Initial Environmental Examination

May 2014

SRI: Integrated Road Investment Program – Project I (Southern Province)

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

CURRENCY EQUIVALENTS

(as of 14 May 2014)

Currency unit	–	Sri Lanka rupee (SLRe/SLRs)
SLRe 1.00	=	$ 0.007669
$1.00	=	SLR 130.400

ABBREVIATIONS

ABC	-	Aggregate Base Coarse
AC	-	Asphalt Concrete
ADB	-	Asian Development Bank
CBO	-	Community Based Organizations
CEA	-	Central Environmental Authority
DoF	-	Department of Forest
DSDs	-	Divisional Secretary Divisions
DWLC	-	Department of Wild Life Conservation
EIA	-	Environmental Impact Assessment
EMoP	-	Environmental Monitoring Plan
EMP	-	Environmental Management Plan
EPL	-	Environmental Protection License
ESDD	-	Environmental and Social Development Division
FBO	-	Farmer Based Organizations
GoSL	-	Government of Sri Lanka
GRC	-	Grievance Redress Committee
GRM	-	Grievance Redress Mechanism
GSMB	-	Geological Survey and Mines Bureau
IEE	-	Initial Environmental Examination
LAA	-	Land Acquisition Act
MER	-	Manage Elephant Range
MOHPS	-	Ministry of Highways, Ports and Shipping
NAAQS	-	National Ambient Air Quality Standards
NBRO	-	National Building Research Organization
NEA	-	National Environmental Act
NWS&DB	-	National Water Supply and Drainage Board
OPRC	-	Output and Performance - based Road Contract
PIC	-	Project Implementation Consultant
PIU	-	Project Implementation Unit
PRDA	-	Provincial Road Development Authority
PS	-	Pradeshiya Sabha
RDA	-	Road Development Authority
ROW	-	Right of Way
TOR	-	Terms of Reference

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EXECUTIVE SUMMARY

1. The Integrated Investment Program (iRoad) is proposed by the Road Development Authority (RDA) under Ministry of Highways, Ports and Shipping (MOHPS) to improve transport connectivity between rural communities and socioeconomic centers. iROAD intends to connect 1,000 Grama Niladari Divisions1 (GNDs) throughout the country as rural hubs and link them to trunk road network to all weather standards, and operating a sustainable trunk road network of at least fair condition. The iROAD will be financed by the Asian Development Bank (ADB) under a Multi tranche Financing Facility (MFF) to have four projects implanted over ten years. Project 1 focuses on the Souther Province and succeeding projects will cover: Sabaragamuwa, Kaluthara District of Western Province, Central, and North Central Provinces.

2. The first project will focus three districts: Galle, Matara, and Hambantota comprised of 2,123 GNDs. Access roads connecting 150 GND's have been selected for financing under Project I based on consultations with MOHPS, local authorities and parliamentarians and a screening criteria on existing road conditions and development needs. Of the 150 GNDs, 65 GNDs are in Galle, 45 in Matara and 40 in Hambantota. A total of l 186 rural and 14 national roads will be upgraded with a total length of and 586 km and 113.8 km, respectively.

3. The proposed road upgrading will include: improvement and maintenance to all weather standards with two lanes facility, surfacing the existing pavement with Asphalt Concrete (AC) if the present surface is weak, repairing or reconstructing damaged culverts, introducing earth drains for all road sections and built up drains where necessary, and removing any irregularities on the existing vertical profile.

4. The Program was classified as environmental category B based on the ADB Rapid Environmental Assessment checklist for roads and highways. This Initial Environmental Examination (IEE) report was prepared consistent with the ADB Safeguard Policy Statement (SPS) 2009 and the Environmental Safeguards Compliance Manual of RDA. Key national environmental laws and regulations that guided the environmental assessment includes: National Environment Act (NEA) No. 47; Coast Conservation Act No 57 of 1981, National environmental protection and quality regulations; National Environmental (Protection and Quality) Regulation No. 1 of 1990; National Environmental (Ambient Air Quality) Regulations, 1994; National Environmental (Noise Control) Regulations No.1 of 1996; Fauna and Flora Protection Act (FFPO) No.2 of 1937; Forest Act No. 34 of 1951; Felling of Trees Control Act No. 9 of 1951; Soil Conservation Act, No. 25 of 1951; Explosives Act No. 36 of 1976; Buddhist Temporalities Ordinance No. 19 of 1931; and Antiquities Ordinance No. 9 of 1940, among othe

5. Roads for inclusion in projects under the investment program will be selected based on priorities for connecting select GND's to the main trunk roads. The project roads will be further subjected to the following screening criteria on environment safeguards: (i) no project roads that will cause significant environmental impacts that would trigger classification as an environment 'Category A' project in accordance with the ADB's SPS (2009) will be included; (ii) no project roads falling in part or whole inside a protected area will be selected under the investment program; (iii) project roads falling adjacent to protected areas or eco-sensitive areas will be will be included only if there is no widening of the road "Right of Way" (ROW) or acquiring of land from the protected area or eco-sensitive area. For such project roads proper consultations will be held with the Department of Wildlife Conservation, local community and other relevant

[1] A Grama Niladhari Division (GND) is the smallest administrative unit in Sri Lanka

stakeholders and appropriate clearances or endorsements should be sought if required; the rehabilitation work of the road must have minimal or no long term impacts on other forms of sensitive ecological habitats such as marshes, natural streams, tanks and related wetland habitats

6. A review of international agreements and conventions were Sri Lanka is a signatory was conducted to ensure compliance. These agreements are: Conventions on Wetlands of International Importance Especially as Water Fowl habitats (Ramsar), Convention concerning the protection of the World Cultural and Natural Heritage, Convention on International Trade in Endangered Species of Wild Fauna & Flora (CITES), Convention on the conservation of Migratory Species of Wild Animals (CMS 1979), United Nations Framework Convention on Climate Change, Convention on Biological Diversity, and Plant Protection Agreement for Asia and the Pacific region.

7. **Public consultation and disclosure**. Consultations with stakeholders during the environmental examination involved local communities and government agencies like the Department of Wildlife Conservation (DWLC). During project implementation, signboards with project information detailing the nature of construction works, road length, construction period, name of contractor, contract sum and contact information for reporting complaints or grievances will be posted in three languages (Sinhala, Tamil and English) for rural roads. For the national roads there will be sign boards on period of works and contact information for reporting complaints or grievances in three languages. Annual environmental monitoring reports will be prepared per province and submitted to ADB for disclosure on the ADB website.

A. Physical Environment

8. Based on major climatic zones of the country, candidate road projects in Galle District located in low- and mid-country wet zones while project roads in Matara District are located within either wet zone or intermediate to mid- country intermediate zones. On the other hand road sections in Hambantota District are located in low- to mid- wet zone, low- to mid-country intermediate, and low-country dry zones. The climatic environment of the project area is further categorized into agro-ecological zones[2] (AEZ) which are categorized based on climate, soil, natural vegetation and land use pattern of an area. Majority of the roads in Galle are located in AEZ WL1a and WL2a, in Matara are WL1A, WL2a, WM1a, IL1a, and IL1b, and in Hambathota are IL1b and DL5a. Surrounding land use also differs with tea, rubber, and paddy dominating the landscapes of Galle and Matara while coconut, paddy, scrub, natural forest and rainfed rice are mostly seen in Hambanthota.

9. Rainfall pattern in the Southern Province of Sri Lanka is influenced by two monsoons; southwest and northeast. The rainfall in the wet zone in which parts of Galle, Matara and Hambanthota districts are located is governed by southwest monsoon experiencing heavy rainfall from May to September. Dry zone in which a part of Hambanthota district falls is fed by the northeast monsoon and wet from December to February. In the dry zone, the period from May to September is generally dry however, localized sporadic rainfall events are possible during this period due to the effect of local convections.

[2] The AEZ nomenclature is alphanumeric where the first upper case letter denotes the climatic condition (W-wet, I-intermediate, D-dry), the second upper case letter indicates elevation (L-low, M-medium, U-upper), the first number describes the moisture regime, and the last lower case letter indicates the rainfall distribution and other environmental factors where the decree of wetness degrades from letters *a* to *f* .

10. **Wind speed.** The coastal zone of Matara and Hambanthota Districts experience average wind speed of 25-30 knots, and slight lower in the coastal zone of Galle District. The inlands of Galle and Matara Districts experiences an average wind speed of 6 -20 knots, and 20-25 knots in Hambantota.

11. **Hydrology.** The Benthara Ganga and Gin Ganga are the major streams that drain Galle District. The Wakwella and Usgoda in Baddegama Divisional Secretary Division are located within the Gin Ganga flood prone area and flood protection bunds have been constructed to protect these areas. There are 3 project roads[3] that are located near the Gin Ganga and another 3 project roads[4] near Benthara Ganga. The Nilwala Flood plain of the Nilwala River is the most hydrologically sensitive area in Matara District with a long history of flooding. The Nilwala River is the third longest river in Sri Lanka which originates from Rakwana hills, encompassing a catchment area of 960km^2 and empties to the sea at Thotamuna after crossing Matara Township. The Nilwala delta and surrounding areas experienced yearly floods and severe floods were recorded in the years 1933, 1944, 1955, 1969, 1972, 2000, 2003, 2008, and 2010 which caused fatal damages to nearby population and properties. In 2003, 1,607 houses severely affecting 43,750 people. To control floods, protection earth dams and dykes were constructed under Nilwala Flood Protection Scheme in 1979. A total of 14[5] project roads are located within or near natural and man-made drainage systems and are prone to flooding. There are 4 project roads that are located in the coastal zone, 3 are No. 64 of Galle district, 27 and 29 of Matara district and 12 of Hambanthota district.

12. **Air quality and noise**. Majority of the project roads are located in rural areas where the air quality is better due to the lack of major air pollution sources. Still, there are short-term instances when the ambient air quality deteriorates due to vehicular emissions, fugitive dust from unpaved road travel, burning of forest patches for *Chena* cultivation (slash and burn cultivation), and use of wood and for cooking.

13. **Natural Disasters**. The project districts are all located in coastal area and prone to tsunami, storm surge, coastal erosion, and sea level rise. In 2004, coastal zone of these districts were severely affected by tsunami which resulted immeasurable damage. The highlands of Galle and Matara districts are susceptible to landsides particularly during peak rainfall from May to September.

B. Ecological Environment

14. Ecologically sensitive areas that include forest reserves, national parks, sanctuary, managed elephant reserves, and coastal area are found along or near the project roads. In Hambantota Ditrict, the Boondala-Meda Para road (1.4 km) is located within 100m of the Bundala National Park which provides foraging habitat and wintering grounds for migratory birds, the first wetland to be declared as a Ramsar site in Sri Lanka, designated UNESCO biosphere reserve, and also a known habitat of crocodiles. The Koggala - Sooriyawewa (7.3km) road is adjacent to the Madunagala sanctuary where several endemic species are found like the Sri Lankan Grey hornbill (*Ocyceros gingalensis*), Sri Lankan Jungle fowl (*Gallus lafayetti*), Sri Lankan Spur fowl (*Galloperdix bicalcarata*), Sri Lankan Lorikeet (*Loriculus beryllinus*) and the Sirkeer Malkoha (*Phaenicophaeus leschenaultii*). The Piyapala Mawatha road (2.1km) is

[3] 36,73, and 75
[4] 40, 42, and 45
[5] 12, 14, 22, 25, 6, 27, 30, 28, 29, 38, 47, 39, 49, and 53

adjacent to proposed Hambantota Managed Elephant Reserve (MER) whose boundaries are to be defined but know to harbour about 400 elephants. Sections of Denuwala - Kapuwatta Jaya Wijayagama road and Udupila Junction – Udupila Vihandagoda – Bandaramulla road, Galduwa Aranya road, and Godawaya junction to temple road are located within the coastal zone and are prone to storm surge and coastal erosion. In addition to these roads, there are 13 roads sections with a total length of 10.7 kms that are located inside forest reserves or unclassified forest.

C. Demographic Characteristics

15. **Population and population density.** The Department of Census and Statistics estimated mid-year population of Galle District in 2012 at 1,058,771 persons with 508,497 males and 550, 274 females. During the same period, estimated mid-year population of Matara and Hambantota districts were 809,344 and 596,617, respectively. In Galle district, population density is 613 persons per square kilometer while Matara its 600 and Hambantota 211.

16. **Ethnicity**. Majority of the people in the project districts are Sinhalese accounting for at least 94% of the total population followed by Muslim and Sri Lankan Tamils accounting for about 3.5% and 1.3%, respectively.

17. **Distribution**. Majority of population lives in rural areas accounting for 87.2% in Galle, 88.9% in Matara and 95.6% in Hambantota. Largest urban population was reported in Galle district at 11.1% of the total population. A small portion of the population, about 3.0%, lives in the estates.

18. **Economic Activities**. The 2012 labor force survey revealed agriculture sector accounted for 45.6% of the total labor force followed by services with 32.1% and industry with 22.3%. Hambantota has the largest agriculture employment, Matara dominates the service sector employment, and Galle leads the industrial sector.

19. **Agriculture**. In Matara and Galle districts, 35.4% and 34.6% of the total employed population are engaged in the agricultural sector. Large scale and small holding tea, rubber and cinnamon plantations, and paddy are the major agricultural crops. Agriculture is also a prominent economic activity in Hambantota district with 45.6% of the total population is engaged in agricultural sector. Paddy is the main agricultural crop covering 26,098 hectares (ha) of cultivable paddy lands and in 2010 has has produced 4,189,059 metric tons (MT) of paddy. Coconut is grown as the main commercial crop, while citronella, cinnamon, pepper, and coffee are grown as export crops. In addition, fruit crops such as mango, melon, papaya, citrus, wood apple, pineapple, banana, and vegetables like tomato, bitter gourd, pumpkin are grown in the highlands of Humbanthota.

20. **Livestock**. Livestock such cattle, buffaloes, and poultry farming are popular agricultural activities in the project districts. Humbantota district is reputed for buffalo milk and curd and know has a sizeable cattle, poultry, and goat industries. In 2010 there were 7,360 livestock farms in Humbantota district, consisting of 4,579 cattle and buffalo farms, and 2,363 poultry farms.

21. **Fishing**. Marine fishing is also a prominent economic activity for many people in the project districts due to their vast sea area and large number of lagoons situated along the coast. Fresh water fishing or inland fishing provides an important role with the availability of a large number of manmade irrigation reservoirs (known as tanks) from ancient times particularly in

Humbantota district. During off sea fishing season, inland fishing becomes the dominant activity of fishermen.

22. **Industries**. Roughly one-third of the workforce is employed in the industrial sector across the project districts. Dominant industries are salt production, agro-industrial processing, and garment manufacturing.

D. Socioeconomic status

23. **Literacy rate**. As of 2012 Census and Statistics, Galle district has the highest literacy rate of 96.6% while Matara and Hambantota districts have 90.7% and 88.8%, respectively. In terms of gender distribution, female literacy rate is lower than male literacy rate particularly in Matara and Hambantota.

24. **Household income.** The Household Income and Expenditure Survey - 2009/10 of the Department of Census and Statistics reported the monthly mean and median per capita income in Hambanthota district is highest among the project districts at Rs8,950 and Rs6,553, respectively due to higher agricultural production. There is no significant difference in per capita income levels between Galle and Matara districts having around Rs7,700/month and Rs5,500 mean and median incomes, respectively.

25. **Poverty.** The poverty headcount index of Southern province including the project districts is comparatively higher than the national poverty headcount index. In 1990/91, the Southern Province recorded a 30.2% poverty headcount index and Galle, Matara and Hambantota districts reported 29.7%, 29.2%, and 32.4%, respectively. During the same period the national poverty index was 26.1%. The higher poverty situation is partly explained by the prevailing agriculture-based economy and low investment in industrial sector due to inadequate infrastructure facilities such as road, electricity, water and telecommunications. However, it is important to note that Hambanthota district sustained its 60% reduction in poverty headcount index as reported from 2002 to 2006/07 with a further 46% drop from 2006/07 to 2009/10. During the same period Galle and Matara districts demonstrated the same trend in poverty reduction due to the steady infrastructure development that led to boost industrial and services sector activities in these three districts.

E. Existing Infrastructure facilities

26. **Energy.** Electricity is the main source of energy used for household lighting in the project districts with 93.2% of the total households in Galle, 93.6% in Matara, and 88.4% reliance. Kerosene follows providing lighting source to 10.4% households in Hambantota district and 5.7% households in Galle and Matara districts.

27. **Drinking water**. Majority of households in Galle and Matara districts use water from protected wells accounting for 57.7% and 44.4% of the total households, respectively. Majority of households in Hambantota district use pipe-borne water for drinking purpose. There are 7.5%, 6.7%, and 2.4% households in Galle, Matara and Hambantota districts, respectively getting water from unprotected wells. Other households draw water from other sources like rural water supply projects, tube wells, bottled water, tank, and river.

28. **Sanitation**. Majority of households in Galle, Matara, and Hambanthota districts use private toilets accounting 89.4%, 90.2%, and 88.0% of the total, respectively while about 10%

shares toilet with other families. A small fraction of the households of less than 1% use common/public toilets.

29. **Education**. There are 423 schools in Galle district, 361 in Matara district and 310 in Hambanthota district majority of which are co-education and only 12 exclusive boys and 4 excusive girls schools in the project districts.

F. Anticipated Environmental Impacts and Proposed Mitigation Measures

30. **Pre-construction stage**. Environmental impacts related to project siting in flood and erosion prone areas, and shifting of utilities were addressed. Hydrologic studies allowed the proper design of bridges and culverts to have adequate capacities based on 100- and 50-year flood return periods. Collected data and structural designs were validated by the Irrigation Department in collecting information and checking the adequacy of design, conducting construction operations during dry weather flow are possible mitigation measures. Road sections located in rolling and hilly terrain were identified and screened for susceptibility to erosion and counter measures were designed in consultation with the National Building Research Organization (NBRO). Finally, the need to safely shift electric power and telephone lines, and water supply mains along the ROW were defined for each road project. Detailed inventory, co-ordination with the concerned authorities, and the need for public notification forms part of the detailed EMPs.

31. **Construction phase**. Significant environmental impacts anticipated during construction phase are: (i) increase of local air pollution, noise and vibration from earthworks, pavement improvement operations, quarry operations, operation of hot mix plants, and operation of construction vehicles; (ii) deterioration of surface water quality due to silt runoff, emissions and spoil from labour camps; (iii) landslides; (iv) social and health impacts from labour camps; (v) disruption to access/traffic; (vi) loss of avenue trees; (vii) alteration of hydrology due to siltation of streams; (viii) disturbance of faunal movement particularly near the Bundala National Park and inside the Hambantota managed elephant reserve; and (ix) occupational health and community safety. Principal mitigation measures imbedded in the EMP includes: (i) utilizing least noisy equipment and timing of equipment operation to reduce noise impacts; (ii) sprinkling of water on material storage and handling areas and unpaved road travel to control dust; (iii) installation of silt and oil traps, and avoiding storage of materials near water bodies to avoid contamination of receiving waters; (iv) bioengineering and slope stabilization to control erosion; (v) locate camps at least 100m away from water resources, provide septic tanks to treat wastewater, and link with local health programs on prevention and control of communicable diseases; (vi) maximize the hiring of local labor to avoid the establishment of big labor camps; (vii) traffic management to avoid congestion and maintain access of local residents; (viii) implement 1:3 compensatory plantation to off-set impacts from tree cutting; (ix) no camp, materials storage, hot mix plant will be allowed near the national park; (x) protection of the existing elephant fences near Koggala-Sooriya wewa road, strict coordination with the Department of Wildlife Conservation and compliance to their guidelines; and (xi) provision of personal protective equipment to all workers.

32. **Operation Phase**. Environmental impacts during operation and less significant involving the potential deterioration of water bodies from oil-contaminated runoff, disposal of debris and waste collected along the roadside including drainage canals, road crashes, and deterioration of air quality. Mitigation measures include regular maintenance of road drain and proper disposal of collected derbris, provision of road safety appurtenances in the road design, and avenue plantation to control noise.

33. **Greenhouse gas emissions and addressing risk of climate change.** Using the Transport Emissions Evaluation Model for Projects (TEEMP) total annual emission was estimated at 46,494 tons which is less than the 100,000 tons per year threshold set by ADB. The projected variations in temperature and precipitation the project roads indicated vulnerability to these climate risks: landslide triggered by increased precipitation, fire, flood, drought, tsunami, cyclone wind, cyclone surge, sea level rise, and coastal erosion. Key engineering measures taken to address these risks in the design are: i) increase in embankment height, ii) construction of new side and lead away drains, iii) construction of new culverts or widening of existing ones and iv) construction of new bridges which amounts to Rs. 389.3 million (about $3 million) of approximately 4% of the total civil works costs.

34. **EMP implementation.** The Ministry of Highways, Ports and Shipping (MOHPS) is the Executing Agency (EA) and RDA is the Implementing Agency and within RDA there will be a Project Implementation Unit (PIU). The PIU will be responsible for implementing the project and managing detailed design and supervision of the construction works and ensuring that all environmental safeguard requirements in accordance with this EARF are met. The PIU will be headed by a full time Project Director (PD) and supported by a team of engineers from RDA. The PIU will have a safeguards team with sufficient social and environment safeguards officers to cover the quantum and geographic distribution of works in all provinces under the investment program. The Project Implementation Consultants (PIC) will support the PIU for supervision of the design and construction works by the civil works contractor. The PIC team will include a team of environment safeguards consultants for conduction of regular monitoring of safeguards implementation on site.

35. **Environmental Management and Monitoring Plans.** A standard EMP was prepared as part of the IEE report, however, contract package specific EMP's will be prepared by the contractor by ij consonance to the standard EMP, road specific information in the environmental checklists and the detailed design (level 1 design). All costs for implementing the mitigation measures will be included in the Bill of Quantities (BOQ) by the contractor as implementation of the EMP will be the responsibility of the contractor. Contractors who implement rural road components will have a construction period of approximately two years and routine maintenance for three years. However, under the output and performance - based road contract, the contractor is responsible to keep the road in operational condition for a period of 7 years after reconstruction. The EMP has been modified accordingly paying more attention on the environmental impacts and mitigation measures during the operational stage together with reconstruction stage. Monitoring of EMP implementation will be carried out during the preconstruction, construction, and operation and maintenance stages of the project. Based on the EMP, environmental monitoring checklists (EMC) will be prepared by the PIC for each of these stages. The EMC monitors the degree of compliance of the mitigation measures proposed in the EMP in all three stages. Every road must have at least one EMC completed during pre-construction, one to three during construction depending on the length of the road and one per year during operation and maintenance. Based on these records and site visits monitoring reports will be prepared during the construction and operation stage on an annual basis per province and submitted to ADB for disclosure on the ADB website. An Environmental Monitoring Plan (EMoP) provides the guidance to contractor and PIU on monitoring environmental quality and implementation of the EMP. Furthermore the contractor will also be responsible for updating EMP and EMOP if there are any significant changes in the project site conditions or engineering design.

36. Grievance Redress Mechanism. Starts at the grass roots level where complaints are received and addressed by the contractor, PIC or PIU representative on site. Grievances that are not immediately resolved are elevated to the Grama Niladhari (GN) levels and Divisional Secretariat (DS) level for final resolution.

G. Conclusion and Recommendations

37. The proposed iROAD project has been categorized as Category 'B' based on environmental screening and assessment of likely impacts while the initial environmental examination ascertains that it is unlikely to cause any significant environmental impacts. Few impacts were identified attributable to the proposed project, all of which are localized and temporary in nature and easy to mitigate.

38. The screening criteria ensure no road will cause significant adverse impacts. iROAD ensures no project road will trigger classification as an environment 'Category A' project in accordance with the ADB's SPS (2009); no project roads falling in part or whole inside a protected area will be selected under the investment program; (iii) project roads falling adjacent to protected areas or eco-sensitive areas will be will be included only if there is no widening of the road "Right of Way" (ROW) or acquiring of land from the protected area or eco-sensitive area.

39. The initial environmental examination conducted for the project conforms to the ADB SPS (2009) and pertinent national environmental laws and regulations technical and procedural requirements. Significant impacts are not considered adverse and typical to road constructions that are simple to mitigate. Impacts related to road siting in flood and erosion prone areas are mitigated through proper design. During construction phase can be mitigated through good engineering and housekeeping practices, and implementation of clearance and permit requirements. During operation, removal of debris along the road and drainage minimized risk of water quality deterioration and flooding while the provision of road safety appurtenances promotes road safety which becomes more significant as road users will be travelling at higher speeds.

40. The initial environmental examination ascertains the program is unlikely to cause any significant adverse environmental impacts. No additional studies or need of undertaking detailed EIA is envisaged at this stage. The Executing Agency shall ensure that EMP and EMoP are included in Bill of Quantity (BOQ) and forms part of bid document and civil works contract. The same shall be revised if necessary during project implementation or if there is any change in the program design and with approval of ADB.

