

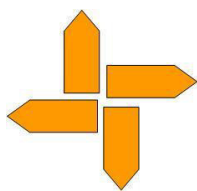
Initial Environmental Examination

October 2014

Sri: Northern Road Connectivity Project – Additional Financing

Bogahawewa - Pulmuddai Road (B060)

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



Ministry of Highways, Ports and Shipping

Road Development Authority

**Northern Road Connectivity Project - Additional
Financing (loan number 2890 SRI(SF)/ 2891 SRI)**



**Rehabilitation and Improvement of
0.0km to 6.0km section of
Bogahawewa - Pulmuddai (B060) Road**

Initial Environmental Examination (IEE)

Draft Final Report

October 2014

**Prepared by
Environmental and Social Development Division
Road Development Authority
Ministry of Highways, Ports and Shipping**

**Submitted to
Asian Development Bank**

Table of Contents

1. Introduction	3
1.1. Background	3
1.2. Objectives of the project.....	4
1.3. Objectives of the Initial Environmental Examination	4
1.4. Scope of the study	4
1.5. Alternative Analysis.....	5
1.6. Legal and Policy Framework	6
1.7. Policy Framework.....	7
2. Description of the Project	11
2.1. Category of the Project	11
2.2. Location of the Project.....	11
2.3. Magnitude of Operations.....	11
2.4. Sources and quantities of material required	12
3. Description of the Existing Environment	13
3.1. Existing Environment along the Road	13
3.2. Existing Physical Environment	14
3.3. Existing Biological Environment.....	15
3.4. Socio – Economic Environment.....	16
4. Anticipated Environmental and Social Impacts and Proposed Mitigation Measures.....	19
4.1. Construction stage	19
4.2. Post construction/Operational stage.....	24
5. Environmental Management and Monitoring.....	27
6. Public Consultation	28
6.1. Public consultation process	28
6.2. Disclosure of information	28
7. Grievance Redress Mechanism	29
8. Conclusions	31

List of Appendixes

Appendix 2.1	Rapid Environmental Assessment (REA) Checklist
Appendix 2.2	Location Map
Appendix 2.3	Proposed cross section
Appendix 2.4	List of fauna and flora observed
Appendix 5.1	Environmental Management Plan
Appendix 5.2	Environmental Monitoring Plan
Appendix 6.1	List of public consultation

List of Figures

Figure 3.1	Starting point
Figure 3.2	Along residential area
Figure 3.3	Causeway at 2.3km
Figure 3.3	End point at 6km
Figure 3.5	Road along the Padawiya Forest Reserve
Figure 7.1	Flow diagram of the GRM

List of Abbreviations

AC	Asphalt Concrete
ADB	Asian Development Bank
CEA	Central Environmental Authority
DoF	Department of Forest
DSD	Divisional Secretary Divisions
EMoP	Environmental Monitoring Plan
EMP	Environmental Management Plan
ESDD	Environmental and Social Development Division
GoSL	Government of Sri Lanka
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
IEE	Initial Environmental Examination
MOHPS	Ministry of Highways, Ports and Shipping
NAAQS	National Ambient Air Quality Standards
NEA	National Environmental Act
NWS&DB	National Water Supply and Drainage Board
PIU	Project Implementation Unit
PIC	Project Implementation Consultant
RDA	Road Development Authority
ROW	Right of Way
TOR	Terms of Reference

1. Introduction

1.1. Background

1. Sri Lanka is a country with an emerging economic growth in the South East Asian region of the world. The civil unrest which continued in the past three decades had a significant impact on its economic and social development. The physical infrastructure especially road network is severely damaged particularly due to non-maintenance. The North Eastern area of the North Central province was also affected by the civil unrest and road network was not maintained and rehabilitated properly. Therefore the mobility between Northern part and the country's rest of the regions has become poor due to the substantial travel time required as the linking national arterial roads are in inadequate condition, which has hindered the spread of economic activities and development. Therefore the Government of Sri Lanka has obtained a loan from Asian Development Bank (ADB) to rehabilitate and improve the roads in Northern Province and roads lead to Northern Province under the Northern Road Connectivity Project (NRCP) of Road Development Authority (RDA).

2. Subsequently under the Additional Financing component of the NRCP (NRCP - AF), 110km of national roads located in Northern and North Central Provinces is rehabilitated and improved to standard two lanes facility. In addition, the project intends to undertake rehabilitation and improvement of other three national roads to ensure the connectivity to the Northern Province. These additional roads include Vavuniya (5.0km) - Kebithigollewa (24.0km) section of Vavuniya - Horowpathana (A029) Road, Kebithigollewa New Town (B210) Road and 0.0km to 6.0km section of Bogahawewa - Pulmuddai (B060) road.

3. This document focuses on rehabilitation and improvement of the road section from 0.0km to 6.0km of Bogahawewa - Pulmuddai (B060) road. The road section is to be rehabilitated and improved to standard two lane status within the existing Right Of Way (ROW) with improved drainage and parking facilities. Total length of the road is 6km and the existing ROW varies between 14m - 16m. The road is mainly traversing through a residential area from its starting point to 6km.

4. This report presents the Initial Environmental Examination (IEE) for the proposed development for the road section from 0.0km to 6.0km of B060 Road prepared by Environmental and Social Development Division (ESDD) of RDA in compliance with the Environmental Safeguards Compliance Manual of RDA and Environmental Safeguard Policy Statement of ADB (2009).

1.2. Objectives of the project

Broad Objective:

- To increase the transportation efficiency within Northern, Eastern and North Central Provinces by ensuring effective connectivity.

Specific objectives:

- To rehabilitate and improve the road section from Bogahawewa (0.0km) to 6km of B060 Road to standard two lanes facility within the existing ROW.
- To introduce cycle lanes, parking bays, bus bays and other road furniture where necessary
- To overlay the road with Asphalt Concrete (AC)
- To improve cross and side drainage facility of the road
- To increase the transportation efficiency between Northern, Eastern and North Central Provinces while contributing to a sustainable development

1.3 Objectives of the Initial Environmental Examination

5. The purpose of this IEE is to gather and provide;

- Information about the following existing environmental settings of the project influential area;
 - Physical Environment (including climate, air quality, topography, soil, surface and ground water hydrology),
 - Biological Environment (fauna and flora and presence of endemic, endangered species and location of ecologically sensitive areas)
 - Socio - economic environment
- Identify beneficial and potential adverse impacts on the existing environment during preconstruction, construction and operational phases of the project;
- Propose effective mitigation measures to avoid/ minimize the project induced adverse impacts while enhancing the beneficial impacts, and;
- Formulate an effective Environmental Management Plan (EMP) to be incorporated in the Bid documents, so as to sensitize and guide respective divisions of RDA in environmental and social safeguards compliance and sensitize and guide respective contractors in environmental and social safeguards compliance during construction stage.

1.4 Scope of the study

6. This IEE was carried out in compliance with RDA manuals on environmental and social safeguards compliance in road development projects and Safeguard Policy Statement of Asian

Development Bank, 2009. The field assessments were carried out during the months of May and June of 2014.

7. During the field reconnaissance, a corridor extending up to 50m to the both sides of the proposed center line of the road was examined where possible to assess direct environmental and social impacts. 1:50,000 scale topographic map sheets of the Survey Department of Sri Lanka and satellite imagery available on-line from Google maps were used as a secondary information base to identify the land use pattern up to 200m/or impact influential area on both sides of the proposed trace.

8. The field assessment was carried out by a multidisciplinary team of ESDD of RDA which comprised of Environmental and Social Safeguards Officer, Hydrologist, Ecologist/Biologist, Field Monitoring Assistant (Ecology) and Map Production Expert. The support and guidance given by Director - ESDD, Deputy Directors of ESDD, Project Director – NRCP (AF) of RDA and Environmental Specialist and other staff of Project Implementation Consultant of NRCP-AF is highly appreciated.

1.5. Alternative Analysis

Without Project Scenario

9. Currently, B060 Road serves a link between Eastern and the North Central Provinces by connecting Trincomalle – Pulmuddai (B424) Road at Pulmuddai and Kebithigollewa – Padawiya (B211) Road at Padawiya (Bogahawewa). At present, B060 road is the shortest landward link from Padawiya areas to the Eastern coastal area. Further once the Kokilai Bridge which is under construction across the Kokilai Lagoon will be in operation, B060 road will facilitate a new link to Kokilai and Mullaitivu of Mullaitivu District of Northern Province from North Central Province and therefore will assist to increase transport efficiency of the area.

10. In addition B060 Road is the only road for communities living along the road to reach major townships such as Padawiya and Pulmuddai where hospitals, schools and other infrastructure facilities are available. Further mainly agriculture based communities could be observed within the project area and the road is used for transportation of agricultural produce to markets. On the other hand, the coastal belt in Pulmuddai has tourist attraction and developed road will enhance the tourism as well.

11. At present, the road section from 6km to the end (27km) of B060 Road has been improved to standard two lanes standard and the road section from 0 to 6km remains in degraded conditions and therefore acts as a bottleneck for the smooth transportation along the B060 Road. Therefore if the proposed project will not be implemented, degraded road section from 0 to 6km will further reduce the transportation efficiency of the road and barricades flow of socio – economic opportunities to the area.

With project scenario

12. Improved road will reduce the travel time between Padawiya (Bogahawewa) and Pulmuddai while providing benefits the surrounding communities whom present socio-economic standard is comparatively low by allowing flow of new socio-economic opportunities. Therefore developed road section will ultimately ensure the improvement of socio-economic status of the Padawiya DS Division which finally facilitate the development of the country.

1.6. Legal and Policy Framework

National Environmental Act and other applicable regulation

13. The National Environment Act (NEA) No 47 of 1980, and its' amendment Act No. 56 of 1988 and Act No. 53 of 2000 gives provisions to establish Central Environment Authority and an environmental council. Further it provides guidelines for environment management, management of natural resources, fisheries, wildlife, forestry, soil conservation, environment quality, environment protection and approval of projects.

14. Rehabilitation of existing highways/roads do not fall within the list of "Prescribed Projects" listed in Gazette Extra-ordinary No. 772/22 of 24th June 1993 and subsequent amendments, which needs to go through the Environmental Impact Assessment (EIA) process and subsequent conditional approval from the Central Environmental Authority (CEA) of the Ministry of Environment and Renewable Energy.

15. The EIA process for a "prescribed project" involves conducting of an Initial Environmental Examination (IEE) or an Environmental impact Assessment (EIA) based on the ToR prepared by the relevant Project Approving Agency (PAA).

16. Basic Information Questionnaire (BIQ) is the preliminary information document submitted to CEA seeking the environmental approval under NEA. And the BIQ was prepared for this project also and already submitted to CEA seeking environmental clearance.

17. Other than the NEA, following national laws and regulation will be applicable for this project.

- Agrarian Services Act No. 58 of 1979
- Crown Land Ordinance (chapter 454)
- Control of pesticide Act No 33 of 1980
- Soil Conservation Act 1951 amended 1996
- Explosive Act No. 36 of 1976
- Forest Act No. 34 of 1951
- Irrigation Act No. 1 of 1951
- National Water Supply and Drainage Board Act No 2 of 1974
- Pradeshiya Saba Act No 15 of 1987

- Felling of Trees Control Act No. 9 of 1951 as amended through Act No. 30 of 1953
- Geological Survey and Mines Bureau (GSMB) Act No 33 of 1992
- Flood Protection Ordinance of 1956, amended 1981
- State Land (Recovery of Possession) Act No 7 of 1979

Environmental Protection License (EPL)

18. The Environmental Protection License (EPL) is a regulatory/legal tool under the provisions of the National Environmental Act 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 "A", "B" and "C" depending on their pollution potential.

19. 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.

20. 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.

21. 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.

1.7. Policy Framework

ADB Safeguards policy statement, June 2009

22. 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 to all project components.

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

24. 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.

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 works. 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 initial environmental examination (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.

Policy Principles:

25. 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 commensurate with the significance of potential impacts and risks.

26. 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

trans boundary and global impacts, including climate change. Use strategic environmental assessment where appropriate.

27. 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.

28. 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 environmental management plan (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.

29. 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.

30. 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.

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

32. 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.

33. 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.

34. 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.

35. 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.

2. Description of the Project

2.1. Category of the Project

36. Based on the Rapid Environmental Assessment (REA) Checklist (Appendix 2.1) of RDA, the project on rehabilitation of B210 Road could be categorized as category B project.

2.2. Location of the Project

37. The candidate road section is located within Anuradhapura District of North Central Province in Sri Lanka and falls in to Padawiya Divisional Secretariat (DS) Division. Particular road section crosses Bogahawewa and Ruwanpura, Grama Niladari Divisions (Sub ordinate divisions of DS) of Padawiya DS Division.

Please refer appendix 2.2 for the location map.

2.3. Magnitude of Operations

38. The project is mainly to rehabilitate and improve the road section from 0.0km to 6.0km of Bogahawewa – Pulmuddai (B060) Road to standard two lanes facility. The road section is mainly located along a residential area where the existing ROW varies from 14.0m – 16.0m at places where measurements were obtained. Particular road section will be developed to comply with the already developed section and the proposed development will strictly be within the existing ROW. The proposed cross section consists of carriageway, hard shoulder and soft shoulder as given below. The road section will be surfaced with Asphalt Concrete (AC).

- Carriageway: 3.1m x 2
- Hard shoulder: 1m x 2
- Soft shoulder: 1m x 2
- Width of the embankment slope: 0.75m x 2
- Total: 11.7m

39. Please refer to the proposed cross section attached in appendix 2.3.

40. At present, the road section from 6 to 27km has been surfaced with Double Bituminous Surface Treatment (DBST) and has proper two lanes status. However the present traffic flow has been increased along the B060 road and measured Average Daily Traffic is 1103 in year 2013 (PIU, NRCP-AF). Further it has been forecasted that the traffic flow will be further increased in future. Therefore to cater this traffic demand and in order to smoothen the traffic flow, the road section from 0km to 6km will be rehabilitated and improved to proper two lanes with AC surface.

41. As mentioned, proposed rehabilitation for the candidate road section of B060 road will be restricted to the available ROW. Therefore the project will not encroach adjacent lands therefore will not involve acquisition of lands or demolition of properties.

42. It was found that the area around the causeway located at 2.3km is vulnerable to inundation therefore hydrology along the road section will be studied under detailed designs which is still to be carried out for the project and recommendations if any will be applied to the project to minimize any hydrological impacts.

43. The contractor will be responsible for construction of the road over about 1.5 years and performance based maintenance for another 5 years.

2.4. Sources and quantities of material required

44. This road development project is closely located to few other road development packages (CP11 to CP15) of NRCP-AF. And particular contractors have mechanism for extracting material for road rehabilitation works for currently ongoing activities. Therefore there is a possibility of using same sites for material extraction for road rehabilitation of 0 to 6km of B060 Road as well. On the other hand, if contractors are going for their own material extraction sites, they will be advised to obtain all necessary approvals and licenses from relevant authorities.

45. Quantities of material will be calculated and finalized once detailed design for the road section will be completed.

3. Description of the Existing Environment

3.1. Existing Environment along the Road

46. This project is to rehabilitate and improve the road section from 0 to 6km of B060 Road. The land use along the road section mainly consists of home gardens, agricultural lands, scrub forests and water bodies such as inland tanks and streams.

47. Proposed road section starts at Bogahawewa junction of Kebithigollewa – Padawiya (B211) Road. After passing the junction road enters a residential area an overhead tank of a community water supply scheme is located at 0.4km on Right Hand Side (RHS). At 1.1km Aluth Halmillewa School is found on Left Hand Side (LHS) while a paddy land is observed around 1.8km on LHS. An inland tank is located beyond the paddy land. At 2.3km, a causeway is located and it was mentioned that the surrounding area is prone to floods when Thiha Wewa (an inland tank) located upstream is spilled during heavy rainy periods. Around 3km, a scrub forest is found and at 3.5km a teak plantation is located on either sides of the road. Around 4.8km, Bogahawewa Tank is located on LHS while a paddy land is observed on LHS around 5km. The proposed road improvement ends at 6km where the road section which is already surfaced with DBST starts.



Figure 3.1: Starting point (0.0km)



Figure 3.2: Along residential area



Figure 3.3: Causeway at 2.3km



Figure 3.4: End point at 6km

3.2. Exiting Physical Environment

Climate

48. The section from 0km to 6km of B060 road entirely lies in the dry zone of Sri Lanka, falling within DL_{1e} and DL_{1d} agro-ecological zones (This categorization is based on climate, soil, natural vegetation and land use pattern of an area). Both DL_{1e} and DL_{1d} regions are characterized by a rainfall of 75% expectancy value more than 900mm per year. Project area gets rains during November to February when the North East Monsoon is in effect. However, the period from May to September is generally dry. The project area is also experienced with intensive rainfalls during the second inter monsoonal rains (October - November) when minor cyclones could also be possible. The average monthly temperature is fairly stable, while annual average temperature lies around 25°C- 27.5°C (The National Atlas of Sri Lanka, Department of Survey, 2007).

Air Quality and Noise

49. Since the candidate road section of B060 Road is mainly located within a residential area the major source of atmospheric pollution in the area is only from road traffic in the form of diesel and petrol engine vehicle fumes. Other than the vehicular emissions the project area is free from any activity which emits air quality pollutants. In addition slash and burn cultivation is common in the area and air quality could be deteriorated due to burning of scrub forest patches for slash and burn cultivation.

50. Similar to air quality, noise is also generated from traffic flow along the B060 road. According to Schedules I and II of National environmental (Noise Control) regulations No.1 1996 (924/12), the study area belongs to “Low noise area”. Therefore the noise levels at boundaries of land from which construction noise is emitted should not be exceeded 55 dB (A) during day time (06.00 hrs-18.00 hrs) and 45 dB (A) night time (18.00 hrs - 06.00).

Surface and Ground Water Hydrology

51. Except the causeway located at 2.3km, it was found that the project area is not hydrologically sensitive. The streams crossed by the road are seasonal in nature and water flow could be observed in irrigation canals mostly during the Major cultivation period which is during November to February. Further the existing road side and cross drainage is found to be poor due to silting and damaging existing drains and culverts.

52. During the public consultation it was noted that the surrounding area gets inundated around the causeway located at 2.3km during heavy rainy periods however it was further mentioned that floods are not experienced in each year. It was further specified that causeway is inundated by up to about 1m however the road is not overtopped. The stream crossing the road at this point is an outflow of Thiha Wewa Tank located upstream therefore the causeway gets inundated when the Thiha Wewa Tank gets spilled off during heavy rainy periods.

53. Ground water of the area is used for domestic requirements using dug wells. However due to recent kidney disease found in North Central Province, use of ground water for domestic purposes especially for drinking is limited. And this situation is observed in Kebithigollewa and Padawiya areas as well and several shops which sell purified water is found in the project area and also along the road and people prefer to use purified water than ground water for drinking.

