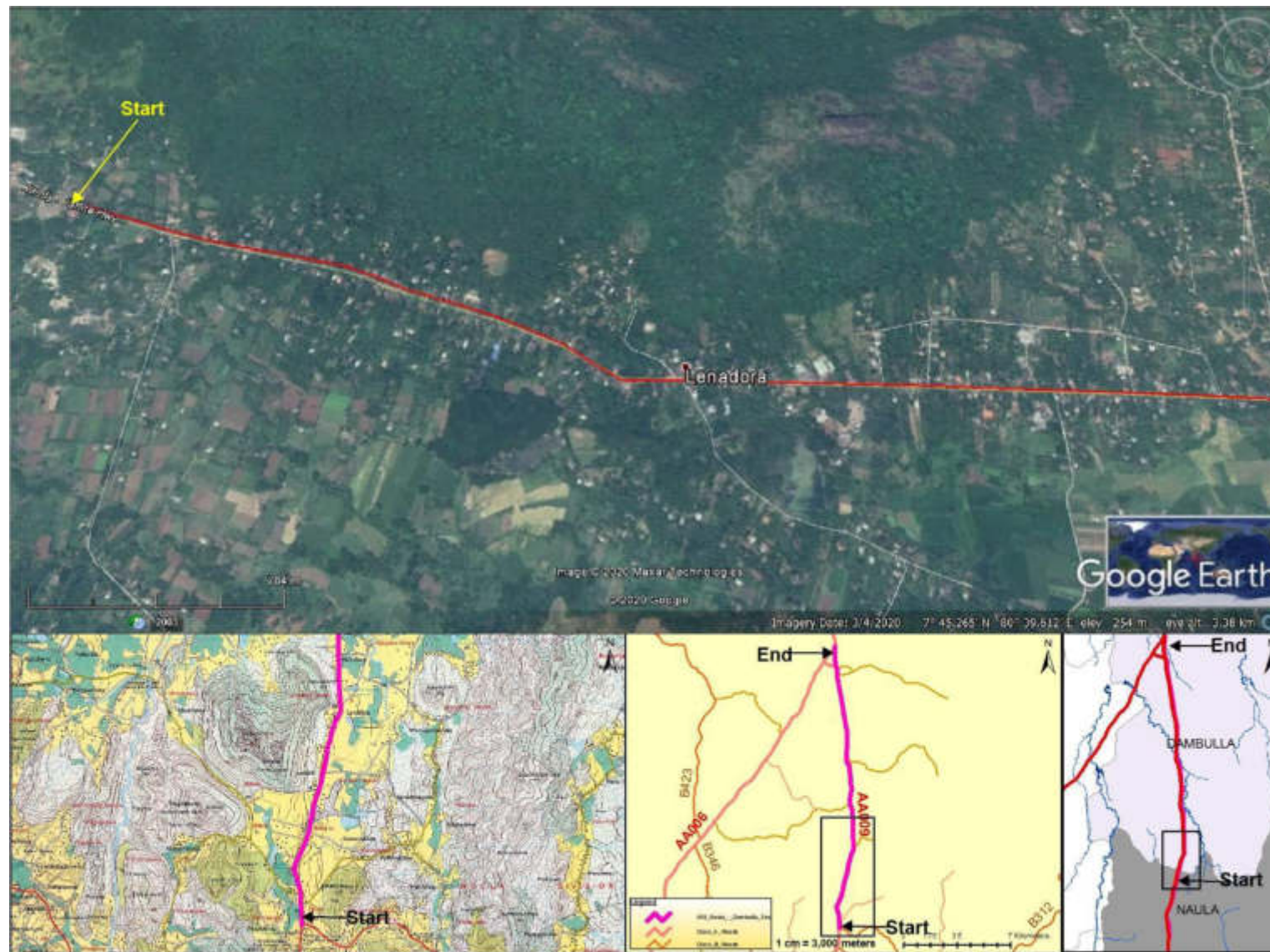
| S/N | Chainage (km) | Type of common/Government property | Road side |
|-----|---------------|------------------------------------|-----------|
| 1 | 58.0 | Temple | LS |
| 2 | 59.4 | Lenadora Primary school | LS |
| 3 | 61.0 | Pre School | RS |
| 4 | 62.3 | Anularamaya Temple | LS |
| 5 | 62.8 | Maliayadeva Primary School | LS |
| 6 | 62.8 | Pannampitiya Maha Viddyalaya | LS |
| 7 | 65.1 | Subhoddaramaya Temple and Shrine | LS |
| 8 | 65.7 | Kiralagolla Primary School | RS |
| 9 | 67.0 | Sri Anandaramaya | RS |
| 10 | 68.8 | Thiitawelgolla Primary School | RS |
| 11 | 71.0 | Dambulla Golden Temple | LS |

- III. Project location map is attached in Appendix 2.1 of the IEE Report.
- IV. Photographs of the project area showing at least 2 m on either side from centre line of road alignment – Please refer to the Chapter 4 of the IEE Report.
- V. List of trees with 600mm of girth (at breast height) or more located within the existing ROW or within 2m on either side of the road from the edge of the carriageway as required in B.4.

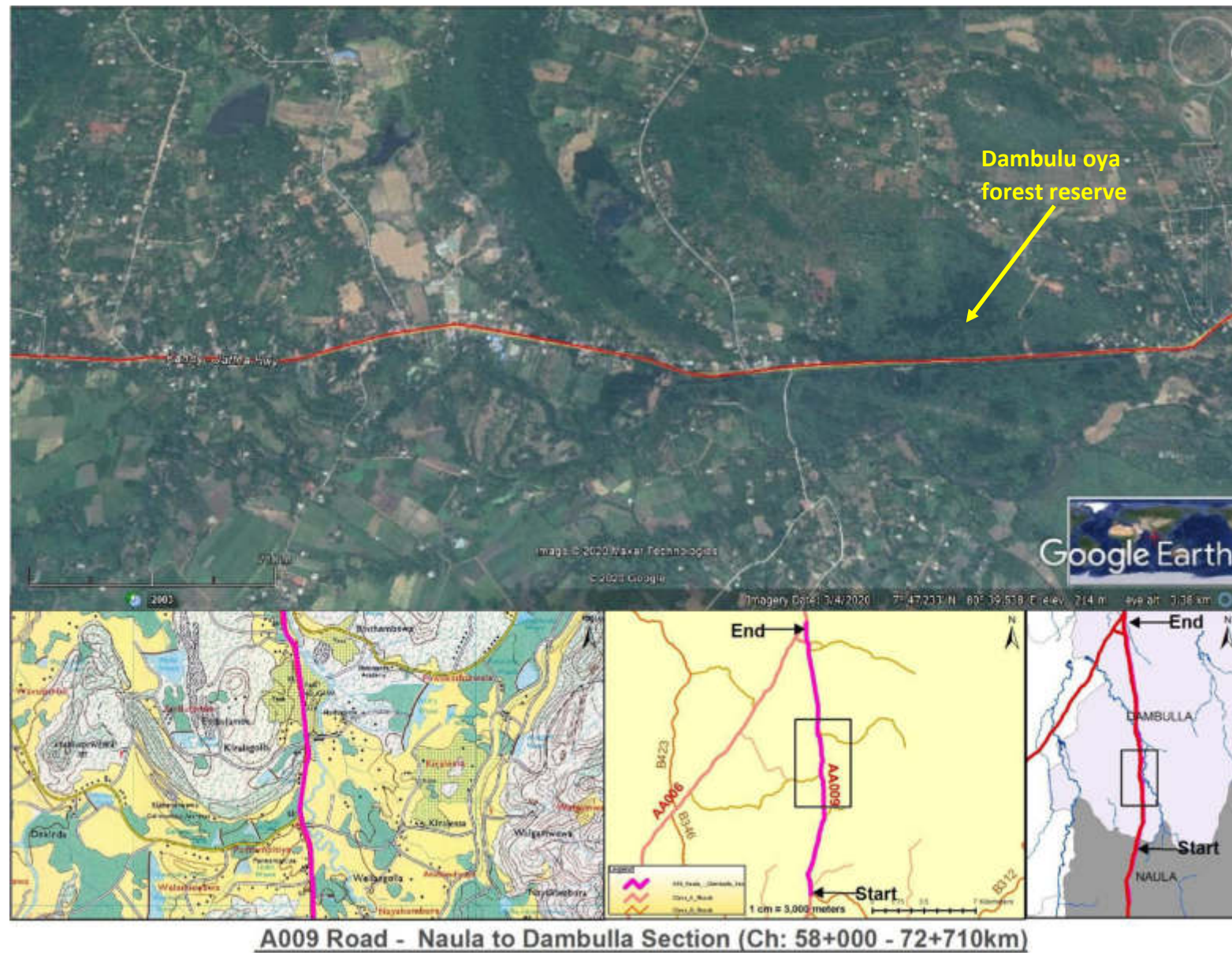
| Chainage (km) | LHS | | | RHS | | |
|---------------|-------------|---------------------------|--------------|-------------|---------------------------|--------------|
| | Common Name | Botanical name | No. of trees | Common Name | Botanical Name | No. of trees |
| 58 – 60 | Rain tree | <i>Samanea saman</i> | 8 | Rain tree | <i>Samanea saman</i> | 7 |
| 60 - 65 | Kolon | <i>Haldina cordifolia</i> | 2 | Rain tree | <i>Samanea saman</i> | 5 |
| | Rain tree | <i>Samanea saman</i> | 11 | Tamarind | <i>Tamarindus indica</i> | 4 |
| | Tamarind | <i>Tamarindus indica</i> | 5 | Kon | <i>Schleichera oleosa</i> | 2 |
| | Neem | <i>Azadirachta indica</i> | 9 | Rain tree | <i>Samanea saman</i> | 14 |
| 65 - 70 | Kon | <i>Schleichera oleosa</i> | 2 | Kottamba | <i>Terminalia catappa</i> | 3 |
| 70 – 72.71 | | | - | | | - |
| Total | | | 37 | | | 33 |