I. INTRODUCTION

A. Background

41. In Sri Lanka, about 85% of the population is living in the rural and peri urban sector and out of that 84.7% are identified as poor. Poverty is concentrated in areas where connectivity to towns and markets, access to electricity and average educational attainment are relatively low, and agricultural labor is an important source of employment. Location attributes are highly correlated with each other, which indicate the many-sided nature of challenges faced by poor areas. Remote areas with lack of all-weather access to the socioeconomic centers have rendered a large portion of the rural population with poor agricultural productivity, limited employment opportunities and slow economic growth.

42. In order to address this problem and improve transport connectivity between rural communities and socioeconomic centers, the Road Development Authority (RDA) under Ministry of Highways, Ports and Shipping (MOHPS) has proposed an Integrated Road Investment Program (iRoad). The Government would like to select about 1000 Grama Niladari Divisions[6] (GNDs) throughout the country as rural hubs according to the population, development potential and distance to trunk road network. As a first step for developing the rural hubs the government will enhance the connectivity by (i) improving rural access roads linking the rural hubs to trunk road network to all weather standards, and (ii) operating a sustainable trunk road network of at least fair condition.

43. This program will be financed by the Asian Development Bank (ADB) under a Multi tranche Financing Facility (MFF). The investment program is planned to have four tranches that will be implemented over a period of ten years. Other provinces that will be covered in the succeeding tranches are expected to be: Sabaragamuwa Province, Kaluthara District of Western Province, Central Province and North Central Province. Roads to be included in succeeding tranches in other provinces are yet to be selected. Therefore, an Environmental Assessment and Review Framework (EARF) has been prepared to guide selection, screening, categorization, impact assessments, project implementation and monitoring of environment safeguards according to requirements of the Government of Sri Lanka (GoSL) as well as the ADB Safeguard Policy Statement (SPS) for succeeding tranches and their project roadss under the investment program.

44. The first project will focus on improving roads in the Southern Province comprising of three districts, Galle, Matara and Hambantota and a total of 2,123 GNDs. Access roads connecting 150 GND's have been selected for financing under project I based on consultations with MOHPS, local authorities and parliamentarians and a screening criteria on existing road conditions and development needs. Of the 150 GNDs, 65 GNDs are in Galle, 45 in Matara and 40 in Hambantota. In all 186 rural roads totaling 586 km will be included in project I. In addition 14 national roads totaling approximately 113.8 km will also be included in project I. Table 1.1, shows a summary of the rural and national roads on a district wise basis. The particular road list is attached in Annex 1.1.

[6] A Grama Niladhari Division (GND) is the smallest administrative unit in Sri Lanka

Table I-1: District-wise length of roads in Southern Province

District	Rural Roads		OPRC Package			
			Reconstruction		Routine and periodic maintenance	
	No. of road sections	Length (km)	Road Name	Length (km)	Road Name	Length (km)
Galle	67	197.6	B248	11.7	B454	10.2
			B249	11.0	B129	2.8
			B303	4.0	B156	6.6
			B139	4.4		
			B411	9.7		
			Sub Total	**40.8**	**Sub Total**	**19.6**
Matara	67	217.5	B607	9.3	B415	7.8
			Sub Total	**9.3**	**Sub Total**	**7.8**
Hambantota	52	170.9	Kirama - Warapitiya - Heegoda	14.4	B485	7.3
					B450	7.8
					B623	7.0
			Sub Total	**14.4**	**Sub Total**	**22.1**
Total	**186**	**586.0**		**64.5**		**49.5**
Grand Total (Rural roads + OPRC roads)						**700.0**

Source: i Road Program, RDA

45. For the rural roads there will be three contract packages per district. The contractor will be responsible for construction of the road over 2 years and performance based maintenance for another 3 years. For the national roads there will be two contract packages within the three districts. The national roads will follow Output and Performance based Road Contracts (OPRC) where the contractor will be responsible for ensuring that the road is in good riding condition for a period of 7 years including reconstruction and maintenance. The scope of works for the national roads will include reconstruction of 64.5km.

46. This document presents the Initial Environmental Examination (IEE) for all roads under project I and has been prepared in accordance with the requirements of ADB's Safeguard Policy Statement (SPS) 2009 and the Environmental Safeguards Compliance Manual of RDA.

B. Output and Performance - based Road Contract

47. Output and Performance-based Contracting for Roads is designed to increase the efficiency and effectiveness of road asset management and maintenance. It should ensure that the physical condition of the roads under contract is adequate for the need of road users, over the entire period of the contract which is possibly seven (7) years. This type of contract significantly expands the role of the private sector, from the simple execution of works to the management and conservation of road assets.

48. The OPRC addresses the issue of inadequate incentives. During the bidding process, contractors compete among each other by essentially proposing fixed lump-sum prices for bringing the road to a certain service level and then maintaining it at that level for a relatively long period. It is important to understand that contractors are not paid directly for "inputs" or physical works (which they will undoubtedly have to carry out), but for achieving specified service Levels, i.e., the rehabilitation of the road to pre-defined standards (if so required by the bidding documents), the maintenance service of ensuring certain Service Levels on the roads under contract, and specific improvements (if so required by the bidding documents), all representing outputs or outcomes. A monthly lump-sum remuneration paid to the Contractor will

cover all physical and non-physical maintenance services provided by the Contractor, except for unforeseen emergency works which are remunerated separately. Maintaining a road includes both routine and periodic tasks. Routine maintenance consists of many different tasks frequently necessary to maintain the function of the road (such as pothole repairs, cleaning of drainage, sealing of cracks, cutting of vegetation, etc.)[7].

49. During the contract period the contractor is responsible for environmental and social safeguards compliance as specified in the contractual agreements and necessary mitigation measures should be implemented to minimize any impacts resulted due to maintenance activities.

C. Objectives of the proposed project

50. The broad objective of this project is to improve the connectivity of road network in rural areas of Sri Lanka, so that rural population can be conveniently involved in the nation wide economic and social development.

51. Specific objectives of this project are;

- To improve the road condition between rural communities and socioeconomic centers of the Southern Province.
- To reconstruct 64.5km of national roads and to upgrade and maintain about 690km of rural access roads connecting 200 rural communities to all-weather standard
- To improve connectivity between production centers and market places and improve linkage with the other districts and provinces,
- To facilitate to increase mobility by improving road network which link up with other provinces,
- To open up rural areas for development,
- To facilitate to generate efficiency gains by lowering the unit cost of individual producers through transport efficiency which will lead to increase their margins and profits thus making them generating another round of investments,
- To reduce rural poverty through improved access to (a) markets and economic centers (b) social infrastructure and (c) new employment opportunities

52. In order to achieve these objectives, the road network in Galle, Matara and Hambantota districts will be upgraded with the following guidelines:

- Upgrade and maintain the existing roads (roads within all three packages) to all weather standards with two lanes facility
- Surfacing the existing pavement with Asphalt Concrete (AC) if the present surface is weak
- Repair or reconstruct damaged culverts
- Introduce earth drains for all road sections and built up drains where necessary
- Remove any irregularities that are on the existing vertical profile,
- There by improve the vehicle operating speeds while ensuring safety of road users.

[7] Draft Bidding Documents for Procurement of Improvement Works, Periodic Maintenance Works and Routine Maintenance Services under Output and Performance - based Road Contract - Galle District Road Network, i Road program, RDA.

D. Objectives of the Initial Environmental Examination

53. As mentioned, this IEE covers reconstruction of 64.5km of national roads and upgrading and maintaining of approximately 690km of rural roads to all weather standards.

54. The purpose of this Initial Environmental Examination (IEE) is to gather and provide:

(i) 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),
- Social Environment (socio economic profile of the communities living in the project influence area, infrastructure facilities and land use etc.)

(ii) Identify beneficial and potential adverse impacts on the existing environment during preconstruction, construction and operational phases of the project;

(iii) Propose effective mitigation measures to avoid/ minimize the project induced adverse impacts while enhancing the beneficial impacts, and;

(iv) Formulate an effective Environmental Management Plan (EMP) which is common for all roads and will be road specified during bidding process, 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.

E. Approach, Methodology and Personnel Involved

55. This IEE for about 690km was carried out in compliance with the RDA manuals on environmental and social safeguards compliance in road development projects which is in line with national environmental and social safeguards acts/ policies and ADB safeguards policy statement, 2009. The field assessments were carried out during the month of January to March 2014 during which videos were produced for each road section.

56. The IEE was prepared over the period of March and April 2014. In preparation of the assessment, 5m to 10m corridor for both sides from the edge of the road was examined to assess direct environmental and social impacts. The land use pattern up to 200m or impact influential area on both sides of the center line of the existing road was studied using videos and maps[8] and site visit. Further satellite imagery available on-line from Google maps were used as a secondary information base. In addition information available in Management Information System (MIS) of the Environment and Social Safeguards Division (ESDD) under the Road Development Authority (RDA) was also utilized for the assessment.

57. Environmental checklists as required by the Environmental Assessment and Review Framework (EARF) were prepared for each road section under the project. A sample of the checklists completed for roads under the three districts are provided in Appendix 1.2. The Environmental checklist summarizes the following details:

- Road details

[8] Maps had a scale of 1:10,000 and had digitized data of Survey Department, Sri Lanka which was updated on 31st of March 2014.

- Location information
- Climatic conditions
- Generic description of Environment
- Specific description of the Road Environment
- Public Consultation
- List of photographs taken along the road

58. The assessment and report preparation was carried out by trained multidisciplinary team including Hydrologist, Biologist/Ecologist, Acting Environment and Social Safeguards officer and Acting Social Impact Awareness officer of ESDD, RDA. This core team was supported by assistant staff members of environment and social dimensions.

II. DESCRIPTION OF THE PROJECT

A. Location of the Project

59. As mentioned, all most all candidate road sections selected for this project connect rural areas with the trunk road network in Galle, Matara and Hambanthota Districts in Southern Province. Accordingly a road length of 197.6km in Galle District, 217.5km in Matara District and 170.9km in Hambanthota District will be upgraded and maintained to all weather standards under this project. The administrative divisions including Divisional Secretariat (DS) Divisions and Grama NIladari Divisions (Subordinate of the Divisional Secretary) falling within particular sections of road are presented in Annex 1.1.

60. Location maps attached in annex 2.1 present the general location of rural road sections in Galle, Matara and Hambanthota Districts respectively. Annex 2.1 also consists of location maps of national roads to be reconstructed under OPRC package.

B. Need of the Project

61. Sri Lanka is currently driven to be a strategically important economic center by means of naval, aviation, commercial, energy and knowledge hub serving as a link between east and west using its geographical location effectively. Accordingly an accelerated development program is undertaken by the Government of Sri Lanka (GOSL) by means of socio-economic and social infrastructure development. And Southern Province is one of the key provinces which is targeted to implement major development projects in order to facilitate economic and social infrastructure development of the country. Hambanthota sea port, Mattala airport, extension of Southern Expressway from Matara to Mattala (Hambanthota) are few of such major development projects offered to the Southern Province. However to increase the effectiveness of the development, it should be assured that the benefits penetrate to the rural regions of the province as well as development potentials available in rural areas should be exposed. On the other hand 34.6%, 35.4% and 45.6% of the labor force in Galle, Matara and Hambanthota districts respectively are engaged in agriculture based employments and majority of them are restricted to rural areas (Department of Census and Statistics, 2012). And in order to find a reasonable price for their products it is necessary to transport them to better markets which are mostly found in urban centers. In this regard, connectivity of these areas with the trunk road network is significant however it is found that the rural road network is still in dilapidated condition and not accessible in all weather conditions. Thus this situation fails to facilitate an efficient connectivity. Therefore after identifying the existing situation, the government intends to select about 1,000 rural communities according to the population, development potentials, and the distance to trunk roads to extend the development benefits to rural areas. And it is required to address the connectivity issues for these communities.

62. The proposed i-Road Program of RDA will improve the transport connectivity between rural communities and socio-economic centers. Under the first project, 700km of the Southern province will be upgraded and maintained to all-weather standard which will serve about 200 communities. Improved connectivity will ultimately benefit the targeted communities by increased flow of economic opportunities and accessibility to developed markets and therefore it is expected to increase income generation possibilities of rural communities. This will ultimately enhance the socio-economic development of such communities which will be a positive drive to development of the country.

C. Analysis of Alternatives

1. No Project Alternative

63. The GOSL has already initiated mega development projects in the southern region including Mattala airport, Hambantota sea port, Sooriyawewa international cricket stadium, Extension of Southern Expressway from Matara to Mattala (Hambanthota) and industrial parks. In order to sustain this socio-economic development of the southern region it is apparent that socio-economic benefits of these development projects should penetrate to rural communities as well. And efficient road network connecting developed centers and under developed areas is essential to facilitate the penetration of socio-economic opportunities.

64. However at present the local road network which links rural areas to major townships of the Southern Province; Galle, Matara and Hambanthota through trunk roads is found to be narrow and mostly in non-motarable conditions. This hinders the accessibility of local communities to better markets, educational and health facilities and other development avenues. Therefore if the local road network is not improved and maintained the socio-economic status of local communities will remain unchanged and it will be a barrier to the national development of the country.

2. With Project Alternative

65. With the i-Road program, approximately 700km length of rural and national roads will be upgraded and maintained to all-weather standard therefore the accessibility of rural communities and socio-economic centers will be increased. And there will be increased flow of socio-economic benefits to local communities which will create new income generation avenues.

66. On the other hand, once the accessibility is increased, the travel time to centers such as hospitals, schools, markets and other infrastructure facilities available in town centers will be reduced. Therefore the i-Road program is a timely required project to facilitate the socio-economic development of the Southern Province and ultimately for the development of the country.

D. Magnitude of Operations

1. Project Activities

67. The i Road Program is mainly to upgrade and maintain the selected road sections within Southern Province to all-weather standards. The selected rural roads are currently governed by Pradeshiya Sabhas (The local Authorities) of Galle, Matara and Hambanthota Districts and Provincial Road Development Authority (PRDA) of Southern Provincial Council. And national roads to be reconstructed under OPRC package of i Road program are vested upon the RDA. Under the project, rural and national roads of 258km in Galle District, 234.6km in Matara District and 207.4km in Hambanthota District have been selected to be upgraded.

68. Currently selected roads are found to be narrow and the width of existing roads is highly variable. And the surface of the particular roads is of gravel, concrete or macadam and existing condition of the most of the roads are categorized as bad. The length of the roads, existing

widths of the roads, number of bridges, culverts and causeways present, existing surface type and the category of the road condition of each selected roads are presented in Annex 1.1.

69. As mentioned, it is proposed to upgrade and maintain selected roads in Galle, Matara and Hambanthota Districts to all weather standards under i Road Program. For rural roads, different typical cross sections have been developed to suit existing road condition; gravel, concrete, macadam and block pavements. And special attention has been provided to avoid land acquisition in all road sections. Therefore proposed cross sections will be modified based on the available Right of Way (ROW) and for narrow road sections minimum 3m carriageway will be kept. The improved pavement will be of Asphalt Concrete (AC) which is comparatively a long lasting treatment. The proposed improvement works for selected roads are as follows[9];

- The widening of roads will be carried out only if there is sufficient right of way.
- If the existing surface is asphalt; it will be overlaid by the asphalt concrete.
- Base correction will be carried out if base failures are found along the road.
- If the existing surface is macadam based it will be overlaid by Aggregate Base Coarse (ABC) and asphalt as per the pavement design given by the Engineer.
- If the existing road surface is concrete paved and in good condition; it should be rectified and if it is damaged; it should be completely demolished and laid with ABC and asphalt.
- If the existing road surface is gravel; it will be reconstructed with ABC and asphalt.
- If the existing surface is block paved; it will be rectified to correct minor damages. Otherwise it will be completely demolished and will be laid with asphalt concrete.
- The buildup drain has been provided for town areas or other requested areas. Otherwise the earth drain will be provided.
- The earth work will be carried out in required areas.
- Finally road marking will be carried out.

70. Proposed typical cross sections are attached in Annex 2.2.

71. In addition, improvement to cross and side drainage of the particular roads will be considered in locations where structures have been badly damaged or rectification of the drainage is significantly required.

72. Since proposed improvement will not be extended beyond the existing ROW, no building or temporary structure will be fully or partially affected.

73. Roads under OPRC package will be reconstructed with minimum 6.2m carriageway and typical two lanes cross section will be adopted with necessary modifications to suit the existing ROW.

74. As mentioned in the Chapter 1, OPRC package is for improvement, rehabilitation, periodic maintenance works and routine maintenance services of selected national roads in the

[9] PIU, i Road Program, RDA

Southern Province. To execute the works and services under this contract, the contract is deemed to be sub divided in to the following major components[10].

- Improvement works: consisting of a set of specific improvements, detailed in these specifications, to add new characteristics to the roads in response to existing or new traffic, environmental, social and safety or other considerations.
- Rehabilitation works: consisting of specific types of pavement reconstruction works on the existing pavement and carriageway width to bring the pavement to the desired design life described in the specifications.
- Periodic maintenance works: consisting of specific types of major interventions designed to ensure the residual pavement and surfacing lives are provided to the employer at the end of the contract period.
- Routine maintenance services: consists of all interventions on the roads which are to be carried out by the contractor in order to achieve maintain the road performance standards defined by the service levels included in these specifications and all activities related to the management and auditing of the road contract performance measures.
- Emergency works: consisting of activities needed to reinstate the roads and reconstruct their structure or their ROW which has been damaged as a result of natural phenomena such as strong storms, floods and earthquakes etc.

2. Extraction of Construction Material

75. Material required for construction will be explored from the project area. Existing sites which are operated with relevant licenses and approvals will be used especially for extraction of metal and sand. Offshore sand could also be used for construction subjected to confirmation of quality. If new material extraction sites will be opened for this project, necessary licenses and approvals will be obtained from relevant agencies.

76. As per the bidding documents prepared for i Road Program, estimated approximate quantities of material required for each district are attached in Annex 2.3.

[10] Draft Bidding Documents for Procurement of Improvement Works, Periodic Maintenance Works and Routine Maintenance Services under Output and Performance - based Road Contract - Galle District Road Network, i Road program, RDA)

III. POLICY AND LEGAL FRAMEWORK

A. Legal Framework

1. National Environmental Act and other applicable regulation

77. The National Environment Act (NEA) No. 47 is the key environmental policy framework which is administered through the Central Environment Authority (CEA) of the Ministry of Environment and Renewable Energy (ME&RE). NEA No. 47 was enacted in 1980 and NEA amendment Act No. 56 of 1988 stipulated the regulations for assessing and managing environmental impacts and obtaining the environmental clearance in a timely and systematic manner. It also provides guidelines for environment management, management of natural resources, fisheries, wild life, forestry, soil conservation, environment quality, environment protection and approval of projects. The environmental clearance process is implemented through the designated Project Approving Agency (PAA) as prescribed by the Minister under section 23 Y of the NEA. The procedure that should be followed for obtaining environmental clearance is described under section 23CC and 32 of the NEA.

78. The environmental clearance process should be initiated by submitting the completed Basic Information Questionnaire (BIQ) to CEA with preliminary information about the project including exact locations of the project components, extent and environmental sensitivity related to project activities. Based on this CEA decides whether the project is a "Prescribed Project"[11] or not and who the PAA will be for administering the IEE or EIA process to obtain environmental clearance if the proposed project is a prescribed project. For Prescribed project CEA or the designated PAA will issue a TOR for the IEE or EIA required.

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

80. If a project road falls adjacent to the boundary or inside a protected area, necessary clearance will need to be sought from the Department of Wildlife Conservation (DWC) even if there will be no widening of the road ROW. Depending on the sensitivity of the protected area, the DWC may require conduction of an IEE or EIA study for the respective road. No works are allowed in project roads falling inside Strict Nature Reserves.

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

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

Table III-1: Applicable National Laws and Regulations for the Investment Program

	Legislation	Relevance and main content	Authorizing institution
1.	Coast Conservation Act No 57 of 1981	This act regulates any un authorized construction within the coastal zone, by making it mandatory to obtain permits for any Development activity falling within the coastal zone.	Coast Conservation and coastal resources management department
2.	National environmental protection and quality regulations under Extraordinary gazette notification No. 1534/18 and No. 1533/16 of 2008 under NEA section 32 & 23A, 23B	This regulates the discharge and deposit of any kind of waste or emission into the environment and stipulates requirements for an Environmental Protection License (EPL) depending on the project activity. Examples of activities requiring and EPL are: asphalt processing plant, concrete batching plants, treatment plants, sewerage networks, mechanized mining activities etc.	CEA
3.	National Environmental (Protection and Quality) Regulation No. 1 of 1990 published in Gazette Extraordinary No. 595/16 of February, 1990	Provides standards for discharging effluents into inland surface water during proposed project activities.	CEA
4.	National Environmental (Ambient Air Quality) Regulations, 1994, published in Gazette Extraordinary, No. 850/4 of December, 1994 and amendment gazette No. 1562/22 of 2008	Provides standards for emissions to the air during proposed project activities.	CEA
5.	National Environmental (Noise Control) Regulations No.1 of 1996 and its amendments	Regulates maximum allowable noise levels for construction activities during proposed project activities	CEA
6.	National Environmental (Vehicle Horns) Regulations, No. 1 of 2011	Regulates maximum allowable noise emanating from vehicular horns on a highway or road any motor vehicle use during project construction activities	CEA
7.	National Environmental (Municipal Solid Waste) Regulations, No. 1 of 2009	Regulates dumping municipal solid waste along sides of any national highway or at any place other than places designated for such purpose by the relevant local authority during proposed project activities	CEA
8.	Fauna and Flora Protection Act (FFPO) No.2 of 1937 amended	The act specifies that any development activity taking place within one mile from the boundary of a National Reserve declared under the	Department of Wildlife Conservation

	Legislation	Relevance and main content	Authorizing institution
	in 1993 and 2009	Ordinance requires an EIA/IEE which provide for the protection and conservation of fauna and flora of Sri Lanka and their habitats; for the prevention of commercial and other misuse of such fauna and flora and their habitats for conservation of biodiversity of Sri Lanka; and to provide for matters connected there with.	
9.	Forest Act No. 34 of 1951	This act is to consolidate and amend the law relating to the conservation , protection and management of forest and forest resources for the control of felling and transport of timber and Forest and for matters connected therewith or incidental thereto.	Department of Forest
10.	Felling of Trees Control Act No. 9 of 1951 as amended through Act No. 30 of 1953	This Act sought to prohibit and control felling of specified trees (mainly intended to stop indiscriminate felling of specified trees) in the country.	Department of Forest Conservation
11.	Water Resources Board Act, No. 29 of 1964 and (Amendment) Act, No. 42 of 1999	The act controls and regulates developments (including conservation and utilization) of water resources; prevention of pollution of rivers, streams and other water resources; formulation of national policies relating to control and use of water resources.	Ministry of Irrigation and Water Resources Management
12.	Soil Conservation Act, No. 25 of 1951 and Amended No. 24 of 1996	This Act makes provisions for the enhancement of productive capacity of soil; to restore degraded land for the prevention and mitigation of soil erosion; for the conservation of soil resources and protection of land against damage by floods, salinity, alkalinity, water logging; and to provide for matters connected therewith or incidental thereto	Department of Agriculture
13.	Explosives Act No. 36 of 1976	To provide control of explosions and regulations of matters connected with explosive activities related with the project.	Ministry Of Defense
14.	Municipal Councils Ordinance No. 29 of 1947, the Urban Councils Ordinance No. 61 of 1939 and the Pradeshiya Sabha Act No. 15 of 1987 as amended in 2010	Regulates and control actions pertaining to socioeconomic development such as roads, culverts, bridges, ferries, waterways and other means of local transport and related site clearance for constructing worker camps, site offices etc. and methods taking place within the command area relevant to government laws and regulations	Ministry Of Local Government And Provincial Council
15.	Flood Protection Ordinance No. 04 of 1924, No 22 of 1955	An ordinance for protection of areas subjected to damage from floods. This includes declaration of flood areas, preparation of schemes for flood protection and other rules and regulations regarding flood in the country	Irrigation Department
16.	Crown Land Ordinance Act No. 1947	An ordinance to make provision for the grant and disposition of crown lands in Sri Lanka; for the management and control of such lands and the foreshore; for the regulation of the use	Land Commissioners Department