3.3. Existing Biological Environment

Existing habitats with respect to Flora and Fauna

54. Both manmade habitats i.e., home gardens (e.g. 0.0km, 4.8km and 6km), paddy fields (e.g., 1.7km, 3.6km, 5km, 5.3km and 5.4km), tanks (6km), and natural or semi natural habitats i.e forest are present in the project area. As per the information of the Department of Forest, the road section crosses Padaviya forest reserve from 2.2km to 3.9km (Please refer to the location map in appendix 2.2). However land use within this road section has been highly modified and home gardens and paddy lands are mostly observed within the particular road section and a teak plantation could be found around 3.5km (figures 3.5). Further an adequate ROW (15.7m) is available within the road section in order to improve the road with the required cross section.



Figures 3.5: Road along the Padawiya Forest Reserve

55. Padaviya forest reserve which is of 48,151 ha was declared as a forest reserve by an extraordinary gazette No. 1793/21 dated 18th January 2013 due to its rich biodiversity and environmental significance including its role as an important catchment area. The vegetation of the forest areas consists with dry mixed evergreen type. Most dominant species in the forest area are *Drypetes sepiaria* (Weera), *Syzygium cordifolium* (Wal jambu), *Terminalia arjuna* (Kumbuk), *Diospyros ovalifolia* (Habara), and *Wrightia angustifolia*. The forest reserve provides habitat to the elephants and many other animal species.

56. List of fauna and flora observed within the project area during the field reconnaissance is attached in appendix 2.4.

3.4. Socio – Economic Environment

Population

57. The proposed project is located in Padaviya Divisional Secretariat Division (DSD) of Anuradhapura district. This road is traversing through two Grama Niladhari Divisions (GND) namely; Bogahawela and Ruwanpura. When considering the population, in 2012, estimated midyear population of Anuradhapura district was 856,232 persons and Padaviya DSD reported 22,924 persons. In the same period population of Bogahawela and Ruwanpura GNDs was 1,978 and 1,110 persons respectively (Department of Census and Statistics, 2013).

58. According to field observations, project area is sparsely populated. The land use pattern of the project area is mainly consisting of residential and agricultural lands. Except for the starting point, road is traversing through a small township area, known as Ruwanpura town, where more trade & business structures and residential housing units were observed and relatively high population could be found. Majority of population in the project area is consisting of Sinhalese.

Main economic activities

(a) Agriculture

59. Agriculture is the prominent economic activity in Anuradhapura district. In 2013, out of total employed population, 58.4% is engaged in agricultural sector. Economy of Padaviya DS division is also based on agriculture. Paddy is the main agricultural crop. According to Department of Census and Statistics, this division has 23,366 ha of cultivable paddy lands and many people in the division are engaged in paddy cultivation.

60. During the field reconnaissance, it was observed that number of cultivated paddy lands located in the project area. Farmers in the area cultivate paddy in Maha season (November to February) and during other months they cultivate subsidiary crops such as kurakkan (*Eleusine coracane*), maize (*Zea mays*), black gram (*Vigna mungo*), peanut (*Arachis hypogaea*) and gingerly (*Zingiber officinale*). In addition, fruit crops such as cashew, orange, mango, banana and, papaw are grown well. Slash and burning cultivation and livestock farming such as raring of cattle and buffaloes, and Inland fishing industry are also popular agricultural activities in the project area.

(d) Industries

61. The industrial sector is not well developed in Anuradhapura district. In the district about 14.5% population are engaged in this sector. In Padaviya DS division, there are 89 industrial establishments including 22 food & beverage, 11 garment and textile, and 25 wood production industries are located.

62. Pulmuddai Mineral sand plant is the major industrial establishment located in the project area. This plant is governed by Lanka Mineral Sand Limited which is a state organization. Since 1957, this plant has produced about 3.5 million Metric Tons of sand (Ilmenite, Rutile, Zircon, Hi-Ti-Ilmenite) and have generated about 600 employment opportunities for the people. In addition, garment and textile is also a potential industry in the project area.

(C) Services

63. In Anuradhapura district employment contribution to services sector is 33.1%. Majority of employed population in this sector belong to wholesale and retail trade activities. In the project area, people are engaged in private and government service employments. During the public consultations people in the area stated that number of youth (both male and female) in the area work for Sri Lanka Armed Forces.

Poverty Situation

64. Compared to other district in the country, poverty in Anuradhapura district is relatively high. In 2010, Poverty Head Count Index of the district was 5.7 percent and in 2013 it has increased up to 7.6 percent. This is due to majority of employed population in the district are in elementary occupations and agriculture, livestock and fishery industry. Most of the people working as casual laborers or own account workers and they earn relatively lower level of monthly income. The project area also shows same situation and it can be assumed that poverty is relatively high in the project area.

Existing Infrastructure facilities

(a) Energy source of households

65. Electricity is the major source of energy for lightning in Padaviya DS division. About 65.4% of households in the division use electricity for lightning. Kerosene is the second major source i.e. accounting 27.2%. Meanwhile 7.3% of households in the division use sola power.

(b) Drinking water

66. Majority of households in Padaviya DS division get drinking water from protected wells, i.e. 60.1%. About 10% of households get water from unprotected wells. Another 24% of households use piped born water and 1.7% get water from tube wells. More than 4.1% use river / tank / stream etc. for drinking water.

67. According to the field observations it was noted that well water is now less popular due to recently occurred kidney problems. A rural water supply project was observed at Bogahawewa village (Near the change of 1.0km) and people in the area get drinking water from that project.

(c) Sanitary Facilities

68. In Padaviya DS division nearly 92% of the households have a toilet of their own. 11.1% are sharing toilets with another household. About 2.3% of households are not using a toilet at all. During the public consultation people in the area mentioned that most of the households in the area have their own toilets.

4. Anticipated Environmental and Social Impacts and Proposed Mitigation Measures

69. This chapter describes the significant impacts that were identified during the field study and suggests feasible mitigation measures based on environment best practices to minimize these adverse impacts (or manage to acceptable limits) while enhancing the beneficial impacts of the project.

4.1. Construction stage

Increase of local air pollution, noise and vibration

70. Earthworks, pavement improvement operations, quarry and crusher operations, operation of Asphalt plants, operation of construction vehicles during construction period will release aerial contaminants (dust and fumes) increasing local air pollution.

71. Heavy machinery used for construction work will create noise and vibration which will cause nuisance to residents in settlements and locations such as the schools at 1.1km.

72. The impacts of construction noise, vibration and emissions at settlement areas can be mitigated by;

- Regular sprinkling of water to dampen the construction surface to reduce emission of dust (frequency of water sprinkling should be changed based on the weather conditions)
- Covering the construction site will also reduce the blowing of dust to sensitive locations and nearby settlement areas.
- Limiting operations to times when there is least impact in settlement areas, especially near the school.
- 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.
- Precondition survey should be conducted for surrounding buildings located within an agreed corridor with the Project Implementation Consultant (PIC) and an appropriate compensation should be paid accordingly if cracks will be appeared due to construction works.

Solid waste from construction materials

73. Solid waste such as excavated soil, waste metal, gravel, leftover of felled trees, rejected/waste concrete and asphalt etc... can be accumulated alongside of the road causing erosion, health hazards, public inconvenience and reduced visual quality. To minimize these impacts, any waste matter should not be dumped within the project area and shall be removed to approved disposal sites. The necessary approvals for all disposal sites should be obtained from the relevant local authority/Divisional

Secretariat with the prior consent from the PIC. Soil requirement of government agencies such as for land filling should be prioritized and fulfilled when disposing excavated waste soil. And once the construction is completed all disposal sites and construction site should be restored by the contractor as required by the PIC.

Biological impacts

Adverse impacts on terrestrial flora

74. The trees and vegetation within the ROW may be affected due to the construction activities. This will directly lead to loss of shade and soil moisture. Therefore, all construction works should be carried out in a manner that the destruction or disruption of vegetation is minimal. A compensatory tree planting program should be developed in the project area. At least three (3) good specimens of native tree species shall be planted for each tree removed. Fruit trees are best avoided as they are causing obstruction to the motorists due to fall of fruits when ripe.

Adverse impacts on fauna

75. The project area is located within Padaviya forest reserve. However, the proposed construction works will be limited to existing ROW and will not encroach in to the forest areas.

76. However, the free movement and natural behaviour of animals especially elephants in the project area will be disturbed during the construction stage due to workers, construction noise and frequent movement of construction vehicles. Further poaching, hunting and scavenging for fuel wood will be carried out by workers if the worker camps are located close to the forest area (2.2km to 3.9km).

77. Strict worker force supervision should be carried out by the contractor when conducting construction work close to these locations. Regular and adequate fuel supplies of Liquid Petroleum Gas (LPG) or kerosene should be supplied to worker camps in order to avoid workers scavenging for fuel wood especially close to forest areas. Project staff should be made aware about the movement of elephants in the project area (if any) and movement and natural behaviour of elephants should not be disturbed by the staff or due to the construction activities.

78. No solid waste or spoil dumping sites, hot mix plants and worker camps should be located within or close to forest area. Strict worker force supervision should be carried out by the contractor when conducting construction work within the area and the construction works should be completed within a minimum specified time period. Night time works should not be carried out in the road section within the forest area. Further, DoF should be informed about the construction activities.

Alteration/disturbance to surface water hydrology of water ways

79. During reconstruction of the culverts, bridges and causeways along the trace, it will be required to alter the water flow from construction area. Following measures are proposed in order to avoid the impacts on existing surface water hydrology;

80. Contractor shall not close or block existing canals and streams permanently. If diversion or closure or blocking of canals and streams is required for the execution of work, contractor must first obtain the Engineer's approval in writing. Contractor shall carry out an investigation and report to the Engineer, if an investigation is requested by the Engineer. Contractor shall also obtain the approval from the relevant agency such as Department of Irrigation (DI)/Agrarian Services Department (ASD)/Divisional Secretary (DS) if existing prior to such action is taken. Contractor shall restore the drainage path back to its original status once the need for such diversion or closure or blockage is no longer required. The debris and spoil shall be disposed in such a manner that waterways and drainage paths are not blocked. Avoid/minimize construction works near/at such drainage locations during heavy rain seasons from October to December.

Flood and drainage impacts

81. Contractor's activities shall not lead to flooding conditions as a result of blocked drainage paths and drains. The contractor shall take all measures necessary or as directed by the Engineer 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. Contractor's activities shall not lead to aggravate floods when working in flood prone areas. Contractor should pay special attention to flood prone area at 2.3km in this regard. Further, any recommendations laid down by the hydrological study report to be carried out under detailed designs should be adopted at the flood prone area.

Traffic Control and site safety

82. The contractor shall take all necessary measures to ensure safety of the public and traffic during construction phase. Contractor is responsible to provide, erect and maintain barricades, sign boards, markings, flags, lights and flagmen as required by the PIC for the information and protection of public and traffic approaching or passing the location.

83. All reasonable precautions will be taken to prevent danger of the workers and the public from accidents such as fire, explosions, falling to excavated pits, chemical sprays, unsafe power supply lines etc... The Contractor shall comply with requirements for the safety of the workmen as per the International Labor Organization (ILO) convention No. 62 and Safety and Health regulations of the Factory Ordinance of Sri Lanka to the extent that those are applicable to this contract. The contractor

shall supply all necessary safety appliances in adequate amounts such as safety goggles, helmets, masks, boots, etc., to the workers and staff and they should be educated about the importance of using safety appliances. The contractor has to comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, excavations, trenches and safe means of entry and egress.

Extraction, transportation and storage of construction materials

84. If quarry sites will be utilized which are running without proper licenses and approvals for extraction of aggregates for the project there will be local impacts at these quarry sites such as noise, vibration, crack on buildings, dust and nuisance to nearby settlements. Existing quarry sites which are operated with necessary licenses and comply with relevant standards could be selected to extract aggregates for the proposed project to mitigate this impact. Existing quarry sites which are used for ongoing construction packages (CP11 to CP15) of NRCP-AF could be considered for this purpose. However if additional quarry sites are needed, above mentioned impacts could be mitigated by utilizing additional quarry sites (if required) approved by Geological Survey and Mines Bureau (GSMB), Central Environmental Authority (CEA) and local authorities (operating with Environmental Protection Licenses (EPL)) and obtaining prior approval from GSMB, CEA and local authorities if new sites are to be commissioned. Selected quarry sites should have proper safety measures such as warnings, safety nets, first aid etc., third party insurance cover to protect external parties that may be affected due to blasting (according to the EPL).

85. Dust emanation, noise and vibration of machineries are the major impacts created by borrowing of earth, if necessary mitigation measures are not practiced at borrow sites. In addition if borrow sites will not be restored after completion water collected pits will provide breeding sites for mosquitoes and mosquito vector born diseases will be possible for neighboring communities. Borrow pits if used could be refilled with spoil and other material removed from road surface which are non-toxic and if recommended by the engineer. Dust emanation should be minimized by sprinkling water over dusty surfaces. Tree plantation should be carried out in order to restore the scenic beauty of such sites. Use of machineries which are periodically serviced and maintained will minimize generation of dust and noise. Borrow pits used for the project should have necessary licenses such as Industrial Mining License (IML), EPL from CEA and approval from the local authority.

86. Public roads will be used to transport above construction material and movement of heavy vehicles can damage these roads. Generally public roads are in dilapidated conditions in the project area and movement of material transportation vehicles will worsen the road conditions. This will finally cause disturbances to local traffic and road users, noise and vibration to people living along these roads and damaged roads will emit dust which adversely impact to residents and road users of particular roads. The contractor should be advised to select material extraction sites that have roads with sufficient capacity to be used by heavy trucks and keeping provisions for repairing and restoration of such roads by the contractor in the contract document, use of covers over transported materials to guard against

dust blow and water spraying to dampen any dusty surface will mitigate the impacts due to transportation of construction material.

Poor sanitation at worker camps, work sites and disposal of spoil

87. Locations selected for labor camps should be approved by the PIC and comply with guidelines/ recommendations issued by the CEA/Local Authority (LA). Construction labor camps should not be located near waterways, near to a site or premises of religious, cultural or archeological importance and schools. Contractor shall report any outbreak of infectious disease of importance in a labor camp to the engineer and the Medical Officer of Health (MOH) or to the Public Health Inspector (PHI) of the area immediately. Contractor shall carry out all instructions issued by the authorities, if any.

88. Labor camps shall be provided with adequate and appropriate facilities for disposal of sewerage, solid waste and wastewater. The sewage systems shall be properly designed, built and operated so that no pollution to ground or adjacent water bodies/watercourses takes place. Garbage bins shall be provided the camps and regularly emptied. Garbage should be disposed off in a hygienic manner, to the satisfaction of the relevant norms. Compliance with the relevant regulations and guidelines issued by the CEA/LA shall be strictly adhered to. Contractor shall ensure that all camps are kept clean and hygienic. Necessary measures shall be taken to prevent breeding of vectors. Contractor shall adhere to the CEA recommendations on disposal of wastewater. Wastewater shall not be discharged to ground or waterways in a manner that will cause unacceptable surface or ground water pollution. Contractor should remove all labor camps fully after its need is over, empty septic tanks, remove all garbage, debris and clean and restore the area back to its former condition.

Impacts due to migrant labour

89. If migrant labour is brought for construction with different cultural norms there may be cultural conflicts among the workers and settlers near worker camps. Activities such as selling of illicit liquor and other narcotics may also affect the living style of the people in the area. Spreading of communal diseases is also possible due to migrant labour. In addition, using public water sources for labour camps and other construction activities will increase scarcity of portable water for local population especially during the dry season and if the available water sources are used for above purposes it will severely affect the day to day life of the local people.

90. All possible measures should be considered to secure labour from areas close to construction sites; there by the necessity of setting up labour camps could be minimized. If labour is to be brought from outside locations, strict labour supervision is required to avoid any conflicts arising due to migrant labour. Awareness programs should be conducted at worker camps on sanitation and diseases to avoid any worker camp waste being disposed at settlement areas and to avoid any disease spread. Also a proper water source if available, which does not interrupt the normal household activities of the local

people should be selected to provide water for labour camps. If not, water should be brought from outside sources for requirements of road construction and it should be included in the contractor document.

Compaction of soil

91. Heavy machinery traversing beyond the area of road to be improved (travelling beyond the road reservation area) will compact the soil and this could affect the existing land use pattern and any scenic beauty of the land.

92. Confining the movement and stationing of vehicles within the proposed ROW, clearly marking boundaries of the working area and parking vehicles on private land where proper leases have been negotiated or state land where appropriate clearance have been obtained will mitigate the impacts of compaction of soil beyond the area of construction.

Impacts to other infrastructure facilities (water, electricity and telecommunication)

93. Shifting of existing water main, electricity supply and telecommunication that are located very close to the existing road edge may be required in order to widen the existing carriageway (where necessary). Also there is a possibility of causing accidental damages to such supply lines during the construction work.

94. Proper co-ordination with the concerned authorities, such as the National Water Supply and Drainage Board (NWSDB), Ceylon Electricity Board (CEB) and Sri Lanka Telecom (SLT) is important when shifting the relevant 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. Advance notice to the public about the times that the utility supplies will be disrupted will help the public to adjust to the situation before hand, there by minimize the difficulties that they will face in the case of sudden disruption of these services. Utility agencies must follow the guidelines used by the RDA for reinstalling utility supply lines. Informing relevant agencies about the road rehabilitation project in advance will allow them to locate utility lines outside the ROW. Thereby the likely impacts on the new supply lines could be avoided.

4.2. Post construction/Operational stage

Impacts on water resources

95. Improvements to the road drainage will result in improved storm water flows, and reduce the tendency of blockages to occur in roadside drains. Risks to the public health caused by such stagnant water bodies by acting as disease vector breeding places will be reduced. By designing the drains to

withstand appropriate storm events will reduce the risk of any operational failure of the drainage system and regular maintenance will further reduce the chances of failure.

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

Disposal of unsuitable material

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

Extraction of material for repairing and maintenance works

98. For repairing of maintenance of carriageway and other structures, material such as gravel, aggregates and sand will be required. And mitigation measures specified in 5.2.7 above could be adopted to minimize impacts due to maintenance activities of the roads.

Pedestrian and commuter safety

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

- Provision of centreline road marking where possible, edge delineation etc...
- 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

100. Furthermore, 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...

Air quality and noise

101. Higher speed limits will reduce the travel time through the area and better surface conditions will 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 signing will be put in sensitive areas such as schools, temples to warn drivers and avoid making unnecessary horn signals.

Ecological Impacts

102. With the improved road surfaces number of vehicles and the speed will be increased. Further, certain number of animals will attract to tarred road surfaces. Also there will be frequent animal movement around the forest areas. This will result in the increase number of collision and run over of animals and disturbance to their natural movement within and the forest area (2.2km to 3.9km). This impact could be reduced by placing warning and information sign boards at least 1km ahead of approaching such areas and installing speed breakers. Instructions from DWLC and DoF could be obtained when placing such warning signs.