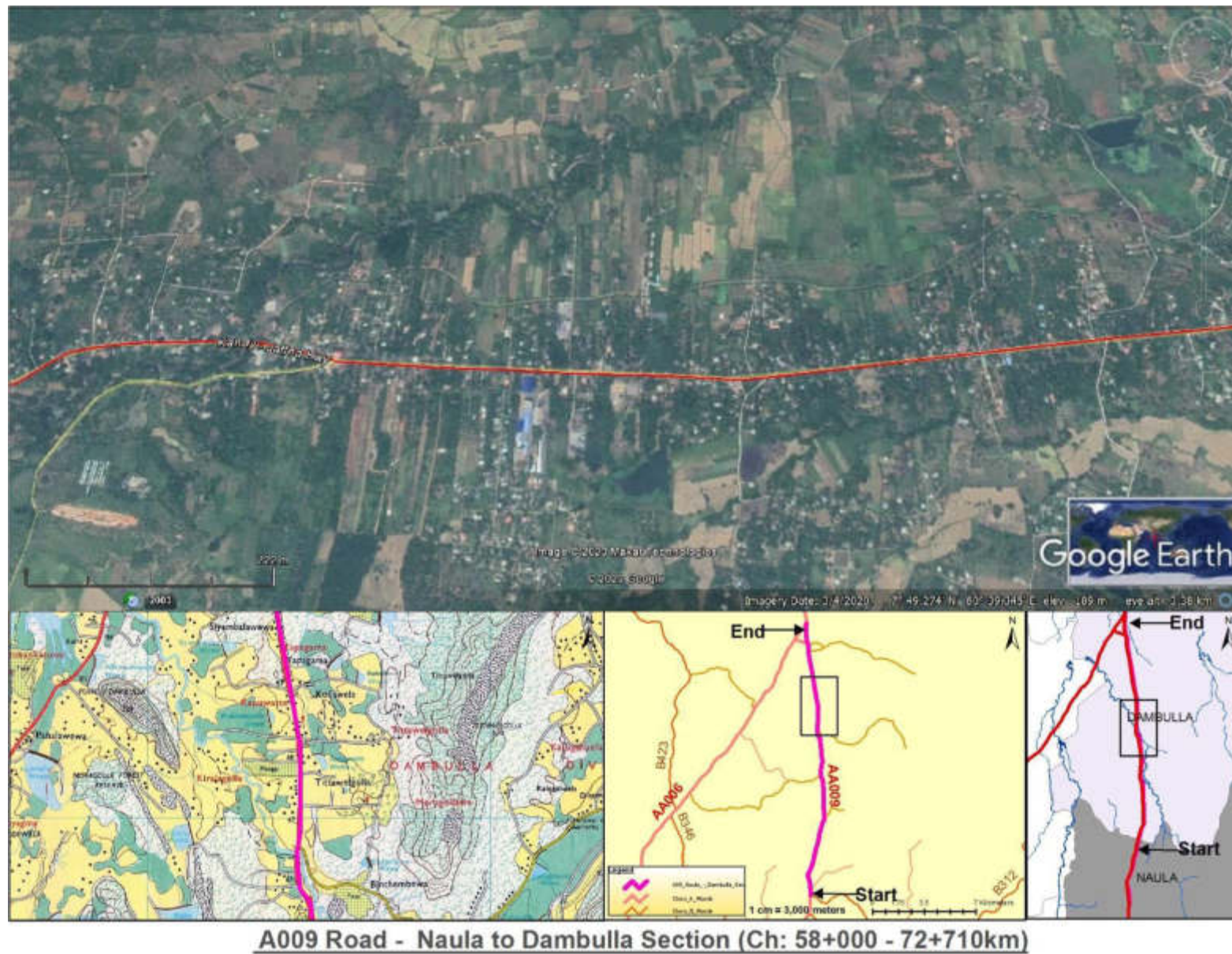
Location Map

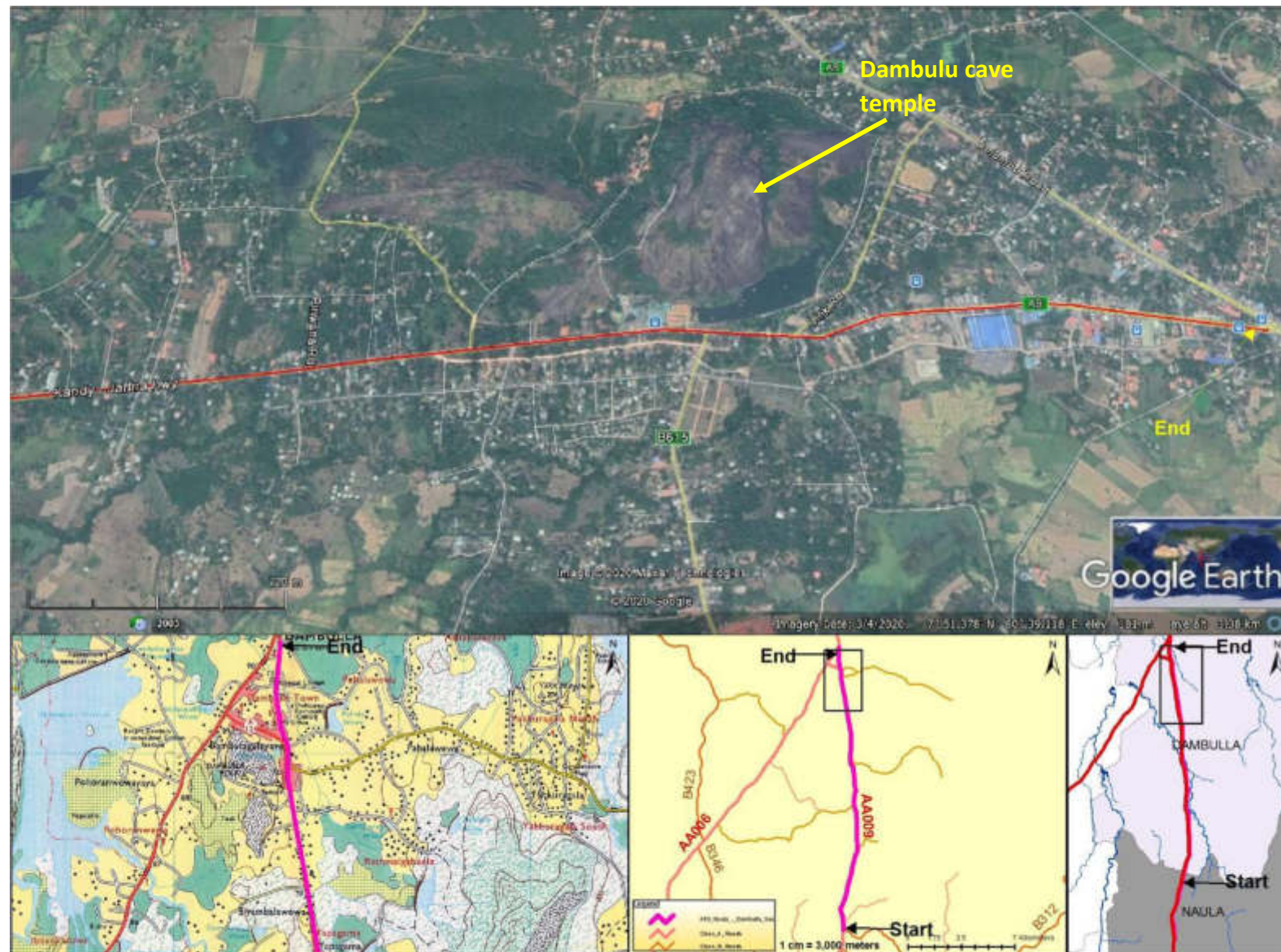




A009 Road - Naula to Dambulla Section (Ch: 58+000 - 72+710km)







A009 Road - Naula to Dambulla Section (Ch: 58+000 - 72+710km)

Culvert Details

C.E's Region
E.E's Region

Road Name & Number- Kandy -Jaffna Road

| Culvert No | Chainage | Culvert Type | | | | Material Used | | | | | | Dimensions of Opening | | No of Opening | Overall width | Invert level from Road surface (m) | | Width of Carriageway | Existing Condition | Structure Condition | Hydrallo condition | Leadaway | Comments | Sketch of Culverts (side views, plan view & other all admensions should be in) |
|------------|----------|--------------|-----|------|-------|---------------|----------|--------|-------|-------|--------|-----------------------|--------|---------------|---------------|------------------------------------|------|----------------------|--------------------|---------------------|--------------------|----------|----------|--|
| | | Hume Pipe | Box | Slab | Other | RCC Pipe | RCC Slab | Rubble | Other | Inlet | Outlet | Inlet | Outlet | | | | | | | | | | | |
| 57/3 | 56/805 | | ✓ | | | | | ✓ | | | | | 1 | | 0.9 | 1.1 | 9.7 | | Good | Free | Free | | | |
| 57/4 | 56/902 | | ✓ | | | | | ✓ | | | | | 1 | | 0.8 | 0.9 | 10 | | Good | Free | Free | | | |
| 58/1 | 57/205 | | ✓ | | | | | ✓ | | | | | 1 | | 0.9 | 0.9 | 9.4 | | Good | Silting | Free | | | |
| 58/2 | 57/230 | | ✓ | | | | | ✓ | | | | | | | 0.6 | 0.7 | 10.7 | | Good | Erosion | Free | | | |
| 58/3 | 57/930 | | ✓ | | | | | ✓ | | | | | | | 1.1 | 1.2 | 1.2 | | Good | Free | Free | | | |
| 59/1 | 58/170 | | ✓ | | | | | ✓ | | | | | | | | | | | Good | Block | Block | | | |
| 59/3 | 58/442 | | ✓ | | | | | ✓ | | | | | 2 | | 1.6 | 1.7 | 9.8 | | Good | Free | Free | | | |
| 59/4 | 58/558 | ✓ | | | | ✓ | | ✓ | | | | | 1 | | 1.75 | 1.85 | 10.1 | | Good | Free | Free | | | |
| 59/5 | 58/624 | | ✓ | | | | | ✓ | | | | | 1 | | 1.34 | 1.38 | 9.5 | | Good | Free | Free | | | |
| 59/6 | 58/854 | | ✓ | | | | | ✓ | | | | | 2\1 | | 1.6 | 1.8 | 7.5 | | Good | Free | Free | | | |
| 59/7 | 58/981 | | ✓ | | | | | ✓ | | | | | 1 | | | | 9.8 | | Good | Block | Block | | | |
| 60/1 | 59-175 | | ✓ | | | | | ✓ | | | | | | | 1.7 | 1.80 | 9.9 | | Good | Free | Free | | | |
| 60/2 | 59/471 | ✓ | | | | ✓ | | | | | | | | | 1.1 | 1.2 | 9.8 | | Good | Free | Free | | | |
| 60/3 | 59/657 | ✓ | | | | ✓ | | | | | | | | | 1.1 | 1.1 | 10.1 | | Good | Free | Free | | | |
| 60/4 | 59/715 | ✓ | | | | ✓ | | | | | | | | | 1.25 | 1.3 | 11.4 | | Good | Free | Free | | | |
| 60/5 | 59/794 | ✓ | | | | ✓ | | | | | | | | | 0.8 | 0.9 | 9.4 | | Good | Block | Block | | | |

Culvert Details

C.E's Region

E.E's Region

Road Name & Number- Kandy -Jaffna Road

| Culvert No | Chainage | Culvert Type | | | | Material Used | | | | | | Dimensions of Opening | | No of Opening | Overall width | Invert level from Road surface (m) | | Width of Carriageway | Existing Condition | Structure Condition | Hydrallo condition | Leadaway | Comments | Sketch of Culverts (side views, plan view & other all adimensions should be in) | |
|------------|----------|--------------|-----|------|-------|---------------|----------|--------|-------|-------|--------|-----------------------|--------|---------------|---------------|------------------------------------|-----|----------------------|--------------------|---------------------|--------------------|----------|----------|---|--|
| | | Hume Pipe | Box | Slab | Other | RCC Pipe | RCC Slab | Rubble | Other | Inlet | Outlet | Inlet | Outlet | | | | | | | | | | | | |
| 60/6 | 59-834 | ✓ | | | | ✓ | | | | | | | | | | | | 9.5 | | Good | Block | Block | | | |
| 60/7 | 59-940 | ✓ | | | | ✓ | | | | | | | | | | | 0.9 | 0.9 | 11 | | Good | Free | Free | | |
| 61/1 | 60-055 | ✓ | | | | ✓ | | | | | | | | | | | | | 10.2 | | Good | Block | Block | | |
| 61/2 | 60-175 | ✓ | | | | ✓ | | | | | | | | | | | 1.3 | 1.4 | 9 | | Good | Free | Free | | |
| 61/3 | 60-542 | | ✓ | | | | | | | | | | | | | | 2.3 | 2.5 | 10.2 | | Good | Free | Free | | |
| 61/4 | 60-661 | ✓ | | | | ✓ | | | | | | | | | | | 1.5 | 1.5 | 11.4 | | Good | Free | Free | | |
| 62/1 | 61-674 | | ✓ | | | | | | | | | | | | | | 2.7 | 2.8 | 9 | | Good | Free | Free | | |
| 62/2 | 61-980 | | ✓ | | | | | | | | | | | | | | 2.9 | 3 | 9.7 | | Good | Free | Free | | |
| 63/1 | 62-640 | | ✓ | | | | | | | | | | | | | | 3.3 | 3.5 | 10.1 | | Good | Free | Free | | |
| 63/2 | 62-765 | | ✓ | | | | | | | | | | | | | | 1.7 | 1.8 | 9.5 | | Good | Free | Free | | |
| 63/3 | 63-845 | | ✓ | | | | | | | | | | | | | | 0.9 | 1 | 9.6 | | Good | Free | Free | | |
| 64/1 | 63-105 | ✓ | | | | | | | | | | | | | | | 1.6 | 1.7 | 11.6 | | Bad | Free | Free | | |
| 64/2 | 63-484 | | ✓ | | | | | | | | | | | | | | 2 | 2.2 | 10.4 | | Bad | Free | Free | | |
| 64/3 | 63-695 | ✓ | | | | | | | | | | | | | | | 1.1 | 1.1 | 11.6 | | Bad | Free | Free | | |
| 64/4 | 63-784 | ✓ | | | | | | | | | | | | | | | 1 | 1.2 | 11.3 | | Good | Free | Free | | |

Culvert Details

C.E's Region

E.E's Region

Road Name & Number- Kandy -Jaffna Road

| Culvert No | Chainage | Culvert Type | | | | Material Used | | | | | | Dimensions of Opening | | No of Opening | Overall width | Invert level from Road surface (m) | | Width of Carriageway | Existing Condition | Structure Condition | Hydrallo condition | Leadaway | Comments | Sketch of Culverts (side views, plan view & other all admensions should be in) | |
|------------|----------|--------------|-----|------|-------|---------------|----------|--------|-------|-------|--------|-----------------------|--------|---------------|---------------|------------------------------------|--|----------------------|--------------------|---------------------|--------------------|----------|----------|--|--|
| | | Hume Pipe | Box | Slab | Other | RCC Pipe | RCC Slab | Rubble | Other | Inlet | Outlet | Inlet | Outlet | | | | | | | | | | | | |
| 65/1 | 64+100 | | | | | | | | | | | | | | 11 | | | 6.63 | | | | | | | |
| 65/2 | 64+ | | | | | | | | | | | | | | 9.2 | | | 6.3 | | | | | | | |
| 65/3 | 64+300 | | | | | | | | | | | | | | 9.4 | | | 6.2 | | | | | | | |
| 66/1 | 65+ | | | | | | | | | | | | | | 8.5 | | | 6.2 | | | | | | | |
| 66/2 | 65+ | | | | | | | | | | | | | | 7.2 | | | 6.2 | | | | | | | |
| 66/3 | 65+900 | | | | | | | | | | | | | | 9.7 | | | 6.1 | | | | | | | |
| 67/2 | 66+200 | | | | | | | | | | | | | | 9.2 | | | 6 | | | | | | | |
| 68/1 | 67+100 | | | | | | | | | | | | | | 9.2 | | | 6.1 | | | | | | | |
| 68/2 | 67+600 | | | | | | | | | | | | | | 9.4 | | | 6.1 | | | | | | | |
| 69/1 | 68+050 | | | | | | | | | | | | | | 9.2 | | | 6 | | | | | | | |
| 69/2 | 68+200 | | | | | | | | | | | | | | 9.7 | | | 6.1 | | | | | | | |
| 69/3 | 68+500 | | | | | | | | | | | | | | 9.1 | | | 6.1 | | | | | | | |
| 70/1 | 69+020 | | | | | | | | | | | | | | 9.1 | | | 6 | | | | | | | |
| 70/2 | 69+200 | | | | | | | | | | | | | | 9.3 | | | 6.1 | | | | | | | |
| 71/1 | 70+030 | | | | | | | | | | | | | | 9 | | | 6.1 | | | | | | | |
| 71/2 | 70+100 | | | | | | | | | | | | | | 9.4 | | | 6.1 | | | | | | | |

Culvert Details

C.E's Region
E.E's Region

Road Name & Number- Kandy - Jaffna Road

| Culvert No | Chainage | Culvert Type | | | | Material Used | | | | | | Dimensions of Opening | | No of Opening | Overall width | Invert/level from Road surface (m) | | Width of Carriageway | Existing Condition | Structure Condition | Hydrallo condition | Leadaway | Comments | Sketch of Culverts (side views, plan view & other all admsions should be in) |
|------------|----------|--------------|-----|------|-------|---------------|----------|--------|-------|-------|--------|-----------------------|--------|---------------|---------------|------------------------------------|--|----------------------|--------------------|---------------------|--------------------|----------|----------|--|
| | | Hume Pipe | Box | Slab | Other | RCC Pipe | RCC Slab | Rubble | Other | Inlet | Outlet | Inlet | Outlet | | | | | | | | | | | |
| 71/3 | 70+220 | | | | | | | | | | | | | | 9.1 | | | 6 | | | | | | |
| 71/4 | 70+700 | | | | | | | | | | | | | | 7.2 | | | 6 | | | | | | |
| 71/5 | 70+500 | | | | | | | | | | | | | | 9 | | | 6.1 | | | | | | |
| 72/1 | 71+050 | | | | | | | | | | | | | | | | | 6.1 | | | | | | |
| 72/2 | 71+200 | | | | | | | | | | | | | | 11 | | | 6.1 | | | | | | |
| 72/3 | 71+500 | | | | | | | | | | | | | | 10 | | | 6.1 | | | | | | |
| 72/4 | 71+400 | | | | | | | | | | | | | | 8.3 | | | 6.1 | | | | | | |
| 72/5 | 71+900 | | | | | | | | | | | | | | 9 | | | 6 | | | | | | |
| 73/1 | 72+200 | | | | | | | | | | | | | | 8 | | | 6.2 | | | | | | |
| 73/3 | 72+900 | | | | | | | | | | | | | | 29 | | | 21.8 | | | | | | |
| 74/1 | 73+100 | | | | | | | | | | | | | | | | | 18.6 | | | | | | |

58

Total culverts

59

Recons:

34

windy. good

19 02

| | | |
|----|----|----|
| 36 | 21 | 02 |
|----|----|----|

Analysis of the Sample Socio-Economic Survey

Table 1: Education Achievement of the Sample Population

| No schooling | | Minor | | Grades 1-5 | | Grades 5-10 | | Up to G.C.E. O/L | | Passed G.C.E. O/L | | Up to G.C.E. A/L | | Passed G.C.E. A/L | | Graduate | | Post Graduate | | Other | |
|--------------|----|-------|----|------------|-----|-------------|-----|------------------|-----|-------------------|----|------------------|-----|-------------------|----|----------|----|---------------|---|-------|---|
| M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F | M | F |
| 37 | 33 | 79 | 76 | 179 | 187 | 248 | 275 | 339 | 392 | 52 | 57 | 172 | 229 | 66 | 85 | 66 | 41 | 0 | 2 | | |

Table 2: Occupation of Head of the Household

| Occupation | Naula | | Dambulla | |
|---------------------------|-----------|----------|------------|------------|
| | Male | Female | Male | Female |
| Farmer | 5 | 1 | 84 | 13 |
| Skilled Labour | 7 | 0 | 54 | 0 |
| Business | 12 | 3 | 173 | 39 |
| Self-Employment | 0 | 0 | 12 | 6 |
| Forces | 2 | 0 | 27 | 0 |
| Foreign Employment | 1 | 0 | 3 | 0 |
| Driver | 5 | 0 | 49 | 1 |
| Government Officer | 2 | 0 | 18 | 2 |
| Housewife | 0 | 0 | 0 | 3 |
| Labour | 1 | 0 | 84 | 27 |
| Retired | 1 | 1 | 37 | 2 |
| Teacher | 0 | 0 | 9 | 1 |
| Private Institute/Company | 6 | 1 | 35 | 2 |
| Unemployed | 0 | 2 | 11 | 18 |
| Total | 42 | 8 | 596 | 114 |

Table 3: Land areas belonging to the sample population (Perches)

| Type of Land Tenure | Residential | Commercial | Paddy | Plantation | Mixed Crop | Abandoned Land |
|--------------------------------------|--------------------|-------------------|--------------|-------------------|-------------------|-----------------------|
| Sole deed/Titleholder | 26235.00 | 1024.00 | 4071.50 | 3411.00 | 816.00 | 5.00 |
| Claims ownership but without title | 1175.00 | 20.00 | 160.00 | 160.00 | 1.00 | 0.00 |
| Lessee/Renter | 6713.00 | 151.00 | 1080.00 | 3130.00 | 80.00 | 60.00 |
| Permit Holder | 1422.00 | 75.00 | 340.00 | 0.00 | 0.00 | 0.00 |
| Shares ownership with another person | 1422.00 | 75.00 | 340.00 | 0.00 | 0.00 | 0.00 |
| Squatters | 244.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tenant | 3387.00 | 152.00 | 360.00 | 540.00 | 100.25 | 6.00 |

Environmental Management Plan (EMP) for Rehabilitation and Improvement of the Naula – Dambulla Section of the Kandy - Jaffna (A009) Road

This Environmental Management Plan (EMP) is the summarized matrix of all likely impacts that may occur during pre-construction, construction and operational activities of the rehabilitation and improvement of the Naula (58km) – Dambulla (72.71km) section of the Kandy - Jaffna (A009) road with the financial assistance of Asian Development Bank (ADB) through the Road Management Contract (RMC) of iRoad which is under the Road Development Authority (RDA). This EMP is prepared based on all anticipated impacts that are identified in the main report of the Initial Environmental Examination (IEE) conducted for the said project during each phase of the project, the possible locations and mitigation measures to minimise the particular impacts at particular locations and responsible agencies for implementation.

The EMP forms part of the Contract, the prescriptions detailed in the EMP are mandatory and contractually binding with the parties stated in the EMP. The EMP will also equally apply to sub – contractors including nominated sub – contractors, if any. With the assistance of the Project Implementation Consultant (PIC)/Engineer the employer shall monitor the compliance of the EMP by the Contractor.

The Contractor is advised to carefully consider the relevant EMP requirements stated under the item “Pre-construction and design phase” and “Construction phase” when preparing the bid. The prescriptions and clauses detailed in the EMP are integral components of the contract unless separate items are included in the bill of quantities (BOQ). Thus, separate payments will not be made in respect of compliance with the EMP by the Contractor. In case the Contractor or Sub-Contractor/s fail/s to implement the recommendations stated in the EMP, after informing them in writing, the PIC/Engineer shall take whatever actions deemed necessary to ensure that the EMP is properly implemented. If the Contractor still fails to comply with the EMP requirements, the PIC/Engineer shall impose a penalty and take actions to arrange appropriate remedial measures to rectify the impact through a third party and the cost shall be recovered from the Contractor.

The Contractor through an appointed dedicated Environmental Manager shall assist the PIC/Engineer to discharge his/her duties as required in the EMP implementation by (a) maintaining up to date records on actions taken by the Contractor with regard to implementation of EMP recommendations (b) timely submission of reports, information and data to be submitted to the employer through Engineer, (c) participating in the meetings convened by the Engineer and (d) any other assistance requested by the Engineer.

Environmental Management Plan

| | Construction Activity | Anticipated Impacts | Mitigation Action | Approx. location | Monitoring/ Performance indicator | Mitigation Cost | Institutional Responsibility | |
|-----|--|--|--|------------------------|---|---|---|---|
| | | | | | | | Implementation | Supervision |
| 1. | Pre-construction/design phase | | | | | | | |
| 1.1 | Impacts to archaeologically protected sites | Damages to archaeologically protected sites. | The proposed road rehabilitation project will not fall within the Dambulla Cave Temple World Heritage Site. However, implementation of the project within the buffer zone as declared by DOA shall only be done with the prior approval from DOA. Necessary assessments shall be conducted if recommended by the DOA in order to obtain their approval. Further the proposed improvement/ activities within the buffer zone shall be presented to the DOA for their concurrence prior to implementation. | From 70.7km to 71.7km | No impact to the archaeological monuments and sites in the design. Concurrence of the Department of Archaeology obtained at given locations | Design Cost under the Bills of Quantities (BOQ) | Project Implementation Unit of iRoad (PIU), Project Implementation Consultant (PIC), and the Contractor | Department of Archaeology and Environmental and Social Development Division (ESDD) of RDA |
| 1.2 | Shifting of temporary developments on the existing ROW | Though all proposed road rehabilitation activities shall be within the existing ROW, temporary buildings/structu | Shifting of the temporary huts and other structures shall be done by giving notifications in advance. Therefore, their livelihood activities shall not be disturbed adversely. Following steps shall be under taken in shifting the vendors to the new | Throughout the section | Vendors are shifted back without hindering their livelihood activities | Design Cost under the BOQ | PIU and the Contractor | ESDD |

| | | | | | | | | |
|-----|-------------------------|--|---|------------------|---|---------------------------|------------------------|---------------------|
| | | res which encroaches to the existing ROW that will result in negative impacts to public such as loss of income etc...will have to be shifted back. | locations. Step 1. Identification of impacted vendors by the resettlement officers after the detailed designs. Step 2. Notify vendors at least 30 days in advance, followed by a reminder in 7 days and again, 24 hours in advance. Step 3. Identify alternative locations in close proximity for affected vendors to continue businesses. Step 4. Assistance by the contractor to shift to new locations. RDA will make sure that there is no income disruption of vendors during this time. | | | | | |
| 1.3 | Impacts to forest areas | Felling of trees, loss of shade for road users, disturbance to fauna and flora of the forest within the Dambulu Oya forest reserve | Implementation of the project within the forest to be started only after obtaining the approval from the Forest Department (FD). No tree shall be felled within the forest reserve or existing canopy cover disturbed. Special attention shall be paid in the detail design stage to protect every tree which provides a large canopy and shade within the forest reserve. In addition, FD and/or the Department of Wildlife | 64.3km to 65.1km | Approval obtained from FD, no trees are marked in the design to be felled within the forest reserve, introduction animal under passes in the design | Design Cost under the BOQ | PIC and the Contractor | PIU, FD, DWLC, ESDD |

| | | | | | | | | |
|-----|---|--|--|---|--|---------------------------|------------------------|---------------------|
| | | | Conservation (DWLC) shall be consulted to confirm the requirement of introducing animal under passes within the forest reserve in order to facilitate safe animal crossing and to be incorporated to the design if recommended by FD and/or DWLC | | | | | |
| 1.4 | Impacts to road side trees | Loss of shade, aesthetic values and habitats for fauna and flora along the road section | Every effort shall be taken to protect road side trees especially rain trees (<i>Samanea saman</i>) in the detail design. Prior approval shall be taken from PIC and PIU if the road side trees are identified to be felled to ensure road safety. | Throughout the road section | Number of road side trees protected in the design | Design Cost under the BOQ | PIC and the Contractor | PIU, ESDD |
| 1.5 | Natural hazards aggravated by the project and impacts to the road | Aggravation of prevailing drainage issues along the road section if necessary measures are not taken in the design | Hydrology along the road with special attention to flood prone locations to be deeply studied and cross drainage structures, lead away canals, road finished level and the surface treatment should be decided accordingly. Close coordination with department of irrigation (DOI) and the Disaster Management Center (DMC) in order to obtain information on high flood levels, return periods, respective retention periods and other recommendations in order to | Throughout the section of the road with special attention near the Dambulu Oya crossing at the 66.2km, area around the culverts 59/2, 59/6, 60/1, | Mitigation measures incorporated to the design at given locations with the agreement of the Department of Irrigation and DMC | Design Cost under the BOQ | PIC and the Contractor | PIU, ESDD, DOI, DMC |

| | | | | | | | | |
|-----|---|--|---|---|---|--|-----------------------------|---|
| | | | support the final design. Public consultation will also be used to verify the findings. | around 59.7km, 67km – 69km, 71km – 72km | | | | |
| 1.6 | Alteration of surface water bodies | Disturbance to canals, waterways and drains located within the ROW | All water bodies crossing or located adjacent to the road shall not be disturbed. Consent from third party agencies such as the Department Agrarian Services to be obtained if such an agency is getting involved. | Throughout the road section | Proposed site-specific mitigation measures are incorporated to the design at given locations. Consent from third party agencies obtained | Design Cost under the BOQ | PIC and the Contractor | PIU, DoI, LA, Department of Agrarian Services and ESDD |
| 1.7 | Removal of public utilities | Inconvenience to the public due to uninformed interruption of utility services Unnecessary damages/accidental damages to utility lines when shifting safety of the labourers and the public | Initial consultation and consent shall be obtained from relevant service providers (CEB / NWSDB / SLT) well in advance. Advance notice to the affected public about the time and the duration of the utility disruption. Use of well trained and experienced machinery operators to reduce accidental damage to public utilities. Restoration of public utilities as soon as possible. | Throughout the road section | Particular service provider consulted. Advance notifications given to the users. Method statement for shifting of utilities presented to the PIC. | Cost estimated by the line agencies/ Cost of utility shifting under the BOQ | The Contractor | The Employer, line agencies (CMC, SLLRDC, CEB/ NWSDB/SLT) |
| 1.8 | Preparatory facilities to manage communicable | Incorporation of precautions to the project to manage | Necessary arrangements shall be incorporated to the project to fight against any occurrence of communicable diseases that | At all project sites | Incorporation of necessary measures to the project and Contract | Design Cost under the BOQ | PIU, PIC and the Contractor | The Employer, Medical Officer of |

| | | | | | | | | |
|--|----------|-----------------------|--|--|--|--|--|-------------------|
| | diseases | communicable diseases | <p>have higher epidemic potential within the project sites such as Coronavirus Disease 2019 (Covid 19), Dengue and Chicken Pox etc... For example, establishment of all sites of the project including labor camps, office facilities, yards and other accommodations shall comply the requirements as specified in the Gazette No. 2197/25 of 15th Oct 2020 issued under Quarantine and Prevention of Disease Ordinance of Sri Lanka in order to control spreading of Covid 19. In addition, the project shall comply with the guidelines of ADB on adopting Covid 19 health and safety measures issued on 29th July 2020 and other guidelines related to the project such as FIDIC Covid 19 Guidance Memorandum to users of FIDIC Standard Forms of Works Contract, April 2020. Medical Officer and Public Health Inspector (PHI) of the area shall be consulted well in advance in planning stage in order to arrange precautionary measures for other diseases</p> | | | | | the area and PHI. |
|--|----------|-----------------------|--|--|--|--|--|-------------------|

| | | | | | | | | |
|-----------|---------------------------------|---|--|--|---|-----------------------|----------------|---------------------|
| | | | such as Dengue and Malaria and their recommendations shall be incorporated to the project. Adequate budgetary provisions shall be allocated in the project to undertake required tests such as PCR, antigen tests etc... and also for provision of personnel protective equipment (PPE) as required | | | | | |
| 2. | Construction phase | | | | | | | |
| 2.1. | Impacts to archaeological sites | Excessive vibration levels and noise generated due to operation of machineries, compaction and other construction activities will damage archaeologically important monuments and sites of the Dambulla Temple. Further, improper handling of machineries, dumping of | <ul style="list-style-type: none"> • All construction activities shall be implemented under the supervision of Department of Archaeology (DoA) • Vibration shall be controlled using low vibration rollers, small compactors and using other measures as recommended by DoA. • Dumping of debris, soil and any other material at archaeological will be avoided. • Machinery operators and other workers shall be made aware about the importance of the sites in order to minimize accidental damages | Near Dambulla Temple from 70.7km to 71.7km | <p>Presence of a supervisor of DoA as required</p> <p>Use of vibration controlling measures at required locations</p> <p>Debris and material not dumped at archaeological sites</p> <p>Operators are aware about the location of archaeological sites</p> | Within Contract Price | The Contractor | PIC, PIU, ESDD, DoA |

| | | | | | | | | |
|-----|------------------------------|---|--|---|---|-----------------------|----------------|----------------|
| | | debris and material can also damage such sites as they are located adjacent to the ROW. On the other hand, thieving of artifacts of the protected monuments and damaging will also be possible by the workers if not properly monitored. Devotees to such sites will face inconveniences if access is disturbed due to road improvement activities. | <ul style="list-style-type: none"> • The road edge at these sites shall be properly barricaded • Labor force shall be monitored continuously to ensure safety of artifacts • Temporary safe access to the sites shall be maintained for the convenience of the devotees • Contractor shall immediately inform DoA through PIU if he finds any artifact during the construction period and activities at the particular location shall be stopped immediately until DoA confirms to re commence the work. | | <p>Road edge is properly barricaded</p> <p>Presence of separated entrance for devotees</p> <p>Contractor is aware about the mechanism to be followed if any artifacts are found</p> | | | |
| 2.2 | Loss of trees and vegetation | Loss of shade, soil moisture, reduction of air quality, reduction of aesthetic value and habitats due | <p>Trees located within the Dambulu Oya forest reserve (64.3km to 65.1km) shall not be felled.</p> <p>Avoidance of unnecessary felling of trees and clearing of</p> | 64.3km to 65.1km At locations where trees to be felled and replanted | <p>Felling only trees as identified in the list approved by PIC</p> <p>Rehabilitation of habitats and</p> | Within Contract Price | The Contractor | PIC, PIU, ESDD |