	Legislation	Relevance and main content	Authorizing institution
		of the water of lakes and public streams; and for other matters incidental to or connected with the matters related to proposed project	
17.	Agrarian Development Act No. 46 of 2000 (Section 32)	This act regulates using paddy land for a purpose other than agricultural cultivation without the written permission of the Commissioner General.	Agrarian Services Department
18.	Land development statuette No. 7 of 2002 the western province provincial council, amendment No. 1287/26 of 2003	A statute for regularizing utilization of state lands situated within the western province either by state or the provincial council, for regulating the distributing of the aforesaid lands and lands in possession of the provincial council, for augmenting productivity of lands and for matters connected with or incidental to them this statute is in compliance with the crown lands ordinance no. 08 of 1947 (chapter 454) and the land development ordinance no.19 of 1935 chapter 464 as amended by land development (amendment) acts, no. 16of 1969 no.27 of 1981,no 22 of1998,no, 22 of 1995 1996. Of divesting of state lands, no. 07 of 1979	Governor _ Western Province Provincial Council And Land Commissioners Department
19.	Sri Lanka Land Reclamation and Development Corporation Act 15 of 1968 as amended by Act No 52 of 1982	This act established Sri Lanka Land Reclamation and Development Corporation which grants permission for the public to fill marshy land subject to provision of storm water drainage.	Sri Lanka Land Reclamation and Development Corporation
20.	National Thoroughfares Act, No. 40 of 2008	This act is known as RDA act which provide for planning, design construction, development, maintenance and administration an integrated public road network in Sri Lanka.	Road Development Authority
21.	Urban Development Authority (UDA) Law No 41 of 1978 and Urban Development Projects (Special Provisions) Act No 2 of 1980	This law provides for the establishment of an UDA to promote integrated planning and implementation of economic, social and physical development of certain areas as may be declared by the minister to be urban development areas and for matters connected with the relevant project activities. Urban Development Projects (Special Provisions) Act No 2 of 1980 is an act to provide for the declaration of lands urgently required for carrying out urban development projects and to provide for matters connected there with relevant project activities.	Urban Development Authority (UDA) under the ministry of Urban Development and Defence
22.	Town and country planning ordinance No. 13 of 1946 and The Town & Country Planning (Amendment)	This regulates the National Physical Plan with transport as the main component	National Physical Planning Department (NPPD) under the Ministry of Urban Development and

	Legislation	Relevance and main content	Authorizing institution
	Act, No. 49 of 2000		Defense
23.	Buddhist Temporalities Ordinance No. 19 of 1931	This act provides necessary assistance to administer and protect the property of Viharas, interventions to settle disputes regarding property of Viharas and makes recommendations to release money to be paid as compensation in respect of property of Viharas acquired by government for any development project	Department of Buddhist Affairs
24.	Cemeteries and burial grounds ordinance No. 9 of 1899 and amendments	The act regulates any disturbance, removal of burial, monuments and use of such areas for development project	Local Government Authority
25.	Antiquities Ordinance No. 9 of 1940 and amendments	The act regulate activities of projects located in close proximity of any archeological reserves	Department of Archaeology

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

Table III-2: Applicable Approvals required for the Investment Program

Project stage	Approvals	Project related activity	Relevant agency
Pre-Construction Stage Note: Although clearances and approval should be obtained during preconstruction stage it is valid throughout the project cycle. However this should be renewed before expiry date	Environment clearance	Implementation of the project	Central Environment Authority
	Clearance from Coast Conservation and coastal resources management department	Development activities in coastal areas	Coast Conservation and coastal resources management department
	Industrial Mining License (IML)	Operation of quarries, borrow areas and other material extraction sites	Geological Survey and Mines Bureau
	Environmental Protection License (EPL)	Operation of material extraction site including operation of asphalt plants, treatment plants etc.	CEA
	Local Government Authority Trade license and machinery permits	Deciding waste disposal sites, material storage and sites for worker camps and other project stations Trade license should be obtained for asphalt plants, batching plants, quarries etc.	Respective Provincial Council, Local authorities and respective Pradeshiya Sabha
	Explosive Permits	Blasting activities	Ministry of Defence
	Approval for removal of trees	Road clearance for construction	Forest department, CEA and local authorities
	Disturbance to Paddy Lands	Ground preparation for ROW and side drains	Commissioner of Agrarian Services
Construction stage	Consent from relevant government agencies	Construction of bridges, culverts and other drainage	Department of Irrigation, Department

Project stage	Approvals	Project related activity	Relevant agency
		systems, land filling, dredging activities	of Agrarian services, Local government authority, Land Reclamation and Development Cooperation
	Approval from relevant state /local agencies for the removal/ temporary disturbances for existing utilities	Surfacing, construction of bridges and side drains, embankment filling works	NWSDB for water lines, Ceylon electricity Board for Electric cable/poles, Sri Lanka Telecom for land line telephone cables, poles, Pradeshiya sabha, other local authorities for drainage, sewer systems etc

2. Environmental Protection License (EPL)

83. 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.

84. 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.

85. 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.

86. Objectives of the EPL

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

3. International Agreements and Conventions

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

- Conventions on Wetlands of International Importance Especially as Water Fowl habitats (Ramsar)
- Convention concerning the protection of the World Cultural and Natural Heritage
- Convention on International Trade in Endangered Species of Wild Fauna & Flora (CITES)
- Convention on the conservation of Migratory Species of Wild Animals (CMS 1979)
- United Nations Framework Convention on Climate Change
- Convention on Biological Diversity
- Plant Protection Agreement for Asia and the Pacific region

B. Policy Framework

1. ADB Safeguards Policy Statement, June 2009

88. 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.

89. 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.

90. 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.

91. 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.

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

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

94. 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.

95. 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.

96. 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.

97. 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.

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

99. 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.

100. 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.

101. 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.

102. 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.

IV. DESCRIPTION OF EXISTING ENVIRONMENT

103. As described, the selected roads to be upgraded under i Road Program are located within Galle, Matara and Hambanthota Districts of Southern Province of Sri Lanka and particular road sections are scattered over the entire district. Therefore in this chapter, existing environment is generally described with respect to the relevant district while specific information is provided for road sections along which environmental or social sensitive entities are observed.

104. In addition, environmental checklists prepared for each road summarizes the environmental profile of each road with specific information and photographs which are submitted along with the IEE report.

A. Physical Environment

1. Climate, land use, terrain and soil

105. Based on major climatic zones of the country, candidate road sections of Galle District fall in to low country - wet and mid country - wet zones. Whereas roads in Matara District are located within low country - wet, mid country - wet, up country - wet, low country - intermediate and mid country - intermediate zones. On the other hand road sections in Hambanthota District fall in to low country - wet, mid country - wet, low country - intermediate, mid country - intermediate and low country - dry zones.

106. The climatic environment of the project area is further categorized in to agro – ecological zones which are categorized based on climate, soil, natural vegetation and land use pattern of an area. The specific agro-ecological zones related to candidate road sections and their characteristics are presented in Table IV.1 below.

Table IV-1: Climatic Characteristics of Candidate Roads

District	Agro-ecological Zone	Roads (ID) falls in to agro-ecological zone	75% expectancy value of rainfall (mm)	Description (Land use, Terrain, Soil groups)
Galle	WL1a	1,2,3,4,5,7,8,9,10,11,28 ,29,30,31,32,40,41,42,4 3,44,45,72,73,74,75, 44a OPRC: B429, B303, B139, B411	>3200	Tea, Rubber, Mixed Home Garden, Paddy , Export Agricultural Crops (Cinnamon) Rolling , Undulating And Hilly RYP,RYP Soils With Semi Prominent A1 Horizon & LGH Soils
	WL2a	12,13,14,15,16,17,18,1 9,20,21,22,23,24,25,26, 27,33,34,36,37,38,39,4 5,46,47,48,49,50,51,52, 53,54,55,56,57,58,59,6 0,61,62,63,64,65,67,68, 69,70,71,75. OPRC: B248	>2400	Rubber , Tea , Coconut ,Mixed Home Garden , Paddy , , Export Agricultural Crops(Cinnamon) Rolling , undulating and flat RYP , LHG & bog and half – bog soils
	WL1b	42,45,46,47	>2800	Rubber , Mixed Home Garden , Paddy

District	Agro-ecological Zone	Roads (ID) falls in to agro-ecological zone	75% expectancy value of rainfall (mm)	Description (Land use, Terrain, Soil groups)
				Undulating & Rolling RYP & LHG Soils
	WM1a	1	>3300	Tea, Natural Forest Mountainous, Steeply Dissected, Hilly And Rolling RYP Soils With Semi Prominent A1 Horizon & Lithosol Soils
Matara	WL1a	6,11,12,14,16,21,22,23, 24,40 41, 42, 10a. OPRC: B607	>3200	Tea, Rubber, Mixed Home Garden, Paddy , Export Agricultural Crops(Cinnamon) Rolling , Undulating And Hilly RYP,RYP Soils With Semi Prominent A1 Horizon & LGH Soils
	WL2a	1,2,3,4,5,7,25,26,28,29, 30,31,32,33,34,35,36,3 8,39,41,50,62	>2400	Rubber , Tea , Coconut ,Mixed Home Garden , Paddy , , Export Agricultural Crops(Cinnamon) Rolling , Undulating And Flat RYP , LHG & Bog And Half – Bog Soils
	WM1a	8,9,10,13,15,17,18,19,2 0,42,24a.	>3300	Tea, Natural Forest Mountainous, Steeply Dissected, Hilly And Rolling RYP Soils With Semi Prominent A1 Horizon & Lithosol Soils
	WM1b	27,42	>2900	Tea, Natural Forest, Mixed Home Gardens Steeply Dissected, Hilly & Rolling RYP Soils With Semi Prominent A1 Horizon & Lithosol Soils
	IL1a	37,44,48,49,51,52,53,5 4,55,58,59,60, 57a.	>1400	Coconut, Mixed Home Gardens, Export Agricultural Crops, Paddy, Rubber Rolling, Undulating & Flat RYP Soils With Strongly Mottled Sub- Soil, RYP, LHG, RBL & Regosol Soils
	IL1b	45,46,47,49,56,57,58,6 1	>1100	Coconut, Paddy, Mixed Home Gardens, Export Agricultural Crops Rolling, Undulating & Flat RYP, RBL, RBE, LHG & Regosol Soils
	IM2a	42	>1800	Export Agricultural Crops, Mixed Home Gardens, Tea, Vegetables Steep, Hilly And Rolling RBL & RYP Soils
Hambantota	WL2a	39, 53. OPRC: Kirama - Warapitiya -	>2400	Rubber , Tea , Coconut ,Mixed Home Garden , Paddy , , Export Agricultural Crops(Cinnamon)

District	Agro-ecological Zone	Roads (ID) falls in to agro-ecological zone	75% expectancy value of rainfall (mm)	Description (Land use, Terrain, Soil groups)
		Hulankanda - Heegoda		Rolling , Undulating And Flat RYP , LHG & Bog And Half – Bog Soils
	WM1b	53 OPRC: Kirama - Warapitiya - Hulankanda - Heegoda	>2900	Tea, Natural Forest, Mixed Home Gardens Steeply Dissected, Hilly & Rolling RYP Soils With Semi Prominent A1 Horizon & Lithosol Soils
	IM2a	53,32	>1800	Export Agricultural Crops, Mixed Home Gardens, Tea, Vegetables Steep, Hilly And Rolling RBL & RYP Soils
	IL1b	1,2,3,4,5,6,7,25,31,32,33,34,35,37,38,40,41,42,46,47,48,49,51,54,55,56	>1100	Coconut, Paddy, Mixed Home Gardens, Export Agricultural Crops Rolling, Undulating & Flat RYP, RBL, RBE, LHG & Regosol Soils
	DL1a	45,49,52	>1100	Mixed Home Gardens, Paddy, Forest Plantations, Scrub, Sugar Cane, Natural Forest Rolling & Undulating RBE & LHG Soils
	DL5	8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,28,29,30,36	>650	Scrub, Natural Forests, Rainfed Upland Crops, Paddy Undulating & Flat RBE Soils With High Amount of Gravel In Sub Soil, LHG & Solodized –Solonetz Soils
	DL1b	23,24,25,26,27,28,29		

LHG - Low Humic Gley, RYP - Red Yellow Podsolic, RBL - Reddish Brown Latosolic, RBE - Reddish Brown Earth

107. Rainfall pattern of Southern Province of Sri Lanka is influenced by two monsoons; South-West Monsoon and North-East Monsoon. The rainfall of the wet zone in which parts of Galle, Matara and Hambanthota districts are falling as described above is governed by South-West Monsoon which is experienced during May to September. This period is the major rainy season for the wet zone. Dry zone in which a part of Hambanthota district falls, is fed by rains from North-East Monsoons and this rain is experienced during December to February. However the rainfall is comparatively low during this period. In the dry zone, the period from May to September is generally dry and there is a dry wind flow over the dry zone. However localized sporadic rainfall events are possible during this period due to the effect of local convections. The intermediate zone is affected by both South-West and North-East monsoons. In addition to these rainy seasons two inter monsoons are also observed during March to April and October to November. And during second inter monsoon, intensive rains with minor cyclones are possible.

2. Hydrology

108. **Galle District**. Benthara Ganga and Gin Ganga are the major streams disgorge to sea across the Galle District. And OPRC roads and rural road sections as given in the table 4.2 below which are to be improved under i Road Program are located within sensitive areas of the above mentioned two streams. As given in the Table IV.2 some road sections are also located within areas where a marshy land use is observed.

Table IV-2: Road sections located within hydrologically sensitive areas of Galle District

No.	Road ID	Hydrologically sensitive area
1	36	Crosses Gin Ganga (stream)
2	40, 42 and 45	Cross a tributary of Benthara Ganga (stream)
3	70	Crosses a marshy area
4	73, B429 and B411	Runs adjacent to Gin Ganga
5	44a	Crosses Benthara Ganga at the end point

109. Areas such as Wakwella and Usgoda within Baddegama DS Division are located within the Gin Ganga flood prone area and flood protection bunds have been constructed to protect these areas from flood. And Wakwella - Ginimallagaha (Road ID: 36 of Galle District) is located within both protected and unprotected areas of the Gin Ganga flood prone area.

110. **Matara District**. Nilwala Flood plain of the Nilwala River is the most hydrologically sensitive area of the Matara District which creates numerous impacts to socio-economic environment around Matara area due to overflowing.

111. Nilwala River is the third longest river in Sri Lanka which originates from Rakwana hills. Nilwala River encompasses catchment area of 960km2 and the river disgorges in to sea at Thotamuna after crossing Matara Township. The catchment includes a large mountainous landscape with variety of vegetation cover and has an annual average precipitation of 3000 – 4000mm.

112. Nilwala delta and surrounding areas experienced yearly floods. Based on hydrological implications carried out, severe floods were recorded in year 1933, 1944, 1955, 1969, 1972, 2000, 2003, 2008 and 2010 which caused fatal damages to nearby population and properties. In year 2003, 1607 houses were damaged while 43750 people were affected.

113. To control flood situations, flood protection earth dams and dykes were constructed under Nilwala Flood Protection Scheme in 1979 and local floods accumulated in low lying areas outside to these bunds are pumped out to the Nilwala River. And it was found that the entire project area went under water before construction of these flood control measures during every May – June and November – December although it was relieved with the introduction of flood protection scheme. However, still the areas such as Hiththatiya, Tudawa and Kosgama are prone to be inundated during heavy rainy periods[12].

114. Several candidate roads of Matara District selected for the i Road Program are also falling within the Nilwala Flood plain and few of such roads cross the Nilwala River.

115. Table IV.3 present roads which are located within hydrologically sensitive areas of Matara District.

[12] Environmental Impact Assessment, Southern Expressway Extension Project, 2013)

Table IV-3: Road sections located within hydrologically sensitive areas of Matara District

No.	Road ID	Hydrologically sensitive area
1	2 and 7	Cross a marshy area
2	18 and 19	Cross a tributary of Gin Ganga
3	21, 22, 23 and 51	Cross Nilwala River
4	32, 33, 35, 44, 48 and 58	Located within Nilwala Flood Plain
5	27	Crosses Polwatta Oya (a stream)
6	34	Crosses a stream
7	B607	Crosses Nilwala River, Kotapola Stream and Urubokka Stream

116. **Hambanthota District.** Unlike in Galle and Matara Districts, Hambanthota District is not rich in natural surface water bodies except Walawe River and Kirindi Oya (A stream). However plenty of manmade water bodies in the nature of irrigation tanks, irrigation canals are found throughout the district. And road sections to be upgraded within Hambanthota District are located near/cross such irrigation canals and natural streams as given in the Table IV.4.

Table IV-4: Road sections located within hydrologically sensitive areas of Hambanthota District

No.	Road ID	Hydrologically sensitive area
1	12	Located near to Walawe River mouth
2	14	Runs adjacent to Kirindi Oya
3	22 and 25	Runs along the service road of an irrigation canal
4	6	Crosses a stream
5	27 and 30	Located near to Ridiyagama Irrigation tank
6	28	Runs along the service road of Eke Ela (an irrigation canal)
7	29	Runs parallel to Walawe river and ends at Ridiyagama Irrigation Tank Bund
8	38 and 47	Section of the roads runs along the service road of Muruthawela Left Bank Canal
9	39	Runs adjacent to Warapitiya tank
10	49	Runs along the bund of Pinntetiya tank
11	Kirama - Warapitiya - Heegoda Road	Traverses along the bund of Warapitiya tank

3. Air Quality and Noise

117. Since the selected road sections are mostly located within rural areas, sources of air quality pollutants are hardly found. Therefore air quality in the entire study area appears to be good. However there is a chance of deteriorating temporarily the air quality due to vehicular emissions and dust emanation from gravel roads as well as from the deteriorated roads. Domestic sources of air pollution will include emissions from burning of forest patches for Chena cultivation (slash and burn cultivation), wood and kerosene burning stoves in settlements and villages. As the project area is rich in vegetation, all such emissions will be very well dissipated.

118. An extract from the National Environmental (Ambient Air Quality) Regulations, declared in 1994 is presented in Table IV.5.

Table IV-5: National ambient air quality standards

Parameter	Averaging time (hrs)	NAAQS (mg m^{-3})	NAAQS (ppm)
Carbon Monoxide	8	10	9
Nitrogen Dioxide	24	0.10	0.05
	8	0.15	0.08
Sulphur Dioxide	24	0.08	0.03
Lead	24	0.002	-
TSP	24	0.03	-
PM10	8	0.35	-

Source: Gazette of the Democratic Socialist Republic of Sri Lanka, 850/4 (20 December,1994)

PM 10 – particulate matter < 10 µm

NAAQS – National Ambient Air Quality Standards (NAAQS)

119. Vehicle Emission Test (VET) became mandatory with effect from 15th July 2008 in order to conform to the environmental standards on vehicle emission as per the Motor Traffic Act (Emission control) Regulation of 1994, 817/6, Part I, Section I. This move is a part of the efforts to improve the air quality in the island. And this regulation is applicable for all construction vehicles as well.

120. The area mostly includes rural areas with a good vegetation cover and therefore the noise levels are relatively low. 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 ambient noise level of the area can be considered as 55 dB (A) during day time (06.00 hrs-18.00 hrs) and 45 dB (A) night time (18.00 hrs - 06.00 hrs). Rich vegetation in the project area acts as an efficient noise absorbent.

4. Proximity to the Coastal Zone

121. The Coastal Zone is defined in the Coast Conservation Act No. 57 of 1981 as that area lying within a limit of three hundred meters (300m) landwards of the Mean High Water Line and a limit of two kilometers seaward of the Mean Low Water Line. In the case of rivers, streams, lagoons, or any other body of water connected to the sea, either permanently or periodically, the landward boundary extends to a limit of two kilometers, measured perpendicular to the straight base line drawn between the natural entrance points and includes waters of such rivers, streams and lagoons or any other body of water so connected to the sea.

122. With respect to the road sections to be upgraded under i Road Program, the road No. 64 of Galle district, 27 and 29 of Matara district and 12 of Hambanthota district fall within the coastal zone.

5. Occurrence of Natural Disasters in the Project Area

123. Being the coastal districts of the country Galle, Matara and Hambanthota Districts are prone to natural hazards such as Tsunami, storm surge, coastal erosion and sea level rise etc. In year 2004, coastal zone of these three districts were severely affected by Tsunami which resulted immeasurable impact to social setup. In addition, highlands of Galle and Matara districts are susceptible to landsides and during peak rainfall period especially from May to September landslide events are recorded from these regions. Coastal zone of Matara and Hambanthota Districts experience average wind speed of 25-30 knots whereas average wind speed of 20 - 25 knots could be observed in coastal zone of Galle District. The inlands of Galle

and Matara Districts experience an average wind speed of 6 -20 knots while in Hambanthota it is increased to 20-25 knots (Source: www.hazard.lk).

B. Ecological Environment

1. Existing Habitats with Respect to Flora and Fauna and protected areas

124. Both manmade habitats i.e., home gardens, paddy fields, plantations of tea, rubber, coconut & cinnamon, and natural or semi natural habitats i.e., marshland, streams, coastal area, scrubland and forest could be observed adjacent to the project area. Many natural habitats within the project area have been subjected to the impact of human activities of varying extents; nevertheless they retain some degree of naturalness.

125. In addition to common land use pattern as mentioned above, there were some specific land uses were observed along the individual road packages. Forest areas, national parks, sanctuary, managed elephant reserves and also the coastal zone can be considered as ecologically sensitive locations found in the larger project area. According to Flora and fauna protection ordinance No 2 of 1937 of Sri Lanka, an area declared to be a sanctuary may include both state land and land other than state land. According to the information given by the Department of Wildlife Conservation (DWLC) none of the other roads are located within wildlife protected area such as strict nature reserves, national parks, sanctuaries or Ramsar sites. Table 4.6, 4.7 and 4.8 gives details of specific roads located near sensitive sites

126. As can be seen from the tables there are a few roads and road sections that are located adjacent to protected areas as given in the location maps in Appendix 4. The starting and the end sections of the Boondala-Meda Para road (1.4km) of Hambanthota District is located within the 100m of Bundala national park which covers an area of 3,340 ha. The area provides foraging habitat and wintering grounds for migratory birds. These species arrive in Sri Lanka towards the end of August and leave the country by following year during April and May. In 1991 Bundala became the first wetland to be declared as a Ramsar site in Sri Lanka. In 2005 the national park was designated as a biosphere reserve by UNESCO. Bundala national park is also a famous habitat of crocodiles.

127. Also Koggala - Sooriyawewa (7.3km) road of Hambanthota District traverses adjacent to the boundary of the Madunagala sanctuary. Endemic species; Sri Lankan Grey hornbill (Ocyceros gingalensis), Sri Lankan Jungle fowl (Gallus lafayetti), Sri Lankan Spur fowl (Galloperdix bicalcarata), Sri Lankan Lorikeet (Loriculus beryllinus) and vulnerable, Sirkeer Malkoha (Phaenicophaeus leschenaultii) were observed in the Madunagala sanctuary area. Elephant movement could also be observed in the project area.

128. Further Piyapala Mawatha (2.1km) is located adjacent to proposed Hambantota Managed Elephant Reserve (MER) which has been zoned in the Strategic Environmental Assessment carried out by the CEA. However, the boundaries of the MER is not yet been finalized. The MER does not have a management plan yet. According to the DWLC, about 400 elephants roam in the MER (Source: Environmental impact assessment report, 2014-Proposed expressway from Hambanthota sea port to Mattala airport).

129. Sections of Denuwala - Kapuwatta Jaya wijayagama road and Udupila Junction – Udupila Vihandagoda – Bandaramulla road in the Matara district and Galduwa Aranya road in

the Galle district and Godawaya juntion to temple road in the Hambantota district are located within the coastal zone.