103. In addition, survival of replanted trees should be ensured and any dead saplings should be replaced immediately after the notice.

Road safety

104. Improvements to the road surface and road geometry will be conducive to safe vehicle driving at higher speeds. But such speeds may increase the incidences of accidents. Incorporating the following measures could offset this negative impacts caused by vehicles operating at higher speeds;

- Provision of centerline road marking and studs, edge delineation on wider pavements and chevron markers on bends,
- Provision of sealed shoulders where cycle and other slow and non-motorised traffic is significant and kerbed footpaths through settlement areas (townships) and pedestrian crossings.
- Provision of appropriate road signs as per the manual on traffic control devices of RDA.

Encroachment to the new ROW

105. With the road rehabilitation and upgrading project there is a possibility to encroach the ROW by encroachers. As a result of encroachment the road users encounter inconvenience. Continuous monitoring and strict regulations should be followed to avoid the encroachment. Regular checking and removing any unauthorized activities within the ROW will also mitigate this impact.

5. Environmental Management and Monitoring

106. Environmental Safeguards Manual of RDA and the Environmental Policy Statement of ADB, outline the requirement for an Environmental Management Plan (EMP) which is presented as a matrix developed based on best practices for environmental management. The mitigation measures suggested in the EMP should be incorporated in the contract document. The Environmental and Social Development Division (ESDD) of the RDA could assist the Project Implementation Unit (PIU) in incorporating the EMP in to contract documents and audit the effectiveness of implementing the EMP by the contractor during the construction period. It is also recommended that an environmental specialist to work in the PIU or PIC to address all issues related environmental aspects during the construction period. This specialist should work closely with the Environmental and Social Safeguards Officer of the ESDD who will assist in issues related to the environment. EMP prepared for the road section from 0.0 to 6.0km of Bogahawewa – Pulmuddai (B060) Road is attached in appendix 5.1.

107. Implementation of the clauses under the “construction stage” of the EMP will be a responsibility of the contractor and any of his nominated subcontractor/s. The PIU with the assistance of the PIC will supervise the effectiveness of the implementation of the EMP.

108. Environmental Monitoring Plan (EMoP) is developed based on the project cycle and monitors the EMP implementation by measuring environmental parameters. During the pre-construction phase it is important to measure air, water quality and noise levels. 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 any adverse impacts. Environmental Monitoring Plan (EMoP) prepared for rehabilitation of 0.0 to 6.0km section of B060 road is presented in appendix 5.2.

6. Public Consultation

6.1. Public consultation process

109. The study team conducted stakeholder consultation during the reconnaissance survey. This included public and government authorities like Forest with government officials. A summary of public consultation is given in appendix 6.1.

110. Public welcomed the road development project. However, they highlighted the inundation area at the causeway location at 2.3km. The public requested to minimize the construction impacts such as dust and noise.

111. Further, ESDD officially requested the location of any declared areas of Department of Forest and their consent over the project.

112. Objective of this activity was to understand the viewpoints of the stakeholders and to respond to their concerns and suggestions during the early stages of the project there by reduce any objections towards the project and incorporate any valuable suggestions by the public in to the design so as to reduce any adverse impacts to the environment.

6.2. Disclosure of information

113. Disclosure of information at an early stage of the project has many benefits such as to negate any objections by the public towards the project, avoid misinformation getting in to the public through agitating groups and some NGOs. While disclosure of information can be done through the Divisional Secretariat and the Grama Niladari (village administrative officer) of the area, Farmer Based Organizations (FBOs), Community Based Organizations (CBO) and village societies are also possible sources of disseminating project related information. Village leaders such as the head priest of the temple can be resource persons for such an activity. The use of mass media to advertise the availability of the report could help information disclosure to other interested groups outside the project area.

7. Grievance Redress Mechanism

114. Project Administration Manual of NRCP - AF states that Grievance Redress Mechanism (GRM) to be formulated to address the issues raised by the public with regard to the project implementation since a GRM provides a predictable, transparent and credible process to all parties, resulting in outcomes that are seen as fair, effective and lasting. Accordingly, Grievance Redress Committees (GRC) will be appointed to take necessary steps in order to harmonize project activities as well as the wellbeing of the General Public.

115. There are two levels of GRM proposed to this project. The step 1 GRC comprises following members.

Representative of PMU	- Chairman
Grama Niladari	- Secretary
Representative of Supervision Consultant	- Member
Representative of Contractor	- Member
Representatives from a Social Organization (if necessary)	- Member
Community member (if necessary)	- Member

116. The issues that could not be resolved by Step 1 GRC, will be forwarded to Step 2 GRC within seven days (working days) of the final decision of Step 1 GRC. Step 2 GRC is chaired by the Divisional Secretary or assistant Divisional Secretary and comprises following members.

Divisional Secretary / Asst. Divisional Secretary	- Chairman
Representative from PIU	- Secretary
An officer from RDA	- Member
A representative from an NGO	- Member
A respected clergy of the area or Community Leader	- Member

117. GRM should be given a wide publicity among stakeholder groups such as affected parties, government agencies, and civil society organizations. Effective awareness of GRM process makes people better understanding about their options, depending on the types of complaints. However, measures should also be taken to encouraged stakeholders not to submit false claims. Criteria for eligibility need to be communicated and also awareness campaigns should be launched to give publicity to the roles and functions of the GRM.

118. The figure 7.1 presents the flow diagram of the GRM.

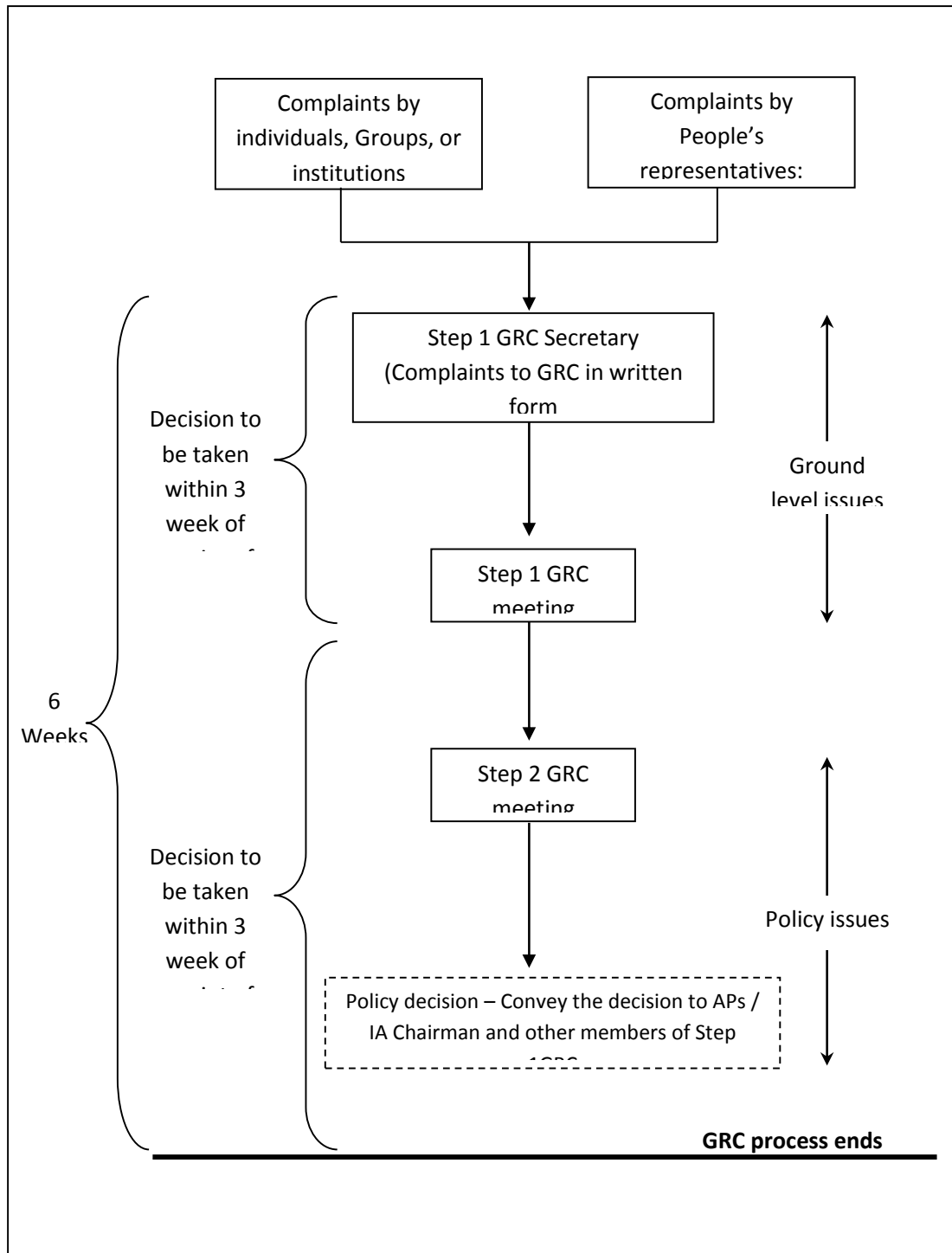


Figure 7.1: Flow diagram of the GRM

8. Conclusions

119. The project aims to rehabilitate and improve the road section from 0.0km to 6.0km of Bogahawewa – Pulmuddai (B060) Road to standard two lanes facility. B060 Road acts as a connecting road between Padawiya and Pulmuddai areas and provide access to local communities in between to nearby townships where infrastructure facilities area available. Therefore rehabilitation and improvement of the road section to proper two lanes facility is timely required with hard shoulders, soft shoulders, parking bays where necessary. The improvement will be strictly limited to the existing ROW only.

120. Road section mainly traverses through a residential area and crosses Padawiya Forest Reserve from 2.2km to 3.9km. As the proposed road improvement will be strictly within the existing ROW there will not be direct impacts to the forest reserves due to the road improvement. Based on public views the area around the causeway at 2.3km gets inundated during heavy rainy periods however the road other than the causeway is not overtopped during inundations. Other than the forest and the causeway area no environmentally or socially sensitive entity is found within the project area.

121. As mentioned, road improvement will not encroach forest lands therefore the project will not cause irreversible impacts to the forest reserves. And indirect impacts if any will be temporary during the construction phase and could be mitigated by implementing comprehensive mitigation measures as given in the EMP. In addition, the project will not generate major environmental and social impacts to the existing environment and possible minor impacts are manageable through adaptation of comprehensive mitigation measures during construction phase through the EMP.

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 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.

Country/Project Title:

Rehabilitation and improvement of 0.0 to 6.0km section of Bogahawewa – Pulmuddai (B060) Road.

Sector Division:

Province	District	DS Division
North Central	Anuradhapura	Padawiya

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site		X	
▪ Protected Area	X		The candidate road section crosses Padawiya Forest Reserve within the section from 2.2km to 3.9km. However proposed road development will be strictly within the existing ROW and will not encroach forest lands.
▪ Wetland		X	
▪ Mangrove		X	
▪ Estuarine		X	

Screening Questions	Yes	No	Remarks
▪ Buffer zone of protected area		X	
▪ Special area for protecting biodiversity		X	
B. Potential Environmental Impacts Will the Project cause...			
▪ Encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		X	
▪ Encroachment on precious ecology (e.g. sensitive or protected areas)?		X	Although the candidate road section crosses forest reserves as mentioned above, road development activities will not encroach the forest reserve
▪ Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?	X		<p>No permanent alteration of surface water hydrology is expected if designs and construction are undertaken considering the existing drainage paths which are crossed by the road. However, adequate opening sizes should be adopted with specific flood return periods to overcome water stagnations in upstream.</p> <p>Carrying out construction works during lean flow periods, storing soil and other spoil materials away from water bodies, covering all soil dumps, carried out construction activities during dry periods will reduce the amount of erosion.</p>

ROADS AND HIGHWAYS

page 3 of 9

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? 	X		This will be a temporary impact during the construction phase. Storing all materials required for construction in well secured and managed sites, installing silt traps near all water bodies prior to construction activities, providing proper sanitary facilities and solid waste management practices to worker camps and creating awareness on sanitation for workers will mitigate these impacts.
<ul style="list-style-type: none"> Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing? 	X		Using approved crushing, batching plants and asphalt processing plants (which are currently being used for ongoing packages of NRCP-AF) in recommended locations which are away from sensitive areas such as settlements, hospitals, schools, and adhere to conditions given by EPL will mitigate this impact
<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 during project construction and operation? 		X	
<ul style="list-style-type: none"> Noise and vibration due to blasting and other civil works? 	X		Blasting will not be practiced within the subproject area. However blasting activities in quarries should be in compliance to the conditions given in the Industrial Mining License (IML). Standard mitigation measures should be anticipated for all other activities during construction period to minimize the impacts to acceptable levels which are specified in National Environmental (Noise Control) Regulations 1996 stipulated by NEA amendments act 924/12
<ul style="list-style-type: none"> Dislocation or involuntary resettlement of people? 		X	

Screening Questions	Yes	No	Remarks
▪ Dislocation and compulsory resettlement of people living in right-of-way?		X	
▪ Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		X	
▪ Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?		X	
▪ Hazardous driving conditions where construction interferes with pre-existing roads?		X	
▪ 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?	X		This impact will be limited to the construction phase. The local labour should be utilized as much as possible to avoid this impact. If outside labour is to be brought, construction camps should be established with proper sanitary facilities with adequate supply of water, solid and waste water disposal methods in recommended locations. Educating both labour and local community on communicable diseases will mitigate this impacts
▪ Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?	X		Burrow pits, construction site and other possible sites which can act as mosquito breeding sites should be restored just after extraction using top soil and denuded materials to minimize this impact
▪ Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?		X	
▪ Increased noise and air pollution resulting from traffic volume?		X	
▪ Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?		X	

Screening Questions	Yes	No	Remarks
▪ Social conflicts if workers from other regions or countries are hired?		X	
▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		X	
▪ 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?		X	
▪ 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.		X	

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	REMARKS
<ul style="list-style-type: none"> Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I) 	X		During public consultation it was mentioned that the area around the causeway at 2.3km gets inundated during intense rainfall events. However further it was noted that only the causeway is flooded and the road is not overtopped.
<ul style="list-style-type: none"> Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (eg., increased erosion or landslides could increase maintenance costs, permafrost melting or increased soil moisture content could affect sub0-grade). 		X	
<ul style="list-style-type: none"> Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (eg., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? 		X	
<ul style="list-style-type: none"> Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by encouraging settlement in areas that will be more affected by floods in the future, or encouraging settlement in earthquake zones)? 		X	

Note: Hazards are potentially damaging physical events.

Project Classification:

Proposed Environmental Classification: **Category B**

This project is for rehabilitation and improving of the existing Bogahawewa - Pulmuddai (B060) Road from 0.0km to 6.0km and the proposed improvement will be limited to existing ROW. Therefore almost all project induced impacts are temporary and reversible and could be mitigated with feasible mitigation measures practiced during the construction phase. Therefore the project could be categorized under environmental category B.

Checklist prepared by:

Environmental and Social Development Division,
Road Development Authority

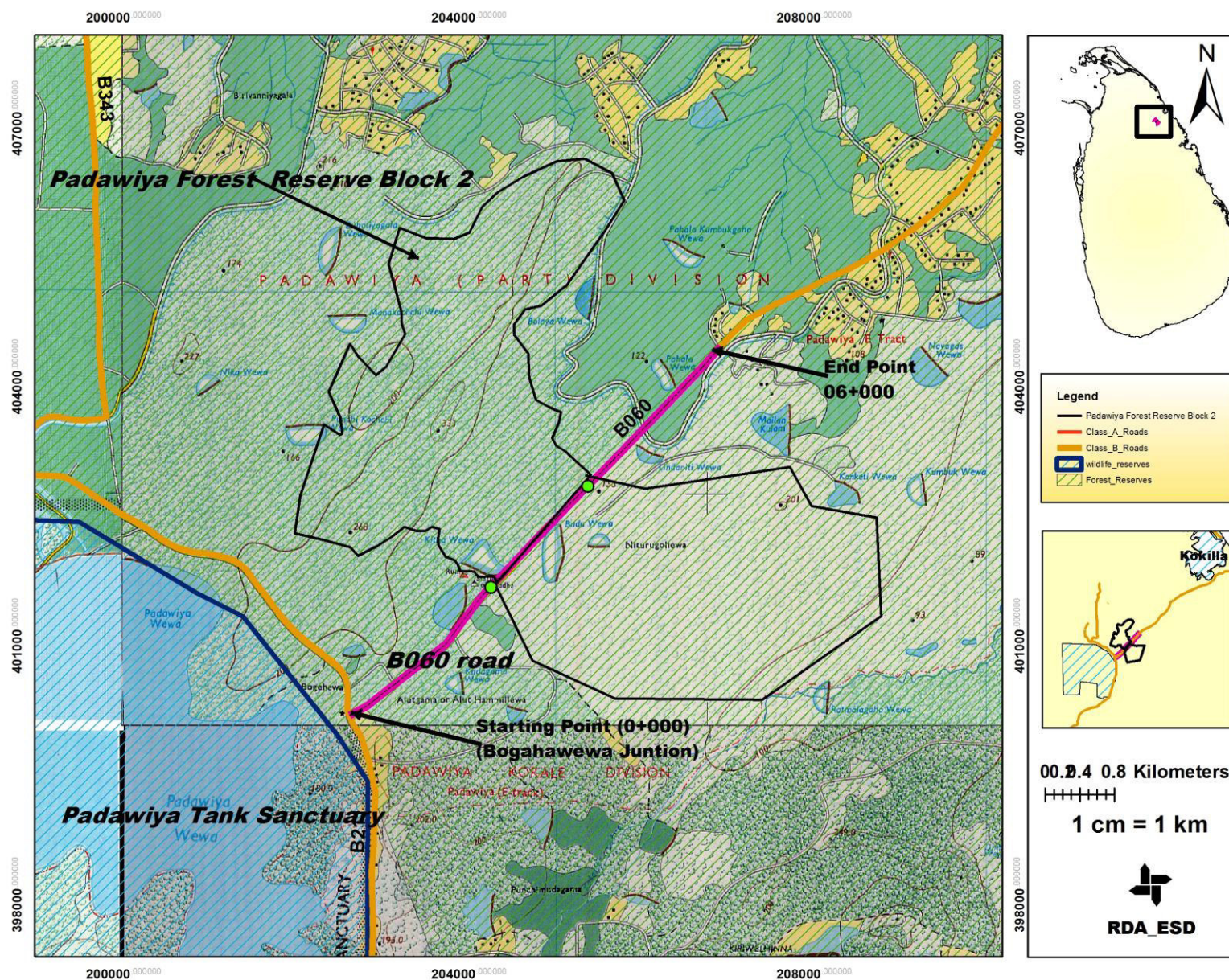
Appendix I: Environments, Hazards and Climate Changes