| | | | | | | | | |
|-----|------------------------------|---|---|---------------|--|-----------------------|----------------|--------------------------|
| | | to clearing of vegetation and felling of trees. | <p>vegetation along the rest of the section of the road, limiting movement of vehicles and machineries to the ROW, trees to be felled to be clearly marked and presence of nests, habitats for species such as epiphytes to be identified and to be relocated to a similar habitat before felling of such trees.</p> <p>Conducting a compensatory tree replanting program by the Contractor to compensate the loss of trees. Suitable native tree species should be selected for the replanting purpose at 1:3 ratio. Replanting of threatened/endemic species should be given priority.</p> <p>Contractor shall ensure survival of replanted trees at least for 2 years.</p> | | <p>species, nests on trees to be felled</p> <p>Conducting a replanting program with the Required number of plants</p> <p>Survival of all replanted trees with an acceptable growth at the end of the contract period</p> | | | |
| 2.3 | Impacts to terrestrial fauna | Animals who meet with road accidents while trying to cross the road | Animal crossing structures shall be constructed as per the design especially within the forest reserve (64.3 – 65.1km) with the recommendation of FD and DWLC. | 64.3 – 65.1km | Construction of animal crossing structures | Within Contract Price | The Contractor | PIC, PIU, FD, DWLC, ESDD |

| | | | | | | | | |
|-----|--|---|---|--|--|-----------------------|----------------|---------------------|
| | | | Further, free movement of animals including both wild and domestic animals shall be facilitated during the construction phase across the road. Also, care should be taken with strict labour supervision to ensure not to harm any animals in the project area | Throughout the section of the road | | | | |
| 2.4 | Increase of local air pollution, noise and vibration | Degradation of air quality, excessive noise and vibration due to excavation for shoulders and other earthwork, operations of pavement improvement, quarry asphalt plant batching plant, and construction vehicles etc... Disturbances to public, schools, hospitals, places of worship and archaeologically protected sites due to high | <ul style="list-style-type: none"> • Limiting operations to times when there is least impact in settlement areas, especially near schools and other sensitive locations such as hospitals and places of worship. • Ensuring that the construction plant and equipment is maintained to high operable standards and that exhaust baffles are fitted and maintained in a very good serviceable condition. • Vibration should be controlled with the agreement of the Project Implementation Consultant (PIC) at locations where sensitive receptors are found. • Regular sprinkling of water to dampen the construction surface will reduce the emission of dust. | Throughout the section of the road with special attention to residential areas, schools, hospitals, places of worship and archaeologically protected sites | <p>Sensitive receptors consulted in advance.</p> <p>Public/stakeholder complaints received on high noise, vibration and degradation of air quality.</p> <p>Method statement presented to PIC on vibration controlling.</p> <p>No. of water bowsers deployed.</p> <p>Necessary licenses obtained for prescribed activities.</p> <p>Property condition survey presented to PIC in advance.</p> | Within Contract Price | The Contractor | PIC, PIU, ESDD, CEA |

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| | | noise, vibration and degradation of air quality | <ul style="list-style-type: none"> • Implementation of all construction activities in compliance with acceptable levels of noise which are specified in National Environmental (Noise Control) Regulations 1996 stipulated by C amendments act 924/12 to mitigate the noise impact. • A property condition survey will be conducted along the trace within a corridor as specified by PIC. The survey shall record all details related to cracks and construction failures existing in structures along this corridor. • Buildings cracked due to construction activities should be compensated or repaired to the satisfactory level (which is agreed by the PIC) of the affected person. Here, a pre-condition survey conducted on surrounding buildings located within an agreed area and a corridor with the PIC will be helpful in differentiating cracks caused by construction activities. • All machinery, plants and vehicles used for the project shall be well maintained and regularly monitored in order to | | <p>No. of complaints received and no. of complaints resolved on the cracks on buildings.</p> <p>Availability of service records and certificates of emission tests</p> <p>Recommendation obtained from the Department of Archaeology.</p> <p>Measures taken to control vibration at particular locations</p> | | | |
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| | | | <p>keep r emissions below the threshold levels (as specified in NEA) in order to minimize degradation of air quality</p> <ul style="list-style-type: none"> • At archaeologically protected sites and monuments, the recommendations given by the Department of Archaeology shall be adhered to avoid any damages to such sites. Precautionary measures such as using small compactors without vibration, avoiding use of heavy machinery and maintaining the air quality at the required standards at such sites should be practiced in order to avoid negative impacts. | | | | | |
| 2.5. | Disruption to traffic flow | <p>Closure of lanes and diversion of traffic to facilitate road rehabilitation work will severely affect the traffic flow creating heavy traffic congestions. This will delay the day to day activities of the</p> | <ul style="list-style-type: none"> • Preparation and implementation of a traffic management plan in collaboration with the Police during the construction phase. The traffic management plan shall be updated as necessary. Assistance of Police shall be obtained to ensure that traffic will comply with the measures of the traffic management plan • Providing information in advance to the public about the | Throughout the road section | <p>Traffic management plan prepared and consent of Police obtained</p> <p>Advance information to the road users</p> | Within Contract Price | The Contractor | PIC, PIU, ESDD, Police |

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| | | commuters such as attending schools and offices on time etc... Further, emergency vehicles such as ambulances which use the road very often will also be stuck in the traffic congestions | <p>planned construction work</p> <ul style="list-style-type: none"> • Providing properly marked by-passes and one-way section including barriers, reflectors and night illumination. • Use of well-trained flagmen to control traffic flows at constricted sites, including safe crossing for pedestrians especially near town areas and schools. • Public shall be made aware about alternative roads that can be used to bypass construction areas using media and sign boards • Flagmen shall be instructed to pay especial attention to emergency vehicles in order to allow these to cross the construction sites without delay | | <p>provided</p> <p>Presence of required sign boards at required locations</p> <p>Flagmen deployed at every required location.</p> <p>Presence of long queues of vehicles causing traffic jams on either side of construction sites</p> | | | |
| 2.6. | Deterioration of surface and ground water quality due to silt runoff, emissions and spoils from labour camps | Siltation of surface and ground water bodies by soil washed off from construction sites, contamination of surface and | <ul style="list-style-type: none"> • Reuse of soil removed for filling sites if any, as much as possible. Unsuitable materials can be used to refill borrow pits with the approval of the PIC. • Where earthwork take place adjacent to surface water bodies and wells, drainage of | Throughout the section of the road | <p>Number of borrow sites refilled with unsuitable material</p> <p>Presence of drainage management</p> | Within Contract ed Price | The Contractor | PIC, PIU, ESDD, CEA, LA |

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| | | <p>ground water resources by chemicals, lubricants, fuels etc... used for the project and degradation of surface and ground water quality by emissions from labor camps.</p> | <p>storm water to be managed. This should be planned prior to the commencement of earthwork activity.</p> <ul style="list-style-type: none"> • All temporary unsuitable soil dumps and debris should be removed to approved disposal sites by the relevant local authority. Contractor should present a method statement stating how the environmental and social impacts that can be generated are managed at disposal sites in advance for approval. • All disposal sites should be situated in locations which are not affected by floods or exposed to soil erosion. • If temporary soil dumps are left at the site for a long time, proper remedial measures to minimize soil erosion should be practiced (E.g.: Placing sandbags around the dump etc...) | | <p>measures as necessary</p> <p>Presence of unsuitable soil heaps along the road.</p> <p>No. of disposal sites operated (approved) Method statements for each disposal site approved by PIC</p> <p>Presence of mitigation measures for temporary soil dumps</p> | | | | |
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| | | | <ul style="list-style-type: none"> • Temporary soil dumps should not be placed near water bodies or flood prone areas • All fills, back fills and slopes should be compacted within the shortest possible time to reach the specified degree of compaction • Turfing of all embankment slopes with suitable turf material and establishment of suitable mulch to cover the slopes of embankments • All materials (including toxic and hazardous material) required for construction shall be stored at secured and managed sites, sited away from water bodies, • Construction vehicles and equipment will be maintained in good operable condition, ensuring no undue leakage of oil or fuel, • Construction vehicles and equipment will be serviced only at properly managed and equipped workshops and waste | | <p>Location of disposal sites near water bodies and flood prone areas</p> <p>Length of embankments turfed</p> <p>Storing of materials in sealed containers, on impervious surfaces etc...</p> <p>Timely servicing of vehicles and equipment (service records)</p> <p>Vehicles and equipment are serviced at approved</p> | | | | |
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| | | | <p>oil will be collected and disposed at approved locations,</p> <ul style="list-style-type: none"> • Sanitation arrangements and an adequate water supply will be made at worksites and at accommodation facilities provided for workers' ensuring that no open dumping of solid wastes or raw sewage is released into drains or water bodies. • An adequate wastewater treatment method shall be provided to concrete batching and asphalt plants • Site specific mitigation measures such as silt fences and barriers shall be applied at wells located close to the road to minimize sedimentation of ground water. It shall be ensured that the wells are not contaminated by chemicals, lubricants and fuels used for the project | | <p>workshops (service records)</p> <p>Permanent water supply provided to labor camps Adequate number of waste bins provided Properly sealed septic tanks provided and a mechanism for removal of sludge available Presence of wastewater treatment plants for concrete batching and asphalt plants</p> <p>Availability of location specific measures if wells are located at project sites</p> | | | |
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| 2.7. | Flood Impacts | Increase of flood situation as a result of construction activities | Construction activities shall not lead to flooding conditions as a result of blocked drainage paths and drains. The contractor shall take all measures necessary and as directed by the PIC to keep all drainage paths and drains clear of blockage at all times. If flooding or stagnation of water is caused by construction activities, contractors shall provide suitable means to (a) prevent loss of access to any land or property and (b) prevent damage to land and property. Further, any recommendations laid down by the hydrological studies, should be adopted at flood prone areas. In addition, the contractor will pay special attention to avoid flood prone areas in selecting disposal sites, locations for material stock piles, yards and other locations where chemicals and other construction materials are stored. | Throughout the section of the road, at material stock yards and disposal sites | All drains and canals are free of blocks Disposal sites, yards and material stock piles not located in flood prone areas | Within Contract ed Price | The Contractor | PIC, PIU, ESDD, LA, DoI |
| 2.8. | Social and environmental impacts due to establishment of labour camps | Improper sanitation, lack of water supply, improper disposal of wastewater and solid waste will | Locating labour camps at least 100m away from major water resources. Application of site specific mitigation measures as agreed with the PIC if camps are to be located close to a water body or other environmentally/ | At locations where labor camps are to be established | Application of location specific measures to minimize impacts to water bodies, soil and society | Within Contract Price | The Contractor | PIC, PIU, ESDD, CEA, LA |

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| | | <p>increase the risk of contaminating surface water sources in the vicinity. Stagnant water will create mosquito breeding and vector for communicable diseases to the workers and host communities. Social conflicts due to use of illicit liquor and unpleasant behaviour which causes inconvenience to local community</p> | <p>socially sensitive location.</p> <p>Providing proper sanitary facilities to the labour camps, any wastewater and other waste matter generated from the camps will be disposed in an environmentally friendly manner as agreed with the PIC.</p> <p>Maximizing recruiting of local labour and conducting awareness programs targeting workers as well as the local community about the above impacts.</p> | | <p>Sanitary facilities provided are adequate. A wastewater treatment method is in place</p> <p>No. of local labor recruited</p> | | | |
| 2.9 | Spreading of communicable diseases in project sites | It is crucial to remain vigilant on the spread of communicable diseases especially COVID 19 and Dengue in all sites of the | All relevant guidelines issued by the Ministry of Health of Sri Lanka including Gazette No. 2197/25 of 15 th Oct 2020 issued under Quarantine and Prevention of Disease Ordinance of Sri Lanka in order to control spreading of Covid 19 shall be strictly complied. In | At all project sites | Consultation of Medical Officers in the area and implementation of their recommendations | Within Contract Price | PIU, PIC, Contractor and his Sub-Contractors | PHI of the area |

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| | | <p>project including those of PIU, PIC, Contractors, Sub-Contractors etc... Since project sites are occupied by a large number of people, it is absolutely essential to take necessary precautions to stop the spread of this virus among all staff of the project</p> | <p>addition, the project shall comply with the guidelines of ADB on adopting Covid 19 health and safety measures issued on 29th July 2020 and other guidelines related to the project such as FIDIC Covid 19 Guidance Memorandum to users of FIDIC Standard Forms of Works Contract, April 2020 in all project sites.</p> <p>Necessary instructions to be obtained from Medical Officers and public health inspectors (PHI) of the area. All their recommendations shall be strictly followed and implemented in establishing and operating all project sites.</p> <p>Facilities as recommended by the medical staff (such as face masks and other PPE, hand washing facilities, sanitisers, regular disinfection of work sites, facilities to monitor body temperature etc...) shall be adequately provided to all staff of the project and visitors by the management of PIU, PIC and Contractor/s.</p> <p>Proper mechanisms shall be setup to inspect all sites of the project regularly by the</p> | | | | | |
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| | | | <p>respective PHI to monitor the progress.</p> <p>If any suspected case for any communicable disease such as COVID 19 or Dengue is reported, it should be immediately informed to the respective Medical Officers and PHI. Their recommendations shall be strictly followed and implemented.</p> <p>Necessary facilities shall be adequately allocated with sufficient budget to test the occurrence of communicable diseases among the project staff.</p> | | | | | |
| 2.10. | Impacts due to extraction and transportation of construction materials | Noise, vibration, dust, induced slope failure, negative visual impacts, creation of mosquito breeding sites, damage to private properties and minor roads, heavy trucks transporting materials all cause | <p>Avoiding over exploitation, reuse of ABC, use of paver in laying ABC against using the grader (the conventional method).</p> <p>Adhering to the conditions laid down in the approval of GSMB and CEA for quarry and borrow sites. Keeping provisions for repairing and restoration of all damages to properties including the roads used for the transportation of construction materials by the contractor in the contract agreement and use of covers over transported</p> | At all material extraction sites and roads used for material transportation | <p>Extraction of material to the approved quantities.</p> <p>All conditions laid down in the approvals adhered. Damages to roads and buildings restored</p> <p>Adequate number of water bowsers deployed/adequate passes done for</p> | Within Contract Price | The Contractor | PIC, PIU, ESDD, GSMB, CEA |