Table IV-6: Forests/wildlife reserves/ sanctuaries located within 100m along roads under packages- Matara district

Road ID	Road Name	Length of the road (km)	Name of the sensitive area	Length of the road section falls inside the sensitive area
1	Kohugoda Road	5.5	Unclassified forest patch is located at about 40m on RHS of the road	-
6	Bangama junction-Dola Mawatha	2.5	Dediyagala forest reserve is located at 0.9-1.3km of the road at RHS to the road	0.4km
9	Dangala – Dellawa	2.4	Unclassified forest patch is located at about 10m near 9km on LHS to the road	-
27	Denuwala - Kapuwatta Jaya wijayagama	2.6	A section of the road is within the coastal zone-1.46km to 1.68km	0.27km
29	Udupila Junction – Udupila Vihandagoda – Bandaramulla	1.6	The end section of the road is within the coastal zone	The end section
41	Lew Pothdeniya	2.6	Kehelwala forest reserve is located on either side of the road at 2.5km	0.1km
61	Kaluhena Kolaniya road	4.3	Initial 700m of the road traverses through the Walakanda forest reserve	0.7km
64	Diyadawa - Olakumbura via Kosmodara Road	2.5	Near to the Start point of the road starts Low Land Rain Forest called Diyadawa forest reserve could be observed	-

Table IV-7: Forests/wildlife reserves/ sanctuaries located within 100m along roads under packages-Hambantota district

Road ID	Road Name	Length of the road (km)	Name of the sensitive area	Section falls inside the sensitive area
10	Boondala-Meda Para	1.4	The starting and the end section of the is located within the 100m of Bundala national park	-
12	Godawaya juntion to temple Rd	1.6	A section of the road is within the coastal zone-1.5km to 1.6km	0.1km
21	Piyapala Mawatha	2.1	The road is located adjacent to the Hambantota MER	-
30	Ridiyagama-Kahabodawila-Thuduwa mulla Rd	6.5	The road section from 300m to 6.5km traverses adjacent to the Bedigantota forest reserve	-
36	Koggalla Sooriya Wewa	7.3	LHS of the entire road traverses adjacent to the boundary of the Madunagala sanctuary	-
38	Bariyar junction to Galwadiya 4th Mile	2.6	Road traverses through the Mahakuluwaragoda forest reserve	0.7km

Road ID	Road Name	Length of the road (km)	Name of the sensitive area	Section falls inside the sensitive area
	post		on either side between 2.3km to 3km	
45	Kakunayaya Market to bhuweliara Rd	1.0km	Road traverses through the Gonadeniya forest reserve between 0km-0.01km	0.01km
OPRC roads				
-	Kirama-Warapitiya-Hulankanda-Heegoda	14.4	LHS of the road traverses about 50m adjacent to Ramalakanda proposed forest reserve	-

Table IV-8: Forests/wildlife reserves/ sanctuaries located within 100m along roads under packages-Galle district

Road ID	Road Name	Length of the road (km)	Name of the sensitive area	Section falls inside the sensitive area
6	Dharmapala Vidyalaya-Dunhena	1.2	LHS of the entire road is within the Habarakada forest reserve	1.2km
13	Kabaragala Badipita Puswelkada Unagaswita Galpoththa Kombala Junior School 10th mile post thiyabarahena Rd	7	Kottawa Komballa proposed forest reserve is located on either side of the from 2.11km to 2.51km of the road	0.4km
16	Pangiri hena-Mayakaduwa	5.8	LHS boundary of the road from 4.26km to 5.85km runs adjacent to Kottawa Komballa Forest reserve	1.59km
20	Mayakaduwa,Wadiya kanda,Makaduwa Temple Kakillawatta junction	3.3	Road traverse along the LHS boundary of the Kottwa Komballa Proposed Reserve at $6^0 03^1 50^{11}.22$N $80^0 21^1 34^{11}.76^{11}$E and again traverse along the LHS boundary of the forest $6^0 03^1 59^{11}.66^{11}$N $80^0 21^1 41^{11}. 90^{11}$E	1km
40	Goluwamulla-Atakohota	2.2	At the end point of road Uragaha forest reserve is located	-
42	Amuna junction-Maitrigama	3.9	At the end point of road Uragaha forest reserve is located	-
45	Galparaya Road	2	At the end point of road Uragaha forest reserve is located	-
46	Surasena Mawatha	1.7	At the end point of road Uragaha forest reserve is located	-
47	Deddugala-Bataduwa	1	At the end point of road Uragaha forest reserve is located	-
49	Manampita-Dehigaha Bedda Kirindiela	2.7	A forest reserve is located LHS to the forest reserve at $6^0 11^1 23^{11}.83^{11}$N $80^0 7^1 27^{11}. 41^{11}$E and	-
51	Welibokkuwa-Banwelgodella	0.9	The entire road is within a forest reserve	0.9km

Road ID	Road Name	Length of the road (km)	Name of the sensitive area	Section falls inside the sensitive area
64	Galduwa Aranya Rd	2.3	A section of the road is within the coastal zone 2km to 2.3km	0.3km
65	Kaluwalagoda Road	5	Road traverses through Uragaha forest reserve between 1km-2km	1 km
66	Mada Kubura junction Kaluwala goda	4.5	Road traverses through Uragaha forest reserve between 1km-2km	1 km
69	Hatharaman junction-Pasman junction	1.7	The entire road is within the Habarakada forest reserve	1.7km
OPRC roads				
B248	Labuduwa-Waduraba	11.7	RHS boundary of the road from 10km to 11.5km runs adjacent to a forest area	-

C. Socio - Economic Environment

1. Demographic Characteristics

130. **Population and population density**. As per the department of Census and Statistics, estimated midyear population of the Galle district in 2012 was 1,058,771 persons. This population includes 508,497 males and 550, 274 females. In the same period, estimated midyear population of Matara and Hambantota districts was 809,344 persons and 596,617 persons respectively. In Galle district population density is 613 persons per square kilometer while Matara its 600 persons and Hambantota 211 persons per square kilometer. Refer table IV.9 below for additional information.

Table IV-9: Population by Gender

District	Population				Total population	Population density
	Male	%	Female	%		
Galle	508,497	48.0	550,274	52.0	1,058,771	613
Matara	388,604	48.0	420,740	52.2	809,344	600
Hambantota	293,567	49.2	303,050	50.8	596,617	211

Source: Department of Census and Statistics, 2012

131. **Population by ethnicity.** With regard to ethnicity, majority of population in these three districts are Sinhalese i.e. 94.3%, 94.3%, and 97.1% in Galle, Matara, and Hambantota districts respectively. Other ethnic categories like Muslim and Sri Lankan Tamils get second and third places. Table IV.10 shows the population data of affected districts by ethnicity.

Table IV-10: Distribution of population by the ethnicity

District	Sinhalese		SL Tamil		Indian Tamil		Muslim		Burger		Other		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Galle	998,540	94.3	15,228	1.4	5,641	0.5	38,591	3.6	242	0.0	529	0.2	1,058,771
Matara	763,121	94.3	8,562	1.1	11,984	1.5	25,300	3.1	177	0.0	200	0.0	809,344
H'bantota	579,032	97.1	2,111	0.4	136	0.0	6,556	1.1	138	0.0	8,644	1.4	596,617

Source: Department of Census and Statistics, 2012

132. **Population by sector.** Table IV.11 shows the distribution of population by sectors. Majority of population in all three districts are living in rural areas, i.e. 87.2% in Galle, 88.9% in

Matara and 95.6% in Hambantota. Highest urban population was reported in Galle district, i.e. 11.1%. A smaller portion of the population is living in estate sector, i.e. below 3.0%.

Table IV-11: Distribution of population by sector

District	Urban Population (%)	Rural Population (%)	Estate Population (%)
Galle	11.1	87.2	1.7
Matara	8.5	88.9	2.7
Hambantota	4.1	95.6	0.3

Source: Department of Census and statistics, 2001.

2. Main economic activities

133. Based on the labor force survey 2012, following table (table IV.12) presents the labor force involvement in main three sectors: Agriculture, Industry and Services.

Table IV-12: Employment by major industry group - 2012

District	Agriculture		Industry		Services	
	No.	%	No.	%	No.	%
Galle	127,442	34.6	110,746	30.0	130,608	35.4
Matara	117,610	35.4	86,662	26.1	128,277	38.6
Hambantota	124,496	45.6	61,048	22.3	87,771	32.1

Source: Department of Census and Statistics, Labor Force Survey - Annual Report 2012

134. **Agriculture.** In Matara and Galle districts, 35.4% and 34.6% of the total employed population is engaged in agricultural sector. Large scale and small holding tea, rubber and cinnamon plantations and paddy are the major agricultural cultivations in these two districts.

135. Agriculture is the prominent economic activity carried out in Hambantota district. As per the labor force data, in Humbantota district, 45.6% of the total population is engaged in agricultural sector. Paddy is the main agricultural crop. According to the Department of Census and Statistics, the district has 26,098 hectares (ha) of cultivable paddy lands and in 2010, it has produced 4,189,059 metric tons (MT) of paddy. Coconut is grown as the main commercial crop, while citronella (Cymbopogon comosus), cinnamon (Cinnamomum zeylanicum), pepper (Piper nigrum) and coffee (Coffea arabics) are grown as export crops. In addition, fruit crops such as mango (Mangifera indica), melon (Citrullus lanatus), papaya (Carica papaya), citrus (Citrus aurantifolia), wood apple (Limonia acidissima), pineapple (Ananas cosmosus), banana (Musa x paradisiacal) and vegetables like tomato (Lycopersicon esculentum), bitter gourd (Momordica charantia), pumpkin (Cucurbita maxima) are grown as highland crops in Humbantota.

136. **Livestock**. Livestock farming such as raring of cattle and buffaloes, and poultry farming are also popular agricultural activities in these three districts. Humbantota district is reputed for buffalo milk and curd made of buffalo milk. Livestock farming in cattle, poultry and goats are potentially profitable investment avenues in this district. According to Dept. of Census and Statistics, in 2010, there were 7360 livestock farms in Humbantota district, consisting of 4579 cattle & buffalo farms and 2363 poultry farms.

137. **Fishing.** Sea fishing is also a prominent economic activity for many people in Galle, Matara and Humbantota districts. This is because of the vast extent of its sea area and the large number of lagoons situated along the coast. In addition to sea fishing, fresh water fishing or inland fishing also performs an important role. Availability of a large number of manmade

irrigation reservoirs (known as tanks) from ancient times mainly in Humbantota district has made inland fishery a common livelihood activity. During off seasons of sea fishing, inland fishing becomes more attractive for fishermen and consumers as well. There are ample opportunities in the fishing sector for potential entrepreneurs for investment in the areas of producing and servicing fishing gear, provision of cold room facilities, canning plants, ice plants and fisheries harbor services etc.

138. **Industries.** In Hambantota district, out of the total employed population, only 22.3% is engaged in the industrial sector (Department of Census and Statistics, 2012). According to the Department of Census and Statistics, 2011, there are about 187 industrial establishments in Hambantota district. Salt industry, which produces 30% of the total salt production of the country, is the major industrial activity in the District. Furthermore, productions of animal feed, textile weaving, sewing, and tile and brick work have been identified as potential industries in the district.

139. Comparatively, industrial sector activities in Matara and Galle districts are carried out successfully than Hambantota district. Out of the total employed population,30% in Matara and 26.1% in Galle district are engaged in industrial sector. As per the Department of Census and Statistic data 2011, there are 407 industrial establishments in Matara and 928 in Galle district. In these three districts, majority of the operating industries are related to agriculture processing and garment manufacturing. Table IV.13 provides the industrial establishments in these districts.

Table IV-13: No. of industrial establishments (with 5 or more persons engaged)

District	No. of industrial establishments	No. of employees
Galle	928	37,816
Matara	407	14,608
Hambantota	187	7,476

Source: Department of Census and Statistics, 2012

3. Socioeconomic status

140. **Literacy rate**. As per the department of Census and Statistics – 2012, Galle district shows the highest literacy rate about 96.6 percent compared to Matara and Hambantota districts. Hambantota district reports a lower literacy rate compared to other districts. With respect to the gender, female literacy rate is lower than male literacy rate particularly in Matara and Hambantota. Refer Table IV.14 for information.

Table IV-14: Literacy rate by district - 2012

District	Literacy Rate		Total
	Male	Female	
Galle	96.4	96.8	96.6
Matara	92.6	89.1	90.7
Hambantota	90.9	86.9	88.8

Source: Department of Census and Statistics, 2012.

141. **Household Income**. As per the 'Household Income and Expenditure Survey - 2009/10' of the Department of Census and Statistics, the monthly mean and median per capita income of Hambantota district is relatively higher than other two districts. This is due to generating of higher agricultural production to the national economy by comparatively low number of

population. There is no significant difference of per capita income levels between Galle and Matara districts. Refer Table IV.15 below for additional information.

Table IV-15: Mean and median monthly per capita income by district -2009/10

District	Average monthly income	
	Mean (Rs)	Median (Rs)
Galle	7923	5381
Matara	7533	5475
Hambantota	8950	6553

Source: Department of Census and Statistics, Household Income and Expenditure Survey - 2009/10

142. **Employment and Unemployment**. Table IV.16 shows the labor force participation rate, employment rate and unemployment rate. In 2012, Galle district labor force participation rate is 44%. Majority of employed population is engaged in services sector employments, i.e. 35.4%. Unemployment rate of the district is 2.3%. In Matara district, Labour force participation rate is 45.5%. As Galle district, majority of people work in the services sector employments, i.e. 38.6%. Matara district shows the highest unemployment rate of 7.0% compared to other two districts. In Hambantota district labour force participation rate is 50.8%. In this district, agriculture is the prominent economic activity and majority of the people are working in this sector, i.e. 45.6% and the unemployment rate is 5.3%.

Table IV-16: Employment and Unemployment - 2012

District	Labor force participation rate (%)	Employment by major industry group (%)			Unemployment rate (%)
		Agriculture	Industry	Services	
Galle	44.0	34.6	30.0	35.4	2.3
Matara	45.5	35.4	26.1	38.6	7.0
Hambantota	50.8	45.6	22.3	32.1	5.3

Source: Department of Census and Statistics, Labor force survey - 2012

143. **Poverty situation**. Table IV.17 shows the comparison of project located provincial and districts poverty headcount index with country poverty situation. It is visible that from 1990/91 to 2002 poverty headcount index of Southern province and affected three districts are comparatively higher than that of country poverty headcount index. For example, according to Department of Census and Statistics, in 1990/91, Southern province has recorded 30.2% of poverty headcount index and Galle, Matara and Hambantota districts have reported 29.7%, 29.2%, and 32.4% respectively. In the same period country poverty index was 26.1%. This higher poverty situation is due to prevailing of agricultural based economy and lower investment on industrial sector due to inadequate infrastructure facilities such as road, electricity, water and telecommunications. However it is important to note that Hambantota district continues its 60% drop of poverty headcount index reported from 2002 to 2006/07. Further, there's a 46% drop from 2006/07 to 2009/10. In the same period Galle and Matara districts also illustrate the same situation. This is due to steady infrastructure development and it has led to boost industrial and services sector activities in these three districts.

Table IV-17: Poverty Headcount Index of Affected provinces and districts

Province/Districts	Poverty Headcount Index (%)				
	1990/91	1995/96	2002	2006/07	2009/10
Sri Lanka	26.1	28.8	22.7	15.2	8.9
Southern Province	30.2	32.6	27.8	13.8	9.8

Province/Districts	Poverty Headcount Index (%)				
	1990/91	1995/96	2002	2006/07	2009/10
Galle District	29.7	31.6	25.8	13.7	10.3
Matara District	29.2	35.0	27.5	14.7	11.2
Hambantota District	32.4	31	32.2	12.7	6.9

Source: Household Income and Expenditure Survey - 2009/10, Department of Census and Statistics, 2011

4. Existing Infrastructure facilities

144. **Energy source of households.** In all three districts electricity is the main source of energy used for lighting the households. There are 93.2% households in Galle, 93.6% in Matara and 88.4% in Hambantota using electricity for lighting. Kerosene is the second major source. Around 10.4% households in Hambantota district and 5.7% households in Galle and Matara districts use kerosene to light the houses. Below Table IV.18 summarizes energy source of households.

Table IV-18: Principle type of lightning the occupied housing units - 2012

District	Electricity from national grid	Rural Hydro power project	Kerosene	Solar power	Bio Gas
Galle	93.2	0.9	5.7	0.1	0.0
Matara	93.6	0.5	5.7	0.1	0.0
Hambantota	88.4	0.9	10.4	0.1	0.0

Source: Department of Census and statistics, 2012.

145. **Drinking water**. As shown in the table IV.19 below, majority of households in Galle and Matara districts use water from protected wells, i.e. 57.7% and 44.4% respectively. Majority of households in Hambantota district use pipe born water for drinking purpose, i.e. 56.6%. There are 7.5%, 6.7%, and 2.4% households in Galle, Matara and Hambantota districts respectively getting water from unprotected wells. There are households that use water from "other" sources like rural water supply projects, tube wells, bottled water, tank, river, etc…

Table IV-19: Source of Drinking water

District	Protected well	Unprotected well	Pipe born water	Other
Galle	57.7	7.5	27.9	7.0
Matara	44.4	6.7	30.1	11.5
Hambantota	19.5	2.4	56.5	21.6

Source: Department of Census and statistics, 2012.

146. **Sanitary facilities.** As shown in table IV.20, majority of households in Galle, Matara, and Hambantota districts use private toilets, i.e. accounting 89.4%, 90.2%, and 88.0% respectively. There are 10.0%, 9.4%, and 11.4% of households in these three respective districts sharing toilets with other families. Meanwhile, 0.6% of households in Galle and Hambantota district and 0.4% of households in Matara district use common/public toilets.

Table IV-20: Type of toilets - 2012

District	Private	Sharing with others	Common/Public toilets
Galle	89.4	10.0	0.6
Matara	90.2	9.4	0.4
Hambantota	88.0	11.4	0.6

Source: Department of Census and statistics, 2012.

147. **Education infrastructure**. There 423 schools in Galle district, 361 in Matara district and 310 in Hambantota district. Considering the type of school, majority are mixed schools, i.e. 407 in Galle, 354 in Matara and 307 in Hambantota district. There are Boys and Girls schools also in these three districts. For example, four boys schools and three Girls schools in Matara district. Refer table IV.21 for additional information.

Table IV-21: Functioning Schools by gender of students - 2008

District	Boys schools	Girls schools	Mixed Schools	Total
Galle	6	10	407	423
Matara	4	3	354	361
Hambantota	2	1	307	310

Source: Department of census and statistics, 2012.

148. **Transport facilities.** Road transport is the dominant mode of transportation in the project area. The proposed roads, are connected to the existing “A and B class” road network in the Southern province.

149. **Development Projects: Port of Hambantota.** Magampura Mahinda Rajapaksha port is the maritime port in Hambantota. It is Sri Lanka’s largest port, after the port of Colombo. The initial phase of this port construction is completed and now in operation. This Port is planned to develop as a service and industrial port. It is expected that the port will be an important catalyst for a major economic development in Sri Lanka, and further it will reduce the prevailing higher unemployment in the Hambantota district.

150. **Mattala International Airport**. The Mattala International airport is an international airport serving the city of Hambantota in southeast Sri Lanka. It is second international airport, after Bandaranayake international airport. The new international airport is expected to expand the local aviation industry whilst being a catalyst for the country’s economic development enabling international trade, tourism, vocational training and employment.

151. **Sooriyawewa International Cricket Stadium.** Mahinda Rajapaksha International Stadium is a cricket stadium in Hambantota. It was built for the 2011 Cricket World Cup to host two matches. The stadium has capacity to have 35,000 people as spectators. The cricket stadium is situated in Meegahajadura of Sooriyawewa.

152. **Matara-Kataragama Railway line**. The Government has begun the construction of the first phase of the proposed Matara-Kataragama railway line from Matara to Beliatta. The length of the stretch from Matara to Beliatta is 30 km which will be constructed with financial assistance from the Government of Peoples’ Republic of China. In the second stage, track will be extended from Beliatta to Hambantota, while in the third stage it will be extended from Hambantota to Kataragama. This project will facilitate to provide efficient and economic transport services by connecting cities from Colombo to Kataragama. It would provide a more comfortable journey to Kataragama, a sacred city for Buddhist, Hindu and Muslim devotees.

153. **Southern extension from Godagama to Mattala and Hambantota**. Sri Lanka’s first access controlled expressway from Kottawa to Pinnaduwa (Galle) was operational since 27th of November 2011. The section from Galle to Matara of length 35km is under construction and scheduled to be completed by 2013. There are plans to extend the southern expressway up to Hambantota connecting Mattala Airport. The length of this section will be 75km and surveys are being done to acquire land for this section of the Expressway. The main objectives of the project

are also aimed at reducing the travel time, reduce traffic congestion on Colombo - Galle - Hambantota - Wellawaya (A002) road, and reduce delay costs, fuel costs there by contributing to national economy.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES

154. This chapter describes anticipated impacts on the environment during preconstruction, construction and operational stages of the project which have been identified during the Environmental Assessment. Feasible mitigation measures were suggested based on environment best practices to minimize the adverse impacts (or manage to acceptable limits) while enhancing the beneficial impacts of the project. Impacts identified below are applicable for both upgrading of rural roads and also reconstruction of national roads under OPRC package. In addition impacts during the operational phase have been identified mostly based on activities to be undertaken under OPRC package and contractors are responsible for implementing the mitigation measures proposed during the maintenance period.

A. Pre-construction phase

1. Project induced natural hazards

155. **Road construction in flood prone areas.** As described in 4.1.2, some roads in Galle and Matara Districts are located within flood prone areas. And if hydraulic structures along the road trace need to be reconstructed or repaired a special consideration should be paid for these roads. If new culverts and bridges are designed and constructed without adequate openings considering the hydrology of such areas, natural drainage of upstream area would get severely altered during intensive rains.

156. Designing bridges and culverts with adequate opening sizes based on detailed hydrological studies considering relevant flood return periods, liaising with institutes such as Irrigation Department in collecting information and checking the adequacy of design, conducting construction operations during dry weather flow are possible mitigation measures.

157. When designing culverts and bridges RDA uses the “RDA bridge design manual” which specify to consider a 50 year flood return period in culvert designs and a 100 year flood return period for designing bridges.

158. **Impacts due to landslides**. As some road sections are located within areas with rolling and hilly terrain as presented in table 4.1 which are prone to landslides, it is possible to occur landslide if natural slopes are disturbed by the construction activities during extreme rainfall events.

159. Since road improvement is restricted to the available ROW, natural slopes along the candidate roads will not be disturbed. Therefore possibility of occurrence of landslides is minimum due to this project. However prior consent should be obtained from National Building Research Organization (NBRO) for roads along which landslide prone locations are already observed. And recommendation of NBRO if any should be incorporated to the designs.

160. **Shifting of utility supply lines.** For the road upgrading works electricity power lines, telephone lines and water supply mains located closer to the ROW will need to be shifted. Such utility facilities are identified in environmental checklists prepared for each road to be upgraded and the exact number of utilities to be shifted will be updated during the preparation of specific EMPs. Proper co-ordination with the concerned authorities in advance will help to reduce the

effects of these utility supply lines. Risks of accidental disruption can be reduced by ensuring that machinery such as excavators are operated by trained personnel, and that operations are adequately supervised. 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, thereby minimize the difficulties that they will face in the case of sudden disruption of these services.

B. Construction phase

1. Increase of local air pollution, noise and vibration

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

162. Heavy machinery used for construction work such as vibrators and compactors and operation of heavy vehicles at higher speeds will create noise and vibration which will cause nuisance to residents in settlements. And since baseline noise and vibration values are low in rural areas, the project induced impact will be severe. Locations such as schools, hospitals and places of worship are particularly vulnerable to nuisance from noise. Buildings located closer to the road trace will have cracks due to construction vibration.

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

- Ensuring that construction plant and equipment is maintained to high operable standards, and that exhaust baffles are fitted and maintained in a high serviceable condition.
- Limiting operations to times when they have least impact in settlement areas, especially near schools and other sensitive locations such as hospitals and places of worship.
- Vibration should be controlled with the agreement of the Engineer at locations where sensitive receptors are found.
- Regular sprinkling of water to dampen the construction surface will reduce the emission of dust.

2. Deterioration of surface water quality due to silt runoff, emissions and spoil from labour camps

164. In order to upgrade roads and widen the narrow roads clearing of roadside vegetation near the edge of the existing road, excavation and removal of unsuitable soil, cutting trenches for roadside drains and removal of degraded surface of roads will be required. Such activities may develop temporary piles of soil and debries along the road edge.

165. All these activities could cause temporary erosion and therefore siltation of nearby water bodies would occur. And if un compacted earth surfaces or soil dumps are left exposed to rain or if they are placed near water bodies and paddy lands soil erosion will be possible. Sediments could drift away and get silted up in the side drains, adjoining streams and irrigation canals causing deterioration of water quality.

166. Run off contaminated with oil, grease, emissions from construction vehicles, equipment and material stores, wastewater and solid waste from worker camp sites will contain pollutant materials. Such materials have the potential to cause deterioration of surface water sources if they are released to adjacent water bodies.

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

- Reuse of soil removed for filling sites if any as much as possible and unsuitable materials can be used to refill borrow pits
- Where earthworks take place adjacent to water bodies, silt traps shall be installed prior to the commencement of earthwork activity
- All temporary unsuitable soil dumps and debries should be removed from site to approved disposal sites
- If temporary soil dumps are left at the site for a long time proper remedial measure to minimize soil erosion should be practiced
- Temporary soil dumps should not be placed near water bodies
- All fills, back fills and slopes should be compacted immediately to reach the specified degree of compaction,
- Suitable local drainage measures should be established to properly drain the water in the construction area to the nearby waterways
- Establishment of suitable mulch to cover the slopes of embankments
- All materials (including toxic and hazardous material) required for construction shall be stored at secure and managed sites, sited away from water bodies,
- Construction vehicles and equipment will be maintained in good operable condition, ensuring no undue leakage of oil or fuel,
- Construction vehicles and equipment will be serviced only at properly managed and equipped workshops and waste oil will be collected and disposed at approved locations,
- Sanitation arrangements will be made at worksites and any accommodation facilities provided for workers' accommodation, ensuring that no raw sewage is released into drains or water bodies.