Environment	Natural Hazards and Climate Change	Example Impact on Roads and Highways
Arid/Semi-arid and desert environment	Low erratic rainfall of up to 500 mm rainfall per annum with periodic droughts and high rainfall variability. Low vegetative cover. Resilient ecosystems & complex pastoral and systems, but medium certainty that 10–20% of drylands degraded; 10-30% projected decrease in water availability in next 40 years; projected increase in drought duration and severity under climate change. Increased mobilization of sand dunes and other soils as vegetation cover declines; likely overall decrease in agricultural productivity, with rain-fed agriculture yield reduced by 30% or more by 2020. Earthquakes and other geophysical hazards may also occur in these environments.	Reduced availability of water for compaction during construction, increased sand on carriageways reduce road safety, road alignment may need to be reviewed where, for example, agriculturally productive zones are shifting.
Humid and sub-humid plains, foothills and hill country	More than 500 mm precipitation/yr. Resilient ecosystems & complex human pastoral and cropping systems. 10-30% projected decrease in water availability in next 40 years; projected increase in droughts, heatwaves and floods; increased erosion of loess-mantled landscapes by wind and water; increased gully erosion; landslides likely on steeper slopes. Likely overall decrease in agricultural productivity & compromised food production from variability, with rain-fed agriculture yield reduced by 30% or more by 2020. Increased incidence of forest and agriculture-based insect infestations. Earthquakes and other geophysical hazards may also occur in these environments.	Increased landslides and mudflows disrupt road networks, Increased moisture content in the subsurface can result in increased penetration of water into the fill, which may also collapse, Reduced effectiveness of drainage which results in a reduction in the bearing capacity of the soils which become saturated
River valleys/deltas and estuaries and other low-lying coastal areas	River basins, deltas and estuaries in low-lying areas are vulnerable to riverine floods, storm surges associated with tropical cyclones/typhoons and sea level rise; natural (and human-induced) subsidence resulting from sediment compaction and ground water extraction; liquefaction of soft sediments as result of earthquake ground shaking. Tsunami possible/likely on some coasts. Lowland agri-business and subsistence farming in these regions at significant risk.	Same as above
Small islands	Small islands generally have land areas of less than 10,000km ² in area, though Papua New Guinea and Timor with much larger land areas are commonly included in lists of small island developing states. Low-lying islands are especially vulnerable to storm surge, tsunami and sea-level rise and, frequently, coastal erosion, with coral reefs threatened by ocean warming in some areas. Sea level rise is likely to threaten the limited ground water resources. High islands often experience high rainfall intensities, frequent landslides and tectonic environments in which landslides and earthquakes are not uncommon with (occasional) volcanic eruptions. Small islands may have low adaptive capacity and high adaptation costs relative to GDP.	Increased salinity increases corrosion of materials which can break-down, Road is eroded by increased wave action, Increased flooding from overtopping of sea-water over road or salt-water intrusion in to groundwater,
Mountain ecosystems	Accelerated glacial melting, rockfalls/landslides and glacial lake outburst floods, leading to increased debris flows, river bank erosion and floods and more extensive outwash plains and, possibly, more frequent wind erosion in intermontane valleys. Enhanced snow melt and fluctuating stream flows may produce seasonal floods and droughts. Melting of permafrost in some environments. Faunal and floral species migration. Earthquakes, landslides and other geophysical hazards may also occur in these environments.	Damage to infrastructure from landslides and mudflows, permafrost melting causes damage to roads, glacial lake outbursts wash out river-crossings.

Environment	Natural Hazards and Climate Change	Example Impact on Roads and Highways
Volcanic environments	Recently active volcanoes (erupted in last 10,000 years – see www.volcano.si.edu). Often fertile soils with intensive agriculture and landslides on steep slopes. Subject to earthquakes and volcanic eruptions including pyroclastic flows and mudflows/lahars and/or gas emissions and occasionally widespread ashfall.	Damage and loss of roads, insecurity for roadworks crew and maintenance

Location Map

Rehabilitation and Improvement of 0.0km to 6km section of Bogahawewa – Pulmuddai (B060) Road





TYPE - 02 TYPICAL SECTION



List of floral species observed in the project area

PF: Paddy Land

WB: Water bodies

HG: Home Garden

OT: Other (road side

F ; Forest

SF & GL: Scrub Forest and Grasslands

T: Tree

S: Shrub

E : Endemic

VU : Vulnerable

IN: Invasive

Indi: Indigenous

Intro: Introduced

Family	Scientific name	Common name	Status ¹	Habit ²	Habitat					
					MA & PF	W B	H G	O T	F	SF & GL
Aclepiadaceae	<i>Calotropis gigantea</i>	Wara	Indi	S	+					+
Acanthaceae	<i>Acanthus ilicifolius</i>	Katu ikili	Intro	H	+	+				
Aloaceae	<i>Aloe vera</i>	Komarica	Indi	H			+			
Amaranthaceae	<i>Aerva lanata</i>	Polpala	Indi	H	+		+	+		
	<i>Alternanthera sessilis</i>	Mukunuwen na	Intro	H	+			+		
	<i>Amaranthus spinosus</i>	Katu thampala	Indi	H	+			+		
Anacardiaceae	<i>Anacardium occidentale</i>	Kaju	Intro	T			+	+		
	<i>Mangifera indica</i>	Amba	Intro	T			+			
	<i>Lannea coromandelica</i>	Hik	Indi	T				+		
	<i>Allamanda cathartica</i>	Kahamal	Intro	S			+			
	<i>Nerium oleander</i>	Kaneru					+			+
	<i>Cerbera odollam</i>	Gon kaduru	Indi	T	+					
	<i>Plumeria obtusa</i>	Araliya	Intro	T			+			
	<i>Tabernaemontana divaricata</i>	Wathusudda	Intro	S			+			
Aponogetonaceae	<i>Aponogeton</i> spp	Kekatiya	Indi	H	+					
Arecaceae	<i>Areca catechu</i>	Puwak	Intro	T			+			
	<i>Nypa fruticans</i>	Gin pol	Vulnerable	T	+					
	<i>Cocos nucifera</i> Var <i>typica</i>	Pol	Indi	T			+			
	<i>Cocos nucifera</i> Var <i>aurantica</i>	Thembili	Indi	T			+			
	<i>Borassus flabellifer</i>	Tal	Indi	T			+			+
	<i>Helianthus annuus</i>	Suriyakantha	Intro	H			+			

¹ As per Senarathne, L.K. (2001), The National Red List 2012 of Sri Lanka.² As per Vlas, J. de and Vlas, J. (2009)

Family	Scientific name	Common name	Status ¹	Habit ²	Habitat					SF & GL
					MA & PF	W B	H G	O T	F	
	<i>Mikania cordata</i>	Wathupalu	Intro	C	+					
	<i>Eupatorium odoratum</i>	Podisinghomaran	IN	H			+	+		+
	<i>Tridax procumbense</i>	Tridax		H				+		+
	<i>Tagetes erecta</i>	Das pethiya	Intro	H			+			
	<i>Vernonia cinera</i>	Monerakudumbiya	Indi	H	+					
Boraginaceae	<i>Cordia dichotoma</i>			S						
Cactaceae	<i>Opuntia</i> spp.	Pathok		H						+
Capparidaceae	<i>Crataeva adansonii</i>	Lunuweraliya		T				+		+
Celastraceae	<i>Cassine glauca</i>	Neralu		T						+
Colchicaceae	<i>Gloriosa superba</i>	Niyangala		Vine				+		+
Caricaceae	<i>Carica papaya</i>	Gaslabu	Intro	T			+			
Combretaceae	<i>Terminalia catappa</i>	Kottan	Indi	T	+		+			
Convolvulaceae	<i>Ipomea aquatica</i>	Kankun	Intro	H	+	+				
	<i>Argyreia popuifolia</i>	Girithilla	E	Vine						+
Cyperaceae	<i>Cyperus haspan</i>		Intro	H	+					
	<i>Cyperus compressus</i>			H	+					
	<i>Cyperus bulbogus</i>			H	+					
	<i>Cyperus castaneus</i>	Sedge		H			+	+		+
	<i>Bridelia retusa</i>	Ketakala	Indi	T			+		+	
	<i>Croton aromaticus</i>	Walkeppetiyaya		H						+
	<i>Manihot esculentus</i>	Maiokka	Intro				+			
	<i>Phyllanthus polyphyllus</i>	Kuratiya								+
	<i>Securinega leucopyros</i>	Katu pila		S						
	<i>Acalypha indica</i>	Kuppameni ya	Indi	H	+					
	<i>Ricinus communis</i>	Behethendaru	Intro	S			+	+		
Euphorbiaceae	<i>Drypetes sepiaria</i>	Veera	Indi	T						+
Fabaceae	<i>Acasia auriculiformis</i>	Acasia	Intro	T			+			
	<i>Mimiosa pudica</i>	Nidikumba	Intro	H	+		+	+		
	<i>Mimosa invisa</i>		IN	S	+					
	<i>Sena alata</i>	Rata thora	Indi	S	+					
	<i>Arachis hypogaea</i>	Ground nut	Intro	H			+			
	<i>Bauhinia racemosa</i>	Maila		T						+
	<i>Cassia auriculata</i>	Ranawara	Intro	S						+

Family	Scientific name	Common name	Status ¹	Habit ²	Habitat					SF & GL
					MA & PF	W B	H G	O T	F	
	<i>Cassia fistula</i>	Ehela	Intro	T			+			+
	<i>Sesbania grandiflora</i>	Kathurumur unga	Intro	T			+			
	<i>Sena spp.</i>			S	+					
	<i>Crotalaria sp.</i>	Adanahiriya		H			+	+		+
Fabaceae	<i>Desmodium triflorum</i>	Heen undupiyaiya					+	+		+
	<i>Dichrostachys cinera</i>	Andara					+			
	<i>Leucaena leucocephala</i>	Ipil Ipil	IN	T						+
	<i>Mimosa pudica</i>	Nidikumba			+		+			+
	<i>Pongamia pinnata</i>	Karanda								
	<i>Tamarindus indica</i>	Tamarind					+			+
	<i>Tephrosia purpurea</i>	Kathuru pila								+
Flacourliaceae	<i>Chlorocarpa pentaschista</i>								+	
	<i>Homalium zeylanicum</i>	liyan		T			+			+
Hydrocharitaceae	<i>Hydrilla spp.</i>		Intro	H	+					
	<i>Sida acuta</i>	Bawila	Indi	S	+					
	<i>Urena lobata</i>	Patta epala	Indi	H	+			+		
Lamiaceae	<i>Gmelina asiatica</i>	Demata		H						+
	<i>Oscimum americanum</i>	Maduruthal a		H						+
Linaceae	<i>Hugonia mystax</i>	Geta weera								+
Loganiaceae	<i>Strychnas muxvomica</i>	Goda kaduru				+				
	<i>Strychnas potatorum</i>	Inginia								+
Lauraceae	<i>Litsea congifolia</i>								+	
Moraceae	<i>Artocarpus heterophyllus</i>	Kos	Intro	T			+		+	
Malvaceae	<i>Sida veronicifolia</i>	Babila								+
Melastomataceae	<i>Melastoma malabathicum</i>	Maha bovitia								+
	<i>Walsura piscidia</i>	Kirikone								+
Meliaceae	<i>Azardidracta indica</i>	Neem					+			+
	<i>Swietenia mahogani</i>	Mahogani	Intro	T			+			+
	<i>Melia azedarach</i>	Lunumidell a	Indi	T						+
Musaceae	<i>Musa spp.</i>	Kesel	Intro	H	+		+			
Moringaceae	<i>Moringa olifera</i>	Murunga	Intro				+			
Myrtaceae	<i>Psidium guajava</i>	Pera	Intro	T			+			

Family	Scientific name	Common name	Status ¹	Habit ²	Habitat					SF & GL
					MA & PF	W B	H G	O T	F	
	<i>Syzygium</i> spp.			S				+		
	<i>Bougainvillea</i> hybrid	Boganwila	Intro	S			+			
	<i>Syzygium cumini</i>	Madan								+
	<i>Mirabilis jalapa</i>	Hendrikka	Intro	H			+			
Myristicaceae	<i>Myristica iryaghedhi</i>	Ruk	E	T					+	
Myrsinaceae	<i>Ardisia elliptica</i>			H	+					
Nelumbonaceae	<i>Nelumbo nucifera</i>	Nelum	Intro	H	+	+				
Nymphaeaceae	<i>Nymphaea stellata</i>	Manel	Intro	H	+	+				
Nymphaeaceae	<i>Nymphaea lotus</i>	Olu	Intro	H	+	+				
	<i>Nymphoides hydrophylla</i>	Kumudu	Intro	H	+	`				
Phyllanthaceae	<i>Phyllanthus amarus</i>	Pitawakka	Intro	H	+		+			
	<i>Flueggea leucopyrus</i>	Katupila			+	+				+
Poaceae	<i>Axonopus</i> spp.	Carpet grass		H			+			
	<i>Bracharia mutica</i>									+
	<i>Cymbopogon nardus</i>	Mana								+
	<i>Cynodon barberi</i>	Grass								+
	<i>Cynodon dactylon</i>	Heen atawara								+
	<i>Eragrotis</i> sp.	Grass								+
	<i>Imperata cylindrica</i>	Illuk								+
Poaceae	<i>Ischaemum</i> sp.	Grass								+
	<i>Panicum maximum</i>	Gini grass	IN							+
	<i>Pennisetum purpureum</i>	Napier grass								+
	<i>Phragmites karka</i>	Damana								+
Pontederiaceae	<i>Eichhornia crassipes</i>	Japan jabara	IN	H	+	+				
	<i>Monochoria vaginalis</i>	Diya habarala		H		+				
Punicaceae	<i>Punica granatum</i>	Delum	Indi	T			+			
Rhamanaceae	<i>Zizyphus oenoplia</i>	Eraminiya		S				+	+	
	<i>Ixora coccinea</i>	Rathmal	Intro	S			+			
	<i>Rubiacea psychotria</i>								+	
	<i>Mitragyna parvifolia</i>	Helamba		T						+
	<i>Morinda citrifolia</i>	Ahu		T						+
Rutaceae	<i>Citrus aurantifolia</i>	Dehi	Intro	S			+			
	<i>Atalantia ceylanica</i>	Bedi naran		H						+
	<i>Chloroxylon sweitenia</i>	Burutha		T						+
	<i>Clausena indica</i>	Gon		H						+

Family	Scientific name	Common name	Status ¹	Habit ²	Habitat					SF & GL
					MA & PF	W B	H G	O T	F	
		karapincha								
	<i>Limonia acidissima</i>	Divul		T						+
	<i>Micromelum minutum</i>	Wal karapincha		H						+
	<i>Toddalia asiatica</i>	Kadumiris								+
Salviniaceae	<i>Salvinia molesta</i>	Salvinia	IN	H	+	+				
Sapindaceae	<i>Cardiospermum halicacabum</i>	Penela wel	Indi	C			+			
	<i>Schleichera oleosa</i>	Kone		T						+
Sapotaceae	<i>Manilkara hexandra</i>	Palu		T						+
	<i>Madhuca longifolia</i>	Mee		T						+
Typhaceae	<i>Typha angustifolia</i>	Hambupan	IN	H	+			+		
Tiliaceae	<i>Berrya ammonilla</i>	Hal milla	Intro	H			+		+	
	<i>Tiliacea spp</i>								+	
Umbellifereaceae	<i>Centella asiatica</i>	Heen gotukola	Indi	H	+		+			
Verbenaceae	<i>Lantana camera</i>	Gandapana	IN	S				+		
	<i>Vitex altissima</i>	Milla	Indi	T						+
	<i>Tectonia grandis</i>	Teek	Intro	T			+			+
	<i>Stachytarpheta indica</i>	Balu nakuta								+

List of faunal species observed in the project area

PF: Paddy
 WB: Water Bodies
 HG: Home Gardens
 F : Forest
 SF& GL : Scrub forest & Grasslands

Class/Family/Scientific name	Common name	Status	Habitat				
			SF & GL	W B	H G	PF & M L	F
Class: Actinopterygii							
Family: Anabantidae							
<i>Anabas testudineus</i>	Kawaiyya			+			
Family: Anguillidae							
<i>Anguilla bicolor</i>	Madaanda						
Family: Aplocheilidae							
<i>Aplocheilus parvus</i>	Udahandaya			+			
Family: Belontiidae							
<i>Trichogaster pectoralis</i>	Theppili			+			
Family: Channidae							
<i>Channa orientalis</i>	Kola Kanaya	Vulnerable		+			
<i>Channa striata</i>	Lula			+			
<i>Esomus thermoicos</i>	Raul dandiya			+			
Family: Cichlidae							
<i>Etilapia suratensis</i>	Koraliya			+			
<i>Oreochromis mossambicus</i>				+			
Family: Claridae							
<i>Clarias brachysoma</i>	Magura	Nearly Threatened					
Family: Gobiidae							
<i>Glossogobius giurus</i>	Maha welogowwa			+			
Family: Heteropneustidae							
<i>Heteropneustes fossilis</i>	Hunga			+			
Family: Poeciliidae							
<i>Gambusia affinis</i>	Guppi			+			
<i>Poecilia reticulata</i>	Guppi			+			

Class/Family/Scientific name	Common name	Status	Habitat				
			SF & GL	W B	H G	PF & M L	F
Class: Amphibia							
Family: Bufonidae							
<i>Bufo melanostictus</i>	Common house toad				+	+	
Class: Aves							
Family: Ardeidae							
<i>Bubulcus ibis</i>	Cattle egret	Resident	+			+	
<i>Egretta garzetta</i>	Little egret	Resident	+			+	
<i>Mesophoyx intermedia</i>	Intermediate egret	Resident	+				
<i>Ardeola grayii</i>	Indian pond heron			+		+	
<i>Ardea purpurea</i>	Purple heron			+		+	
<i>Ixobrychus flavicollis</i>	Black bittern						
Family : Anatidae							
<i>Dendrocygna javanica</i>	Lesser whistling duck	Migrant	+	+			
Family : Accipitridae							
<i>Accipiter badius</i>	Shikra		+			+	
<i>Haliastur indus</i>	Brahminy kite	Resident	+	+			+
<i>Haliaeetus leucogaster</i>	White bellied sea eagle	Resident	+	+			
<i>Lchthyophaga ichthyaetus</i>	Grey headed fish eagle	Resident	+	+			
<i>Spilornis cheela</i>	Crested Serpent eagle	Resident	+	+			+
Family :Aegithinidae							
<i>Aegithinia tiphia</i>	Common iora						
Family : Bucerotidae							
<i>Ocyrceros gingalensis</i>	Sri Lanka Grey Hornbill	Endemic					+
Family: Alcedinidae							
<i>Alcedo atthis</i>	Common Kingfisher	Resident	+	+			
<i>Halcyon smyrnensis</i>	White throated Kingfisher	Resident	+	+			
<i>Ceryle rudis</i>	Pied Kingfisher	Resident	+	+			
Family: Columbidae							
<i>Columba livia</i>	Pigeons	Feral			+		
<i>Stigmatopelia chinensis</i>	Spotted dove	Resident				+	
<i>Chalcophaps indica</i>	Emerald Dove	Resident			+	+	+
Family: Corvidae							
<i>Corvus splendens</i>	House crow	Resident	+		+	+	
Family: Cuculidae							
<i>Centropus sinensis</i>	common coucal	Resident	+				
<i>Eudynamys scolopaceus</i>	Asian koel	Resident	+		+		
Family: Ciconiidae							
<i>Mycteria leucocephala</i>	Painted Stork	Resident	+				