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| | | disturbances to the local communities and traffic. | materials to guard against dust and water spraying to dampen the gravel surfaces. | | dust controlling | | | |
| 2.1 1. | Impacts to surface water hydrology | Alteration/blocking of drainage paths and upstream flooding. | <p>Drainage passages and drainage paths across the road shall not be blocked for construction activities.</p> <p>Temporary drainage passages/diversions shall be provided (if drainage structures to be blocked for reconstruction of the bridge) to facilitate smooth drainage of water across the road until meeting lead away drains. Such facilities shall be maintained until the permanent solution will be in place. The Contractor should ensure that project activities will not create any flooding conditions during the construction phase due to these activities.</p> <p>The Contractor shall avoid storage of construction materials and disposal of debris in and around drainage paths. Location specific mitigation measures as recommended by the PIC will be implemented in order to minimize soil erosion and disturbance to the natural</p> | Throughout the section of the road | <p>All drains and canals across the road are not blocked</p> <p>Temporary by-passes for water paths provided and the water flow continues downstream</p> | Within Contract Price | The Contractor | PIC, PIU, ESDD, DoI, Agrarian Department, LA |

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| | | | drainage pattern if materials are to be stored near such locations. | | | | | |
| 2.1 2. | Requirement of land for the road upgrading | Public unrest due to improper use of land for construction activities | Lands required for stock piling, use as yards etc... shall be obtained by the contractor with the concurrence of project staff. They will sign a temporary occupation contract with the owner in which a site restoration plan is specified. | At all locations where lands are temporarily required for the project | Contract signed for every land used for the project Site restoration plan is integrated to each contract | Within Contract Price | The Contractor | PIC, PIU, ESDD |
| 2.1 3. | Health and Safety | Safety of the laborers, residents and the public during the day and night work | <p>The Contractor shall organize awareness programs regarding personal safety of workers, residents and general public at regular times.</p> <p>Establishment of appropriate road engineering work to reduce the likelihood of accidents (warning signs, barricading, speed limits markings, breakers and signals to particular locations) and night visibility of these shall be ensured. Placement of well-trained flag men will be necessary to control traffic in collaboration with the Police.</p> <p>Providing Personnel Protective Equipment (PPE) for laborers such as protective footwear, helmets, goggles, eye-shields</p> | Throughout the section of the road and at all other sites used for the project | <p>Number of awareness programs conducted per week is adequate</p> <p>Necessary sign boards placed at required locations and maintained properly All project staff wearing PPE as and when required</p> | Within Contract Price | The Contractor | PIC, PIU, ESDD |

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| | | | <p>and clothes depending on their respective duties (Mixing asphalt, blasting, handling equipment etc...)</p> <p>Arranging a first aid unit and transport facilities to take injured people to the nearest hospital. Contractor shall place firefighting equipment where necessary</p> <p>Use experienced and well-trained workers for the handling of machinery, equipment and material processing plants</p> <p>Construction work shall be carried out at night only with adequate lighting, night visible road signs, PPE etc...</p> | | <p>Presence of adequate facilities for first aid and fire fighting</p> <p>Adequate lighting facilities are available for night works</p> | | | |
| 2.1 4. | Loss of access to houses, commercial activities and public utilities | Loss of access to houses, commercial activities, office premises and other lands located along the road due to excavations and other road improvement activities | <p>Convenient and safety access to all existing residential and commercial lands located along the section of the road shall be ensured.</p> <p>Access to houses, commercial structures and public utilities should be clearly marked within the road reservation. Safe temporary access will be maintained until the permanent</p> | Throughout the section of the road | <p>Access is not lost to all houses and shops by the roadside</p> <p>Compensation paid for loss of access as instructed</p> | Within Contract Price | The Contractor | PIC, PIU, ESDD |

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| | | | <p>solution will be in place.</p> <p>If access is significantly lost for houses and shops, compensation shall be paid for temporary evacuation of households and for loss of livelihood of commercial structures with the approval of the PIC and PIU.</p> | | | | | |
| 2.1 5. | Handling environmental issues/grievances during construction | | <p>The Contractor shall appoint a qualified Environmental Manager for implementation of the EMP and also for community liaison to handle public complaints and grievances. The Contractor shall develop the Grievance Redress Mechanism (GRM). The person who is responsible for receiving complaints shall be easily accessed by the public. Complaints that could not be resolved shall be referred to GRM.</p> | At every project site | Environmental Officer/s recruited as necessary Availability of GRM (method of receiving complaints, submitting to the responsible party, resolving etc...) | Within Contract Price | The Contractor | PIC, PIU, ESDD |
| 3. | Operational Phase (Maintenance period of the contract) | | | | | | | |
| 3.1. | Impacts on water resources | Blocking of canals and drains across the road due to siltation, stagnation of debris. Degradation of | Regular maintenance of all canals and drains located within the ROW and proper handling of chemicals used during the period of maintenance under strict supervision | Throughout the section of the road | Smooth drainage is ensured | Within Contract Price | The Contractor | PIC, PIU, ESDD |

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| | | water quality due to improper handling of chemicals used for maintenance works such as paints, pesticides, asphalt etc... | | | | | | |
| 3.2. | Disposal of waste material generated during maintenance operations | Siltation of water bodies and soil from agricultural lands from removed as a result of maintenance activities. | Proper disposal of all unsuitable material resulting from periodic and routine maintenance activities in the approved disposal sites. | Throughout the section of the road | Unsuitable matter is disposed to approved sites | Within Contract Price | The Contractor | PIC, PIU, ESDD |
| 3.3. | Extraction of material for repairing and maintenance work | Impacts due to extraction of material for road maintenance activities. | Mitigation measures as given in 2.10 above shall be implemented. | At all material extraction sites and roads used for material transportation | Indicators as given in 2.9 shall be applied | Within Contract Price | The Contractor | PIC, PIU, ESDD, GSMB, CEA |
| 3.4. | Pedestrian and Commuter Safety | Vehicles travelling at high speeds on the rehabilitated road will increase the number of accidents. | Provision of centreline road marking where possible, edge delineation etc... Provision of clearly marked signage at townships, sensitive areas such as schools and temples. Enforcement of speed limits and | Throughout the section of the road | All necessary road markings done All necessary permanent sign boards are established | Within Contract Price | The Contractor | PIC, PIU, ESDD |

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| | | | <p>other traffic rules, especially within the town limits.</p> <p>Placing of sign boards for animal crossings etc.</p> <p>Safety of road users could be ensured during repairing of carriageway and hydraulic structures by placing standard sign boards, barricading of the site under repair etc...</p> | | | | | |
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Environmental Management Checklist (EMC) for Rehabilitation and Improvement of the Naula - Dambulla section of the Kandy – Jaffna (A009) road

1. Pre-Construction Stage

| | Construction activity | Anticipated impacts | Mitigation Action | Approx. location | Monitoring/Performance Indicator | Compliance Status (Complied, partly complied, not complied) | Corrective Action Proposed if any |
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| 1.1 | Impacts to archaeologically protected sites | Damages to archaeologically protected sites. | The proposed road rehabilitation project will not fall within the Dambulla Cave Temple World Heritage Site. However, implementation of the project within the buffer zone as declared by DOA shall only be with the prior approval from DOA. Necessary assessments shall be conducted if recommended by the DOA in order to obtain their approval. Further, the proposed improvement/ activities within the buffer zone shall be presented to the DOA for their concurrence prior to implementation | From 70.7km to 71.7km | No impact to the archaeological monuments and sites in the design. Concurrence of the Department of Archaeology obtained at given locations | | |
| 1.2 | Shifting of temporary structures on the existing ROW | Though all proposed road rehabilitation activities shall be within the existing ROW, the temporary buildings/structures which encroached onto the existing ROW need to be shifted. This will result in | Shifting of the temporary huts and other developments shall be with advance notifications. Therefore, their livelihood activities shall not be disturbed adversely. Following steps shall be under taken in shifting the vendors to new locations. Step 1. Identification of impacted vendors by the resettlement officers after the detailed designs. | Throughout the section of the road | Vendors are shifted back without hindering their livelihood | | |

| | Construction activity | Anticipated impacts | Mitigation Action | Approx. location | Monitoring/Performance Indicator | Compliance Status (Complied, partly complied, not complied) | Corrective Action Proposed if any |
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| | | negative impacts to public such as loss of income etc... | <p>Step 2. Notify vendors at least 30 days in advance, followed by a reminder 7 days and again, 24 hours in advance.</p> <p>Step 3. Identify alternative locations in the vicinity for affected vendors to continue businesses.</p> <p>Step 4. Assistance by contractor to shift to new locations. RDA will make sure that there is no income disruption of vendors during this time.</p> | | | | |
| 1.3 | Impacts to forest areas | Felling of trees, loss of shade for road users, disturbance to fauna and flora of the forest within the Dambulu Oya forest reserve | Implementation of the project within the forest to be started only after obtaining the approval from Forest Department (FD) and no tree shall be felled within the forest reserve. The existing canopy cover shall not be disturbed. Special attention shall be paid in the detailed design stage to protect every tree which provides large canopy and shade within the forest reserve. In addition, FD and/or Department of Wildlife Conservation (DWLC) shall be consulted to confirm the requirement of introducing animal under passes within the forest reserve in order to facilitate safe animal crossing and to be incorporated to the design if recommended by FD and/or DWLC | 64.3km to 65.1km | Approval obtained from FD, no trees are marked in the design to be felled within the forest reserve, introduction of animal under passes in the design | | |
| 1.4 | Impacts to trees by the road side | Loss of shade, aesthetic values and habitats for fauna and | Every effort shall be taken to protect trees by the roadsides especially rain trees (<i>Samanea saman</i>) in the detailed | Througho ut the | Number of trees by the roadside | | |

| | Construction activity | Anticipated impacts | Mitigation Action | Approx. location | Monitoring/Performance Indicator | Compliance Status (Complied, partly complied, not complied) | Corrective Action Proposed if any |
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| | | flora along the section of the road | design. Prior approval shall be taken from PIC and PIU if the trees by the roadsides are identified to be felled to ensure road safety. | section of the road | that are protected in the design | | |
| 1.5 | Natural hazards aggravated by the project and impacts to the road | Aggravation of drainage issues prevailing along this section of the road if necessary measures are not taken in the design | <p>Hydrology along the road with special attention to flood prone locations to be deeply studied and cross drainage structures, lead away canals, road finished level and the surface treatment should be decided accordingly.</p> <p>Close coordination with the Department of Irrigation (DOI) and Disaster Management Center (DMC) in order to obtain high flood levels, return periods, respective retention periods and other recommendations in order to support the final design. Public consultations will also be used to verify the findings.</p> | Throughout the section of the road with special attention near the Dambulu Oya crossing at the 66.2km, area around the culverts 59/2, 59/6, 60/1, around 59.7km, 67km – 69km, 71km – 72km | Mitigation measures incorporated to the design at given locations with the agreement of the Department of Irrigation and DMC | | |

| | Construction activity | Anticipated impacts | Mitigation Action | Approx. location | Monitoring/Performance Indicator | Compliance Status (Complied, partly complied, not complied) | Corrective Action Proposed if any |
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| 1.6 | Alteration of surface water bodies | Disturbance to canals, waterways and drains located within the ROW | All water bodies crossing or located adjacent to the road shall not be disturbed. Consent from third party agencies such as the Department Agrarian Services to be obtained if such an agency is getting involved. | Throughout the section of the road | Proposed site-specific mitigation measures are incorporated to the design at given locations and consent from third party agencies obtained | | |
| 1.7 | Removal of public utilities | Inconvenience to the public due to uninformed interruption of utility services Unnecessary damages/accidental damages to utility lines when shifting and safety of the labourers and the public | Initial consultation and consent shall be taken from relevant service providers (CEB / NWSDB / SLT) well in advance. Advanced notice to the affected public about the time and the duration of the utility disruption. Use of well trained and experienced machinery operators to reduce accidental damage to public utilities. Restoration of public utilities as soon as possible. | Throughout the section of the road | Particular service provider consulted. Advanced notifications given to the users. Method statement for shifting of utilities presented to the PIC. | | |
| 1.8 | Preparatory facilities to manage communicable diseases | Incorporation of precautions to the project to manage communicable diseases | Necessary arrangements shall be incorporated to the project to fight against any occurrence of communicable diseases that have higher epidemic potential within the project sites such as Coronavirus Disease 2019 (Covid 19), Dengue and Chicken Pox etc... For example, establishment of all sites of the project | At all project sites | Incorporation of necessary measures to the project and Contract | | |

| | Construction activity | Anticipated impacts | Mitigation Action | Approx. location | Monitoring/Performance Indicator | Compliance Status (Complied, partly complied, not complied) | Corrective Action Proposed if any |
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| | | | <p>including labor camps, office facilities, yards and other accommodations shall comply the requirements as specified in the Gazette No. 2197/25 of 15th Oct 2020 issued under Quarantine and Prevention of Disease Ordinance of Sri Lanka in order to control spreading of Covid 19. In addition, the project shall comply with the guidelines of ADB on adopting Covid 19 health and safety measures issued on 29th July 2020 and other guidelines related to the project such as FIDIC Covid 19 Guidance Memorandum to users of FIDIC Standard Forms of Works Contract, April 2020.</p> <p>Medical Officer and Public Health Inspector (PHI) of the area shall be consulted well in advance in planning stage in order to arrange precautionary measures for other diseases such as Dengue and Malaria and their recommendations shall be incorporated to the project.</p> <p>Adequate budgetary provisions shall be allocated in the project to undertake required tests such as PCR, antigen tests etc... and also for provision of personnel protective equipment (PPE) as required</p> | | | | |

2. Construction stage

| | Constructio n Activity | Anticipated Impacts | Mitigation Action | Approx. Location | Monitoring/Perfor mance Indicator | Compliance Status (Complied, partly complied, not complied) | Corrective Action Proposed if any |
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| 2.1. | Impacts to archaeologic al sites | Excessive vibration levels and noise generated due to operation of machineries, compaction activities and other construction activities will damage archaeologically important monuments and sites of Dambulla temple. Further improper handling of machineries, dumping of debris and material can also damage such sites as they are located adjacent to the ROW. On the other hand, thieving and damaging of artifacts of the protected monuments will also possible by the workers if not properly monitored. Devotees to such sites will face | <ul style="list-style-type: none"> • All construction activities shall be implemented under the supervision of the Department of Archaeology (DoA) • Vibration shall be controlled using low vibration rollers, small compactors and using other measures as recommended by DoA. • Dumping of debris, soil and other material at archaeological will be avoided. • Machinery operators and other workers shall be made aware about the importance of the sites in order to minimize accidental damages • The road edge at these sites shall be properly barricaded • Labor force shall be monitored continuously to ensure safety of artifacts • Temporary safe access to the sites shall be maintained for the convenience of the devotees • Contractor shall immediately inform DoA through PIU if he finds any artifact during the period of construction. Activities at the | Near Dambulla temple from 70.7km to 71.7km | Presence of a supervisor of DoA as required Use of vibration controlling measures at required locations Debris and material not dumped at archaeological sites Operators are aware of the location of archaeological sites Road edge is properly barricaded A separate entrance for devotees is available Contractor is aware of the | | |