3. Landslides during construction stage

168. Since the proposed upgrading is designed to restrict to the available ROW of roads, there will be minimal disturbance to the road side natural slopes and therefore possibility of occurring project induced landslides is lowt. However proper coordination should be maintained with NBRO for roads which already have landslides or slope failures along its trace when construction activities are carried out and any recommendation from NBRO should be adhered. Where required appropriate engineering and bioengineering measures in combination with drainage measures must be taken to protect and stabilize slopes especially in roads located in hilly terrain.

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

169. Labour camps may need to be established near the road trace or in the vicinity. If improper sanitation, wastewater and solid waste disposal are practiced in labour camps there is a possibility of contaminating surface water sources. And also there is a potential of facilitating

formation of breeding mosquitoes places, spreading of communicable diseases from workers to local population and social conflicts may arise due to use of illicit liquor and due to other unpleasant behavior which causes inconvenience to local community.

170. Labour camps must be located at least 100m away from the water resources. Proper sanitary facilities should be provided to the labour camps and there should be a proper way of disposing any wastewater and other waste matter generated from the camps as agreed with the Public Health Inspector (PHI) of the area.

171. Recruiting local labour as much as possible, strict labor supervision and labor counseling is necessary to avoid spreading of communicable diseases and any conflicts arising due to labor at construction site. Awareness programs should be conducted targeting workers as well as local community in order to minimize and avoid any such conflicts. These mitigation measures need to be incorporated in to the constructor's contract and environmental management plan to minimize the negative impacts.

5. Disruption to Traffic/Transportation

172. Improvement works on the road pavement and reconstruction of culverts will impede existing traffic flows. The movement of trucks and other construction vehicles may cause accident risks and may damage other roads that they use to bring construction material to the construction sites.

173. Following measures should be considered to minimize the impacts on existing traffic;

- Providing advance information to the public about the planned construction works,
- Use of flagmen control traffic flows at constricted sites, including safe crossing for pedestrians especially near town areas and schools.

6. Biological impacts

174. **Adverse impacts on terrestrial flora.** During the construction stage loss of vegetation is inevitable. During this phase the loss of vegetation could aggravate the erosive processes especially during the rainy season. Loss of soil moisture especially for the project area lies within the Hambantota district. Loss of trees may also cause economic loss to the owners of the trees.

175. All construction works should be carried out in a manner that the destruction or disruption of vegetation is minimal. Therefore, a compensatory tree planting program should be developed in the project area. At least three (3) good specimens of tree species shall be planted for each tree removed. If there will be no space on either side of roads for tree planting it is recommend to practice alternative options such as promoting home gardening in the project area. Further, the tree planting program could be promoted among schools, government institutions, private institutes and government institutes in the project area.

176. Suitable species of trees should be distributed to free of charge among the interested parties by the contractor with the consultation of Department of Forest/ DWLC/Central Environmental Authority/Agrarian Service Department/community based organization.

177. **Establishment of invasive species**. During the construction stage, soil brought into the project area from outside may contain seeds of alien invasive species. Also, the construction machinery and vehicles can accidentally introduce seeds of such plants if used without proper cleaning. Temporary facilities such as labour camps, dumping sites, soil storage sites are potential locations where invasive plant species can get established in quick succession. This will negatively affect both the natural and manmade habitats.

178. It is observed that several alien invasive species have dominated the vegetation in certain sections. Therefore, there is a possibility that such invasive species may invade new areas if the waste plant material generated during site clearing and dredging activities (if any) is disposed to areas away from the project.

179. Securing soil from locations close to the project area will reduce the chances of transporting any seeds of alien invasive species to the project area (use of material locations suggested in the report). Land area of labour camps, dumping sites and soil storage sites should be frequently checked for any growth of invasive plant species. If found they should be burned and destroyed within the premises which they were found.

180. **Adverse impacts on terrestrial fauna.** Most of the project roads are located within the agricultural areas where there are buffaloes, neat cattle birds such as Pea fowls. Further the Koggala-Sooriya wewa road traverses along the border of the madunagala sanctuary. There will be frequent animal movement including elephants observed in the area. The starting and the end section of Boondala-Meda Para road are located within the 100m of Bundala national park. Also Piyapala Mawatha is located adjacent to the Hambantota MER. Further some roads are located within and adjacent to forest areas.

181. The free movement and natural behavior of and animals in the project area will be disturbed during the construction stage due to workers, construction noise and frequent movement of construction vehicles.

182. Further poaching and hunting could be carried out by workers if the worker camps are located close to the national park/forest areas/sanctuary areas. The contract agreement with the contractor must include clauses to prohibit any illegal activities such as hunting and poaching. 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.

183. No solid waste or spoil dumping sites, hot mix plants and worker camps should be located within or close to the /national park/forest area/ sanctuary reserve areas. Available elephant fences (e.g., elephant fence run parallel to near Koggala-Sooriya wewa road should not be disturbed due to the construction vehicles/activities. If any alteration is temporary required prior approval should be taken from the Department of Wildlife Conservation. 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. Further any guidelines given by the DWLC/DoF should be strictly adhered. No solid waste or spoil dumping sites, hot mix plants and worker camps should be located within or close to the protected areas. Restrictions on the daily working hours between daylight and sunset must be enforced in sites near protected areas or wildlife zones. For roads falling near protected areas or MER areas appropriate measures such as posting of information

sign boards on the presence of wildlife, speed controls such as speed bumps etc. must be installed as appropriate.

184. Other measures to facilitate wildlife movement across the road such as exclusion fences may be installed with advice of DWLC.

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

186. This impact could be mitigated by; location of all hot mix plants, crushing plants, workshops, depots and temporary worker camps and storing of toxic and hazardous materials at approved locations, and recycling and dumping of solid waste matter at locations approved by local authorities, maintenance of vehicles and equipment in good operable condition, ensuring no leakage of oil or fuel and the fitting of proper exhaust baffles. Any solid waste should not be dumped into water bodies.

7. Impacts Due to Extraction and Transportation of Construction Materials

187. Sources of construction materials such as soil/metal could be obtained from the quarry and borrow sites which are in or away from the project site. Extraction and transportation of materials from such sites will cause noise, vibration, dust, induced slope failure, negative visual impacts, creation of mosquito breeding sites and damage to private properties and minor roads. Heavy trucks will be used to transport material to construction sites. Such trucks can potentially cause disturbances to local traffic, damage minor roads, and increase dust and noise nuisance.

188. This could be mitigated by using quarry and burrow sites approved by Geological Survey and Mines Bureau (GSMB). Spoils should not be dumped along road side and near water bodies. Spoils, top soil and denuded materials could be reused for refilling of burrow sites and transported materials should be covered using polythene or any other suitable material to avoid dust blow. Keeping provisions for repairing and restoration of the roads used for the transportation of construction materials by the contractor in the contract document and use of covers over transported materials to guard against dust blow and water spraying to dampen the surface will mitigate the impacts due to transportation of construction material.

8. Alteration of surface water hydrology of waterways

189. Natural drainage pattern especially along road sections which are located in flood prone areas could be disturbed if construction materials are temporarily stored close to water bodies or excavated soil are washed in to the streams (washed by storm water). Blockage of streams by such washed material could also give rise to upstream flood conditions.

190. Road sections especially in Hambanthota District where there are cross drainage paths (i.e. drainage from paddy fields) and irrigation canals which are mostly manmade. Temporary blockage or diversion of these canals and drainage paths will have an impact on cultivation activities resulting in loss of crop and produce especially in the upstream side of the drainage path. In addition, few roads in Hambanthota (e.g.: Road ID 38, 47, 22 and 28) traverses along

the service roads of irrigation canals while roads 49, 53 of Hambanthota District runs along the bunds of irrigation tanks. And Road ID 36 of Galle District traverses along the Gin Ganga flood protection bund. Therefore there will accidental damages to such structures if construction activities are not managed properly.

191. Proper coordination with the Department of Irrigation and Mahaweli Authority when construction activities carried out at above mentioned hydrological structures and incorporate any recommendation to the work plan will minimize any impact.

192. No material including excavated soil should be allowed to be disposed near water bodies or in paddy lands (even on temporary basis) to curtail any undue wash off of soil and debris in to such nearby water bodies and agricultural lands.

193. The contractor should be advised not to damage or block any manmade drainage canal even for temporary basis. If blocked the contractor should remove such debris without any delay preventing any long interruptions of water flow which could damage or hinder cultivation activities resulting in loss of crop and produce especially in the upstream side of the drainage path.

9. Requirement of lands for the road upgrading

194. Land acquisition has not been envisaged for this project expecting that available right of way will be adequate to carry out road improvements. In case the land is required, the land will be acquired on land donation basis for rural roads and standard acquisition and compensation procedures for national roads. Further details of this is given in the Resettlement Framework and Resettlement Plan prepared separately.

195. During construction, temporary occupation of privately owned land may be required for stock pilling, use as yards etc. If such a necessity occurs the contractor with the concurrence of the PIU will sign a temporary occupation contract with the owner and make necessary payments if required by the land owner.

10. Safety of Workers and Public

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

- Proper briefing and training of workers on safety precautions, and their responsibilities for the safety of themselves and others
- Provision to workers of Personnel Protective Equipments (PPE) to be used at every time involved in when construction activities and high visibility jackets at night
- Ensuring that plant and vehicle operators are properly licensed and trained
- Arranging for the provision of first aid facilities, readily available trained paramedical personnel, and emergency transport to the nearest hospital
- Arranging for regular safety checks of vehicles and material, and allocation of responsibility for this
- Ensuring that quarry operations, particularly blasting is carried out and supervised by trained personnel, that explosives are stored in a secure location

and that all due precautions are taken to ensure that blasting does not induce rock falls

- Provision of hazard warning signals around construction sites, and directing vehicle and pedestrian traffic away from work sites
- Provision of traffic management plans during construction including barricading of openings and lighting at night where required.

C. Operational Phase

1. Impacts on water resources

197. 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.

198. 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.

2. Disposal of unsuitable material

199. 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.

3. Extraction of material for repairing and maintenance works

200. 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.

4. Pedestrian and commuter safety

201. 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

202. 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...

5. Air quality and noise

203. 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. This has been further validated by the quantitative assessment on the expected greenhouse gas emissions from the project provided in section 5.5.1. Clear signing will be put in sensitive areas such as schools, temples to warn drivers and avoid making unnecessary horn signals.

6. Ecological Impacts

204. 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 (e.g., especially the snake's cold blood attracts them to warm road surfaces during the night). Moreover there are plenty of buffaloes, neat cattle birds such as Pea fowls adjacent and within the road. There will be frequent animal movement including elephants occur in the madunagala area. This will result in the increase number of collision and run over of animals (buffaloes, neat cattle, goat, elephants small mammals, reptiles and birds such as Pea fowls) and disturbance to their natural movement within and close to the forest areas. This impact could be reduced by placing warning and information sign boards at least 1km ahead of approaching such areas and installing speed breakers.

D. Positive Impacts of the Project

1. Socio - economic benefits

205. Following socio-economic benefits are expected to transfer to the affected populations of roads selected under the iRoad Program.

- Improvements in road connectivity reduce regional disparity, open up new markets, generate employment opportunities and thereby reduce poverty in lagging areas.
- An efficient and convenient transportation system will accelerate the economic growth by facilitating easy and faster mobility of people, goods and services and reducing disparities in regional development.
- The road network improvement in Southern Province will boost economic activities including potential growth in industries, tourism, fisheries and agriculture in lagging areas.
- Good road net work will reduce transport cost and travel time leading to increase the profit margin of the small scale farmers. The market expansion increases the marketability of the product.
- The wages of agricultural laborers will be increased when profit margins and sales are increased due to the road development.
- Similarly, better road network will provide access to schools and other services. In the long term this will improve education level and other associated life values

(health status, awareness and social skills) of the people and they will become more competitive in the labor markets in finding their destinies.

E. Climate Change Impacts and Risks

1. Climate Change Mitigation

206. The Transport Emissions Evaluation Model for Projects (TEEMP)13 developed by Clean Air Asia[14] was utilized to assess the CO2 gross emissions with- and without the project improvements which is mainly surface roughness and directly impacts speed and fuel consumptions. It also allows the assessment of future congestion, if they will occur in the future given the projected increase in traffic and road capacity with-and without the project improvements like lane configuration and road roughness.

207. Information that was fed into the model for projecting the CO2 emissions were:

(i) Project 1 will upgrade 197 rural roads with a total aggregated length of 688 kms distributed across Matara, Galle, and Hambanthota districts;
(ii) No land acquisition will be allowed and all improvements will be limited to the existing 2-lane configuration with 7.0m carriageway with an asphalt concrete surface;
(iii) road roughness will decrease from the general condition of 8.0 m/km to 2.5 m/km;
(iv) Other improvements include the repair or reconstruct damaged culverts, introduction of earth drains for all road sections and built up drains where necessary, removal of any irregularities that are on the existing vertical profile, and road safety appurtenances.

208. Traffic forecasts were taken from the economic analysis for each road section disaggregated into vehicle types and share to the annual average daily traffic as follow:

Table V-1: Vehicle Composition

Vehicle Type	Comp,%
Motor Cycle	62.8
Three Wheeler	15.1
Car/Jeep	4
Utility/Van	3.5
Mini Bus	1
Standard Bus	1.9
LGV	4.3
MGV	3.5
HGV	0.9
Mult-axle	0.1
Tractor	2.9
TOTAL (AADT)	100

[13] TEEMP is an excel-based, free-of-charge spreadsheet models to evaluate emissions impacts of transport projects.
[14] A network of 250 organizations in 31 countries established by the Asian Development Bank, World Bank, and USAID to promote better air quality and livable cities by translating knowledge to policies and actions that reduce air pollution and greenhouse gas emissions from transport, energy and other sectors.

209. Road capacity of 7,200 PCU/lane/day for rural roads was adopted for the project. Emission factors were mostly taken from the CBCP/MOEF (2007) Draft Report on Emission Factor Development for Indian Vehicles, the Automotive Research Association of India, and C. Reynolds et.al (2011) Climate and Health Relevant Emissions from in-Use Indian for three-wheelers rickshaw as follow:

Table V-2:CO2 Emission Factors

Vehicle Type	Gas	Diesel	LPG/CNG
2-Wheel	1.37 kg/l		
3-Wheel	2.12 kg/l		3 kg/l
Cars/bus/bus	2.24 kg/l	2.58 kg/l	

210. Finally, emission from road construction were estimated using unit bill of materials to upgrade 1 kilometer of rural road which requires 15.5 tons of cement, 1.24 tons of steel, 620 liters of gasoline, 620 liters of diesel, and 2.48 tons of bitumen.

211. **Estimated carbon emissions**. For each kilometer of rural road upgrading, CO2 emission from construction is estimated at 3 tons. The design life of the roads range from 10 to 15 years. Total annual emission without the project at the middle of the design life at year 7.5 is estimated at 29,399 tons and with project including induced traffic is estimated at 46,494 tons. A summary of the expected annual CO2 emissions is provided in Table V.3.

Table V-3: Estimated Annual Gross CO2 Emissions Intensity for iROAD

District	Business-As-Usual	Project (without Induced Traffic)	Project (with Induced Traffic)
Matara	8,035	9,648	10,048
Hambantota	8,035	19,106	19,829
Galle	13,330	16,174	16,617
Total	**29,399**	**44,928**	**46,494**

212. While there is an increase in the CO2 emissions due to increase in traffic the levels are still far below the 100,000 tons per year threshold set in the ADB SPS 2009 and therefore not required to implement options to reduce or offset CO2 emissions.

2. Climate Risks and Adaptation needs

213. Climate risks were identified following both top down and bottom up approaches. Under the top down approach changes of key climate parameters, mainly temperature and precipitation were projected for 2050 using an ensemble of Global Climate Models (GCMs). Given the projected variations of temperature and precipitation the project roads were screened for 9 types of climate risks:

a. Landslide triggered by increased precipitation
b. Fire
c. Flood
d. Drought
e. Tsunami
f. Cyclone wind
g. Cyclone surge
h. Sea level rise
i. Coastal erosion

214. Climate risk maps based on information from the GCMs were created for the project area using Geographic Information System (GIS) maps. After overlaying the road locations on the climate risk maps low to medium risks identified for the project roads were flooding, landslides triggered by precipitation, coastal erosion and tsunami.

215. **Landslides triggered by precipitation**. Heavy rains can cause disruption of the road networks, decreased accessibility, erosion of roads and embankments, surface water drainage problems, slope failures, landslides, among others. Increased river flow resulting from precipitation and storminess may result in damages to bridges. Bridge/culvert capacities are reduced or exceeded, causing upstream flooding to occur. Coastal areas are particularly vulnerable to flood risks due to additional risk of storm surge. All road sections along the coastline are prone to flooding. High risks are found for the sections within southern Matara. The remaining sections are prone to medium level of flood risks. Flooding occurs during the 2 rainy seasons (April-June, and September - November).

216. **Landslide Triggered by Precipitation**. All roads and road sections 10km off the coastal areas within Galle and Matara, districts and road sections in western Hambantota bordering Matara are potentially susceptible to low to medium levels of landslide risk. Roads in northern and northeastern Galle and in northern and western Matara are potentially vulnerable to a medium level of risk.

217. **Coastal Erosion**. Coastal erosion has been identified as a major hazard in many coastal areas of Sri Lanka, particularly along the densely populated southwest coastline. There are 3 roads in Galle, 4 in Matara, and 2 in Hambantota are under low risk.

218. **Tsunami.** Tsunamis are infrequent in Sri Lanka but have caused severe damages, and recent understanding of the tectonics of the Indian Ocean region points to an increasing risk of earthquakes. The screening identified 4 roads in Galle, 3 roads in Matara, and 4 roads in Hambantota under low risk.

219. Under the bottom up approach environmental checklists were compiled on all environmental features including risks for landslides, coastal erosion, flooding for each and every road under the project. A combination of review of videos of the roads, field visits and public consultations were carried out to complete the environmental checklists. District level consultations were carried out to find out information on history of flooding in the project area. Through these methods information on the existing hydrology and potential hydrological impacts that may arise from the project activities were compiled. Based on information from the road specific environmental checklists, public consultations and hydrological analysis the main risks identified were flooding, coastal erosion and tsunami. It was found that only some of the roads faced these risks. Hence, only those roads which had risks were listed.

220. The climate risks and roads with risks identified using the top down and bottom up approach though not exactly the same were largely consistent. After combining the findings from the two approaches, the final list of roads and types of risks they faced were listed. A final review of the list was carried out by the engineers. It was found that the risk of tsunami was very low. Hence, only flooding and coastal erosion that was considered for addressing the road design.

221. Key engineering measures taken to address these risks in the design are: i) increase in embankment height, ii) construction of new side and lead away drains, iii) construction of new culverts or widening of existing ones and iv) construction of new bridges. As shown in Table

V.4, costs for taking these measures add up to a total of Rs. 389.3 million (about $3 million). This is approximately 4% of the total civil works costs. It must be pointed out that these measures would have been considered anyway in the conventional design as the issue of flooding and coastal erosion is a threat to the sustainability of the road. However, these measures also contribute to adaptation of the roads for future increases in precipitation and storm surges. This risk screening and risk identification exercise has helped to ensure that all roads with climate risks have adequate risk mitigation or adaptation measures. The detailed list of roads with climate risks, specific engineering measures taken and the costs of those measures are provided in Appendix 5.

Table V-4: Cost of Climate Adaptation Measures (in Rs million)

District	Increase Embankment Height	New side and lead away drains	New/ Widening Culverts	New Bridges	Total
Galle	18.321	18.015	11.187	1.5	**49.023**
Matara	47.486	16.516	82.779	0	**146.781**
Hambantota	47.087	0.548	140.859	5	**193.494**
Total	**112.894**	**35.079**	**234.825**	**6.5**	**389.298**

222. Provisions have also been made in the bidding documents for the contractor to prepare contract package specific EMP's based on the final detailed design to address a range of issues including climate related risks and vulnerabilities such as flooding, coastal erosion, landslide and accordingly incorporate required costs in the BOQ.

VI. INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MANAGEMENT PLAN AND GRIEVANCE REDRESS MECHANISM

A. Institutional Arrangements

223. The Ministry of Highways, Ports and Shipping (MOHPS) is the Executing Agency (EA) and the secretary to the ministry will be responsible for decisions on overall approvals and operational policies of the project. RDA will be the IA and within RDA there will be a PIU. The PIU will be responsible for implementing the project and managing detailed design and supervision of the construction works and ensuring that all environmental safeguard requirements in accordance with this EARF are met. The PIU will be headed by a full time Project Director (PD) and supported by a team of engineers from RDA. The PIU will have a safeguards team with sufficient social and environment safeguards officers to cover the quantum and geographic distribution of works in all provinces under the investment program. RDA will have a Surveys and Preparation of Engineering Design (SAPE) team that will be responsible for conducting studies including environmental assessments of all project roads before the processing and approval each project. The Project Implementation Consultants (PIC) will support the PIU for supervision of the design and construction works by the civil works contractor. The PIC team will include a team of environment safeguards consultants for conduction of regular monitoring of safeguards implementation on site.

B. Responsibilities

224. Detailed list of responsibilities of the EA, IA, PIU, PIC, SAPE, and contractors for implementation of environmental safeguard matters are presented in Table VI.1.