<i>Anastomus oscitans</i>	Asian Openbill	Resident	+				
Family: Chloropseidae							
<i>Chloropsis jerdoni</i>	Jerdon's leafbird	Resident					+
Family: Dicaeidae							
<i>Dicaeum erythrorhynchos</i>	Pale billed flowerpecker	Resident			+		
Family: Dicuridae							
<i>Dicrurus caerulescens</i>	White bellied drongo	Resident				+	
Family : Estrildidae							
<i>Lonchura malaca</i>	Black headed munia		+				
Family: Hirundinidae							
<i>Hirundo rustica</i>	Barn swallow	Migrant	+				
Family: Jacanidae							
<i>Hydrophasianus chirurgus</i>	Pheasant tailed jacana	Resident	+				
Family : Laniidae							
<i>Lanius cristatus</i>	Brown shrike		+				
Family: Meropidae							
<i>Merops philippinus</i>	Blue tailed bee eater	Migrant	+				
<i>Merops orientalis</i>	Green Bee eater	Resident				+	+
Family: Monarchidae							
<i>Terpsiphone paradisi</i>	Asian paradise flycatcher	Resident/migrant			+		
Family: Motacillidae							
<i>Anthus refulus</i>	Paddy field pipit		+				
<i>Dendronanthus indicus</i>	Forest wagtail	Migrant			+		
<i>Motacilla cinerea</i>	Grey wagtail	Migrant	+				
Family : Muscicapidae							
<i>Luscinia brunnea</i>	Indian blue robin	Migrant	+				
Family: Nectariniidae							
<i>Nectarinia zeylonica</i>	Purple rumped sunbird				+		
Family: Oriolidae							
<i>Oriolus xanthornus</i>	Black hooded oriole				+		
Family: Phalacrocoracidae							
<i>Phalacrocorax niger</i>	Little Cormorant	Resident	+	+			
Family: Phasianidae							
<i>Gallus gallus domesticus</i>	Domestic hen/cock	Domestic			+		
<i>Gallus lafayetii</i>	Sri Lanka junglefowl	Endemic					+
<i>Pavo cristatus</i>	Indian Peafowl	Resident				+	+
Family: Picidae							
<i>Dinopium benghalense</i>	Black rumped flameblack	Resident			+		
Family : Psittacidae							
<i>Psittacula krameri</i>	Rose ringed parakeet	Resident			+	+	+
Family : Pittidae							
<i>Pitta brachyura</i>	Indian pitta	Migrant	+				

Family:Pycnonotidae							
<i>Pycnonotus cafer</i>	Red vented bulbul	Resident				+	
<i>Hypsipetes leucocephalus</i>	Asian black Bulbuk	Resident					+
<i>Pycnonotus melanicterus</i>	Black crested bulbul	Endemic					+
Family : Ramphastidae							
<i>Megalaima zeylanica</i>	Brown headed Barbet	Resident			+	+	+
<i>Megalaima rubricapillus</i>	Crimson fronted Barbet	Endemic					+
Family: Oriolidae							
<i>Oriolus xanthornus</i>	Black Hooded Oriole	Resident			+	+	+
Family: Rallidae							
<i>Amauronis phoenicurus</i>	White breasted waterhen	Resident	+	+			
<i>Porphyrio porphyrio</i>	Purple swamphen	Resident	+				
<i>Gallinula chloropus</i>	Common Moorhen	Resident	+				
Family: Rhipiduridae							
<i>Rhipidura aureola</i>	White Browed fantail	Resident					+
Family: Rallidae							
<i>Amauronis phoenicurus</i>	White breasted waterhen		+	+			
Family: Sturnidae							
<i>Acridotheres tristis</i>	Common myna	Resident			+		
Family: Sylviidae							
<i>Orthotomus sutorius</i>	Common tailorbird	Resident			+		
<i>Acrocephalus dumetorum</i>	Blyth's reed warbler	Migrant	+				
Family: Timalidae							
<i>Turdoides affinis</i>	Yellow billed babbler	Resident			+		
Family: Threskiornithidae							
<i>Threskiornis melanocephalus</i>	Black headed Ibis	Resident	+				
Class: Mammalia							
Family: Bovidae							
<i>Bos indicus</i>	Cattle	Domestic			+	+	
<i>Bubalus bubalus</i>	Buffalo	Domestic			+	+	
Family: Canidae							
<i>Canis familiaris</i>	Dog	Domestic			+	+	
<i>Canis aureus</i>	Jackal		+				
Family : Cercopithecidae							
<i>Macaca sinica</i>	Toque monkey	Endemic	+				
Family: Colobinae							
<i>Trachypithecus vetulus</i>	Purple faced leaf monkey	Endemic					+
Family : Cervidae							
<i>Axis axis</i>	Tith muwa		+				

Family : Elephantidae							
<i>Elephas maximus</i>	Elephant	Endangered	+				
Family: Felidae							
<i>Canis familiaris</i>	Cat	Domestic				+	
<i>Prionailura rubugins</i>	Rusty spotted cat	Vulnerable					+
<i>Prionailura viverrinus</i>	Fishing cat	Vulnerable					+
Family: Herpestidae							
<i>Herpestes brachyurus</i>	Brown mongoose		+				
Family : Leporidae							
<i>Lepus nigricollis</i>	Black -naped hare		+				
Family: Sciuridae							
<i>Funambulus palmarum</i>	Palm squirrel				+		
<i>Ratufa macroura</i>	Giant squirrel	Vulnerable					+
Family: Soricidae							
<i>Suncus murinus</i>	Common musk Shrew	Native			+		
Family: Suidae							
<i>Sus scrofa</i>	Wild boar						+
Family: Tragulidae							
<i>Maschiola meminna</i>	Mouse deer	Vulnerable					
Family : Viverridae							
<i>Paradoxurus aureus</i>	Golden palm cat	Endemic, Endangered				+	
Class: Reptilia							
Family:Agamidae							
<i>Calotes calotes</i>	Pala katussa		+				
<i>Calotes versicolor</i>	Green garden lizard		+				
<i>Otocrptis wiegmanni</i>	Kangaroo lizard	Endemic					+
Family: Colubridae							
<i>Coluber mucosus maximus</i>	Common rat snake						
<i>Lycodon osmanhilli</i>		Endemic	+				
<i>Xenochrophis piscator piscator</i>	Water snake			+			
Family: Crocodylidae							
<i>Crocodylus palustris</i>	Marsh crocodile	Nearly Threatened		+			
<i>Crocodylus porosus</i>	Salt water crocodylus		+	+			
Family: Elapidae							
<i>Naja naja</i>	Indian cobra		+				
Family: Gekkonidae							
<i>Hemidactylus depressus</i>	Kandian Gecko	Endemic					+
Family: Pythonidae							
<i>Python molurus</i>	Indian python			+			
Family :Scincidae							
<i>Lankascincus fallax</i>	Common supple skink	Endemic					+
Family:Testudinidae							

<i>Geochelone elegans</i>	Star tortoise	Vulnerable			+		
Family: Trionychidae							
<i>Lissemys punctata</i>	Soft shelled terrapin	Vulnerable	+				
Family: Varanidae							
<i>Varanus salvator</i>	Water monitor		+				
Family: Viperadidae							
<i>Daboia russelli</i>	Tith polanga		+				
Class: Insecta							
Family: Apidae							
<i>Apis cerana</i>	Asian honey bee		+				
Family: Chrysomelidae							
<i>Aspidimorpha miliaris</i>	Tortoise beetle		+				
<i>Aspidimorpha sanctaecrucis</i>	Tortoise beetle					+	
Family: Coccinellidae							
<i>Chilomenes sexmaculata</i>	Ladybird beetle					+	
<i>Coccinella transversalis</i>	Ladybird beetle					+	
Damselflies			+				
Family: Coenagrionidae							
<i>Ceragrion coromandelianum</i>	Yellow waxtail	Common/	+				
<i>Onychargia atrocyana</i>	Marsh dancer	Uncommon	+				
Family: Euphaeidae							
<i>Euphaea splendens</i>	Shining Gossamerwing	Nearly Threatened		+			
Family: Platycnemididae							
<i>Copera marginipes</i>	Yellow feather leg			+			
Dragonflies							
Family: Libellulidae							
<i>Neurothemis tullia tullia</i>	Pied parasol	Common	+				
<i>Orthetrum Sabina sabina</i>	Green skimmer	Common/P	+				
<i>Rhyothemis variegata variegata</i>	Variegated flutterer	Common	+				
Butterflies							
Family: Danaidae							
<i>Danaus limniace</i>	Blue tiger		+				
Family: Lycaenidae							
<i>Castalius rosimon</i>	Common pierrot		+				
<i>Discolampa ethhion ethhion</i>	Banded blue pierrot					+	
<i>Zizula hylax</i>	Tiny Grass Blue		+				
Family: Nymphalidae							
<i>Ariadne merione</i>	Common caster					+	
<i>Byblia ilithyia</i>	Joker					+	
<i>Danaus chrysipus</i>	Plain tiger	Migrant	+				
<i>Danaus limniace</i>	Blue tiger					+	

<i>Danaus plexippus</i>	Common tiger					+	
<i>Danaus septentrionis</i>	Dark blue tiger					+	
<i>Danaus similis</i>	Blue glassy tiger					+	
<i>Elymnias hypermnestra</i>	Common Palmfly		+				
<i>Euploea core</i>	Common Indian crow					+	
<i>Neptis hylas</i>	Common sailor	Migrant	+				
<i>Precis atlites</i>	Grey pansy	Migrant	+				
<i>Chilades parrhasius</i>	Small Cupid	Vulnerable					+
Family: Pieridae							
<i>Catopsilia pomona</i>	Lemon emigrant	Migrant	+				
<i>Delias eucharis</i>	Jezebel	Migrant	+				
<i>Appias lyncida</i>	Chocolate albatross		+				
<i>Appias paulina</i>	Ceylon lesser albatross		+				
<i>Colotis calais</i>	Common salmon arab			+			
<i>Eurema blanda silhetana</i>	Three spot grass yellow		+				
<i>Leptosia nina</i>	Psyche		+				
Family: Papilionidae							
<i>Chilasa clytia</i>	Common mime		+				
<i>Graphium agamemnon</i>	Tailed jay		+				
Moths							
Family: Amatiidae							
<i>Euchromia polymena</i>			+				
Family: Arctiidae			+				
<i>Syntomis</i> spp.			+				
Skippers							
Family: Hesperidae							
<i>Cephrenes trichopepla</i>	Yellow Palm Dart		+				
Family: Lyceidae							
<i>Chilades parrhasius</i>	Small Cupid	Vulnerable					+
LANDS SNAILS							
Class : Gastropoda							
Family: Achatinidae							
<i>Lissachatina fulica</i>	Giant African snail		+				
Family : Avidae							
<i>Acavus haemastoma</i>		Endemic					+
Family: Ariophantidae							
<i>Satiella</i> sp		Endemic					+
Family: Corillidae							
<i>Corilla adamsi</i>		Endemic					+

Environmental Management Plan (EMP) for rehabilitation and improvement of 0.0 – 6.0km section of Bogahawewa – Pulmuddai (B060) Road

This Environmental Management Plan (EMP) is the summarized matrix of all possible impacts that may occur during preconstruction, construction and operational stages of rehabilitation and improvement of 0 – 6km section of Bogahawewa – Pulmuddai (B060) Road project.

The EMP should form part of the Bid Documents and shall be considered alongside with the specifications. Thereby the prescriptions detailed in the EMP are mandatory in nature and also contractually binding. The EMP will also equally be applicable to sub-contractors including nominated sub-contractors if any. The Contractor shall be responsible for the compliance with the requirements of the EMP. With the assistance of the Project Implementation Consultant (PIC) the “Engineer” on behalf of the Employer the Road Development Authority (RDA) will monitor the compliance of EMP by the Contractor.

The bidders are advised to carefully consider the EMP requirements stated under item 2.0 “Construction phase” when preparing the bid and pricing the items of work. As a thumb of rule it is suggested that the contractor allows 10~15% of construction cost as cost to execute environmental compliance requirements. However, most of the prescriptions and clauses detailed in the EMP are integral components of the specifications for relevant item of work unless separate items are included in the Bill of Quantities. Thus separate payments will not be made for such components in respect of compliance with the EMP.

In case the Contractor or his sub-contractor/s fails to implement the EMP recommendations after informing in writing, the Engineer will take whatever actions it is deemed necessary to ensure that the EMP is properly implemented. If the contractor or his sub-contractor/s still fails to comply with EMP requirement, the “Engineer” may levy a penalty based on the level of non-compliance, cost incurred to rectify the damages caused by such negligence and/ or recover the cost from contractor’s payments.

The Contractor through an appointed Environmental Officer shall assist the Engineer to discharge his 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 the Project Implementation Unit (PIU) through PIC, (c) participating in the meetings conveyed by the Engineer and (d) any other assistance requested by the Engineer.

Environmental Issues	Protection and preventive measures		Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
1.0 Advance Works						
1.1	Design for cross drainage					
	(a)	Design of cross drainage structures should be based on RDA bridge design manual. Any recommendations given by Hydrological Study Report under detailed designs should be considered when designing road side drains, culverts and bridges.	Throughout the project area with special attention to area around 2.3km	Design Cost	RDA/ PIU	RDA/ ES Division
1.2	Identification of utility supply lines that may need to be shifted					
	(a)	Prior consultation and consent should be taken from relevant service providers (CEB, NWS & DB, SLT) if sections of utility lines need to be shifted due to design requirements or shift in alignment.	Throughout the road section	Design cost	RDA	Service providers
2.0 Construction Phase						
2.1	Earthwork and Soil Conservation					
	2.1.1	Disposal of debris and spoil				
	(a)	All debris and residual spoil material including any left earth shall be disposed only at locations approved by the engineer for such purpose and subjected to the clauses 2.1.1.b and 2.1.1.c below. Temporary dumps of construction material should not be placed within forest, paddy land or near to any canal, drain or drainage path. Waste soils and other denuded materials should not be left in places where it may be carried by rain water/flood to downstream flood plains. Waste soils and other denuded materials should not be left in places where it may be carried by rain water/flood to downstream flood plains.	Throughout the project area and disposal sites identified	Engineering Cost	Contractor	PIC, RDA/ PIU, DS/LA
	(b)	Waste soil disposal sites should be selected carefully avoiding water bodies and forest lands as much as possible and they should be approved by the relevant Divisional Secretary (DS)/Local Authority (LA). The contractor should submit the approval along with a soil disposal management plan to the “Engineer” before commencement of such disposal operations.	-Do-	-Do-	-Do-	-Do-

¹Mitigation costs are intermingled with the road construction costs (i.e. the cost of civil engineering works). Cost for environmental monitoring is indicated in the Monitoring Plan.

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	Soil requirement of government agencies should be prioritized when disposing waste soil.				
(c)	The debris and spoil shall be disposed in such a manner that; (i) waterways and drainage paths are not blocked (ii) the disposed material should not be washed away by runoff and (iii) should not be a nuisance to the public	All waterways located along the road section	-Do-	-Do-	PIC, RDA/ PIU, DS/LA
(d)	If directed by the Engineer the debris and residual spoil material including any left earth shall be used, to refill the borrow areas, subjected to laying of topsoil as per EMP clause 2.1.2 below.	At all borrow sites identified by contractor and approved by engineer	-Do-	-Do-	-Do-
(e)	If approved by the engineer, contractor can dispose the debris and spoil as a filling material provided that the contractor can ensure that such material is used for legally acceptable purposes with disposed in an environmentally acceptable manner.	Throughout the project area	-Do-	-Do-	-Do-
(f)	Dump trucks should not be overfilled with debris or excavated soil. The site supervisor should make sure that no material is hanging over the tipper bed before releasing the truck to the disposal site.	Throughout the project area and disposal sites identified	Engineering Cost	Contractor	PIC, RDA/ PIU
2.1.2	Conservation and reuse of top soil				
(a)	If the contractor is in any doubt on whether to conserve the topsoil or not for any given area he shall obtain the direction from the Engineer in writing. If directed by the engineer, top soil of the agricultural lands and any other productive areas where it has to be removed for the purpose of this project shall be stripped to a specified depth of 150mm and stored in stockpiles of height not exceeding 2m.	Within the project area where topsoil from productive land to be removed	Engineering Cost	Contractor	PIC, RDA/PIU
(b)	Removed top soil could be used as a productive soil when replanting/establishing road side vegetation.	Throughout the project area	-Do-	-Do-	-Do-
(c)	Such stockpiled topsoil could also be used to cover the areas including cut slopes where the topsoil has been removed due to project activities. Residual topsoil could be distributed on adjoining/proximate barren areas as identified by the contractor with approval from Divisional Secretary (DS) and LA under the supervision of PIC. The layer of thickness of such spread soil should be within 75mm – 150mm.	-Do-	-Do-	-Do-	PIC, RDA/PIU, DS, LA

Environmental Issues		Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
	(d)	Topsoil thus stockpiled for reuse shall not be surcharged or overburdened. As far as possible multiple handling of topsoil stockpiles should be kept to a minimum.	Locations where topsoil is stockpiled for reuse	-Do-	-Do-	PIC, RDA/PIU
	2.1.3	Borrowing of earth				
	(a)	Earth available from excavation for roadside drains as per design, may be used as embankment materials, subject to approval of the engineer.	Soil fill and embankment locations	Engineering Cost	Contractor	PIC, RDA/PIU
	(b)	Utilizing the existing borrow sites in the project influential area as much as possible which are approved by relevant authorities.	All borrow sites which will be used during construction phase	Engineering Cost	-Do-	RDA/PIU, GSMB, CEA, LA
	(c)	Contractor shall comply with the environmental requirements/guidelines issued by the Geological Survey and Mines Bureau (GSMB) through Industrial Mining License (IML) and Central Environmental Authority (CEA) through Environmental Protection License (EPL) and the respective LA with respect to locating borrow areas and with regard to all operations related to excavation and transportation of earth from such sites.	All borrow sites	-Do-	-Do-	-Do-
	(d)	All borrow pits/areas should be rehabilitated at the end of their use by the contractor in accordance with the requirements/guidelines issued by the CEA and the respective LA.	-Do-	-Do-	-Do-	-Do-
	(e)	Borrow areas shall not be opened without the permission of the engineer. The location, depth of excavation and the extent of the pit or open cut area shall be as approved by the engineer.	-Do-	-Do-	-Do-	-Do-
	(f)	Establishment of borrow pits/areas and its operational activities shall not cause any adverse impact to the properties close by the site or through which material will be transported. Also such extraction shall not be a danger or health hazard to the people and fauna.	-Do-	-Do-	-Do-	-Do-
	(g)	Contractor shall take all steps necessary to ensure the stability of slopes including those related to borrow pits.	-Do-	-Do-	-Do-	-Do-
	2.1.4	Prevention of soil erosion				
	(a)	Exposed slopes such as cut slopes, embankment slopes shall not be unduly exposed to erosive forces. These exposed slopes shall be graded and covered by suitable material (e.g. grass) or as per the details given in specifications of contract.	All locations with embankment slopes will be located	Engineering Cost	Contractor	PIC, RDA/PIU