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| | | inconveniences if access is disturbed due to road improvement activities. | particular location shall be stopped immediately until DoA confirms to recommence the activities. | | mechanism to be adhered to in case artifacts are found | | |
| 2.2 | Loss of trees and vegetation | Loss of shade, soil moisture, reduction of air quality, reduction of aesthetic value and habitats due to clearing of vegetation and felling of trees. | <p>Trees located within the Dambulu oya forest reserve (64.3km to 65.1km) shall not be felled.</p> <p>Avoidance of unnecessary felling of trees and clearing of vegetation along the rest of the section of the road, limiting movement of vehicles and machineries to the ROW, trees to be felled to be clearly marked and presence of nests, habitats for species such as epiphytes to be identified and to be relocated to a similar habitat before felling of such trees.</p> <p>Conducting a compensatory tree replanting program by the Contractor to compensate for the loss of trees. Suitable native tree species should be selected for the replanting purpose at 1:3 ratio. Replanting of threatened/endemic species should be given priority. Contractor shall ensure survival of replanted trees for at least 2 years.</p> | 64.3km to 65.1km At locations where trees to be felled and replanted | <p>Felling only trees as identified on the list approved by PIC</p> <p>Rehabilitation of habitats and species. Nests on trees to be felled</p> <p>Conducting a replanting program with the required number of plants</p> <p>Survival of all replanted trees with an acceptable growth at the end of the period of contract</p> | | |
| 2.3 | Impacts to terrestrial fauna | Animals who try to cross the road and meet with accidents. | Animal crossing structures shall be constructed as per the design especially within the forest reserve (64.3 – 65.1km) with the recommendation of FD and DWLC. | 64.3 – 65.1km | Construction of animal crossing structures | | |

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| | | | Further, free movement of animals including both wild and domestic animals shall be facilitated during the construction phase across the road. Also, care should be taken with strict labour supervision to ensure not to harm any animals in the project area | Throughout the section of the road | | | |
| 2.4 | Increase in local air pollution, noise and vibration | Degradation of air quality, excessive noise and vibration due to excavation for shoulders and other earthwork, operations of pavement improvement quarry asphalt plant, batching plant, and construction vehicles etc... Disturbances to public, schools, hospitals, places of worship and archaeologically protected sites due to high noise, vibration and degradation of air quality | <ul style="list-style-type: none"> • Limiting operations to times when they have least impact on settlement areas, especially near schools and other sensitive locations such as hospitals and places of worship. • Ensuring that the construction plant and equipment are maintained to high operable standards and that exhaust baffles are fitted and maintained to a very good serviceable condition. • Vibration should be controlled with the agreement of the Project Implementation Consultant (PIC) at locations where sensitive receptors are found. • Regular sprinkling of water to dampen the construction surface will reduce the emission of dust. • Implementation of all construction activities in compliance with acceptable levels of noise which are specified in National Environmental (Noise Control) Regulations 1996 stipulated by C amendments act 924/12 to mitigate the noise impact. • A property condition survey will be conducted along the trace within a | Throughout the section of the road with special attention to residential areas, schools, hospitals, places of worship and archaeologic ally protected sites | <p>Sensitive receptors are consulted in advance.</p> <p>Public/stakeholder complaints received on high noise, vibration and degradation of air quality.</p> <p>Method statement presented to PIC on controlling vibration.</p> <p>No. of water bowsers deployed.</p> <p>Necessary licenses obtained for prescribed activities.</p> <p>Property condition survey presented to PIC in advance.</p> | | |

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| | | | <p>corridor as specified by PIC. The survey shall record all details related to cracks and construction failures existing in structures along this corridor.</p> <ul style="list-style-type: none"> • Buildings cracked due to construction activities should be compensated or repaired to the satisfactory level (which is agreed by the PIC) of the affected person. Here, a pre-condition survey conducted for surrounding buildings located within an agreed area and a corridor with the PIC will be helpful in differentiating cracks caused by construction activities. • All machinery, plants and vehicles used for the project shall be well maintained and regularly monitored in order to keep their emissions below the threshold levels (as specified in NEA) in order to minimize degradation of air quality • At archaeologically protected sites and monuments, the recommendations given by the Department of Archaeology shall be adhered to avoid any damages to such sites. Precautionary measures such as using small compactors without vibration, avoiding use of heavy machinery, maintaining the air quality according to the standards at such sites should be practiced in order to avoid negative impacts. | | <p>No. of complaints received and no. of complaints resolved on cracking of buildings.</p> <p>Availability of service records and certificate of emission test</p> <p>Recommendation obtained from the Department of Archaeology.</p> <p>Measures taken to control vibration at particular locations</p> | | |
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| 2.5. | Disruption to traffic flow | <p>Closure of lanes and diversion of traffic to facilitate road rehabilitation works will severely affect the traffic flow creating heavy traffic congestions. This will delay the day to day activities of the commuters such as schooling, attending to office works at time etc... Further, emergency vehicles such as ambulances which use the road very often will also be trapped in the traffic congestions</p> <p>Closure of lanes and diversion of traffic to facilitate road rehabilitation work will severely affect the traffic flow creating heavy traffic congestions. This will delay the day to day activities of the commuters such as attending schools and offices on time etc... Further, emergency</p> | <ul style="list-style-type: none"> • Preparation of traffic management plan in collaboration with the Police and implementation during the construction phase with the help of Police. Traffic management plan shall be updated as necessary. Assistance of Police shall be obtained to ensure that traffic will comply with the measures of the traffic management plan • Providing advance information to the public about the planned construction works, • Providing properly marked by-passes and one-way section including barriers, reflectors, and night illumination. • Use of well-trained flagmen to control traffic flows at constricted sites, including safe crossing for pedestrians especially near town areas and schools. • Public shall be made aware about alternative roads that can be used to bypass construction areas using media and sign boards • Flagmen shall be instructed to pay especial attention to emergency vehicles in order to allow them to cross the construction sites without delay • Preparation and implementation of a traffic management plan in collaboration with the Police during | Throughout the section of the road | <p>Traffic management plan prepared and consent of Police obtained</p> <p>Advance information to the road users provided</p> <p>Presence of required sign boards at required locations</p> <p>Flagmen deployed at every required location.</p> <p>Presence of long queued of traffic jams on either sides of construction sites</p> <p>Presence of long queues of vehicles causing traffic jams on either sides of construction sites</p> | | |
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| | | vehicles such as ambulances which use the road very often will also be stuck in the traffic congestions | <p>the construction phase. . The traffic management plan shall be updated as necessary. Assistance of Police shall be obtained to ensure that traffic will comply with the measures of the traffic management plan</p> <ul style="list-style-type: none"> • Providing information inn advance to the public about the planned construction work • Providing properly marked by-passes and one-way section including barriers, reflectors and night illumination. • Use of well-trained flagmen to control traffic flows at constricted sites, including safe crossing for pedestrians especially near town areas and schools. • Public shall be made aware about alternative roads that can be used to bypass construction areas using media and sign boards • Flagmen shall be instructed to pay especial attention to emergency vehicles in order to allow these to cross the construction sites without delay | | | | |
| 2.6. | Deterioration of surface and ground water quality due to silt runoff, emissions and spoil | Siltation of surface and ground water bodies by soil washed off from construction sites, contamination of surface and ground water resources by chemicals, lubricants, | <ul style="list-style-type: none"> • Reuse of soil removed for filling sites if any as much as possible and unsuitable materials can be used to refill borrow pits with the approval of the PIC. • Where earthworks take place adjacent to surface water bodies and wells, drainage of storm water to be | Throughout the road section | <p>Number of borrow sites refilled with unsuitable material</p> <p>Presence of drainage management</p> | | |

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| | from labour camps | fuels etc... used for the project and degradation of surface and ground water quality by emissions from labor camps. | <p>managed. This should be planned prior to the commencement of earthwork activity.</p> <ul style="list-style-type: none"> • All temporary unsuitable soil dumps and debris should be removed to approved disposal sites by the relevant local authority. Contractor should present a method statement stating how the environmental and social impacts that can be generated are managed at disposal sites in advance for approval. • All disposal sites should be sited in locations which are not affected by floods or exposed to soil erosion. • If temporary soil dumps are left at the site for a long time, proper remedial measures to minimize soil erosion should be practiced (E.g.: Placing sandbags around the dump etc...) • Temporary soil dumps should not be placed near water bodies or flood prone areas • All fills, back fills and slopes should be compacted within the shortest possible time to reach the specified degree of compaction • Turfing of all embankment slopes with suitable turf material, Establishment of suitable mulch to cover the slopes of embankments • All materials (including toxic and hazardous material) required for construction shall be stored at | | <p>measures as necessary</p> <p>Presence of unsuitable soil heaps along the road.</p> <p>No. of disposal sites operated (approved)</p> <p>Method statements for each disposal site approved by PIC</p> <p>Presence of mitigation measures for temporary soil dumps</p> <p>Location of disposal sites near water bodies and flood prone areas</p> <p>Length of embankments turfed</p> <p>Storing of materials sealed containers, on impervious surfaces etc...</p> <p>Timely servicing of vehicles and equipment (service records)</p> | | |
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| | | | <p>secured and managed sites, sited away from water bodies,</p> <ul style="list-style-type: none"> • Construction vehicles and equipment will be maintained in good operable condition, ensuring no undue leakage of oil or fuel, • Construction vehicles and equipment will be serviced only at properly managed and equipped workshops and waste oil will be collected and disposed at approved locations, • Sanitation arrangements and an adequate water supply will be made at worksites and at any accommodation facilities provided for workers' accommodation, ensuring that no open dumping of solid wastes, no raw sewage is released into drains or water bodies. • Adequate wastewater treatment method shall be provided to concrete batching plants and asphalt plants • Site specific mitigation measures such as silt fences, barriers shall be applied at wells located nearby to the road to minimize sedimentation of ground water and it shall be ensured that the wells are not contaminated by chemicals, lubricants and fuels used for the project | | <p>Vehicles and equipment are serviced at approved workshops (service records)</p> <p>Permanent water supply provided to labor camps</p> <p>Adequate number of waste bins provided</p> <p>Properly sealed septic tanks provided and mechanism for removal of sludge available</p> <p>Presence of wastewater treatment plants for concrete batching plants and asphalt plants</p> <p>Availability of location specific measures if wells are located at project sites</p> | | |
| 2.7. | Flood Impacts | Increase of flood situation as a result of Contractors activity | Contractor's activities shall not lead to flooding conditions as a result of blocked drainage paths and drains. The contractor shall take all measures | Throughout the road section, at material | All drains and canals are free of blocks | | |

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| | | | necessary and as directed by the PIC to keep all drainage paths and drains clear of blockage at all times. If flooding or stagnation of water is caused by contractor's activities, contractors shall provide suitable means to (a) prevent loss of access to any land or property and (b) prevent damage to land and property. Further, any recommendations laid down by the hydrological studies, should be adopted at flood prone areas. In addition, contractor will pay special attention to avoid flood prone areas in selecting disposal sites, locations for material stock piles, yards and other locations where chemicals and other construction material are stored. | stock yards and disposal sites | Disposal sites, yards and material stock piles not located in flood prone areas | | |
| 2.8. | Social and environmental impacts due to establishment of labour camps | Improper sanitation, lack of water supply, improper disposal of wastewater and solid waste will increase risk of contaminating nearby surface water sources. Stagnant water will create mosquito breeding and vector for communicable diseases to the workers and host communities. Social conflicts due to use of illicit liquor and | Locating labour camps at least 100m away from major water resources. Application of site specific mitigation measures as agreed with the PIC if camps are to be located nearby a water body or other environmentally/socially sensitive location. Providing proper sanitary facilities to the labour camps and any wastewater and other waste matter generated from the camps will be disposed in environmentally friendly manner as agreed with the PIC. Maximizing recruiting of local labour and conducting awareness programs targeting workers as well as local community in order to above impacts. | At locations where labor camps to be established | Application of location specific measures to minimize impacts to water bodies, soil and society Sanitary facilities provided are adequate Presence of wastewater treatment method No. of local labor recruited | | |

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| | | unpleasant behaviour which causes inconvenience to local community | | | | | |
| 2.9 | Spreading of communicable diseases in project sites | It is crucial to remain vigilant on the spread of communicable diseases especially COVID 19 and Dengue in all sites of the project including those of PIU, PIC, Contractors, Sub-Contractors etc... Since project sites are occupied by a large number of people, it is absolutely essential to take necessary precautions to stop the spread of this virus among all staff of the project | All relevant guidelines issued by the Ministry of Health of Sri Lanka including Gazette No. 2197/25 of 15 th Oct 2020 issued under Quarantine and Prevention of Disease Ordinance of Sri Lanka in order to control spreading of Covid 19 shall be strictly complied. In addition, the project shall comply with the guidelines of ADB on adopting Covid 19 health and safety measures issued on 29 th July 2020 and other guidelines related to the project such as FIDIC Covid 19 Guidance Memorandum to users of FIDIC Standard Forms of Works Contract, April 2020 in all project sites. Necessary instructions to be obtained from Medical Officers and public health inspectors (PHI) of the area. All their recommendations shall be strictly followed and implemented in establishing and operating all project sites. Facilities as recommended by the medical staff (such as face masks and other PPE, hand washing facilities, sanitisers, regular disinfection of work sites, facilities to monitor body temperature etc...) shall be adequately provided to all staff of the project and visitors by the | At all project sites | Consultation of Medical Officers in the area and implementation of their recommendations | | |