Table VI-1: Responsibilities for Environmental Safeguards Implementation

	Agency	Responsibility
1.	Ministry of Highways, Ports and Shipping (EA)	– Make final decision on roads to be included under the investment program – Overall responsibility for project design, feasibility, construction and operation and guide RDA to play its role as the IA – Ensure that sufficient funds are available to properly implement all agreed environmental safeguards measures – Ensure that all projects and roads, regardless of financing source, complies with the provisions of ADB's SPS 2009 and GoSL's environmental laws and regulations – Ensure that tender and contract documents for civil works include all relevant parts of the environmental assessment and project agreements – Submit annual safeguards monitoring reports to ADB
2.	Road Development Authority (IA)	– Ensure that Project complies with ADB's SPS and GoSL laws and regulations – Ensure that the project complies with all environment safeguard requirements as given in this EARF – Ensure that tender and contract documents for civil works include all relevant parts of the environmental assessment and project agreements
3.	Project Implementation Unit (PIU) with support of safeguards	– Ensure that Project complies with ADB's SPS and GoSL laws and regulations

	Agency	Responsibility
	team	– Ensure that the project complies with all environment safeguard requirements as given in this EARF – Ensure that the environment checklist is completed each and every project road – Review and approve the environment checklists – Based on the findings of the completed environment checklist for all project roads complete one Rapid Environment Assessment (REA) checklist as required by the ADB SPS for the respective project – Ensure the preparation of one province level IEE report based on the information from the project road environment checklists and other consultations and literature review as necessary – Ensure the preparation of due diligence reports on the environment safeguards performance of the earlier project before the approval of the next project – Obtain feedback on draft IEE report findings from major stakeholders where necessary and facilitate necessary revisions – Facilitate public disclosure of safeguard documents where necessary in accordance to the requirements of ADB and CEA – Ensure that environmental protection and mitigation measures in the Environmental Assessment report and EMP are incorporated into the design (level 2 design) – Ensure that requisite measures from the Environmental Assessment report and EMP are incorporated into the bid and contract documents – Ensure that necessary provisions are made in the contract documents for the EMP to be updated in accordance with revisions in the final detailed design (level 1 design) – Organize environmental management capacity building activities for PIU and orientation and awareness training for PIC and contractors as described in para 21 of this EARF. – Ensure that RDA has obtained necessary environmental clearances, permits, license(s) etc. from CEA and other agencies as specified in this EARF (Table 3) – Review and approve the contract package specific EMP's and EMOP's prepared by the contractor – Ensure that contractors obtain necessary environmental permits, license(s) etc. from respective agencies as specified in this EARF (Table 3) prior to commencement of civil works contracts – Facilitate the establishment of a grievance redress mechanism, as described in this EARF and respective IEE report, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances related to environment safeguards – Ensure that all mitigation measures as given in the EMP are implemented properly

	Agency	Responsibility
		– Ensure proper conduction of environmental monitoring during pre-construction, construction and operation phases – Review and approve the monitoring checklists and reports prepared by the PIC and conduct field spot checks to verify the accuracy of the monitoring checklists – Ensure annual environmental monitoring reports are prepared and submitted to ADB for disclosure on their website on an annual basis – Identify environmental corrective actions and prepare a corrective action plan, as necessary, for submission to ADB and during project implementation – Facilitate additional environmental assessment (if required) for specific sub-projects and submit to ADB and CEA for review and clearance – Review and approved EMP's if they get updated and revised by the contractor
4.	ESDD, RDA	– Facilitate and act as resource persons during training workshops under the investment program – Provide technical advice and support as necessary to the PIU – Monitor implementation of safeguards under the investment program on a bi-annual basis as necessary
5.	SAPE team under RDA	– Conduct field surveys and complete the environment checklist for each and every project road – Based on the findings of the completed environment checklist for all project roads complete one Rapid Environment Assessment (REA) checklist as required by the ADB SPS for the respective project – Prepare one province level IEE report and standard EMP based on the information from the project road environment checklists and other consultations and literature review as necessary – Make necessary revisions to the IEE based on feedback from the PIU, PIC, ADB or other agencies such as CEA as necessary
6.	Project Implementation Consultants (PIC)	– Review and approve the contract package specific EMP's and EMOP's prepared by the contractor – Daily on site supervision for implementation of environmental safeguards – Completion of monitoring checklists during pre-construction, construction and operation and maintenance stages for each road – Close coordination and communication with the contractor to facilitate implementation of all mitigation measures identified in EMP – Preparation of monitoring reports and submission to PIU, RDA – Provide technical support and advise for addressing complaints and grievances and participate in resolving issues as a member of the GRC – Provide technical advice and on the job training to the contractors as necessary

	Agency	Responsibility
		– Preparation of annual monitoring reports based on the monitoring checklists and submission to RDA for further submission to ADB – Preparation of due diligence reports on the environment safeguards performance of the earlier project before the approval of the next project – Review the environmental assessment report prepared by the SAPE team under RDA – Review and approve updated/revised contract specific EMP's as necessary
7.	Contractor	– Based on the standard EMP, environment checklists for each road and the detailed design (level 1 design) prepare a contract package specific EMP for approval by the PIC and/or PIU before start of physical works – Based on the standard Environmental Monitoring Program (EMOP) on collection of environmental quality data prepare contract package specific (EMOP) for approval by the PIC and/or PIU before the start of physical works – Ensure that adequate budget provisions are made for implementing all mitigation measures specified in the EMP – Participate in induction training on EMP provisions and requirements delivered by the PIU – Obtain necessary environmental license(s), permits etc. from relevant agencies as specified by EARF (Table 3) for associated facilities for project road works, quarries, hot-mix plant etc. prior to commencement of civil works contracts – Implement all mitigation measures in the EMP – Ensure that all workers, site agents, including site supervisors and management participate in training sessions delivered by PIU. – Ensure compliance with environmental statutory requirements and contractual obligations – Collect the baseline data on environmental quality before the start of physical works and continue collection of environmental quality data as given in the Environmental Monitoring Plan during construction and operation – Participate in resolving issues as a member of the GRC – Respond promptly to grievances raised by the local community or any stakeholder and implement environmental corrective actions or additional environmental mitigation measures as necessary. – Based on the results of EMP monitoring, cooperate with the PIU to implement environmental corrective actions and corrective action plans, as necessary. – Annually review the road specific EMP and update it if required
8.	ADB	– Review REA checklist and endorse or modify the project classification and recommend the ToR for the Environmental Assessment report

	Agency	Responsibility
		– Review IEE reports and disclose the draft and final reports on the ADB's website as required – Issue project approval based on IEE reports; – Monitor implementation and monitoring of EMP through due diligence missions – Provide assistance to the EA and IA of project roads, if required, in carrying out its responsibilities and for building capacity for safeguard compliance – Monitor overall compliance of the project roads to this EARF – If necessary provide further guidance to the IA on the format, content, and scope of the IEE reports and annual or semi-annual monitoring reports for submission to ADB
9.	CEA	– Review and approve Environmental Assessment reports required by the project as per GoSL environmental laws – Issue, and renew environmental licenses as required by the contractor and PIU during the project cycle – Undertake monitoring of the project's environmental performance

C. Environmental Management Plan and Monitoring

225. Environmental Safeguards Manual of RDA and the ADB SPS, outlines the requirements for an Environmental Management Plan (EMP) which is presented as a matrix developed based on best practices for environmental management. This IEE report includes one general or standard EMP for the rural roads and national/OPRC roads respectively as given in Appendix 6.1 and 6.4. These standard EMPs cover all impacts and mitigation measures identified within the respective province. Contract package specific EMP's will required to be prepared by the contractor by referring to the standard EMP, road specific information in the environmental checklists and the detailed design (level 1 design). All costs for implementing the mitigation measures must be included in the Bill of Quantities (BOQ) by the contractor as implementation of the EMP will be the responsibility of the contractor and the PIU will oversee the effectiveness of the implementation with the assistance of the PIC.

226. Contractors who implement rural road components will have a construction period of approximately two years and routine maintenance for three years. A typical EMP prepared for the rural road component is attached in annex 6.1. However, in the OPRC package contractor's responsibility will be to keep the road in operational condition for a period of 7 years after reconstruction. Therefore the EMP has been modified accordingly paying more attention on the environmental impacts and mitigation measures during the operational stage together with reconstruction stage. A standard EMP prepared for OPRC package is attached in annex 6.4.

227. Monitoring of EMP implementation will be carried out during the preconstruction, construction, and operation and maintenance stages of the project. Based on the EMP, environmental monitoring checklists (EMC) will be prepared by the PIC for each of these stages. The EMC monitors the degree of compliance of the mitigation measures proposed in the EMP in all three stages. Every road must have atleast one EMC completed during pre-construction, one to three15 during construction depending on the length of the road and one per year during

[15] The monitoring checklist during construction stage will be completed three times when the progress of physical works is 25%, 50% and 75% respectively. This may not be practically feasible for shorter roads

operation and maintenance. Sample EMC based on the standard EMP is provided in Appendix 6.2 for rural roads and appendix 6.5 for national roads. Records of these completed monitoring checklists must be systematically maintained within the PIC and/or PIU office. Based on these records and site visits monitoring reports will be prepared during the construction and operation stage on an annual basis16 per province and submitted to ADB for disclosure on the ADB website.

228. In addition there will be an Environmental Monitoring Plan (EMoP) based on the project cycle to monitor EMP implementation by measuring environmental parameters. During the pre-construction phase baseline data on air, water quality and noise levels will need to be collected. This data will provide baseline information on the existing conditions which could be used to compare the changes in quality levels during construction and operational phases. Such a comparison will reflect how effective the EMP is and help to revise it to rectify any shortcomings that will cause any adverse impacts. Appendix 6.3 presents a sample EMOP prepared for a typical rural road and appendix 6.6 presents a sample EMOP for national/OPRC roads. Based on these sample or standard EMOP's the contract will be required to prepare contract package specific EMOPs.

229. Furthermore the contractor will also be responsible for updating EMP, EMC and EMOP if there are any significant changes in the project site conditions or engineering design.

D. Grievance Redress Mechanism

230. Grievances from the affected people on social and environmental issues during project implementation will be addressed mainly through the existing local administrative system. Depending on the nature and significance of the grievances or complaints, grievances will be addressed at three levels. The first will be at the grass roots level where complaints will be directly received and addressed by the contractor, PIC or PIU representative on site. Grievances which are simple but still cannot be addressed at the grass roots level will be addressed at the Grama Niladhari (GN) level. More complex grievances which cannot be addressed at the GN level will be addressed at the Divisional Secretariat (DS) level. There will be a Grievance Redress Committee (GRC) at the GN and DS levels.

231. At the GN level the GRC members will be:

i)	Grama Niladari of the area	Chairman
ii)	Representative of PIU	Secretary
iii)	Representative of Supervision Consultant	Member
iv)	Representative of Contractor	Member
v)	A community member/religious leader	Member
vi)	Woman representative from the local community	Member

232. At the DS Level GRC members will be:

i)	Divisional Secretary of the area	Chairman

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that are only 1 to 3 km long. Hence for these shorter roads only one completed monitoring checklist during construction stage will be adequate.

[16] The first annual monitoring report will cover the period starting from the date of first contract award.

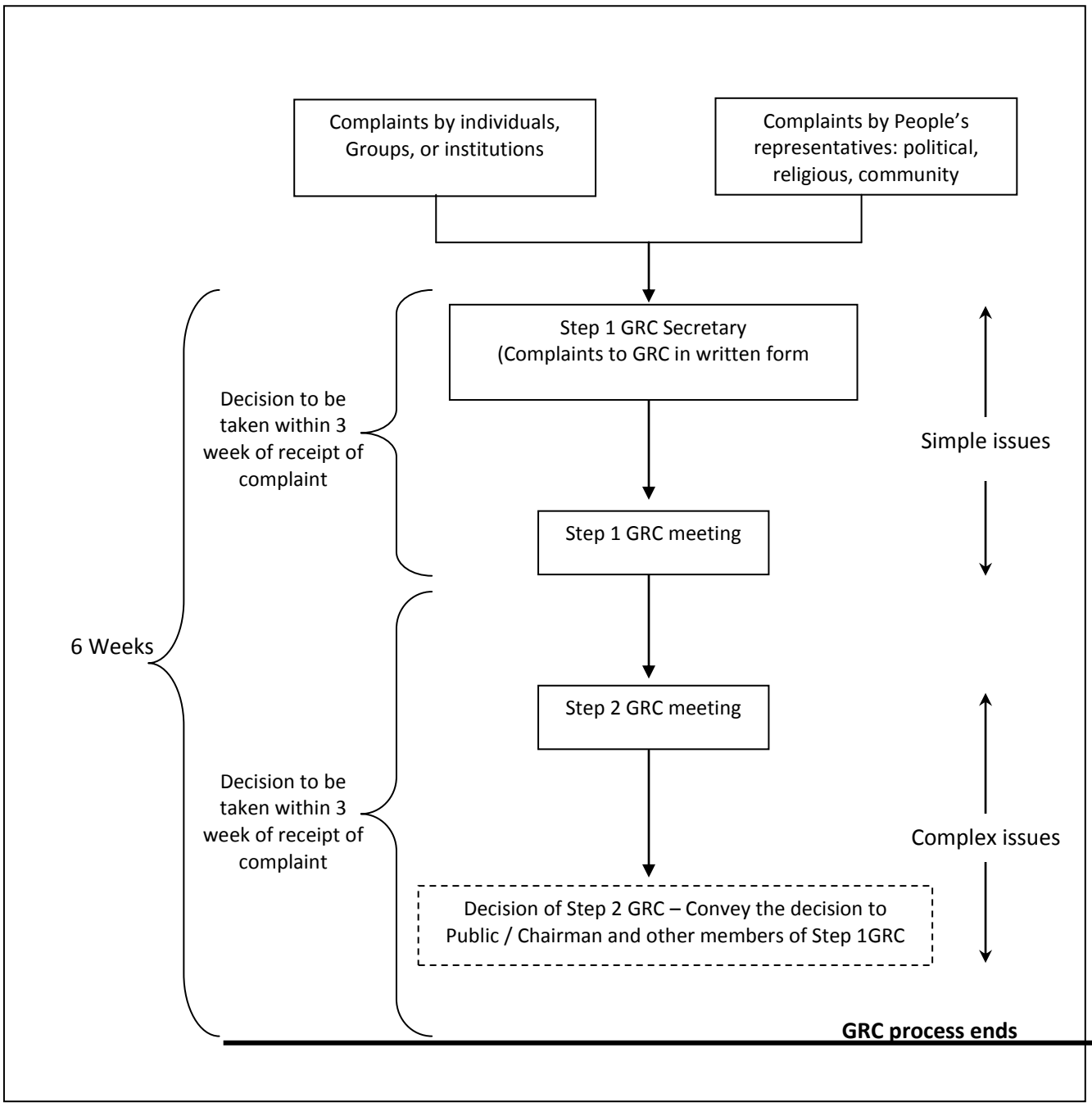
ii)	Representative of PIU	Secretary
iii)	Grama Niladari	Member
iv)	Representative of Supervision Consultant	Member
v)	Representative of Contractor	Member
vi)	Representative of a social organization (NGO/CBO) of the area	Member
vii)	A community member/religious leader	Member
viii)	Woman representative from the local community	Member

233. To make the GRM process gender responsive the GRC will include one woman member to represent the local community women. Further when grievances or complaints are submitted to the GRC, both women and men complainants will be treated equally and necessary measures will be taken to address the grievance in the best way possible.

234. Recommended steps with timeline on the operation of the GRM is provided in Figure 6.1. Adjustments may be made to the GRM during processing of succeeding tranches if necessary and accordingly described in the respective IEE. In addition a complaints contact person will be designated within the PIU to help address all concerns and grievances of the local communities and affected parties. Contact details of this person will be provided in the project information display board that will be placed at the project site.

235. The flow chart of the GRM is presented in Figure 6.1.

Figure 6. 1: GRM process



236. In addition to the above measures, for the national (OPRC) roads the contractor will be required to establish an information center for receiving and addressing complaints or grievances and forwarding them to the PIU and PIC as necessary.

VII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. One on one consultation

237. One on one consultations were held with local community people living in the project area in March 2014. A summary of the one on one public consultation is given in Annexure 7.1.

238. People in the project (a total of 36 males and 44 females) area have positive ideas about the road development and their ideas indicate the importance of the road network development in the southern province. The main benefits perceived by the public are listed below.

- Easy transportation for people and agro products
- Easy access to main towns
- Ability use roads in all weather conditions
- Less travel time for school children
- Improvement in living standard of people
- Security for women, children and elders
- Increased road safety
- Potential development to tourism industry and other industries
- Town development and increase in land value
- Increased connectivity among villages

239. 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 reducing any objections towards the project, incorporate any valuable suggestions by the public in to the design so as to reduce any adverse impacts to the environment.

240. In addition, consultations were held with the Department of Wildlife Conservation (DWLC) in order to obtain their views on roads located near protected areas. DWLC confirmed that there will be no major impacts on the protected areas since the road improvement works will be strictly within the existing ROW.

B. Focus Group Discussions

241. In addition to the one on one interviews, eight Focus Group Discussion (FGDs) representing the three districts were carried out in May, 2014. The location and number of attendees in each FGD is presented in Table VII.1.

Table VII-1: A summary of FGDs held for IROAD project

Date	Location	Male	Female	Total No. of participants
2 May 2014	Wanduramba PS auditorium	12	16	28
2 May 2014	Neluwa DS auditorium	9	6	15
5 May 2014	Gonapeenuwala DS auditorium	41	23	64
5 May 2014	Imaduwa DS auditorium	22	20	42
5 May 2014	Akuressa DS auditorium	20	21	41
5 May 2014	Hambantota DS auditorium	20	13	33
5 May 2014	Lunugamwehera DS auditorium	26	19	45
7 May 2014	Walasmulla DS auditorium	14	24	38
	TOTAL	**164**	**142**	**306**

242. Key comments and suggestions made during above meetings are listed below. It should be noted that some participants made comments on the rural road segment of i Road program (even during one on one interviews). These comments are also included in this summary.

Table VII-2: Summary of key points discussed in FGDs

Location of FGD	Comments made by participants	File photo
Wanduramba PS auditorium	• Filling of nearby paddy fields and lands with material removed from road constriction works should be avoided as it creates flood problems. • Road side drains and all other existing drainage structures need to be properly investigated and reconstructed where necessary. • It is important to improve/ widen road sections with sharp bends and locations with poor visibility. This will improve road safety. • A proper drainage study should be carried out to identify locations where drainage improvements are needed. Suggest that the engineers obtain assistance from Grama Niladri Officers. • Propose a pedestrian flyover at Karapitiya hospital area and Waduraba School. • Increase the number of pedestrian crossings and locate them at strategic points. • Pave about 15- 20 m inwards of all by roads that are connected to the candidate road. This will reduce the amount of debris and soil flowing on to the candidate road. Improves road safety as motor cyclists slip on this debris.	
Neluwa DS auditorium	• Blockage of drainage causes flooding over some road sections. • Few landslide areas are located within the DS division. Need to consider stability of cut slopes. • Poor road conditions affect the agricultural and other economic activities in the area. • Construction works need to be properly monitored.	
Gonapeenuwala DS auditorium	• The roads must be widened to have safe passage. • Blockage of drainage causes flooding over some road sections. • Pave about 15- 20 m inwards of all by roads that are connected to the candidate road. This will reduce the amount of debris and soil flowing on to the candidate road. Improves road safety as motor cyclists slip on this debris.	
Imaduwa DS auditorium	• Slope failures could be initiated if cut slope angles are too high. • Proper drainage study should be carried out to identify all locations where drainage needs to be	

Location of FGD	Comments made by participants	File photo
	improved. • It is important to improve/ widen road sections with sharp bends and locations with poor visibility. This will improve road safety. • Improvement of roads in the area will help in the economic development. • This project will ensure the safety of women, children and elderly who uses these roads.	
Akuressa DS auditorium	• Improvement of roads in the area will help in the economic development. • This project will ensure the safety of women, children and elderly who uses these roads. • Drainage investigation is important and this should be done with the help of village people or at least with respective Grama Niladari Officers in the area.	
Hambantota DS auditorium	• People are willing to provide their labour for the road construction and required lands for the road widening. • Poor road conditions badly affect social life of the people in the project area. • It is important to synchronize other development projects such as water supply line projects with the road project. This will avoid any future damages to the road surface. • Improvement of roads in the area will help in the economic development.	
Lunugamwehera DS auditorium	• There should be proper coordination when selection of roads. • Soil erosion of road embankment and land inundation should be avoided. • Drainage investigation is important and this should be done with the help of village people or at least with respective Grama Niladari Officers in the area.	
Walasmulla DS auditorium	• Need a better drainage structure to accommodate the spill water of Warapitiyawewa. • Road sub base at certain locations need to be improved. If not the improved road surface will be affected. Grama Niladri officers in the area could show such locations. • Drainage investigation is important and this should be done with the help of village people or at least with respective Grama Niladari Officers in the area. • Improvement of roads in the area will help in the economic development.	

C. Disclosure of information

243. According to the National Environment Act no. 47 and its amendment no. 56, only Prescribed Projects are subjected to specific information disclosure requirements. Since this project is not a prescribed project no information disclosure is required.

244. According to the requirements of the ADB SPS, for environment category B project roads the respective draft IEE will be disclosed before the Management Review Meeting (MRM) or equivalent meeting or approval of the respective project, if there is no MRM. Signboards with project information including details on nature of construction works, road length, construction period, name of contractor, contract sum and contact information for reporting complaints or grievances will be posted in three languages (Sinhala, Tamil and English) for rural roads. For the national (OPRC) roads there will be sign boards on period of works and contact information for reporting complaints or grievances in three languages.

245. During project implementation annual environmental monitoring reports will be prepared per province and submitted to ADB for disclosure on the ADB website.

VIII. CONCLUSION AND RECOMMENDATIONS

246. The information on existing social environment suggests that agriculture is a main occupation for most of population in the Southern province and poverty and unemployment still prevails in the region. The public consultation confirmed that the roads cannot be used during rainy seasons and lack of connectivity within the region. Thus, the public welcome this development project and expect an improvement to their socio economic situation with the project.

247. This Initial Environmental Examination has discussed various aspects of the proposed rehabilitation and upgrading of 200 road sections comprising about 700km length including reconstruction of 64.5km of national roads under OPRC package. Contractors are liable to keep the roads in operational status for approximately 7 years under OPRC package.

248. As discussed, candidate roads are dispersed over the entire province and few road sections are located near ecologically and hydrologically sensitive entities however as the proposed improvement is restricted to the available ROW the impact on such locations will be minimum. In addition DWLC confirmed that there will be no major or irreversible impacts to the protected areas as road upgrading works will not be extended beyond the existing ROW. Therefore this assessment concludes that the project will not cause significant environmental and social problems and the potential adverse impacts are mostly temporary and manageable through the implementation of the proposed mitigation measures stated in the EMP.

249. A standard EMP, EMC and EMOP has been prepared as part of this report. These are required to be updated and converted into contract package specific EMPs, EMCs and EMOPs before the commencement of construction activities.

250. Since a project of this nature involving hundreds of roads is being implemented by RDA, systematic and timely training programs will need to organized to ensure proper compliance of the project to all environmental safeguard requirements.

251. The road network improvement in southern province will boost economic activities in the southern province including potential growth in industries, tourism, fisheries and agriculture in lagging rural areas which will be a positive step to the socio economic development of the country.

Appendix 1.1: Details of roads to be upgraded under i Road Program

A. Galle District

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts and bridges	Surface Type	Road Condition
1	Mavita-Dooliella	6.20	PRDA	Neluwa	Mavita East Kosmulla Batuwangala West Neluwa	3	19	Macadam	medium
2	Batuwangala-Ehalapitiya	1.10	PS		Kosmulla Batuwangala Ehelapitiya	3	10	Macadam/ Gravel	medium
3	Madagama-Ihalamadagama-Puswelkada-Maddegama-Bopagoda	7.30	PS		Medagama Pahala Maddegama Lelwala Batuwangala Maddegama East Ihala Maddegama	-	20	concrete/ Gavel	medium
4	Danawala-Mawita	3.70	PS		Mavita West Mavita East	-	12	Concrete/ macadam/ Gravel	medium/ bad
5	Batahena-Kudagalpola-Habarakada	9.00	PS	Tawalama	Kudugalpala Hiniduma West Malhathawa	4	14	macadam/ concrete/gravel	bad/medium
6	Dharmapala Vidyalaya-Dunhena	1.20	PS		Ela Ihala Kudugalpala Habarakada West	3	25	macadam/ concrete/gravel	medium
7	Habarakada-Ibbawala Yattapatha	3.20	PS		Ela Ihala Ela Ihala North	3	5	concrete/ Gavel/foot path	good/bad
8	Kumburagoda-Mandalapura	6.80	PS		Ela Ihala North Kumburegoda	3	36	concrete/Gavel/ interlock/macadam	medium/bad
9	Halwitigala-Janapadaya-Tawalama Mukalana	2.80	PS		Thawalama South Thawalama Mookalana	-	-	gravel	medium
11	Mandalapura 12th m post	2.20	PS		Ela Ihala North	3	10	gravel	medium
12	Mayakaduwa-Kombala Temple-Watiyadeniya-Heenpandala	1.00	PS	Habaraduwa - Imaduwa	Kombala	3	2	concrete/gravel	medium
13	Kabaragala Badipita Puswelkada Unagaswita Galpoththa Kombala	7.00	PS		Kombala Puswelkada Ihala Kombala	3	6	gravel/ concrete/ macadam	medium/good/bad

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts and bridges	Surface Type	Road Condition
	Junior School 10th mile post thiyabarahena Rd								
14	Taramulla-Allalagoda Rd	2.30	PS		Pitidoowa Lanumodara Katukurunda	4	15	macadam	medium
15	Galkatiya-Jayasumanaramaya, Goviyapana junction	1.50	PS		Kombala Imaduwa Athireka	-	-	-	-
16	Pangiri hena-Mayakaduwa	5.80	PRDA		Kombala Ihala Kombala Hawpe North Wathawana Pituwalahena Mayakaduwa Ihala Walpala	-	-	-	-
17	Liyanagoda-Lanumodara-Pitiduwa	3.00	PS		Kombala	4	-	gravel	medium
18	Dodampe-Padinnoruwa	1.80	PS		Melegoda Peddinnoruwa Dodampe Attaragoda Meepe Bogahamulugoda	3	15	macadam	medium
19	Kombala-Halamulla-Niriwella	3.50	PS		Kabaragala Danduwana Hatangala Hawpe Bedipita Puswelkada Hawpe North	-	-	-	-
20	Mayakaduwa,Wadiyakanda,Makaduwa Temple Kakillawatta juction	3.30	PS		Pituwalahena Mayakaduwa Ihala Walpala	3	6	gravel/ concrete	medium
22	Hapugala-Eriyagaha Junction	1.20	PRDA		Opatha Wakwella Beraliyadola Uluvitike Abeysundarawatta				
23	Edirisinghe Mw-Navinna	1.60	PS		Madawalamulla South Kahadoowawatta	3	-	macadam/ concrete/gravel	medium