Environmental Issues		Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
		All fills, back fills and slopes should be compacted immediately to reach the specified degree of compaction. Uncompact earth surfaces/embankment slopes and cut areas should be covered with suitable material until permanent measures are carried out.				
	(b)	Work that lead to heavy erosion shall be avoided during the raining season. If contractor intends to carry out such activities during rainy season prior approval must be obtained from the Engineer by submitting a proposal on actions that will be undertaken by the contractor to prevent erosion.	Throughout the project area with special attention to areas where possibly be flooded (17.5km)	-Do-	-Do-	-Do-
	(c)	The work, permanent or temporary shall consist of measures as per design or as directed by the engineer to control soil erosion, sedimentation and water pollution to the satisfaction of the engineer. Typical measures include the use of dikes, sediment basins, fiber mats, mulches, grasses, slope drains and other devices. All sedimentation and pollution control works and maintenance thereof are deemed, as incidental to the earthwork or other items of work.	-Do-	-Do-	-Do-	-Do-
	2.1.5	Contamination of soil (fuel, lubricants and salts from sea sand)				
	(a)	Vehicle/machinery and equipment servicing and maintenance work shall be carried out only in designated locations/ service stations approved by the engineer.	Servicing yards to be used for vehicle servicing	Engineering Cost	Contractor	PIC, RDA/ PIU
	(b)	Approval from CEA in the form of an Environmental Protection Licenses (EPL) should be secured by the contractor if he intends to operate his own vehicle servicing yards.	-Do-	-Do-	-Do-	PIC, RDA/ PIU, CEA, LA
	(c)	Waste oil, other petroleum products and untreated wastewater shall not be discharged directly out of the service yards. Adequate measures shall be taken against pollution of soil by spillage of petroleum/oil products from storage tanks and containers. All waste petroleum products shall be disposed of in accordance with the guidelines issued by the CEA or the engineer.	Servicing yards to be used for vehicle servicing and locations along the road section where vehicles will be temporarily stationed	-Do-	-Do-	-Do-
	(d)	Sites used for vehicle and plant service and maintenance shall be restored back to its initial status. Site restoration will be considered as incidental to work.	New servicing yards developed by the contractor for the project	-Do-	-Do-	-Do-
	(e)	If sea sand is to be used for the construction activities this sand should	Locations of sea sand	-Do-	-Do-	-Do-

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	be stockpiled on the shore and washed with fresh water to desalinate before being transported to the project sites.	storage areas			
2.1.6	Disposal of harmful construction wastes				
(a)	Contractor prior to the commencement of work shall provide list of harmful, hazardous and risky chemicals/ material that will be used in the project work to the Engineer. Contractor shall also provide the list of places where such chemicals/materials or their containers or other harmful materials have been dumped as waste at the end of the project.	Locations identified to store chemicals and waste disposal	Engineering Cost	Contractor	PIC, RDA/PIU, LA, CEA
(b)	All disposal sites used for disposal of any chemical waste should be approved by the engineer, CEA and relevant local authority.	-Do-	-Do-	-Do-	PIC, RDA/PIU, LA, CEA
(c)	The contractor shall clean up any area including water-bodies affected/contaminated as directed by the engineer at his own cost.	All affected water bodies close to material storage and waste disposal sites	-Do-	-Do-	-Do-
2.1.7	Quarry operations				
(a)	Utilizing the existing quarry sites in the project influential area as much as possible which are approved by GSMB or local authorities, operating with Trade License, Environment Protection License (EPL), Industrial Mining Licences (IML) and Explosives License. If new quarries are to be opened, prior approval should be obtained from GSMB, CEA and local authorities such as Pradeshiya Sabha (PS). Selected quarry sites should have proper safety measures such as warnings, safety nets etc., and third party insurance cover to protect external parties that may be affected due to blasting.	All quarry sites which will be used during construction phase	Engineering Cost	Contractor	PIC, RDA/PIU, GSMB, CEA, LA, MOD
(b)	It is recommended not to seek material from quarries that have ongoing disputes with community.	-Do-	-Do-	-Do-	-Do-
(c)	The maintenance and rehabilitation of the access roads in the event of damage by the contractors operations shall be a responsibility of the contractor.	-Do-	-Do-	-Do-	-Do-
2.2	Storage and handling of construction material				
2.2.1	Emission of dust				
(a)	Storage locations of sand, metal, soil should be located away from settlements and other sensitive receptors and covered (with artificial barriers or natural vegetation). Measures given under clause 2.5.1 should be considered within material	At all material storage locations (stock piles of soil, sand and aggregate)	Engineering Cost	Contractor	PIC, RDA/PIU

Environmental Issues		Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
		storage site to minimize dust during handling of material. All access roads within the storage site should be sprinkled with water for dust suspension.				
	2.2.2	Storage of fuel, oil and chemicals (avoid fumes and offensive odour)				
	(a)	All cement, bitumen (barrels), oil and other chemicals should be stored and handled on an impervious surface (concrete slab) above ground level. Storage facility of cement, bitumen (barrels), oil and other chemicals should be an enclosed structure ensuring that no storm water flows in to the structure. Material storage sites should not be located within flood prone areas. A ridge should be placed around the storage facility to avoid runoff getting in to the material storage structure. Adequate ventilation should be kept to avoid accumulation of fumes and offensive odour that could be harmful to material handlers. Measures given under clause 2.10 should be considered to avoid any accidents and risks to worker population and public.	At all material storage locations (cement, bitumen, fuel, oil and other chemicals used for construction activities)	Engineering Cost	-Do-	-Do-
	2.2.3	Transportation of material				
	(a)	The contractor should avoid over loaded trucks to transport material to construction sites.	Throughout the project area	Engineering Cost	Contractor	PIC, RDA/PIU
	(b)	All material transported to site shall be adequately covered to avoid any spillage. When transporting material such as soil it is best to dampen the surface of soil to minimize dust emission.	Throughout the project area	-Do-	-Do-	-Do-
2.3.	Water – Protection of water sources and quality					
	2.3.1.	Loss of minor water sources and disruption to water users				
	(a)	Contractor should make employees aware on water conservation and waste minimization in the construction process.	Throughout the project area and at worker camps	Engineering Cost	Contractor	PIC, RDA/PIU
	(b)	Contractor shall protect sources of water (potable or otherwise) such as water sources used by the community so that continued use of these water sources will not be disrupted by the work. In case the closure of such sources is required on temporary basis contractor shall provide alternative arrangements for supply. Alternative sources such as wells thus provided should be within	Wells and other public water sources locations close to the project area	-Do-	-Do-	PIC, RDA/PIU, LA

Environmental Issues		Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
		acceptable distance to the original sources and accessible to the affected community.				
	(c)	Contractor shall not divert, close or block existing canals and water paths in a manner that adversely affect downstream intakes. If diversion or closure or blocking of canals and water paths is required for the execution of work, contractor must obtain the engineers approval in writing. Closure of such canals should not be done during periods when they are highly used such as cultivation periods of agricultural lands. Contractor shall also obtain the approval from line agency that is responsible to maintain the canal, intake/water supply (such as DOI, MASL, Department of Agrarian Services (DoAS), NWS & DB or local authority of Divisional Secretary). Contractor shall restore the drainage path back to its original status once the need for such diversion or closure or blockage ceased to exist. During the affected period contractor shall supply water to the affected community.	Existing canals and water paths which need to be diverted or temporarily closed for construction work	-Do-	-Do-	PIC, RDA/PIU, DoAS, DOI, NWS & DB, LA, DS
	(d)	Contractor should ensure smooth drainage of water to avoid any upstream inundation and water logging condition of paddy lands by properly maintaining every canal/stream by de-silting, clearing any blockings.	-Do-	-Do-	-Do-	-Do-
	(e)	In case the contractor's activities are going to adversely affect the quantity or quality of water, the contractor shall serve notice to the relevant authorities and downstream users of water sufficiently in advance.	Throughout the project area	-Do-	-Do-	-Do-
	2.3.2	Siltation into water bodies				
	(a)	Contractor shall take measures to prevent siltation of waterways as a result of his work including construction of temporary/ permanent devices to prevent water pollution due to siltation and increase of turbidity. These shall include the measures against erosion as per EMP 2.1.4.	Existing streams, canals, drains and tanks within and close to the project area	Engineering Cost	Contractor	PIC, RDA/PIU, LA, DOI, DoAS
	(b)	Construction materials containing small/ fine particles shall be stored in places not subjected to flooding and in such a manner that these materials will not be washed away by runoff.	Existing streams, canals, drains and tanks within and close to the	-Do-	-Do-	-Do-

Environmental Issues		Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
			project area			
	(c)	Temporary soil dumps should be placed sufficiently away from all water ways.	-Do-	-Do-	-Do-	-Do-
	(d)	Temporary soil dumps should be kept avoiding drainage canals and wetlands. If such dumps are left at the site for a long time those dumps should be covered with thick polythene sheets and should not be exposed to direct rainfall.	Throughout the project area	-Do-	-Do-	-Do-
	(e)	Embankment slopes should be compacted to the required degree of compaction and covered with proper mulch.	-Do-	-Do-	-Do-	-Do-
	2.3.3	Alteration of drainage paths				
	(a)	Contractor shall not close or block existing canals, drains and other water paths permanently. If diversion or closure or blocking of canals and streams is required for the execution of work, contractor must first obtain the Engineers approval in writing and diversion or closure should not be carried out during water is highly demanded such as cultivation seasons. Contractor shall carry out an investigation and report to the Engineer, if an investigation is requested by the Engineer. Contractor shall also obtain the approval from the relevant agency such as DOI, MASL, DoAS and Divisional Secretary (DS) if instructed by the engineer. Contractor shall restore the drainage path back to its original status once the need for such diversion or closure or blockage is no longer required.	-Do-	-Do-	-Do-	PIC, RDA/PIU, DOI, DoAS, LA, DS
	(b)	The debris and spoil shall be disposed in such a manner that waterways and drainage paths are not blocked. And contractor should clear the waterway if blocked due to such activities.		-Do-	-Do-	-Do-
	(c)	Avoid/ minimize construction works near/ at such drainage locations during heavy rain seasons which create flood conditions.		-Do-	-Do-	-Do-
	2.3.4.	Contamination of water from construction wastes				
	(a)	The work shall be carried out in such a manner that pollution of natural watercourses and irrigation canals is avoided. Measures as given in 2.1.4, 2.1.5, 2.1.6, 2.3.2, 2.3.5 and 2.3.6 clauses shall be taken to	Near to existing streams, canals, drains and tanks within and close to the	Engineering Cost	Contractor	PIC, RDA/ PIU

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	prevent the wastewater produced in construction from entering directly into streams, water bodies or the irrigation systems.	project area			
(b)	Avoid/ minimize construction works near/ at such drainage locations during heavy rain seasons such as North East Monsoonal rains from November to February.	-Do-	-Do-	-Do-	-Do-
(c)	The discharge standards promulgated under the National Environmental Act shall be strictly adhered to. All waste arising from the project is to be disposed in a manner that is acceptable to the engineer and as per the guidelines/instructions issued by the CEA.	-Do-	-Do-	-Do-	-Do-
2.3.5.	Contamination from fuel and lubricants				
(a)	All vehicle and plant maintenance and servicing stations shall be located and operated as per the conditions and /or guidelines stipulated under the EPL issued by CEA. In general these should be located at least 200m away from water bodies and wastewater shall not be disposed without meeting the disposal standards of the CEA. Wastewater from vehicle and plant maintenance and servicing stations shall be cleared of oil and grease and other contaminants to meet the relevant standards before discharging to the environment.	Vehicle and plant maintenance and servicing centers	Engineering Cost	Contractor	PIC, RDA/ PIU, LA, CEA
2.3.6.	Locating labour camps, sanitation and waste disposal in construction camps				
(a)	Locations selected for labour camps should be approved by engineer and comply with guidelines/ recommendations issued by the CEA, LA. Construction labour camps shall not be located within 200m from waterways, near to a site or premises of religious, cultural importance and school.	Locations where labour camps will be setup	Engineering Cost	Contractor	PIC, RDA/ PIU, LA, CEA
(b)	Labour camps shall be provided with adequate and appropriate facilities for disposal of sewerage and solid waste. The sewage systems shall be properly designed, built and operated so that no pollution to ground or adjacent water bodies/watercourses takes place. Garbage bins shall be provided the camps and regularly emptied. Garbage should be disposed off in a hygienic manner, to the satisfaction of the relevant norms. Compliance with the relevant regulations and guidelines issued by the CEA/LA shall be strictly adhered to.	At all labour camps	-Do-	-Do-	-Do-
(c)	Contractor shall ensure that all camps are kept clean and hygienic.	-Do-	-Do-	-Do-	-Do-

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	Necessary measures shall be taken to prevent breeding of vectors				
(d)	Contractor shall report any outbreak of infectious disease of importance in a labour camp to the engineer and the Medical Officer of Health (MOH) or to the Public Health Inspector (PHI) of the area immediately. Contractor shall carry out all instructions issued by the authorities, if any.	Within and close to the project area with special attention near to labour camps	-Do-	-Do-	PIC, RDA/ PIU, LA, CEA, MOH/ PHI
(e)	Contractor shall adhere to the CEA recommendations on disposal of wastewater. Wastewater shall not be discharged to ground or waterways in a manner that will cause unacceptable surface or ground water pollution.	At all labour camps	-Do-	-Do-	-Do-
(f)	All relevant provisions of the Factories Act and any other relevant regulations aimed at safety and health of workers shall be adhered to.	-Do-	-Do-	-Do-	-Do-
(g)	Contractor should remove all labour camps fully after its need is over, empty septic tanks, remove all garbage, debris and clean and restore the area back to its former condition.	-Do-	-Do-	-Do-	-Do-
2.3.7.	Wastage of water and waste minimization				
(a)	The contractor will minimize wastage of water in the construction process/operations by reusing water as much as possible, utilizing only the required amount of water for the construction works etc.	Within and close to the project area and labour camps	Engineering Cost	Contractor	PIC, RDA/PIU, LA, CEA
(b)	The contractor shall educate and made employees aware on water conservation, waste minimization and safe disposal of waste following guidelines given by CEA and LA.	-Do-	-Do-	-Do-	-Do-
2.3.8.	Extraction of water				
(a)	The contractor is responsible for arranging adequate supply of water for the project purpose throughout the construction period. Contractor shall not obtain water for his purposes including for labour camps from public or community water supplies without approval from the relevant authority. Such extraction (if approved) should be under direct supervision of the Engineer.	Within and close to the project area and labour camps	Engineering Cost	Contractor	PIC, RDA/PIU, LA
(b)	Extraction of water by the contractor for the project purposes shall comply with the guidelines and instructions issued by relevant authority. The Contractor shall not extract water from groundwater, water springs or from surface water-bodies without permission from the Engineer and	-Do-	-Do-	-Do-	-Do-

Environmental Issues	Protection and preventive measures		Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
		the relevant government agency.				
	(c)	Construction over the irrigation canals will be undertaken under necessary permission from the Department of Agrarian Services and Department of Irrigation.	Existing streams, canals and drains within and close to the project area	-Do-	-Do-	PIC, RDA/PIU DoAS, DOI
	(d)	The Contractor may use natural sources of water subject to the provision that any claim arising out of conflicts with other users of the said natural sources of water shall be made good entirely by the contractor.	At all natural water sources used for construction works	-Do-	-Do-	PIC, RDA/PIU LA
2.4.	Flood Prevention					
	2.4.1.	Blockage of drainage paths and drains				
	(a)	Contractor's activities shall not lead to flooding conditions as a result of blocked drainage paths and drains. The contractor shall take all measures necessary or as directed by the Engineer to keep all drainage paths and drains clear of blockage at all times.	Existing streams, canals and drains within and close to the project area with special attention to 2.3km	Engineering Cost	Contractor	PIC, RDA/PIU
	(b)	If flooding or stagnation of storm 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. Contractor shall compensate for any loss of income or damage as a result of such flooding.	-Do-	-Do-	-Do-	-Do-
	2.4.2	Work in flood prone areas				
	(a)	Contractor's activities shall not lead to aggravate floods in nearby areas when working in flood prone areas.	Special attention to flood prone areas; around 2.3km	Engineering Cost	Contractor	PIC, RDA/PIU DoAS, DOI
	(b)	When working in flood prone areas during rainy season the contractor shall avoid storing materials, chemicals and other items of work in areas where such material could be washed away by the floods.		-Do-	-Do-	-Do-
2.5	Air Pollution					
	2.5.1.	Generation of dust				
	(a)	The contractor shall effectively manage the dust generating activities such as topsoil removal, handling and transporting sand, rubble, bitumen, and cement during periods of high winds or during more stable conditions with winds directed towards adjacent residences and	Within and close to the project area where earth work will take place, storage locations of sand,	Engineering Cost	Contractor	PIC, RDA/PIU