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| | | | <p>management of PIU, PIC and Contractor/s.</p> <p>Proper mechanisms shall be setup to inspect all sites of the project regularly by the respective PHI to monitor the progress.</p> <p>If any suspected case for any communicable disease such as COVID 19 or Dengue is reported, it should be immediately informed to the respective Medical Officers and PHI. Their recommendations shall be strictly followed and implemented.</p> <p>Necessary facilities shall be adequately allocated with sufficient budget to test the occurrence of communicable diseases among the project staff.</p> | | | | |
| 2.10. | Impacts due to extraction and transportation of construction materials | Noise, vibration, dust, induced slope failure, negative visual impacts, creation of mosquito breeding sites, and damage to private properties and minor roads. Heavy trucks transporting materials cause disturbances to local traffic, damage minor roads, and increase dust and noise nuisance. | Avoiding over exploitation, reuse of ABC, use of paver in laying ABC against using the grader (the conventional method). Adhering the conditions laid down in the approval of GSMB and CEA for quarry and borrow sites. Keeping provisions for repairing and restoration of all property damages including the roads used for the transportation of construction materials by the contractor in the contract document and use of covers over transported materials to guard against dust blow and water spraying to dampen the gravel surfaces. | At all material extraction sites and road used for material transportation | <p>Extraction of material to the approved amount</p> <p>All conditions laid down in the approvals adhered</p> <p>Damages to roads and buildings restored</p> <p>Adequate number of water bowsers deployed/adequate passes done for dust controlling</p> | | |

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| 2.11. | Impacts to surface water hydrology | Alteration/blocking of drainage paths and upstream flooding. | Drainage passages, drainage paths across the road shall not be blocked for construction activities. Temporary drainage passages/ diversions shall be provided (if drainage structures to be blocked for reconstruction of the bridge) to facilitate smooth drainage of water across the road until meeting lead away drains and such facilities shall be maintained until the permanent solution will be in place. Contractor should ensure that project activities will not create any flooding condition during the construction phase due to his activities. Contractor shall avoid storage of construction materials and disposal of debris in and around drainage paths. Location specific mitigation measures as recommended by the PIC will be implemented in order to minimize soil erosion and disturbance to natural drainage pattern if material are to be stored near to such locations. | Throughout the road section | All drains, canals across the road are not blocked Temporary bypasses for water paths provided and water flow continues to downstream | | |
| 2.12. | Requirement of lands for the road upgrading | Public unrest due to improper use of lands for construction activities | Lands required for stock piling, use as yards etc... shall be obtained by the contractor with the concurrence of project staff and will sign a temporary occupation contract with the owner in which a site restoration plan is specified. | At all locations where lands are temporarily required for the project | Contract signed for every land used for the project Site restoration plan is integrated to each contracts | | |
| 2.13. | Health and safety | Safety of the laborers, residents and the public during the day | Contractor shall organize awareness program regarding personal safety of workers, residents and general public at regular time basis. | Throughout the road section and at all other | Number of awareness programs | | |

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| | | work and night time work | <p>Establishment of road engineering aspects to reduce the likelihood of accidents (warning signs, barricading, speed limits markings, breakers and signals to particular locations) and night visibility of them shall be ensured. Placement of well-trained flag men will be necessary to control traffic in collaboration with the Police.</p> <p>Providing Personnel Protective Equipment (PPE) for laborers such as protective footwear, helmets, goggles, eye-shields and clothes to the workers depending on their duty (Mixing asphalt, blasting, handling equipment etc...)</p> <p>Arranging a first aid unit and transport facilities to take injured people to the nearest hospital.</p> <p>Contractor shall place firefighting equipment where necessary</p> <p>Use experience and well trained workers for the handling of machinery, equipment and material processing plants</p> <p>Construction work shall be carried out at night only with adequate lighting, night visible road signs, PPE etc...</p> | sites used for the project | <p>conducted per week is adequate</p> <p>Necessary sign boards introduced for required locations and maintained properly</p> <p>All project staff wearing PPE as and when required</p> <p>Presence of adequate facilities for first aid and fire fighting</p> <p>Adequate lighting facilities' are available for night works</p> | | |
| 2.14. | Loss of access to houses, commercial activities | Loss of access to houses, commercial activities, office premises and other lands located along the | Convenient and safety access to all existing residential and commercial lands located along the road section shall be ensured. | Throughout the road section | Access is not disturbed to all road side houses and shops | | |

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| | and public utilities | road due to excavations and other road improvement activities. | Access to houses, commercial structures and public utilities should be clearly marked within the road reservation and safe temporary access will be maintained until the permanent solution will be in place. If the access is significantly lost for houses and shops, compensation shall be paid for temporary evacuation of households and for loss of livelihood of commercial structures with the approval of the PIC and PIU. | | Compensation paid for loss of access as instructed | | |
| 2.15. | Handling environmental issues/grievances during construction | | The Contractor shall appoint a qualified Environmental Manager for implementation of the EMP and also for community liaison to handle public complaints and grievances. The Contractor shall develop the grievance redress mechanism (GRM). The person who is responsible for receiving complaints shall be easily accessible by the public. Complaints that could not be resolved shall be referred to GRM. | At every project site | Environmental Officer/s recruited as necessary Availability of GRM (method of receiving complaints, submitting to the responsible party, resolving etc...) | | |

3. Operational Phase

| | Construction activity | Anticipated impacts | Mitigation Action | Approx. location | Monitoring/performance indicator | Compliance status (Complied, partly complied, not complied) | Corrective action proposed if any |
|------|--|---|--|--|---|---|-----------------------------------|
| 3.1. | Impacts on water resources | Blocking of canals, drains across the road due to siltation, stagnation of debris. Degradation of water quality due to improper handling of chemicals used for maintenance works such as paints, pesticides, asphalt etc... | Regular maintenance of all canals and drains located within the ROW and proper handling of chemicals used during the maintenance period under strict supervision | Throughout the road section | Smooth drainage is ensured | | |
| 3.2. | Disposal of waste material generated during maintenance operations | Siltation of water bodies, agricultural lands from soil removed as result of maintenance activities. | Proper disposal of all unsuitable material resulted from periodic and routine maintenance activities in the approved disposal sites. | Throughout the road section | Unsuitable matter is disposed to approved sites | | |
| 3.3. | Extraction of material for repairing and maintenance works | Impacts due to extraction of material for road maintenance activities. | Mitigation measures as given in 2.9 above shall be implemented. | At all material extraction sites and road used for material transportation | Indicators as given in 2.9 shall be applied | | |
| 3.4. | Pedestrian and commuter safety | Higher vehicular speed on the rehabilitated road will | Provision of centreline road marking where possible, edge delineation etc... | Throughout the road section | All necessary road markings done | | |

| | Construction activity | Anticipated impacts | Mitigation Action | Approx. location | Monitoring/performance indicator | Compliance status (Complied, partly complied, not complied) | Corrective action proposed if any |
|--|-----------------------|---------------------------------------|--|------------------|---|---|-----------------------------------|
| | | increase the incidences of accidents. | Provision of clearly marked signing at townships, sensitive areas such as schools, temples. Enforcement of speed limits and other traffic rules, especially within the town limits. Placing of sign boards for animal crossings etc. Safety of road users could be ensured during repairing of carriageway and hydraulic structures by placing standard sign boards, barricading of the repairing site etc... | | All necessary permanent sign boards are established | | |

Environmental Monitoring Plan (EMoP) for the Rehabilitation and Improvement of Naula (58km) to Dambulla (72.71km) of the Kandy - Jaffna (A009) Road

| Environmental component | Project Stage | Parameters to be Monitored | Location ⁱ | Frequency | Standards | Approx. Rate (Rs.) | Approx. Amount (Rs.) | Implementation and Supervision |
|-------------------------|-------------------------------|--|---|--|------------------------|--------------------|----------------------|--|
| Air Quality | Before the construction stage | SPM, PM10, NO ₂ , CO, SO ₂ , CO ₂ | 1. Lenadora Primary School (59.4km) 2. Pannampitiya Maha Vidyalaya (62.8km) 3. Dambullu Oya Forest Reserve (65km) 4. Dambulla Golden Temple (71km) 5. Dambulla Town (72km) 6. Selected Quarry Sites and Crusher Plants 7. Selected Burrow Sites 8. Selected Asphalt Plants | Twice, covering dry and wet weather conditions | NAAQS of Sri Lanka | Per sample 40,000 | 640,000 | Contractor through the approved monitoring agency under the supervision of PIC, PIU and ESDD |
| | Construction stage | SPM, PM10, NO ₂ , CO, SO ₂ , CO ₂ | 1. Lenadora Primary School (59.4km) 2. Pannampitiya Maha Vidyalaya (62.8km) 3. Dambullu Oya Forest Reserve (65km) 4. Dambulla Golden Temple (71km) 5. Dambulla Town (72km) 6. Selected Quarry Sites and Crusher Plants 7. Selected Burrow Sites 8. Selected Asphalt Plants | Construction - Three times a year for 2 years. (however, additional measurements may need to be taken in | As specified under NEA | Per sample 40,000 | 1,920,000 | Contractor through the approved monitoring agency under the supervision of PIC, PIU and ESDD |

Appendix 7.3

| Environmental component | Project Stage | Parameters to be Monitored | Location ⁱ | Frequency | Standards | Approx. Rate (Rs.) | Approx. Amount (Rs.) | Implementation and Supervision |
|-------------------------|---------------------------|---|---|--|------------------------|--------------------|----------------------|--|
| | Maintenance stage | SPM, PM10, NO ₂ , CO, SO ₂ , CO ₂ | 1. Lenadora Primary School (59.4km) 2. Pannampitiya Maha Vidyalaya (62.8km) 3. Dambullu Oya Forest Reserve (65km) 4. Dambulla Golden Temple (71km) 5. Dambulla Town (72km) 6. Selected Quarry Sites and Crusher Plants 7. Selected Burrow Sites 8. Selected Asphalt Plants | Once a year for 5 years | As specified under NEA | Per sample 40,000 | 1,600,000 | Contractor through the approved monitoring agency under the supervision of PIC, PIU and ESDD |
| Water Quality | Before construction stage | Temperature, pH, Electrical Conductivity, DO, BOD ₅ , TSS, Turbidity, Salinity, Total Coliform count | 1. At culvert 59/2 2. At culvert 62/2 3. Dambulu Oya 66.2km | Twice, covering dry and wet weather conditions | As specified under NEA | Per sample 10,000 | 60,000 | Contractor through the approved monitoring agency under the supervision of |
| | Construction stage | Temperature, pH, Electrical Conductivity, DO, BOD ₅ , TSS, Turbidity, Salinity, Total Coliform count | 1. At culvert 59/2 2. At culvert 62/2 3. Dambulu Oya 66.2km | Construction – three times a year for 2 years | As specified under NEA | Per sample 10,000 | 180,000 | Contractor through the approved monitoring agency under the supervision of PIC, PIU and |

Appendix 7.3

| Environmental component | Project Stage | Parameters to be Monitored | Location ⁱ | Frequency | Standards | Approx. Rate (Rs.) | Approx. Amount (Rs.) | Implementation and Supervision |
|-------------------------|-------------------------------|---|---|--|------------------------|--------------------|----------------------|--|
| | Maintenance stage | Temperature, pH, Electrical Conductivity, DO, BOD ₅ , TSS, Turbidity, Salinity, Total Coliform count | <ol style="list-style-type: none"> At culvert 59/2 At culvert 62/2 Dambulu Oya 66.2km | Once a year for 5 years | As specified under NEA | Per sample 10,000 | 150,000 | Contractor through the approved monitoring agency under the supervision of PIC, PIU and ESDD |
| Noise and Vibration | Before the construction stage | Leq10 and Leq50 values | <ol style="list-style-type: none"> Lenadora Primary School (59.4km) Pannampitiya Maha Vidyalaya (62.8km) Dambullu Oya Forest Reserve (65km) Dambulla Golden Temple (71km) Dambulla Town (72km) Selected Quarry Sites and Crusher Plants Selected Burrow Sites Selected Asphalt Plants | Twice, covering dry and wet weather conditions | As specified under NEA | Per sample 10,000 | 160,000 | Contractor through the approved monitoring agency under the supervision of PIC, PIU and ESDD |

Appendix 7.3

| Environmental component | Project Stage | Parameters to be Monitored | Location ⁱ | Frequency | Standards | Approx. Rate (Rs.) | Approx. Amount (Rs.) | Implementation and Supervision |
|-------------------------|-------------------|----------------------------|---|---|------------------------|--------------------|----------------------|--|
| | Construction | Leq10 and Leq50 values | 1. Lenadora Primary School (59.4km) 2. Pannampitiya Maha Vidyalaya (62.8km) 3. Dambullu Oya Forest Reserve (65km) 4. Dambulla Golden Temple (71km) 5. Dambulla Town (72km) 6. Selected Quarry Sites and Crusher Plants 7. Selected Burrow Sites 8. Selected Asphalt Plants | Construction – three times a year for 2 years | As specified under NEA | Per sample 10,000 | 480,000 | Contractor through the approved monitoring agency under the supervision of PIC, PIU and ESDD |
| | Maintenance stage | Leq10 and Leq50 values | 1. Lenadora Primary School (59.4km) 2. Pannampitiya Maha Vidyalaya (62.8km) 3. Dambullu Oya Forest Reserve (65km) 4. Dambulla Golden Temple (71km) 5. Dambulla Town (72km) 6. Selected Quarry Sites and Crusher Plants 7. Selected Burrow Sites 8. Selected Asphalt Plants | Once a year for 5 years | As specified under NEA | Per sample 10,000 | 400,000 | Contractor through the approved monitoring agency under the supervision of PIC, PIU and ESDD |

Appendix 7.3

| Environmental component | Project Stage | Parameters to be Monitored | Location ⁱ | Frequency | Standards | Approx. Rate (Rs.) | Approx. Amount (Rs.) | Implementation and Supervision |
|-------------------------|-------------------------------|--|--|----------------------------|--|--------------------|----------------------|--|
| Flora | Before the construction stage | No. of trees to be removed and existence of endangered, threatened species | Land available within the proposed ROW | Once | - | 100,000 | 100,000 | Contractor through qualified consultant/s under the supervision of PIC, PIU and ESDD |
| | Construction stage | No. of trees replanted and impacts to endangered and threatened species | Land available within the proposed ROW | 2 times a year for 2 years | As specified in NEA and F&FPO | 100,000 | 400,000 | Contractor through qualified consultant/s under the supervision of PIC, PIU and ESDD |
| | Maintenance stage | Survival of trees and number of trees planted to replace dead plants Impacts to endangered and threatened species | Land available within the proposed ROW | Once a year for 5 years | As specified in NEA and F&FPO, percentage of survival of replanted trees | 100,000 | 500,000 | Contractor through qualified consultant/s under the supervision of PIC, PIU and ESDD |