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts and bridges	Surface Type	Road Condition
24	Kapuhempala,Ambalamakanda,Hinidumgoda,Haliwala	1.80	PS	Akmeemana	Paliwathugoda Kerenvila Colony Haliwala	2.5	3	concrete/macadam	medium
25	Poorwarama Road Bataduwa	2.00	PS		Ettiligoda South Makuluwa Haliwala Batadoowa Batadoowa west	2.5	4	gravel/concrete	bad/medium
26	Bataduwa - Sudaramaramaya Rd	1.00	PS		Katugoda Magalle Dewathura Batadoowa west	2.5	-	Concrete	medium
27	Hiyare East-School Road via Kaluwala Badipita Hawpe	1.20	PS		Kadurugashena Hiyare East Bedipita	2.5	12	macadam/concrete/gravel	bad/medium
28	Kimbulawala-Porawagama Road	3.90	PS	Niyagama	Kimbulawala Mattaka Duwegoda Porawagama South	2.5	11	macadam	medium
29	Hattaka-Pityagala North Sasanathilaka Mawatha	3.40	PS		Pitigala North Hattaka	2.5	15	concrete/macadam	medium/bad
30	Kurupanawa Maliban Janction-Old Samurdhi Building Via Polkella	1.20	PS	Nagoda	Kurupanawa Keppitiyagoda Udalammatta North	3	12	gravel/concrete	medium
31	Udugama- Kothalawala Rd	6.60	PS		Homadola	-	-	macadam/concrete/gravel	medium
32	Udugama - Aluthwatta	5.00	PS		Aluthwatta Hangaranwala Udugama Central	2.5	5	gravel/concrete	bad/medium
33	Yakkalamulla Via Udumala gala to Nakiyadeniya	4.00	PS	Yakkalamulla	Nakiyadeniya North Nakiyadeniya Ihala Nakiyadeniya Udumalagala Yakkalamulla	3	6	macadam	medium
34	Janahitha Tea Factory-Nawungala School Via Muslim Janapadaya	2.70	PS		Nevungala Nevungala South	3	3	macadam/concrete/gravel	medium/bad
35	Nawala Community Hall	5.10	PS		Mabotuwana	4	1	macadam/concret	medium/bad

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts and bridges	Surface Type	Road Condition
	to Goluwamal hena via Ellagawa				Nawala Thalawa			e/gravel	
36	Wackwella-Ginimallagaha	6.00	PRDA	Baddegama	Wakwella Lelkada Ginimellagaha East Ginimellagaha South Dodangoda Thelikada Thelikada Nagaraya Horagampita Central Gonapura	3	13	macadam	medium
37	K.G.Palis Mawatha	2.00	PS		Ginimellagaha East Ginimellagaha South Pituwalgoda Thelikada	3	6	macadam	medium
38	Waulagala-Batakatiya	2.00	PS		Halpathota Central Wavulagala Weweldeniya Bataketiya	3	8	macadam	bad
39	Nagashandiya-Halpathota	2.00	PS		Halpathota Central Wavulagala Weweldeniya	2.5	2	gravel/concrete	bad/medium
40	Goluwamulla- Atakohota	2.20	PRDA	Elpitiya	Goluwamulla Atakohota	3	6	macadam	medium
41	Goluwamulla-Welimanana Nagahatenna	1.90	PS		Goluwamulla Digala Nagahathenna	2.5	-	concrete/macadam/gravel	medium
42	Amuna junction-Maitrigama	3.90	PS		Hipanwatta Hipankanda Goluwamulla West Goluwamulla North	3	10	macadam/gravel	bad/medium
43	Pinikahana - Puwakdola	2.70	PS		Pinikahana	4	12	macadam/gravel/interlock	bad/medium
44	Opatha-Omatta-Bulugaha	4.80	PRDA		Opatha Pahala Omatta Omatta	3	28	macadam	medium
45	Galparaya Road	2.00	PS	Benthota	Delkabalagoda Maha Uragaha Goluwamulla West	3	11	gravel/concrete/macadam	medium/bad
46	Surasena Mawatha	1.70	PS		Kuda Uragaha	1.8	4	gravel/ concrete	medium

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts and bridges	Surface Type	Road Condition
					Kotuwabendahena				
47	Deddugala-Bataduwa	1.00	PS		Kuda Uragaha	-	-	-	-
48	Waduweliwitiya Muktawela junction-Putuwagoda watta via Soratha Gammanaya	1.30	PS	Weliwitiya-Diwithura	Pathavalivitiya North	3	3	macadam	medium
					Waduwelivitiya				
49	Manampita-Dehigaha Bedda Kirindiela	2.70	PS	Gonapinuwala	Diddeliya	3	1	macadam	medium
					Karuwalabedda				
					Manampita				
					Kirindiela				
50	Aluthwala-Angamakanda	0.50	PS		Mahagangoda	2.5	2	gravel/macadam	bad
51	Welibokkuwa-Banwelgodella	0.90	PS		Ampegama	2.5	2	macadam	medium
					Banwelgodella				
52	Ampegama School-Unapandura junction Road	1.30	PS		Ampegama	3	8	macadam	medium
					Banwelgodella				
53	Batapola Dorala junction to Kirimatiara Road	1.10	PS	Ambalangoda	Batapola Central	3	2	macadam	medium
					Kondagala				
54	Nindana school to 5th mile post via Waturawila	5.00	PS		Nindana	-	-	-	-
					Batapola West				
					Diddeliya				
					Nawagama				
					Karuwalabedda				
56	Kahawa-Galduwa Rd	1.90	PS		Udakerewa	4	4	macadam	medium
					Galdoowa				
					Weragoda				
57	Dewagoda-Balabokka Rd	0.70	PS		Idanthota	4	1	macadam	medium
					Usmudulawa				
58	Boosa Kakilla mandiya Regjipura Madawala Rd	3.00	PS		Rejjipura	-	-	macadam/concret/grvel	bad/medium
					Medawala				
59	Buddajayanthi Mawatha Thirangama	1.30	PS		Delgahadoowa	3	4	macadam	bad/good/medium
					Katukoliha				
60	Ratagama Imbulagoda	1.40	PS		Katudampe	-	-	macadam	bad
					Imbula				
61	Sirikadura watta Sunami Niwasa Rd	1.40	PS		Handaudumulla	-	-	gravel	medium
					Mawadavila				
					Thotavila				

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts and bridges	Surface Type	Road Condition
62	Dudly Senanayaka Mawatha Weragoda	1.40	PS		Udakerewa	3	-	macadam	medium
					Meetiyagoda				
					Delmar Colony				
					Weragoda				
63	Boosa Hagoda Rajakoratuwa Rd	1.20	PS		Rejjipura	-	-	macadam	medium
					Hegoda				
					Mahahegoda				
					Maliduwa				
					Palanthriyagoda				
64	Galduwa Aranya Rd	2.30	PS		Udakerewa	-	-	macadam	bad
					Dimbuldoowa				
					Galdoowa				
65	Kaluwalagoda Road	5.00	PS	Karandeniya	Magala North	4	23	macadam	bad
					Beligaswella				
					Magala South				
					Kaluwalagoda				
					Diyapitagallana				
66	Mada Kubura junction Kaluwala goda	4.50	PS		Kaluwalagoda	-	-	macadam/gravel/concrete	bad/medium
					Diyapitagallana				
					Angulugalla				
					Madakumbura				
					Thalgahawatta				
67	Bogaha junction Kaluwala goda	1.90	PS		Magala North	4	6	concrete/macadam	medium/bad
					Beligaswella				
					Kaluwalagoda				
69	Hatharaman junction-Pasman junction	1.70	PS		Nape	4	3	macadam	bad
70	Thannahengoda Rd	2.00	PS		Katuvila	4	4	gravel	medium
44a	Elpitiya-Awiththawa	9.50	RDA	Elpitiya	Elpitiya -South				
					Elpitiya -Central				
					Goluwamulla -North				
					Opatha				
					Awittawa				
OPRC Package (Reconstruction)									
71	Labuduwa - Wanduraba (B248)	11.70	RDA	Bope-Poddala	Magadeniya	-	-	-	-
					Baswatta				
					Ambagahawatta				
				Akmeemana	Thalgasyaya				
					Niyagama				
					Ganegoda				

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts and bridges	Surface Type	Road Condition
					Akmeemana				
				Baddegama	Kokawala				
					Kasideniya				
					Panvila				
					Wanduramba South				
					Wandurambe				
					Deiyandara				
					Pitiharawa				
					Meda Keembiya East				
72	Nagoda - Gonadeniya (B303) and Gonadeniya - Udugama Bar junction (B139)	4.00	RDA	Nagoda	Gonadeniya	-	-	-	-
					Ukovita North				
					Udugama				
					Nagoda				
					Kurupanawa				
					Ukovita				
73	Udugama-Hiniduma (B429)	11.00	RDA	Nagoda	Homadola	-	-	-	-
					Udugama North				
					Udugama				
				Thawalama	Habarakada West				
					Thawalama North				
					Batahena				
					Hiniduma North				
					Malhathawa				
					Panangala North				
					Panangala East				
					Koralegama				
					Gallandala				
					Hiniduma South				
74	Thawalama-Neluwa-Batuwangoda	9.70	RDA	Neluwa	Mawanana	-	-	-	-
					Batuwangala West				
					Neluwa				
					Pahala Gigummaduwa				
					Pahala Maddegama				
					Batuwangala				
					Ehelapitiya				
				Thawalama	Habarakada East				
					Thawalama North				

B. Matara District

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts	Surface Type	Road Condition
1	Kohugoda Road	5.50	PS	Akuressa	Kohugoda				
					Ihala Maliduwa				
					Pahala Maliduwa				
2	Poramba School – Diyalape Junction via Hikgoda	3.70	PS		Poramba				
					Imbulgoda				
					Higgoda				
					Diyalape				
3	Ilukpella – Mahingoda- Bopitiya	5.20	PS		Iluppella				
					Imbulgoda				
					Eramudugoda				
					Manikgoda				
					Bopitiya				
4	Akuressa - Katanavila	7.00	RDA		Ketanvila				
					Akuressa				
					Iluppella				
					Imbulgoda				
					Diyalape				
					Eramudugoda				
					Manikgoda				
5	Paraduwa- Pahuranwila	2.40	PS		Paraduwa North				
					Paraduwa South				
					Henegama				
6	Bangama junction- Dola Mawatha	2.50	PS		Dolamawatha				
					Ehelape				
7	Sri Sudarshi Pirivena Junction to Bibulewela Shramadana Road	3.70	PS	Athuraliya	Pahala Athuraliya				
					Athuraliya East				
					Athuraliya West				
					Karagoda Uyangoda 1 Atha East				
					Bibulewela				
8	Alapaladeniya – Thalpekumbura	2.50	PS	Pitabeddara	Alapaladeya South	2.5	13	Macadam	Medium
					Alapaladeya North				
9	Dangala – Dellawa	2.40	PS		Dangala East	3	3	Macadam	Medium
10	Morawaka – Millawa	2.90	PS		Weliwa	4	8	Macadam/Gravel	Medium/Bad
					Morawaka				
11	Millagaha hena- Kudagala hena	4.00	PS		Kudagalahena	2.5	9	Gravel / Concrete/Macadam	Bad / Medium
12	Darangala-Dahaya	3.50	PS		Banagala East	3	2	Concrete /	Medium /

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts	Surface Type	Road Condition
	Kanda Mahena				Kiriwelkele North			Gravel	Bad
13	Batayaya – Kandilpana – Bewraliiya	13.50	PS	Kotapola-Morawaka	Bateyaya				
					Ihalagama				
					Viharahena				
					Kandilpana				
14	Morawaka-Paragala Diyadawa	11.20	PS		Uvaragala				
					Pelawatta				
					Paragala				
					Wanasinkanda				
					Diyadawa				
15	Berala Panathara-Thala Palakanda	6.00	PRDA		Thalapelakanda	4	15	Macadam / Concrete	Medium
					Thenipita				
					Batandura North				
					Beralapanathara North				
					Kalugalahena				
16	Kosmodara-Bodeniya	4.00	PS		Kotapola North	3	16	Gravel /Concrete	Bad / Medium
					Nawalahena				
					Usamalagoda				
17	Pathawala-Nadakanda-Keeriwellagama	2.80	PS		Pathawala Nadakanda	3	12	Gravel /Concrete	Bad
					Keeriwalagama				
18	Kiriwellagama Market to Dewala Road	1.20	PS		Keeriwalagama	2.5	3	Gravel /Concrete	Bad / Medium
19	Kiriwalladola junction to Hingurahena	2.10	PS		Kiriweldola	2.5	9	Concrete /Gravel	Medium /Bad
20	Keeriwaldola–Keeriwelgama	2.30	PS		Kiriweldola	3	4	Concrete	Bad / Medium
					Keeriwalagama				
21	Porupitiya Annasigalawila	1.40	PS		Porupitiya	3	6	Concrete	Medium
					Pelawatta				
22	Millalle via Aluwana Sankassa to Madde Ala Rd	6.90	PS		Pelawatta	3	10	Concrete /Macadam / Gravel	Medium / Bad
					Aluwana				
					Paradupalla				
					Morawaka				
23	Weliwa Pahuruthota - Neel Ella	4.20	PS		Kosnilgoda	3	13	Gravel / Concrete / Macadam	Bad / Medium
					Siyambalagoda West				
					Rambukana West				
24	Bengamuwa-	3.20	PS		Bengamuwa West				

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts	Surface Type	Road Condition
	Dabogala Road up to Napath Ella				Denkandaliya Bengamuwa South				
25	Kananke juntion Polhena-Hallala-Ambedola	2.70	PS	Weligama-Welipitiya	Puhulahena	3	3	Concrete /Macadam / Gravel	Medium / Bad
26	Dehigahahena – Udukawa	2.50	PS		Wellana Udukawa North	3	6	Gravel / Concrete / Macadam	Medium / Bad
27	Denuwala - Kapuwatta Jaya wijayagama	2.60	PS		Midigama West Denuwala	3	7	Concrete / Gravel / Macadam	Medium / Bad
28	Yatipila – Udahahena – Henwala	1.80	PS		Henwala West Mirissa North Mirissa Udupila	3.5	3	Concrete / Gravel / Macadam	Medium / Bad
29	Udupila Junction – Udupila Vihandagoda – Bandaramulla	1.60	PS		Mirissa Udupila Bandaramulla	3	2	Concrete	Medium
30	Ibbawala-Panchaliya-Andugoda	2.30	PS		Midigama North Borala Ibbawala Vilegoda Midigama North	3.5	3	Macadam	Medium
31	Ibbawala – Ranamaduuragama	1.30	PS		Midigama North Vilegoda Midigama North	3		Gravel / Concrete / Macadam	Bad / Medium
32	Welipitiya Junction – Addarawela	2.20	PS		Moonamalpe Welipitiya Palalla Borala	2.5	22	Concrete / Gravel / Macadam	Medium / Bad
33	Jaburegoda – Bodhirukkaramaya	2.30	PS		Palalla Jamburegoda East	3	7	Footpath / Concrete / Gravel	Bad / Medium
34	Pathegama – Kudulumulla	2.30	PS		Midigama West Midigama East	3	4	Macadam / Gravel / Concrete	Bad / Medium
35	Jamburagoda Heelelgoda junction-Bodduwa	1.80	PS		Jamburegoda West	2.5	5	Macadam / Gravel / Concrete	Bad / Medium
36	Kananke police Station Dewelagoda	1.60	PS		Wahala Kananke South	3	8	Macadam / Gravel	Medium / Bad

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts	Surface Type	Road Condition
37	Kotavila Kudawella Sulthanagoda	2.00	PS		Kotavila West	3	11	Macadam / Gravel	Bad / Medium
38	Udukawa Baduravila Rd	1.20	PS		Udukawa South Udukawa North	2.5	4	Concrete / Gravel / Macadam / interlock	Medium / Bad
39	Welipitiya junction-Munamalpe Udukawa	2.40	PS		Moonamalpe Beraleliya Udukawa South	3		Macadam	Medium / Bad
40	Urawa-Pilikannahena Thalgasthenna Rotuba	2.50	PS	Pasgoda	Rotumba East Rotumba West				
41	Lew Pothdeniya	2.60	PS		Puwakbadovita kehelwala	3	7	Concrete /Gravel	Medium / Bad
42	Urubokka - Pothdeniya	6.40	PS		Urubokka Keeripitiya East Mekiliyathenna Heegoda Keeripitiya West				
43	Baragammulla Moragasmandiya	2.70	PS	Kamburupitiya	Beragammulla	2.2	3	Gravel / interlock / Footpath / Concrete	Bad / Medium
44	Narangalgoda - Palliya Gedara	2.30	PS		Karagoda Uyangoda 2 East Karagoda Uyangoda 2 West	3	5	Concrete / Gravel / Interlock /Macadam	Medium / Bad
45	10th Mile Post-Hakmana Gedara Kade	3.40	PS	Kirinda-Puhulwella	Yatiyana Puhulwella West Kirinda Mangin Ihala South Wathukolakanda North Wathukolakanda East	3	8	Macadam / Gravel / Concrete / Interlock	Medium / Bad
46	Karatota School-Gewal Dahaya	2.40	PS		Karathota Boraluketiya Hettiyawala East	3	11	Macadam / Gravel / Concrete / Interlock	Medium / Bad
47	Kubalgoda Seelaratna Mawatha	1.70	PS		Kumbalgoda Naradda	3	4	Macadam	Bad
48	Samagimawtta via	2.70	PS	Thihagoda	Pahala Vitiyala West	2.5	5	Macadam /	Bad /

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts	Surface Type	Road Condition
	Siridewapriya mawatha				Narangala Ihala Vitiyala West			Gravel / Concrete / Interlock	Medium
49	Atapattukanda Handiya-Pothuvila	1.40	PS	Mulatiyana	Parapamulla East Athapattukanda				
50	Wilpita-Ukgashena via Ransagoda Galpothta junction Keeriwellagama	5.40	PS		Vilpita East 1 Uggashena Ransegoda South				
51	Jayawardhana Mawtha(Wellithota Rd)	1.20	PS	Malimbada	Malimbada North Katuwangoda Wellethota				
52	Ogaspe junction to Maligathenna Athtuduwa	1.20	PS		Malimbeda West Malimbada North				
53	Pahattu Kade to Nagoda via Welihinda junction	1.00	PS		Galpamuna Malimbeda West Malimbada North				
54	Sulthangoda Kotavila	1.20	PS		Kirimetimulla North Akurugoda East Kirimetimulla South Akurugoda South				
55	Sulthangoda-Welihinda	1.00	PS		Akurugoda South Sulthanagoda Wast Akurugoda West				
56	Kongala D.C Abeywickrama Rd	2.40	PS	Hakmana	Kongala Central Kongala East				
57	Obadakanda Badabadda Rd	4.70	PS		Panawela West Wepathaira North Wepathaira West Badabadda				
58	Sri Piyarathana Mawtha (Kakuluwangoda-Mawatha)	1.90	PS	Devinuwara	Palle Aparekka Uda Aparekka Uduwa East	2.5	4	Macadam / Concrete	Bad / Mdium
59	Ashokarama Rd	1.70	PS		Pathegama North Pathegama East	3	6	Macadam / Concrete / Gravel	Bad / Mdium
60	Degigewatta Hakalamulla	1.20	PS	Dikwella	Wehella	2.5	3	Concrete / Gravel	Medium / Bad
61	Kaluhena Kolaniya	4.30	PS		Walakanda West	2.5	5	Gravel /	Bad /

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts	Surface Type	Road Condition
	Rd				Urugamuwa West			Concrete / Macadam / Interlock	Mdium
10a	Abewala – Thibbatuwa road	4.90	PS	Pittabeddara	Kalubovitiyana			gravel/concret	
2.24a	Deniyaya - Viharahena Road	6.30	RDA	Kotapola	Viharahena			Macadam	
					Adaradeniya				
					Ihalagama				
2.57a	Thumbe-Kongala Road	4.70	PRDA	Hakmana	Karaputugala South			Macadam	
					Kongala Central				
					Kongala South				
OPRC Package (Reconstruction)									
62	Bengamuwa-Molagoda-Galdola (B607)	9.30	RDA	Kotapola	Kotapola South				
					Kosmodara				
				Pasgoda	Mologgamuwa North				
				Kotapola	Ilukpitiya				
				Pasgoda	Mologgamuwa South				
					Bengamuwa West				
					Bengamuwa South				
				Kotapola	Lindagawahena				

C. Hambantota District

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts	Surface Type	Road Condition
1	Pattiyawela – Pallattara	3.90	PS	Beliatta	Pallattara South	4		Concrete	Medium
					Pallattara West				
2	Upaskagoda well – Water Trunk	1.20	PS		Eldeniya	4	2	Concrete / Gravel	Medium
					Getamanna West				
3	Edirisingha Mawatta	1.20	PS		Getamanna North	3	4	Gravel / Macadam / Concrete	Medium
4	Polapothe Watta Rd	1.00	PS		Getamanna North	3	2	Gravel	Medium
					Eldeniya				
					Getamanna West				
5	Siyabalapa hena	1.30	PS		Ovilana	3	3	Gravel / Interlock / Concrete	Medium
					Palapotha West				
6	Anamaduwa-	2.20	PS		Aranwela West			Gravel /	Medium /

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts	Surface Type	Road Condition
	Aranwela				Kahawatta Agulmaduwa Aranwela North			Concrete / Macadam	Bad / Good
7	Pattiyawela – Tharapeliya	1.30	PS		Tharaperiya Pattiyawela			Macadam / Concrete / Interlock	Medium /Bad
8	Boralukand junction Uda Beragama to mahaa Ara junction	3.20	PS	Hambanthota	Dehigahalanda Udaberagama	4		Macadam	Medium
9	4 Ela – School Road	1.50	PS		Siyambalagasvila South Udaberagama	3		Macadam	Medium
10	Boondala-Meda Para	1.40	PS		Bundala	3		Macadam	Medium
11	Boralu kanda Cooperative to Boralukanda handiya (Laksiri Rd)	0.70	PS		Dehigahalanda	3		Macadam	Medium
12	Godawaya juntion to temple Rd	1.60	PS		Dehigahalanda Godawaya	4	5	Macadam	Medium
13	Manchgawa layma handiya	0.40	PS		Manajjawa	4		Macadam	Medium
14	Magama Road	8.40	PRDA	Tissa	Konwelena Shuddha Nagaraya Rathnelumwalayaya Halmillawa Gotabhayapura	4	5	Concrete	Medium
15	Nadigamvila Vijithapura Road	4.20	PS		Nedigamvila Wijayapura	3		Concrete / Macadam	Medium
16	Sabapathikade – Gonamuwa Hospital Rd	1.90	PS		Gonagamuwa Uduvila Saliyapura	4	3	Macadam	Bad
17	Ikkapallama School Road	1.90	PS		Wijayapura Gonagamuwa Saliyapura	4		Concrete	Medium
18	Diya bediya Road	1.30	PS	Lunugamvehera	Abhayapura Mihindupura	3		Gravel / Concrete	Medium / Bad
19	Weeravila Ara 01st cross Road	1.20	PS		Lunugamvehera New Town Punchiappujandura	2	1	Gravel	Bad
20	Ittan wewa 02nd Cross Road	0.70	PS		Lunugamvehera New Town	3		Gravel / Footpath	Bad
21	Piyapala Mawatha	2.10	PS		Muwanwewa	3	11	Gravel /	Medium /

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts	Surface Type	Road Condition
					Weeravil Ara			Interlock	Bad
22	Uswewa – Binkama Road	15.10	PS	Angunakola Pelassa	Kankanamgama	3	16	Macadam	Medium / Bad
					Kohombagaswewa				
					Meda Ara				
					Kalawelwala				
					Binkama				
					Uswewa				
					Amarathungama				
23	Ddambarella Co-Op-Kanabandi Area	4.50	PS		Dabarella North	3		Gravel / Macadam / Concrete	Bad / Medium
24	Gajanayakagama Habokka junction-Gajanayakagama Junction	2.00	PS		Medagoda	2	4	Gravel / Concrete	Medium / Bad
					Gajanayakagama				
25	Uswewa via Pahalagama Sooriya Pokuna junction	5.20	PS		Debokkawa South	3	9	Gravel / Concrete	Medium / Bad
					Pahalagama				
					Debokkawa North				
					Sooriyapokuna				
					Amarathungama				
26	Eraminiyaya-Hadunkatuwa	5.1	PS	Ambalamtota	Angunakolapelessa	3	1	Gravel / Macadam	Bad / Medium
					Yakagala				
					Eraminiyaya				
27	Thuduwa mulla - Habarakthawala Goda Koggalla Rd	5.9	PS		Habarattawala	3	9	Macadam / Concrete / Gravel	Medium / Bad
					Godakoggala				
					Liyangasthota				
28	Hathagala handiya-Deniya Pingama to Athbatuwa to Hadunkatuwa Gamaralagama Handiya	9.5	PS		Hathagala	4	6	Macadam / Concrete / Gravel	Medium / Bad
					Wetiya				
					Miniethiliya				
					Murawasihena				
					Handunkatuwa				
					Ethbatuwa				
					Deniya				
29	Ridiyagama Livestock farm to Gangawalana Rd	6.1	PS		Ridiyagama	3	8	Macadam / Concrete / Gravel	Medium / Bad
					Liyangasthota				
30	Ridiyagama-Ahabodawila-Thuduwa mulla Rd	6.5	PS		Liyangasthota	4	3	Gravel	Medium
31	Thorakolayaya-	3.00	PS	Katuwana	Sapugahayaya	3	3	Concrete /	Medium /