Environmental Issues		Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
		other facilities.	rubble, bitumen, cement and all sub roads used for material transportation, paying special attention to sensitive locations such as; schools and places of religious importance E.g.: School at 1.1km			
	(b)	All stockpiles shall be located sufficiently away from sensitive receptors.		-Do-	-Do-	-Do-
	(c)	All vehicles delivering materials shall be covered to avoid spillage and dust emission.		-Do-	-Do-	-Do-
	(d)	The Contractor should avoid, where possible and take suitable action to prevent dirt and mud being carried to the roads (particularly following wet weather).		-Do-	-Do-	-Do-
	(e)	The contractor should enforce vehicle speed limits to minimize dust generation.		-Do-	-Do-	-Do-
	(f)	The Contractor shall employ adequate number of water trucks/ bowsters (at all times) to sprinkle water to suppress dust at all exposed areas as required (note: the use of waste water / waste oil for dust suppression is prohibited). The frequency of spraying water will depend on the weather condition and as instructed by the Engineer.		-Do-	-Do-	-Do-
	(g)	All cleared areas shall be rehabilitated progressively.		-Do-	-Do-	-Do-
	(h)	All earthwork shall be protected in a manner acceptable to the minimize generation of dust.		-Do-	-Do-	-Do-
	(i)	All existing roads used by vehicles of the contractor, or any of his sub-contractor or supplies of materials or plant and similarly roads which are part of the works shall be kept clean and clear of all dust/mud or other extraneous materials dropped by such vehicles or their tyres.		-Do-	-Do-	-Do-
	(j)	Clearance shall be affected immediately by manual sweeping and removal of debris, or, if so directed by the Engineer, by mechanical sweeping and clearing equipment. Additionally, if so directed by the Engineer, the road surface will be hosed or sprinkled water using appropriate equipments.		-Do-	-Do-	-Do-
	(k)	Plants, machinery and equipment shall be handled (including dismantling) so as to minimize generation of dust.		-Do-	-Do-	-Do-
	(l)	The contractor shall take every precaution to reduce the level of dust emission from the hot mix plants and the batching plants up to the satisfaction of the Engineer in accordance with the relevant emission		-Do-	-Do-	-Do-

Environmental Issues		Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
		norms.				
	(m)	Asphalt Concrete Plants and Concrete Batch Mixing Plants shall be sited in accordance with CEA guidelines and operated with EPL and Trade License. The hot mix plants shall be fitted with the requirements of the relevant current emission control legislation.		-Do-	-Do-	PIC, RDA/PIU, CEA
	2.5.2	Emission from Asphalt Concrete (AC) Plants and Concrete Batch Mixing Plants				
	(a)	The AC plants and batching plants shall be sited in accordance with CEA guidelines. It is recommended that hot mix plants and batching plants to be located sufficiently away from sensitive receptors such as settlement areas, places of religious importance and schools.	Locations at which hot mix plant/s and concrete batching plant/s to be located. No hot mix plant or concrete batching plant will be established close or at near vicinity of sensitive locations such as; settlement areas, hospitals & schools and places of religious and archeological importance	Engineering Cost	Contractor	PIC, RDA/PIU, CEA
	(b)	The exhaust gases shall comply with the requirements of the relevant current emission control legislation. All operations at plants shall be undertaken in accordance with all current rules and regulations protecting the environment as well as the conditions given in the EPL.	-Do-	-Do-	-Do-	-Do-
	(c)	Regular checks shall be carried out on the plants to verify the effectiveness of the dust control systems. The contractor shall take immediate action to rectify any problems found in the systems.	AC plant and Concrete Batch Mixing plant	Engineering Cost	Contractor	PIC, RDA/PIU, CEA
	2.5.3.	Odour and offensive smells				
	(a)	Contractor shall take all precautions such as storing all chemicals used for construction works in properly closed containers with good ventilations to prevent odour and offensive smell emanating from chemicals and processes applied in construction works or from labour camps. In a situation when/where odour or offensive smell does occur contractor shall take immediate action to rectify the situation. Contractor is responsible for any compensation involved with any health	Within and close to the project area including all sites used for store all chemicals and places where chemical reactions take place.	Engineering Cost	Contractor	PIC, RDA/PIU

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	issue arisen out of bad odour and offensive smells.				
(b)	The waste disposal and sewerage treatment system for the labour camps shall be properly designed, built and operated so that no odour is generated. Compliance with the regulations on health and safety as well as CEA and LA guidelines shall be strictly adhered to.	At all labour camps	-Do-	-Do-	-Do-
2.5.4.	Emission from construction vehicles, equipment and machinery				
(a)	The emission standards promulgated under the National Environment Act shall be strictly adhered to.	All plants, machinery and vehicles used for the project	Engineering cost	Contractor	PIC, RDA/PIU, CEA, LA
(b)	All vehicles, equipment and machinery used for construction shall be regularly serviced and well maintained to ensure that emission levels comply with the relevant standards.	-Do-	-Do-	-Do-	-Do-
(c)	Contractor should obtain the certificate issued by the Vehicular Emission Test (VET) for all construction vehicles, plants and other machineries and it should be renewed annually	-Do-	-Do-	-Do-	PIC, RDA/PIU
2.5.5.	Air Pollution from crusher				
(a)	Crusher plants should operate under an EPL, Trade License and shall confirm to relevant dust emission levels as stated in the EPL. Only the quarries approved by GSMB and holding current EPL shall be used for material extraction.	Quarry sites operated for material extraction for the project	Engineering Cost	Contractor	PIC, RDA/PIU, CEA, LA
(b)	Crusher plants shall be sited sufficiently away from sensitive receptors such as houses, schools, hospitals, temples, shrines and outdoor recreation areas or as required by the Engineer.	Locations where crusher plants to be established	-Do-	-Do-	-Do-
(c)	An automated or manual system to sprinkle water at the main crusher and to conveyer belts shall be in place to reduce dust emission from crusher plant.	Locations where crusher plants to be established	-Do-	-Do-	-Do-
(d)	A green belt should be maintained around the crusher plant area. If not possible to maintain such green belt the contractor will use physical barriers such as tarpaulin, corrugated sheets to cover the crusher plant area. Such cover should be at least 5 ~ 10 m above ground level.	Locations where crusher plants to be established	-Do-	-Do-	-Do-

Environmental Issues	Protection and preventive measures		Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
2.6. Noise Pollution and Vibration						
	2.6.1	Noise from vehicles, plants and equipment.				
	(a)	All machinery and equipment should be well maintained and fitted with noise reduction devices in accordance with manufacturer’s instructions.	All machinery and vehicles used for the project	Engineering Cost	Contractor	PIC, RDA/PIU CEA, LA
	(b)	All heavy equipment and machinery shall be fitted in full compliance with the national regulation, Noise Control Regulations - Extra Ordinary Gazette No. 924/12 May 1996 amended by Extra Ordinary Gazette 937/7 April 1997.	-Do-	-Do-	-Do-	-Do-
	(c)	All vehicles and equipment used in construction shall be fitted with exhaust silences. During routine servicing operations, the effectiveness of exhaust silencers shall be checked and if found to be defective shall be replaced. Notwithstanding any other conditions of contract, noise level from any item of plant(s) must comply with the relevant legislation for levels of sound emission. Non-compliance machinery shall be removed from site.	All machinery and vehicles used for the project	-Do-	-Do-	-Do-
	(d)	Maintenance of vehicles, equipment and machinery shall be regular and proper, to the satisfaction of the Engineer, to keep noise from these minimal.	-Do-	-Do-	-Do-	-Do-
	(e)	Workers in vicinity of strong noise, and workers working with or in crushing, compaction, batching or concrete mixing operations shall be provided with protective gear.	Within and close to the project area, quarry, crusher plants	-Do-	-Do-	-Do-
	(f)	Limiting operations to times when they have least impact in settlement areas, especially near schools and places of worship. Such time schedules should be prepared in consultation with relevant institutions & places that will be affected.	Near to sensitive areas: schools and places of religious importance	-Do-	-Do-	-Do-
	(g)	Contractor should avoid any construction activity during public holidays with religious importance.	Throughout the project	-Do-	-Do-	-Do-
	(h)	Contractor should avoid any construction activity which generates heavy noise during noise sensitive hours at day time and night hours. If work is to be carried out during night time, the contractor will need to obtain prior approval from the “Engineer” and relevant agency/ ies.	Throughout the project	-Do-	-Do-	-Do-

Environmental Issues		Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
		The contractor shall adhere to any given guidelines by “Engineer” and/or relevant agency/ ies.				
	2.6.2	Vibration				
	(a)	The contractor should carry out a property pre-condition survey of all structures within a corridor from both edges of the proposed ROW and record any existing failures of the structures. The width of the corridor will be defined by “Engineer” with the concurrence of Employer.	Along the entire trace and near the quarry sites operated for the project	Engineering Cost	Contractor	PIC, RDA/PIU
	(b)	Contractor shall take appropriate action to ensure that construction works do not result in damage to adjacent properties due to vibration.	Within and close to the project area	Engineering Cost	Contractor	PIC, RDA/PIU
	(c)	Contractor shall carry out monitoring at the nearest vibration sensitive receptor during blasting or when other equipments causing vibration are used.	Within and close to the project area where construction works will commence	-Do-	-Do-	-Do-
	(d)	The contractor shall modify the method of construction until compliance with the criteria, if vibration levels exceed the relevant vibration criteria.	Within and close to the project area where construction works will commence	-Do-	-Do-	-Do-
	(e)	Contractor shall pay due consideration on vibration impacts of blasting on adjoining structures. Explosive loads shall be determined so that excessive vibration can be avoided and blasts shall be controlled blasting in nature. Notwithstanding to these provisions contractor is liable for any damage caused by blasting work.	Within and close to the project area where construction works will commence and at all blasting sites	-Do-	-Do-	-Do-
2.7.	Impacts to Flora					
	2.7.1	Loss or damage to trees and vegetation				
	(a)	All works shall be carried out in a manner that the destruction to the flora and their habitats is minimised. Trees and vegetation shall be felled / removed only if that impinges directly on the permanent works or necessary temporary works. In all such cases contractor shall take prior approval from the engineer.	Applicable throughout/adjacent the project area with special attention to Padawiya Forest Reserve (2.2 – 3.9km)	Engineering/ Environmental Cost	Contractor	PIC, RDA/PIU, DOF
	(b)	Contractor should provide necessary instructions to drivers, operators and other construction workers not to destroy ground vegetation cover	-Do-	Engineering Cost	Contractor	PIC, RDA/PIU

Environmental Issues		Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
		unnecessarily. Construction vehicle, machinery and equipment shall be used and stationed only in the areas of work and in any other area designated/ approved by the engineer. Entry and exit of construction vehicles and machinery should be restricted to particular points as directed by the engineer.				
	(c)	A compensatory tree planting program should be developed in consultation with DOF/ local authorities/ communities in order to replenish the loss of trees. At least 3 good specimens native tree species should be planted for each tree removed. Compensatory tree planting should be attended for about two years to promote survival of the replanted specimens	Throughout/adjacent the project area	Engineering/ Environmental Cost	-Do-	PIC, RDA/PIU, DOF
	(d)	In order to prevent further invasion of existing invasive species, the waste plant materials generated during the site clearing and dredging activities (if any) should be securely disposed. Also, it is recommend to use native floral species when replanting to be carried out in order to prevent the risk of new invasion to the project area.	Throughout/adjacent the project area	Engineering/ Environmental Cost	-Do-	PIC, RDA/PIU, DOF
	2.7.2	Chance found important flora				
	(a)	During construction, if a rare/threatened/endangered flora species is found, it shall be immediately informed to the PIU by the contractor. All activities that could destroy such flora and/or its habitat shall be stopped with immediate effect. Such activities shall be started only after obtaining the Engineer's approval. Contractor shall carry out all activities and plans that the Engineer instructed him to undertake to conserve such flora and/or its habitat.	Applicable throughout/adjacent the project area with special attention to Padawiya Forest Reserve (0.0 – 3.9km)	Engineering/ Environmental Cost	Contractor	PIC, RDA/PIU, DOF
2.8.	Impact on Fauna					
	2.8.1.	Loss, damage or disruption to fauna				
	(a)	All works shall be carried out in such a manner that the destruction or disruption to the fauna and their habitats is minimum.	Applicable throughout/adjacent the project area with special attention to Padawiya Forest Reserve (2.2 – 3.9km)	Engineering Cost	Contractor	PIC, RDA/PIU

Environmental Issues		Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
	(b)	Construction workers shall be instructed to protect fauna including wild animals and aquatic life as well as their habitats. Hunting, poaching and unauthorized fishing by project workers is not allowed.	-Do-	-Do-	-Do-	-Do-
	2.8.2	Chance found important fauna				
	(a)	During construction, if a rare/threatened/endangered fauna species is found, it shall be immediately informed to the PIU by the contractor. All activities that could destroy such fauna and/or its habitat shall be stopped with immediate effect. Such activities shall be started only after obtaining the Engineer's approval. Contractor shall carry out all activities and plans that the Engineer instructed him to undertake to conserve such fauna and/or its habitat.	Applicable throughout/adjacent the project area with special attention to Padawiya Forest Reserve (2.2 – 3.9km)	Engineering/ Environmental Cost	Contractor	PIC, RDA/PIU
2.9.	Disruption to Users					
	2.9.1	Loss of access				
	(a)	At all times, the Contractor shall provide safe and convenient passage for vehicles, pedestrians and livestock to and from side roads and property accesses connecting the project road. Work that affects the use of side roads and existing accesses shall not be undertaken without providing adequate provisions to the prior satisfaction of the Engineer.	Within and close to the project area	Engineering Cost	Contractor	PIC, RDA/PIU
	(b)	The works shall not interfere unnecessarily or improperly with the convenience of public or the access to, use and occupation of public or private roads and any other access footpaths to or of properties whether public or private.	-Do-	-Do-	-Do-	-Do-
	(c)	On completion of the works, all temporary obstructions to access shall be cleared away, all rubbish and piles of debris that obstruct access be cleared to the satisfaction of the Engineer.	-Do-	-Do-	-Do-	-Do-
	(d)	Providing advance information to the public about the planned construction works and activities causing disruption to access roads, and the temporary arrangements made to give relief to public in order to avoid any inconveniences due to the construction activities.	-Do-	-Do-	-Do-	-Do-
	(e)	Use of flagmen and/or temporary traffic lights to control traffic flows at constricted sites, including safe crossing for pedestrians especially at town areas and near schools.	-Do-	-Do-	-Do-	-Do-

Environmental Issues		Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
2.10	Accidents and Risks					
	2.10.1	Public and worker safety				
	(a)	All reasonable precautions will be taken to prevent danger of the workers and the public from accidents such as fire, explosions, blasts, falling rocks, falling to excavated pits, chemical sprays, unsafe power supply lines etc. Workers should be aware about possible risks of accidents during the work at the railway crossing	Within and close to the project area, material storage and worker camps with especial attention to existing settlements	Engineering Cost	Contractor	PIC, RDA/PIU
	(b)	The Contractor shall comply with requirements for the safety of the workmen as per the International Labour Organization (ILO) convention No. 62 and Safety and Health regulations of the Factory Ordinance of Sri Lanka to the extent that those are applicable to this contract. The contractor shall supply all necessary safety appliances such as safety goggles, helmets, masks, boots, etc., to the workers and staff. The contractor has to comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, excavations, trenches and safe means of entry and egress.	-Do-	-Do-	-Do-	-Do-
	2.10.2	Prevention of risks of electrocution				
	(a)	All electrical wiring and supply related work should confirm to British Standards (BS) or relevant Sri Lankan Standards. Adequate precautions will be taken to prevent danger of electrocuting from electrical equipment and power supply lines including distribution boards, transformers, etc. Measures such as danger signboards, danger/red lights, fencing and lights will be provided to protect the public and workers. All electric power driven machines to be used in the construction shall be free from defect, be properly maintained and kept in good working order, be regularly inspected and as per BS provisions and to the satisfaction of the Engineer.	Within and close to the project area, material storage and worker camps	Engineering Cost	Contractor	PIC, RDA/PIU
	2.10.3	Risk at hazardous activity				
	(a)	All workers employed in hazardous activities shall be provided with necessary protective gear. These activities include mixing asphalt material, cement, lime mortars, concrete etc., welding work, work at crushing plants, blasting work, operators of machinery and equipment such as power saws, etc.	Within and close to the project area, quarry site and borrow pits	Engineering Cost	Contractor	PIC, RDA/PIU

Environmental Issues		Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
	(b)	The use of any toxic chemical shall be strictly in accordance with the manufacturer's instructions. The Engineer shall be notified of toxic chemicals that are planned to be used in all contract related activities. A register of all toxic chemicals delivered to the site shall be kept and maintained up to date by the Contractor. The register shall include the trade name, physical properties and characteristics, chemical ingredients, health and safety hazard information, safe handling and storage procedures, and emergency and first aid procedures for the product.	Within and close to the project area	-Do-	-Do-	-Do-
	2.10.4	Lead pollution				
	(a)	No paint containing lead or lead products will be used except in the form of paste or readymade paint. Facemasks shall be supplied to workers who are working in spray painting or scraping lead paints.	Workshops, yards where spray painting is done	Engineering Cost	Contractor	PIC, RDA/PIU
	2.10.5	Handling of explosives				
	(a)	Except as provided in the contract or ordered or authorized by the Engineer, the Contractor shall not use explosives. Where the use of explosives is so provided or ordered or authorized, the Contractor shall comply with the requirements of the following Sub-Clauses of this Clause besides the law of the land as applicable.	All locations where blasting activities will commence	Engineering Cost	Contractor	PIC, RDA/PIU
	(b)	The Contractor shall at all times take every possible precaution and shall comply with relevant laws and regulations relating to the importation, handling, transportation, storage and use of explosives. Contractor shall obtain Ministry of Defense (MoD) approval for importing and handling explosives and keep the Local Police informed of the same.	-Do-	-Do-	-Do-	PIC, RDA/PIU, MoD
	(c)	Contractor shall take precaution to prevent injury to people and damage the structures/houses and vehicles in the vicinity at the locations of blasting work. Blasting should be controlled to prevent vibration damage to structures and injury to people. The vehicles and road users should be stopped at a reasonable distance from the site and people in the vicinity should be informed when the blasting is carried out. Any debris on the road should be removed promptly before clearing the road for users. Blasting work should be carried out in off peak hours but not during the hours of darkness or at other times, which may cause	-Do-	-Do-	-Do-	PIC, RDA/PIU, (GS&MB if required)

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	unacceptable disturbance to religious or other ceremonies.				
(d)	Sufficient and adequate warning shall be given prior to blasting. Use of flagmen, siren, etc. should be arranged to the full satisfaction of the Engineer. The public in the area should be informed well in advance about the blasting operation and timing.	-Do-	-Do-	-Do-	-Do-
2.11	Health and safety				
2.11.1	Prevention of vector borne diseases				
(a)	Contractor shall take necessary actions to prevent breeding of mosquitoes at places of work, labour camps, plus office and store buildings. Stagnation of water in all areas including gutters, used and empty cans, containers, tyres, etc shall be prevented. Approved chemicals to destroy mosquitoes and larvae should be regularly applied. All borrow sites should be rehabilitated at the end of their use by the contractor in accordance with the requirements/guidelines issued by the Central Environmental authority and relevant local authorities	At worker camps, stores, yards	Engineering Cost	Contractor	PIC, RDA/PIU, LA
(b)	Contractor shall keep all places of work, labour camps, plus office and store buildings clean devoid of garbage to prevent breeding of rats and other vectors such as flies.	-Do-	-Do-	-Do-	-Do-
2.11.2	Workers health and safety				
(a)	Contractor shall comply with the provisions in Health and Safety regulations under the Factory Ordinance with regard to provision of health and safety measures and amenities at work place(s).	Within and close to the project area, workshops and worker camps	Engineering Cost	Contractor	PIC, RDA/PIU
2.11.3	First aid				
(a)	At every workplace, first aid kit shall be provided as per the regulations. At every workplace an ambulance room containing the prescribed equipment and nursing staff shall be provided.	Within and close to the project area, quarry, crusher, concrete batching plants, workshops and worker camps	Engineering Cost	Contractor	PIC, RDA/PIU
2.11.4	Potable water				
(a)	In every workplace and labour camps portable water shall be available throughout the day in sufficient quantities.	Within and close to the project area (work sites),	Engineering Cost	-Do-	-Do-