Appendix 7.3

| Environmental component | Project Stage | Parameters to be Monitored | Location ⁱ | Frequency | Standards | Approx. Rate (Rs.) | Approx. Amount (Rs.) | Implementation and Supervision |
|---------------------------------|-------------------------------|--|--|----------------------------|-------------------------------|--------------------|----------------------|--|
| Fauna (including aquatic fauna) | Before the construction stage | Diversity of species and presence of animal corridors/pathway, locations/number of animal crossing structures to be placed during construction stage | Land available within the proposed ROW | Once | As specified in NEA and F&FPO | 100,000 | 100,000 | Contractor through qualified consultant/s under the supervision of PIC, PIU and ESDD |
| | Construction stage | Adequate animal crossing structures and impacts to fauna species | Land available within the proposed ROW | 2 times a year for 2 years | As specified in NEA and F&FPO | 100,000 | 400,000 | Contractor through qualified consultant/s under the supervision of PIC, PIU and ESDD |
| | Maintenance stage | No. of animal deaths due to road accidents and impacts to fauna species | Land available within the proposed ROW | Once a year for 5 years | As specified in NEA and F&FPO | 100,000 | 500,000 | Contractor through qualified consultant/s under the supervision of PIC, PIU and ESDD |

Appendix 7.3

| Environmental component | Project Stage | Parameters to be Monitored | Location ⁱ | Frequency | Standards | Approx. Rate (Rs.) | Approx. Amount (Rs.) | Implementation and Supervision |
|-------------------------|-------------------------------------|--|-----------------------|--|-----------|--------------------|----------------------|---|
| Waste disposal | Before the construction stage | <ul style="list-style-type: none"> Submission of the list of disposal sites selected for the project and their locations to the PIC | | Once | - | - | - | Contractor under the supervision of PIC, PIU and ESDD |
| | Construction and maintenance phases | <ul style="list-style-type: none"> Submission of the list of disposal sites and locations used for the project to the engineer Submission of approvals obtained for such sites to the engineer Submission of progress of disposal of all debris and spoils from the site to approved sites by the site engineer to the engineer Submission of the number of disposal sites restored after completion to the engineer | | Once a month during construction and once in six months during the period of maintenance | - | - | - | Contractor under the supervision of PIC, PIU and ESDD |
| Dust Generation | Construction phase | Submission of; <ul style="list-style-type: none"> Construction activities and locations along the road Number of bowsers allocated for water sprinkling including roads used to transport material Frequency and locations of water sprinkling Public complaints regarding dust issues to the PIC Presence of; <ul style="list-style-type: none"> Appropriate dust control measures (approved by | | Once a month | - | - | - | Contractor under the supervision of PIC, PIU and ESDD |

Appendix 7.3

| Environmental component | Project Stage | Parameters to be Monitored | Location ⁱ | Frequency | Standards | Approx. Rate (Rs.) | Approx. Amount (Rs.) | Implementation and Supervision |
|---|--|--|-----------------------|--|---------------------------|--------------------|--|---|
| Occupational safety | Construction and maintenance phases | Submission of; <ul style="list-style-type: none"> Number of laborers working in the project List of PPE supplied to laborers (in appropriate sizes) Record from Field Supervisors on use of PPE Frequency of conducting tool box meetings and attendance of laborers to the engineer | | Once a month during construction and once in six months during maintenance | Road safety manual of RDA | - | - | Contractor under the supervision of PIC, PIU and ESDD |
| Public Safety | Construction and maintenance phases | Submission of; <ul style="list-style-type: none"> Construction activities and locations along the road List of safety precautions such as placing sign boards, barricading, direction boards, use of flag men and blinkers used for the project based on | | Once a month during construction and once in six months during the | Road safety manual of RDA | - | - | Contractor under supervision of PIC, PIU and ESDD |
| Soil erosion | Construction phase and maintenance phase | <ul style="list-style-type: none"> Incorporation of site-specific mitigation measures to control soil erosion in the SSEMAP approved by PIC Implantation of proposed mitigation measure at the given locations in compliance of SSEMAP | | Once a month during construction and once in six months during the | - | - | - | Contractor under the supervision of PIC, PIU and ESDD |
| Slope stability | Construction phase and maintenance phase | <ul style="list-style-type: none"> Incorporation of site-specific mitigation measures to ensure slope stability in the SSEMAP approved by PIC Implantation of proposed mitigation measure at the given locations in compliance of SSEMAP | | Once a month during construction and once in six months during | - | - | - | Contractor under the supervision of PIC, PIU and ESDD |
| Total Cost for monitoring the pre-construction and construction stages | | | | | | | 7,590,000 (40,237.50 US\$) | |

Notes:

BOD = Biological Oxygen Demand, CO=Carbon monoxide, CO₂= Carbon Dioxide, PIC = Construction Supervision Consultant, DO = Dissolved Oxygen, DOF = Forest Department, ESD Division = Environmental and Social Development Division, NAAQS= National Air Quality Standards, NO₂= Nitrogen Dioxide, PM₁₀= Reparable particulate matter<10micrometers diameter, RDA=Road Development Authority, SO₂=Sulphur dioxide, SPM= Suspended particulate matter, TSS = Total Suspended Solids, NEA – National Environmental Act, F&FPO – Flora and Fauna Protection Ordinance

1. Contractor should secure the cost of monitoring for “before (Pre) construction”, “construction” and “maintenance” stages of this monitoring plan.
2. Locations of monitoring shall be updated and the number of locations will be altered based on field conditions, contract packages and weather conditions with the consent of the PIC
3. 1US\$ = Rs. 188.63 (Aug, 2020)

ⁱ Locations and number of locations can be revised as required with the instructions of PIU

A Sample of One on One Interviews Carried out with Stakeholders and Public during the Preparation of Social Assessments for the Work to be done on the Naula - Dambulla Section of the Kandy – Jaffna (A009) Road

| Name of the Respondent | Sex | Designation/ Address | Date | Views |
|-------------------------------|------------|-----------------------------------|-------------|--|
| B.M. Piyal Jayasuriya | Male | Divisional Secretary, Dambulla | 31.07.2020 | It is good to develop the road after many years. There will be no issue as there is no need to acquire land. It is good to have a meeting with all stakeholders and public prior to commencing the road development close to Dambulla town and near the temple. It is important to discuss and agree on the proposed development and land areas. There are issues in these two places that need to be settled. The road is narrow, and accidents take place due to this. The road was developed in 1990's. The drainage system at 72km in front of the temple needs to be rehabilitated and the storm water diverted to the Thammanna stream. The drains should be widened considering the capacity of the storm water. It is better if the hydrology assessment is carried out to study the water flow in the area. There is a forest reserve called Dambu Oya sanctuary and it is around 20 ha. Most of the population living along the sides of the road are engaged in businesses. There are also farmers, daily wagers and government and private sector employees. |
| Sajini Dassanayaka | Female | Divisional Secretary, Naula | 31.07.2020 | It is important to develop the road as there is a heavy flow of daily traffic and this road is not been developed for many years. There are many heavy vehicles traveling along the A009 road especially for the transportation of vegetables to the Economic Centre, and sand from Manampitiya and Mahiyangana. Further, public and private vehicles use this road to reach Kandy, Matale, the North Central and Northern provinces daily. The public have complained to us about accidents taking place due to not covering drains in the ongoing road development activities close to Kapuwatta and Bibila junctions. Make sure that this will not happen in this development work. Between 59-60km, close to the Serudandapola temple, the bridge is narrow and gets flooded during the rainy season. In the Serudandapotha village, many people are engaged in small and |

| Name of the Respondent | Sex | Designation/ Address | Date | Views |
|------------------------|--------|---|------------|--|
| | | | | medium businesses. A few people are employed in government and private sectors, farming, skilled and unskilled labour and self-employment. |
| R.M.P. Rathnayaka | Male | Executive Engineer, RDA, (Naula/Dambulla), Nalanda | 31.07.2020 | The RoW is sufficient to develop the road and around 72km, land is available for development. RDA has estimated that there will be 1.4 billion rupees for the development and RDA expects to develop 4.2m on either side of the centreline. The lands in front of the Economic Center belongs to the UDA. The road was rehabilitated in the 1990's under a Korean project. The central expressway and proposed railway projects will cross the road at Yapagama. Thus, the development of this area is complex. |
| R.P. Weerasuriya | Male | Irrigation Engineer, Irrigation office, Dambulla | 31.07.2020 | There is one river crossing A009, its Dambulu Oya belonging to Mahaweli authority. There are no flood risk areas along the road. However, the road gets inundated when water flow is blocked, and it happens many locations along the road. This happens as drains and culverts are not maintained properly. |
| D.A.N.D. Boopali | Female | Zonal officer, Archaeology office, Dambulla, | 31.07.2020 | The Dambulla temple is a world heritage site and it is located close to the A009 road. It is important to carry out the road development work without affecting the green belt in front of the temple. There needs to be an impact assessment, and this can be done prior to the construction of the road. The road design should be submitted to the department with an application. Approval will be granted after discussions are held. The RDA needs to consult Rahula thero, the chief incumbent of the temple. The information can be taken from secretary of Archaeology. |
| E.M.J.K. Ekanayaka | Male | Grama Niladari, Dambulla Town, Dambulla | 31.07.2020 | Road development is good as there is a lot of traffic on this road. The Water Board damaged the surface of the road while maintenance work was done. During road construction work, developing a drainage system only is not enough. The leader way canals should be provided in places where required. , If not, the overflowing water flows onto the road. Even the section where the road development is ongoing, this issue is prevalent. It is better to cut the |

| Name of the Respondent | Sex | Designation/ Address | Date | Views |
|------------------------|------|--|------------|---|
| | | | | unnecessary trees along the road. There are accidents taking place at the Kandalama and Kapuwatta junctions and close to Yapagama temple. There are two lakes located close to the Pannampitiya junction. When these lakes overflow, the road gets flooded. Therefore, the canals need to be built to address this. Most of the culverts should be replaced with more capacity. During rainy seasons, the water in the Dambulla town flows to the Nawapadeniya colony. There are 144 families living in this area and their houses get flooded during rainy seasons. Therefore, this water should be diverted to the Thammanna stream. The drains along the road should be developed from Naula to Dambulla. |
| E.M.K. Ekanayaka | Male | Grama Niladari – Administration, Naula DSD | 31.07.2020 | The road needs to be developed as it not been developed for a long time and the traffic flow has increased. It is important to consider leader way canals and the drainage system along the road. I suggest cutting the trees by the sides of the road as when the roots of one side is removed, the tree can easily fall. It has already happened in Naula. This need to be considered in this project. The Bobella slope is dangerous and accidents take place there. There is no pedestrian crossing at the CD junction and the bus bay is located away from the road. The pedestrian crossing at the Naula – Bibila junction needs to be shifted away from the junction. There are two lakes located close to Bibila junction and these lakes overflow and floods the road. |
| M.U.G. Jayakody | Male | Site Forest Officer, Forest Office, Naula | 31.07.2020 | There is a forest reserve along this section of the road, which is Dambulu Oya. It is located between 63 – 65km. It is a commercial plantation of the Forest Department. Although the forest is fragmented, animals do not cross the road. The Forest Department has placed boundaries and the road development work should not damage these. If there is a need to park construction vehicles or store construction material, approval needs to be obtained from the district forest office. If there is a need to cut trees, it needs to be informed to the Executive Engineer and the Department of Timber. Waste should not be disposed onto forest land. RDA needs to take the responsibility not to let |

| Name of the Respondent | Sex | Designation/ Address | Date | Views |
|-------------------------|--------|---|------------|---|
| | | | | workers cause harm to the forest. Eg.. Possibility of throwing cigarettes after smoking causing fire. |
| Channa Areula | Male | President of the Chamber of Commerce – Special Economic Centre, Dambulla | 31.07.2020 | Around 15,000 people come to the Dambulla Economic Centre daily. There are 50 lorries arriving from Jaffna and Vavuniya. Around 400 vehicles arrive from Anuradhapura and Polonnaruwa while there are 70 vehicles coming from the Kurunegala and Puttalam districts. Around 300 vehicles arrive from Nuwaraeliya and Badulla, 500 vehicles come from Matale and Kandy. Daily, around 1500 to 2500 vehicles arrive at the Economic Centre. The development of A009 road is important as 50% of vehicles arriving to the Economic Centre use the A009 road. The parking area belongs to the UDA. It is important to develop the road in front of the Centre to five lanes as there is sufficient space. One lane should be dedicated to park vehicles coming to the Economic Centre. When vehicles arrive from Nawala on the A009 road, there needs to be a proper procedure followed for vehicles to enter. The drains in front of Economic Centre should be covered with concrete slabs. Further, there needs to be a system to divert storm water coming from drains away from the town. There should be road sign boards. The road development plan in the Dambulla town area needs to be discussed with the officers of the Economic Centre prior to implementation. |
| H.G. Upali Aththanayaka | Male | Community Member, No.166, Wihara Junction, Dambulla (GND - Dambulla Town) | 15.07.2020 | The road construction is good. The road has not been developed for many years. The drainage system along the road need to be properly constructed when the development work is carried out. Accidents take place near 71-72km as the road is very narrow. During construction, dust needs to be controlled. |
| D.G. Kusumawathi | Female | Community Member, 117/5, Moragollewa, Dambulla (GND - Moragollewa) | 19.07.2020 | The development work is good. When developing the road, the drains and culverts along the road should be replaced. It is good if the project can provide job opportunities for local people. During construction, there will be dust and noise. This should be controlled. |

| Name of the Respondent | Sex | Designation/ Address | Date | Views |
|------------------------|--------|--|------------|--|
| W. Wimalarathna | Male | Community Member, No108/11, Yapagama, Dambulla. (GND - Yapagama) | 18.07.2020 | Accidents take place at the Idigolla junction, the main issue with the road is the lack of maintenance of the drainage system. Due to this, water flows onto the road on rainy days. This made it difficult to walk and for vehicles to travel. Therefore, the road should be developed with a proper drainage system. |
| A.G. Nandawathi | Female | Community Member, Aluthgedara, Kapuwalla. (GND - Kapuwalththa) | 25.07.2020 | During construction, noise and dust will be an issue. Dust will cause health issues. This will be an issue for the shops along the sides of the road as well. This needs to be controlled properly. Priority should be given local to the locals when hiring is done for labour work. |
| K.M. Nilantha Jayalath | Male | Community Member, No 109, 37 Mile post, Lenadora. (GND – Lenadora south) | 19.07.2020 | The development work is good. The road has not been developed for decades. The main problem are the drains and culverts. The capacity of these are not sufficient. This should be considered in the development work. |
| I. T. Anurasiri | Male | Vendor by the roadside Gobarella, Lenadora | 09.06.2020 | The drainage system is not good. During rainy days, the water flows along the road up to the culvert. The culvert also needs to be repaired. |