Environmental Issues		Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
			quarry, crusher, concrete batching plants, workshops and worker camps			
	2.11.5	Hygiene				
	(a)	The contractor shall provide and maintain necessary (temporary) living accommodation and ancillary facilities for labour to standards and scale approved by the resident engineer.	Within and close to the project area, workshops, worker camps	Engineering Cost	Contractor	PIC, RDA/PIU, LA, CEA
	(b)	At every workplace and labour camps sufficient number of bathing facilities, latrines and urinals shall be provided in accordance with the Health and Safety regulations and/or as directed by the Engineer. These bathroom and toilet facilities shall be suitably located within the workplace/buildings. Latrines shall be cleaned at least three times daily in the morning, midday and evening and kept in a strict sanitary condition. If women are employed, separate latrines and urinals, screened from those for men and marked in the vernacular shall be provided. There shall be adequate supply of water, within and close to latrines and urinals.	Worker camps and temporary sheds at work sites	-Do-	-Do-	-Do-
	(c)	The sewage system for the camp must be properly designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place.	Worker camps and temporary sheds at work sites	-Do-	-Do-	-Do-
	(d)	Garbage bins must be provided in the camp, work sites and regularly emptied and the garbage disposed off in a hygienic manner. Construction camps shall have a clean hygienic environment and adequate health care shall be provided for the work force.	-Do-	-Do-	-Do-	-Do-
	(e)	Unless otherwise arranged for by the LA, the contractor shall arrange proper disposal of sludge from septic tanks. The contractor shall obtain approval for such disposal from the Public Health Inspector of the area.	-Do-	-Do-	-Do-	-Do-
2.12	Protection of cultural and religious places and properties					
	2.12.1	Prevention of damage to cultural and religious places and properties				
	(a)	During construction activities the contractor should take all necessary	Within and close to the	Engineering Cost	Contractor	PIC, RDA/PIU, DOA, LA,

Environmental Issues		Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
		and adequate care to minimize impacts on places of worship. Workers should not be allowed to trespass in to such areas.	project area			Religious leaders
	(b)	Conservation and protection measures shall be taken up as per design and as per the instructions issued by the Department of Cultural Affairs when working close to such sites. Contractor shall seek advice from the Engineer if such instructions are not available. Access to such properties from the road shall be maintained clear and clean.	-Do-	-Do-	-Do-	-Do-
2.13	Environmental enhancement					
	2.13.1	Roadside landscape				
	(a)	Road landscape plantation, re-vegetation of road embankments and other slopes, edge treatment of water bodies shall be taken up as per either detailed design or typical design guidelines given as part of the Bid Documents. The contractor also shall remove all debris, piles of unwanted earth, spoil material, away from the roadsides and from other work places and disposed at locations designated or acceptable to the Engineer.	Within and close to the project area, and all locations used for quarry sites, borrow pits, asphalt plant, concrete batching plants, workshops and labour camps	Engineering Cost	Contractor	PIC, RDA/PIU
	(b)	On completion of the works, the temporary structures shall be cleared away in full, all rubbish burnt, waste dumps and septic tank shall be filled and closed and roadsides, workplaces and labour camps, cleared and cleaned.	-Do-	-Do-	-Do-	-Do-
	2.13.2	Utilities				
	(a)	Contractor shall take care not to damage/destroy or affect the functional purposes of utilities such as water, electricity, telephone posts. The arrangements the contractor made with those service providers shall be informed to the Engineer in writing (advance work). Contractor shall assist the service providers in whatever possible manner to minimize disruption to such services.	At all locations where electricity, water and telecommunication supply lines located close to the project area	Engineering Cost	Contractor	PIC, RDA/PIU
	(b)	In case of an inadvertent damage cause to a utility, the contractor shall immediately inform the Engineer and service provider and help to restore the service without delay.	Within and close to the project area	-Do-	-Do-	PIC, RDA/ PIU, Service provider

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
2.13.3	Road furniture				
(a)	Road furniture including footpaths, railings, storm water drains, crash barrier, traffic signs, speed zone signs, pavement markers and any other such items will be provided as per design given in the Bid Documents.	Throughout the project area	Engineering Cost	Contractor	PIC, RDA/PIU
(b)	Intersections, rotaries, traffic islands, roadside protection and other structures or furniture shall be constructed, complete with the landscape elements as per design in the above manner.	-Do-	-Do-	-Do-	-Do-
2.14	Handling environmental issues during construction				
(a)	The Contractor will appoint a suitably qualified Environmental Officer following the award of the contract. The Environmental Officer will be the primary point of contact for assistance with all environmental issues during the pre-construction and construction phases. He/ She shall be responsible for ensuring the implementation of EMP.	Throughout the project construction period	Engineering Cost	Contractor	PIC, RDA/PIU
(b)	The Contractor shall appoint a person responsible for community liaison and to handle public complaints regarding environmental/ social related matters. All public complaints will be entered into the Complaints Register. The Environmental Officer will promptly investigate and review environmental complaints and implement the appropriate corrective actions to arrest or mitigate the cause of the complaints. A register of all complaints is to be passed to the Engineer within 24 hrs they are received, with the action taken by the Environmental Officer on complains thereof.	-Do-	Engineering Cost	-Do-	-Do-
(c)	Contractor shall develop suitable method to receive complaints. The complain register shall be placed at a convenient place, easily accessible by the public.	Throughout the project construction period At local authority and DS offices	-Do-	-Do-	-Do-
(d)	Contractor shall prepare detailed Environmental Method Statement (EMS) clearly stating the approach, actions and manner in which the EMP is implemented. It is required from the contractor to prepare the EMS for each work site, if work will be carried out at more than one site at once and time plan for implementation. The EMS shall be updated regularly and submit for Engineers review and	Throughout the project construction period	-Do-	-Do-	-Do-

Environmental Issues	Protection and preventive measures		Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
		approval.				
2.15	Grievances of people due to project activities					
	(a)	A Grievance Redress Mechanism (GRM) will be introduced to project to solve grievances arising due to project activities. The proposed structure of GRM will be included in the Grievance Redress Mechanism Report of Northern Road Connectivity Project (Additional Financing).	Locations where grievances occur	Environmental cost	Contractor, RDA	PIC, RDA/ PIU
3.0 Operational stage						
	3.1	Stagnation of water at hydraulic structures during heavy rains due to siltation and blocking of openings with debris.				
	(a)	Maintaining of cross drainage structures to facilitate uninterrupted flow is of paramount importance. If any hindrance occurs within the system it could lead to flooding and long term inundation of upstream side. This aspect should be looked with a wide perspective as there are many agencies who are responsible for the drainage in the system and RDA will only be able to (and mandated to) maintain the drainage structures within the ROW. Hence even RDA upkeeps all drainage structures within the ROW and if there is a lapse in maintain a structure downstream it will lead to even inundate the expressway.	At all hydraulic structures within the project area	Maintenance Cost	Contractor (During maintenance period) & RDA	RDA
	3.2.	Road safety				
	(a)	All road furniture described under item 2.13.3 should be maintained by RDA	Throughout the project area	Maintenance Cost	Contractor (During maintenance period) & RDA	RDA
	(b)	A management plan should be formulated with the local police to avoid any vehicle to carry loads that exceed the carrying capacity (load) of the road Weigh stations could be introduced at selected locations to measure the load of vehicle.	Throughout the project area	-Do-	Contractor (During maintenance period) & RDA	RDA, LA, local police
	3.3	Encoachment on to ROW				
	(a)	Continuous monitoring and strict regulations should be followed to avoid the encroachment. Executive Engineers under direct supervision of Chief Engineer and Provincial Director should conduct regular	Throughout the project area	Maintenance Cost	Contractor (During	RDA

Environmental Issues		Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
					Implement	Supervision
		checking along the road and remove any unauthorized activities within the ROW.			maintenance period) & RDA	
	3.4	Conservation of ecology along the road section				
	(a)	Survival of replanted trees should be ensured and any dead saplings should be replaced immediately after the notice. Any additional trees should not be damaged by the maintenance activities during the maintenance period	Throughout the project area	Maintenance Cost	Contractor (During maintenance period) & RDA	RDA

Abbreviations: PIU= Project Management Unit, LA= Local authority, EO= Environmental Officer, RDA= Road Development authority, NWS&DB= National Water Supply & Drainage Board, DoAS= Department of Agrarian Services, DOA = Department of Archeology, DOI = Department of Irrigation, EMoP= Environmental Monitoring Plan, EPL= Environmental Protection License, GSMB= Geological Survey and Mines Bureau, SLLRDC = Sri Lanka Land Reclamation and Development Corporation, ROW = Right of Way, EMS = Environmental Method Statement, MOD = Ministry of Defense, MASL = Mahaweli Authority of Sri Lanka, LAA = Land Acquisition Act, NIRP = National Involuntary Resettlement Policy, CV = Chief Valuer

Environmental Monitoring Plan (EMoP) for the Rehabilitation and Improvement of 0.0 to 6.0km section of Bogahawewa – Pulmuddai (B060) Road

Environmental component	Project Stage	Parameters to be Monitored	Location	Frequency	Standards	Rate (Rs.)	Amount (Rs.)	Implementation and Supervision
Air Quality	Before construction stage	SPM, PM10, NO ₂ , CO, SO ₂ , CO ₂	1. At 1km 2. At 4km 3. Selected quarry sites and crusher plants 4. Selected burrow sites 5. Selected asphalt plants	Once	NAAQS of Sri Lanka	Per sample 40,000	80,000	Contractor RDA/ PIU through PIC and consultation with ESD Division
	Construction stage	SPM, PM10, NO ₂ , CO, SO ₂ , CO ₂	1. At 1km 2. At 4km 3. Quarry sites and crusher plants 4. Burrow sites 5. Asphalt plants	Construction - 2 times/Year for 1.5 Years (however, additional measurements may need to be taken in case there are complaints of deterioration of air quality)	NAAQS of Sri Lanka	Per sample 40,000	240,000	Contractor RDA/ PIU through PIC and consultation with ESD Division
	Operation stage	SPM, PM10, NO ₂ , CO, SO ₂ , CO ₂	Should be decided on complaint basis	On complaint basis	NAAQS of Sri Lanka	Per sample 40,000		RDA through ESD Division Central Environmental Authority

Environmental component	Project Stage	Parameters to be Monitored	Location	Frequency	Standards	Rate (Rs.)	Amount (Rs.)	Implementation and Supervision
Water Quality	Before construction stage	Temperature, pH, Electrical Conductivity, DO, BOD ₅ , TSS, Turbidity, Salinity, Total Coliform count	1. Well around 1km 2. Stream at 2.3km 3. Well around 4km	Once	CEA Water Quality Regulation	Per sample 10,000	30,000	Contractor RDA/ PIU through PIC and consultation with ESD Division
	Construction stage	Temperature, pH, Electrical Conductivity, DO, BOD ₅ , TSS, Turbidity, Salinity, Total Coliform count	1. Well around 1km 2. Stream at 2.3km 3. Well around 4km 4. Water resources near labor camps if any	Construction – 2 times/Year for 1.5 Years	CEA Water Quality Regulations	Per sample 10,000	90,000	Contractor RDA/ PIU through PIC and consultation with ESD Division
	Operation stage	Temperature, pH, Electrical Conductivity, DO, BOD ₅ , TSS, Turbidity, Salinity, Total Coliform count	Should be decided on complaint basis	On complaint basis	CEA Water Quality Regulations	Per sample 10,000		RDA through ESD Division Central Environmental Authority

Environmental component	Project Stage	Parameters to be Monitored	Location	Frequency	Standards	Rate (Rs.)	Amount (Rs.)	Implementation and Supervision
Noise and Vibration Noise and vibration	Before construction stage	Leq10 and Leq 50 values	1. At 1km 2. At 4km 3. Selected quarry sites and crusher plants 4. Selected burrow sites 5. Selected asphalt plants	Once	CEA Regulations on ambient noise levels and permissible ground vibration levels	Per sample 10,000	20,000	Contractor RDA/ PIU through PIC and consultation with ESD Division
	Construction	Leq10 and Leq 50 values	1. At 1km 2. At 4km 3. Quarry sites and crusher plants 4. Burrow sites 5. Asphalt plants	Construction - 2 times/Year for 1.5 Years (however, additional measurements may need to be taken in case there are complaints of high noise and vibration levels).	CEA Regulations on ambient noise levels and permissible ground vibration levels	Per sample 10,000	60,000	Contractor RDA/ PIU through PIC and consultation with ESD Division
	Operation stage	Leq10 and Leq 50 values	Should be decided on complaint basis	On complaint basis	CEA Regulations on ambient noise levels and permissible ground vibration levels	Per sample 10,000		RDA through ESD Division Central Environmental Authority

Environmental component	Project Stage	Parameters to be Monitored	Location	Frequency	Standards	Rate (Rs.)	Amount (Rs.)	Implementation and Supervision
Flora	Before construction stage	No. of trees to be removed	Land available within the proposed ROW with special attention to 2.2 – 3.9km section (Padawiya Forest Reserve)	Once	-	Per sample 30,000	30,000	Contractor RDA/ PIU through PIC and consultation with ESD Division (DOF if required)
	Construction stage	Replanting of trees	Land available within the proposed ROW with special attention to 2.2 – 3.9km section (Padawiya Forest Reserve)	2 visits/ year for 1.5 years	No. and Diversity of species replanted	Per sample 30,000	180,000	Contractor RDA/ESD Division
	Operation stage	Survival of trees	Land available within the proposed ROW with special attention to 2.2 – 3.9km section (Padawiya Forest Reserve)	2 visits/ year for 3 years	Percentage of survival	Per sample 30,000	180,000	RDA designated division RDA/ESD Division, (DOF if required)
Fauna (including aquatic fauna)	Before 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 with special attention to 2.2 – 3.9km section (Padawiya Forest Reserve)	Once		Per sample 30,000	30,000	Contractor RDA/ PIU through PIC and consultation with ESD Division

Environmental component	Project Stage	Parameters to be Monitored	Location	Frequency	Standards	Rate (Rs.)	Amount (Rs.)	Implementation and Supervision
	Construction stage	Adequacy of animal crossing structures	Land available within the proposed ROW with special attention to 2.2 – 3.9km section (Padawiya Forest Reserve)	2 visits/year for 1.5 years		Per sample 30,000	180,000	Contractor RDA/ PIU through PIC and consultation with ESD Division
	Operation stage	No. of animal death due to the expressway	Land available within the proposed ROW with special attention to 2.2 – 3.9km section (Padawiya Forest Reserve)	2 visits/ year for 3 years		Per sample 30,000	180,000	RDA designated division RDA/ESD Division
Waste disposal	Before construction stage	<ul style="list-style-type: none"> Submission of the list of disposal sites selected for the project and their locations to the engineer 		Once	-	-	-	Contractor RDA/ PIU through PIC and consultation with ESD Division
	Construction phase	<ul style="list-style-type: none"> Submission of the list of disposal sites used for the project and their locations to the engineer Submission of approvals obtained for such sites to the engineer Submission of progress of disposal of all debris and spoil from the site to approved sites by the site engineer to the engineer Submission of number of disposal sites restored after completion to the engineer 		Once a month	-	-	-	Contractor RDA/ PIU through PIC and consultation with ESD Division

Environmental component	Project Stage	Parameters to be Monitored	Location	Frequency	Standards	Rate (Rs.)	Amount (Rs.)	Implementation and Supervision
Dust Generation	Construction phase	Submission of; <ul style="list-style-type: none"> Construction activities and their locations along the road Number of bowsers allocated for water sprinkling Frequency and locations of water sprinkling Public complaints regarding dust issues to the engineer 		Once a week	-	-	-	Contractor RDA/ PIU through PIC and consultation with ESD Division
Occupational safety	Construction phase	Submission of; <ul style="list-style-type: none"> Number of labor occupied in the project List of PPE supplied to laborers Record from Field Supervisors on use of PPE Frequency of conducting tool box meetings and attendance of laborers to the engineer 		Once a week	Road safety manual of RDA	-	-	Contractor RDA/ PIU through PIC and consultation with ESD Division
Public safety	Construction phase	Submission of; <ul style="list-style-type: none"> Construction activities and their locations along the road List of safety precautions such as placing sign boards, barricading, direction boards, use of flag men and blinkers applied for the project based on the construction activities and their locations to the engineer 		Once a week	Road safety manual of RDA	-	-	Contractor RDA/ PIU through PIC and consultation with ESD Division
Total Cost for monitoring of before construction and construction stage¹							1,300,000 (US\$ 10,000)	

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

- Contractor should secure the cost of monitoring for “before construction” (Baseline) and “construction” stages of above monitoring plan.
- Locations of monitoring shall be updated and number of locations will be altered based on field conditions, contract packages and weather conditions with the consent of the engineer

Public consultation of Bogahawewa – Pulmudai (B060) Road

Name	Date	Sex	Designation	Comment
Ms. Dingiri Manike	28.05.2014	Female	Road User	There's Halmillewa school and Padawiya hospital close to the project area. The road development is good as this road improve access to these common properties. The road provides access to villages such as Mahasenpura, Ruwanpura and Pulmudai villages. The buses are available for every 2-3 hours. When the road is developed, there will be more buses.
Mr. N.M. HAMI	28.05.2014	Male	Residential Property owner	(2+300) The road gets inundated when there's rain. In last December water level came close to our houses. The water flows away after the rain but the road gets blocked. There's no alternate road as well. It's better to develop the road taking this in to consideration. We use well water as drinking water. The tap line also was laid halfway. These lands are inherited. Majority of people in the village engage in agriculture activities and civil security services. Women also engage in these occupations. The dust issue will be there during construction.
Mr. Nandapala	28.05.2014	Male	Commercial Property owner	We have permits for these lands. The road development is good. We use well water. The tap line is also available for some areas. RDA needs to consider about the construction impact.
Ms. Sandya Kumari	28.05.2014	Female	Commercial Property owner	(2+300) Every year, during rains, the road gets inundated at the location of the causeway. The water doesn't come close to houses but the road is blocked for hours and there's no alternate road as well. The road needs to be raised in this area.
Mr. Jayantha Kumara	28.05.2014	Male	Three wheel driver	There are no accident prone locations in the project area. There are few buses traversing in this road in 2-3 hours interval. If the road is developed. It's good for vehicle users. There will be less travel time for road users.