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts	Surface Type	Road Condition
	Gammaimpara				Hellala			Gravel / Macadam	Bad
32	Welipitiya Ambagasara via Siyarapitiya	8.80	PS		Siyarapitiya Gangulandeniya Siyambalamuraya Welipitiya West Kohomporuwa Ambagas Ara	3	23	Concrete / Macadam	Medium
33	Pattiyapola – Marakolliya	3.30	PS	Tangalla	Vitharandeniya North Marakolliya Vitharandeniya South Pattiyapola South Palathuduwa	3	11	Macadam / Gravel / Concrete	Bad / Medium
34	Kadurupokuna-Seenimodara Rd	2.60	PS		Seenimodara West Kadurupokuna West	3	6	Concrete / Macadam / Interlock / Gravel	Medium / Bad / Good
35	Pattiyapola-Akkarawela Thalunna	4.00	PS		Udayala Sudarshanagama Pattiyapola West	3	2	Gravel / Macadam / Concrete	Medium / Bad / Good
36	Koggalla Sooriya Wewa	7.30	PRDA	Sooriya Wewa	Namadagaswewa Andarawewa Habarattawala	5	13	Macadam / Concrete / Gravel	Bad / Medium
37	Ela Banteka Para	3.60	PS	Walasmulla	Galahitiya North Muruthawela Pahala Ihala Muruthawela Pahala Obada	3	3	Gravel / Interlock / Concrete	Medium
38	Bariyar junction to Galwadiya 4th Mile post	2.60	PS		Pahala Obada Galwadiya Palle Julampitiya	4	5	Gravel / Concrete / Interlock / Macadam	Medium / Bad
39	Warapitiya Hospital to Karadeniya RD	3.10	PS		Warapitiya Haggitha Kanda North Keredeniya	3	3	Concrete / Macadam	Medium / Bad
40	School to Ela Banteka Para	2.00	PS		Omara East Pahala Walasmulla Omara West	4	13	Macadam / Concrete / Interlock / Gravel	Bad / Medium
41	Pallekanda junction Udahatana Gambaddala	1.10	PS	Okewella	Kanumuldeniya North	3	2	Gravel / Concrete / Macadam	Bad / Medium

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts	Surface Type	Road Condition
42	Sumihirigama Co-Op city-Kukula Mandiya Hena Mahamadiththa	1.90	PS		Rajapuragoda Kurunduwatta Kanumuldeniya North Sumihirigama	2	6	Gravel / Concrete / Interlock	Bad / Medium
43	Kadigamauwa Palamkada to Ekamuthu Mawatta to Batalawatta	5.70	PRDA		Mulgirigala West Modarawana North Kadigamuwa West Kadigamuwa East	2	17	Concrete / Gravel / Macadam	Bad / Medium
44	Gonadenihena Kanda via Rajapaksha Mawatha	1.10	PS		Kanumuldeniya East Kanumuldeniya South	2		Gravel / Concrete	Bad / Medium
45	Kakunayaya Market to bhuweliara Rd	1.00	PS	Weeraketiya	Wekandawala North Debokkawa East Debokkawa West	4	4	Concrete / Gravel / Interlock	Medium
46	Maregawa Rd	0.80	PS		Okandayaya West Okandayaya North			Interlock / Footpath / Concrete	Medium / Good
47	Kudabibula Lidagawa Rd	1.00	PS		Kuda Bibula North Siyambalaheddawa Kuda Bibula South Meegas Ara	4	1	Interlock / Gravel / Concrete	Medium
48	Okandayaya Paluwatta Rd	1.50	PS		Okandayaya North Thalawa South Kudagal Ara Dambethalawa			Gravel / Interlock / Concrete	Medium
49	Gonadeniya-Kaluwagaha yaya-Talawa	5.20	PS		Thalawa North Pahala Gonadeniya Kaluwagahayaya Ihala Gonadeniya Thalawa South	4	10	Gravel / Macadam	Bad
50	Perahara Mawatha - Mulkirigala School	3.20	PS		Mulgirigala West	2		Gravel / Macadam	Bad
51	Katuwewa to Mulgirigala School Rd	2.80	PS		Weeraketiya East Mulgirigala South Mulgirigala East	3	5	Concrete / Gravel / Interlock / Macadam	Medium / Bad
52	Watarauma Rd	2.80	PS		Wekandawala South	4	2	Concrete /	Medium /

Road ID	Road Name	Length (km)	Road Category	DSD	GNS	Present Width	No. Of culverts	Surface Type	Road Condition
					Wekandawala North			Macadam / Gravel	Bad
					Debokkawa West				
OPRC Package (Reconstruction)									
53	Kirama-Warapitiya-Hulankanda-Heegoda	14.40	RDA	Katuwana	Wathukanda				
				Walasmulla	Mapitakanda				
					Welandagoda				
					Rammala				
					Warapitiya				
					Pahalawatta				
					Batagassa				
					Keredeniya				

Appendix 1.2 : Sample Completed Environmental Checklists

No:	Type of Ecosystem	Yes	No	Explanation
1.	Type of Terrain (~~Plain~~/ Undulating/ Hilly/ ~~Mountainous~~ etc.) (Explain the topography of the area and how many km of the road are located in the hilly area)	X		Altitude: 180 - 300 ft Undulated and some places are hilly
2.	Forest Area / Mangrove / Other natural habitats (Explain whether the road passes through forest areas or located along the forest areas and distance from shoulder to the forest area)?	X		Type of Vegetation: Stream vegetation Legal Status of the Forest Area: (Reserved, National Park, Sanctuaries, Unclassified, etc.) Unclassified
3.	Inhabited Area	X		
4.	Agricultural Land	X		Cinnamon, Rubber, Tea and Paddy
5.	Barren Land	X		

A. Specific description of the Road Environment

No.	Parameter/ Component	Yes	No	Explanation
1.	Are there any areas with landslide or erosion problems along the road? (If yes, indicate the location whether Right or Left side and the chainage)	X		Hilly areas and areas with road side earth walls ( ) No Secondary Information is available and Local Community is not aware of this matter
2.	Are there any Tanks/streams /rivers etc. along/crossing the road or any lakes/swamps beside the road? (If yes, list them indicating the location Right/ Left or crossing and the chainage)	X		• 06^0 22.893 - 80^0 21.503 Stream crossing • 06^0 23.018 - 80^0 21.813 Stream crossing • 06^0 23.027 - 80^0 21.916 Stream crossing • 06^0 23.371 - 80^0 22.393 Stream crossing • 06^0 23.661 - 80^0 22.680 Stream crossing • 06^0 23.776 - 80^0 22.930 Stream crossing • 06^0 23.804 - 80^0 23.061 Stream crossing • 06^0 23.652 - 80^0 23.275 Stream crossing • 06^0 23.633 - 80^0 23.309 Stream crossing
3.	Is the area along the project road prone to flooding or any problems of water stagnation and other drainage issues? (If yes, mention chainage, flood level and frequency)	X		No proper side drainage system ( ) No Secondary Information is available and Local Community is not aware of this matter

No.	Parameter/ Component	Yes	No	Explanation
4.	Are there any trees with a dbh of 30 cm or more affected on either side from the centre line of the road alignment? (If yes attach list of trees indicating the location (Right or Left side)and the chainage)	X		See annex 1
5.	Along the road and within 100 m of the road shoulder, are there any Faunal habitat areas, Faunal breeding ground, bird migration area, or other similar areas? (If yes, specify details of habitat with chainage)	X		• Stream vegetation • Home gardens • Abandoned land • Cultivated lands
				( ) No Secondary Information is available and Local Community is not aware of this matter
6.	Along the road and within 100m of the road shoulder is there any evidence of Flora and Fauna species that are classified as endemic, endangered /Threatened species?	X		See annex 2 and 3
				( ) No Secondary Information Available and Local Community is not aware of this matter
7.	Are there any utility structures[17] within 10 m on either side from the centre line of the road alignment? (If yes, attach list with chainage)	X		• Electric poles • Concreted canal going on the right hand side of the road 06^0 23.007 - 80^0 22.170 See annex 4 for other
8.	Are there any religious, cultural or community structures/buildings[18] within 50 m on either side from the centre line of the road alignment? (If yes attach list with chainage)	X		See annex 4

B. Public Consultation

No.	Consultation Activities	Yes	No	Remarks
1.	Consultation with local community was conducted before finalizing the alignment. (Attach list of people met and dates)		X	
2.	Any suggestion received in finalizing the alignment		X	
3.	If suggestions received, were they incorporated into the design?			

C. Please attach the following:

I. List of utility structures indicating location (left or right side of the road) and chainage (as required under C. 7)

II. List of community structures indicating location (left or right side of the road) and chainage (as required under C. 10)

[17] Water tap, hand pump, electric pole, telephone pole, pipe lines and other similar structures
[18] Religious/cultural/historical monuments, school, health centre, public toilet and other similar structures

III. Project Map

IV. Photographs of the project area showing at least 10 m on either side from centre line of road alignment. Every 2 km or less of road must have at least 1 photograph.

Annex 1: Affected Tree over 30 cm dbh

No.	Location		Side	Family	Scientific Name	Common name	TS	NCS
	Latitude	Longitude						
Start	06^0 22.823	80^0 21.476						
1	06^o 23.011	08^o 22.195	R	Fabaceae	*Acacia mangium*		I	
2	06^o 23.013	80^o 22.214	R	Fabaceae	*Acacia mangium*		I	
3	1m from 2		R	Fabaceae	*Acacia mangium*		I	
End	06^0 23.470	80^0 23.497						

TS – Taxonomic Status, I – Introduced or Exotic, NCS – National Conservation Status, R – Right Side

Annex 2: Recorded Endemic, Endangered / Threatened Plant Species

No.	Habitat	Family	***Scientific Name***	Common Name	HA	TS	NCS
1	HG	Fabaceae	*Pericopsis mooniana*	Nadun	T	N	VU
2	AB/SS	Fabaceae	*Adenanthera bicolor*	Mas Mora	T	E	
3	AB/SS	Celastraceae	*Bhesa ceylanica*	Pelan	T	E	
4	SS	Monimiaceae	*Hortonia angustifolia*		T	E	VU

HA – Habit, T – Tree, TS – Taxonomic Status, E – Endemic, N - Native, NCS – National Conservation Status, VU - Vulnerable, HG - Home garden, AB - Abandoned Land, SS - Stream side,

Annex 3: Recorded Endemic, Endangered / Threatened Fauna Species

Family	Scientific Name	English Name	Sinhala Name	TS	NCS
Psittacidae	*Loriculus beryllinus*	Sri Lanka Hanging Parakeet	Sri Lanka Giramaliththa	Endemic	
Ramphastidae	*Megalaima flavifrons*	Sri Lanka Yellow-fronted Barbet	Sri Lanka Ranmhunatha Kottoruwa	Endemic	

TS – Taxonomic Status, NCS – National Conservation Status TS – Taxonomic Status, NCS – National Conservation Status

Annex 4: List of Utility and Community Structures

No.	Location		Side	Structure
	Latitude	Longitude		
Start	06^0 22.823	80^0 21.476		
	06^0 23.010	80^0 21.806	L	Community hall
	06^0 23.015	80^0 22.213	L	Buddha statue
	06^0 23.665	80^0 22.598	R	Buddha statue
	06^0 23.652	80^0 23.275	R	Buddha statue

No.	Location		Side	Structure
	Latitude	Longitude		
End	06^0 23.470	80^0 23.497		

R – Right Side, L – Left Side

Annex 5: Photographs of the Project Area

Photo 1

Start of the road section

Photo 2

Stream crossing

Photo 3

Concreted canal at right side of the road from N 06^0 23.007 - E 80^0 22.170

Photo 4

Stream crossing

Photo 5

Photo at 4 km

Photo 6

End of road section

ENVIRONMENTAL CODE OF PRACTICE (ECOP) CHECKLIST

INCLUSIVE ROAD OPERATION AND DEVELOPMENT INVESTMENT PROGRAMME (iROAD)

Road Name: Pattiyawela – Pallattara Road

District Name: Hambanthota

DSD & GNDs: Beliatta DSD; Pallattara west, Pallattara south

Total Length of the Road: 3.9 km

A. Climatic Conditions

Temperature	High: X Low:
Humidity	High: X Low:
Rainfall Rainy Season	mm/year: From 1,000 to 1,500 Mainly during October - December

B. Location of the Road and Generic description of Environment

No:	Type of Ecosystem	Yes	No	Explanation
1.	Type of Terrain (Plain/ ~~Undulating/ Hilly/ Mountainous~~ etc.) (Explain the topography of the area and how many km of the road are located in the hilly area)	X		Altitude: Between 80 - 130 ft Plain
2.	Forest Area / Mangrove / Other natural habitats (Explain whether the road passes through forest areas or located along the forest areas and distance from shoulder to the forest area)?	X		Type of Vegetation: Tank & stream vegetation
				Legal Status of the Forest Area: (Reserved, National Park, Sanctuaries, Unclassified, etc.)
3.	Inhabited Area	X		
4.	Agricultural Land	X		Mainly paddy
5.	Barren Land	X		

C. Specific description of the Road Environment

No.	Parameter/ Component	Yes	No	Explanation
1.	Are there any areas with landslide or erosion problems along the road? (If yes, indicate the location whether Right or Left side and the chainage)		X	
				( ) No Secondary Information is available and Local Community is not aware of this matter
2.	Are there any Tanks/streams /rivers etc. along/crossing the road or any lakes/swamps beside the road? (If yes, list them indicating the location Right/ Left or crossing and the chainage)	X		• 20 m – Small canal at N 06 05.260 / E 080 43.830 • 0-180 m – Left, Small tank and its along the road • At the end Kirama oya at N 06 05.017 / E 080 43.239
3.	Is the area along the project road prone to flooding or any problems of	X		Water flows over the bridge of Kirama

No.	Parameter/ Component	Yes	No	Explanation
	water stagnation and other drainage issues? (If yes, mention chainage, flood level and frequency)			oya at N 06 05.017 / E 080 43.239
				( ) No Secondary Information is available and Local Community is not aware of this matter
4.	Are there any trees with a dbh of 30 cm or more affected on either side from the centre line of the road alignment? (If yes attach list of trees indicating the location (Right or Left side)and the chainage)	X		See annex 1
5.	Along the road and within 100 m of the road shoulder, are there any Faunal habitat areas, Faunal breeding ground, bird migration area, or other similar areas? (If yes, specify details of habitat with chainage)	X		• At the end Kirama oya at N 06 05.017 / E 080 43.239Paddy lands • Home gardens • Abandon lands • Roadsides
				( ) No Secondary Information is available and Local Community is not aware of this matter
6.	Along the road and within 100m of the road shoulder is there any evidence of Flora and Fauna species that are classified as endemic, endangered /Threatened species?	X		See annex 2
				( ) No Secondary Information Available and Local Community is not aware of this matter
7.	Are there any utility structures[19] within 10 m on either side from the centre line of the road alignment? (If yes, attach list with chainage)	X		Electric poles present throughout the road both sides and underground water pipelines are present
8.	Are there any religious, cultural or community structures/buildings[20] within 50 m on either side from the centre line of the road alignment? (If yes attach list with chainage)		X	

D. Public Consultation

No.	Consultation Activities	Yes	No	Remarks
1.	Consultation with local community was conducted before finalizing the alignment. (Attach list of people met and dates)		X	
2.	Any suggestion received in finalizing the alignment		X	
3.	If suggestions received, were they incorporated into the design?			

E. Please attach the following:

[19] Water tap, hand pump, electric pole, telephone pole, pipe lines and other similar structures

[20] Religious/cultural/historical monuments, school, health centre, public toilet and other similar structures

I. List of utility structures indicating location (left or right side of the road) and chainage (as required under C. 7)

II. List of community structures indicating location (left or right side of the road) and chainage (as required under C. 10)

III. Project Map

IV. Photographs of the project area showing at least 10 m on either side from centre line of road alignment. Every 2 km or less of road must have at least 1 photograph.

Annex 1: Affected Tree over 30 cm dbh

No	Family	Scientific Name	Common Name	TS	NCS	Side	Location		Distant
							Latitude	Longitude	
1	Fabaceae	*Samanea saman*	Para Mara	I		L	06 05.034	080 43.372	

TS – Taxonomic Status, N – Native, E- Endemic, I – Introduced or Exotic, NCS – National Conservation Status, VU – Vulnerable, R – Right Side, L – Left Side

Annex 2: Recorded Endemic, Endangered / Threatened Fauna Species

BIRDS					
Family	**Scientific Name**	**English Name**	**Sinhala Name**	**TS**	**NCS**
Cercopithecidae	*macaca sinica*	Sri Lanka toque monkey	Sri Lanka Rilawa	Endemic	

TS – Taxonomic Status, NCS – National Conservation Status

Annex 3: Photographs of the Project Area

Photo 1

Start of the road section

Photo 2

Road side abandoned paddy lands (Right side)

Photo 3

Road side coconut plantation

Photo 4

0-180 m – Left, Small tank and its along the road

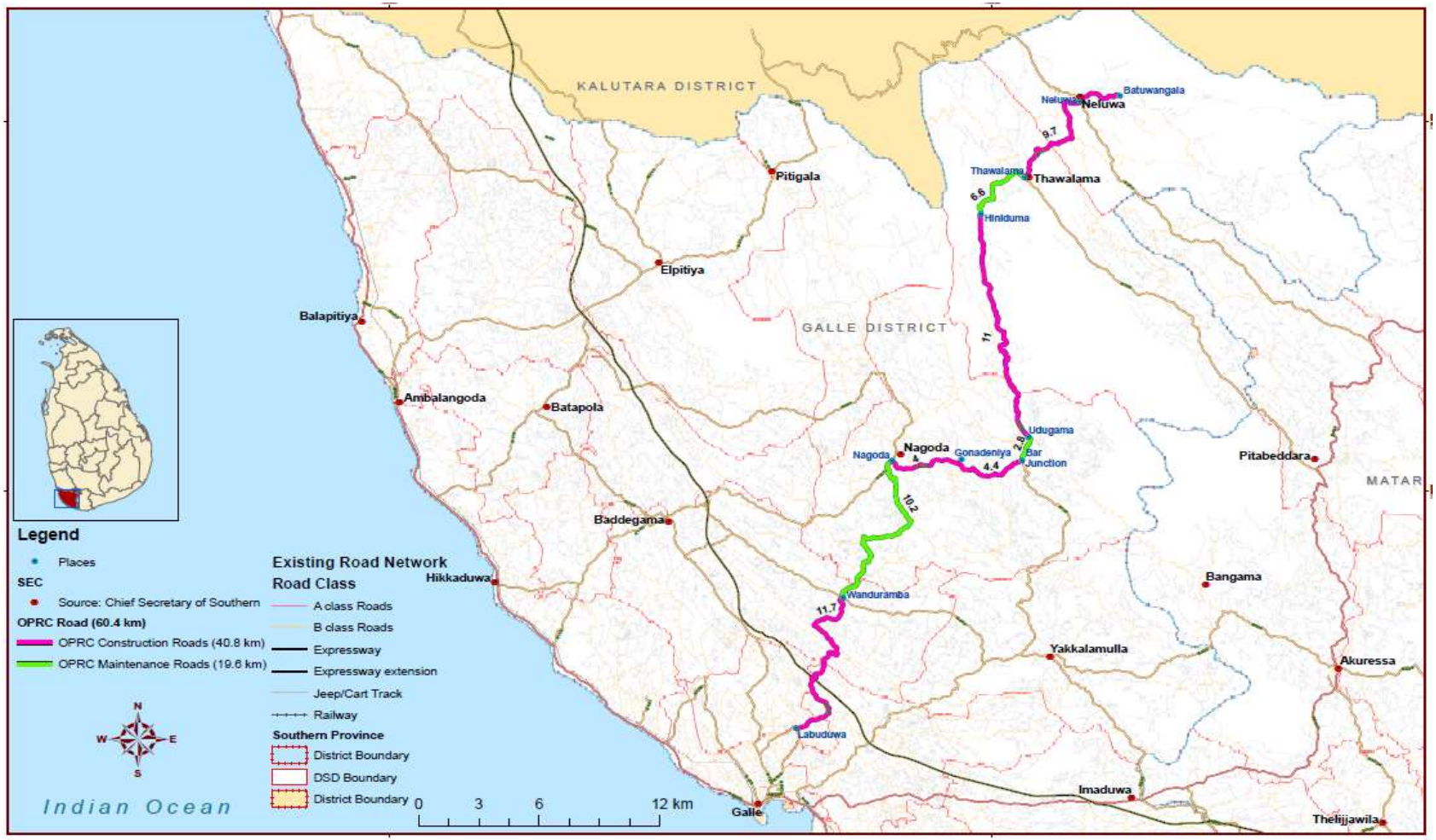
Photo 5

Kirama oya flowing across the road at end

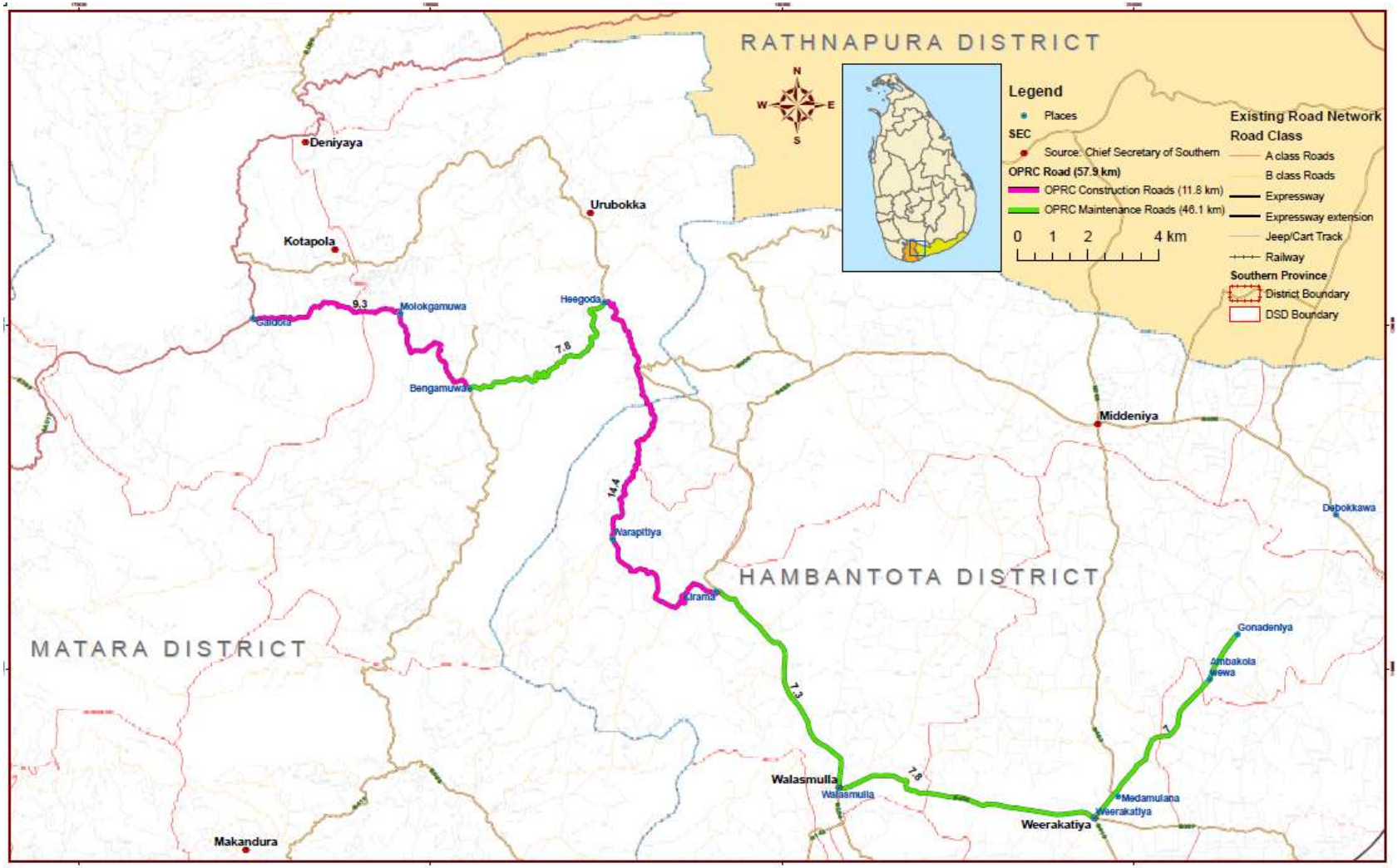
Photo 6

End of the road section

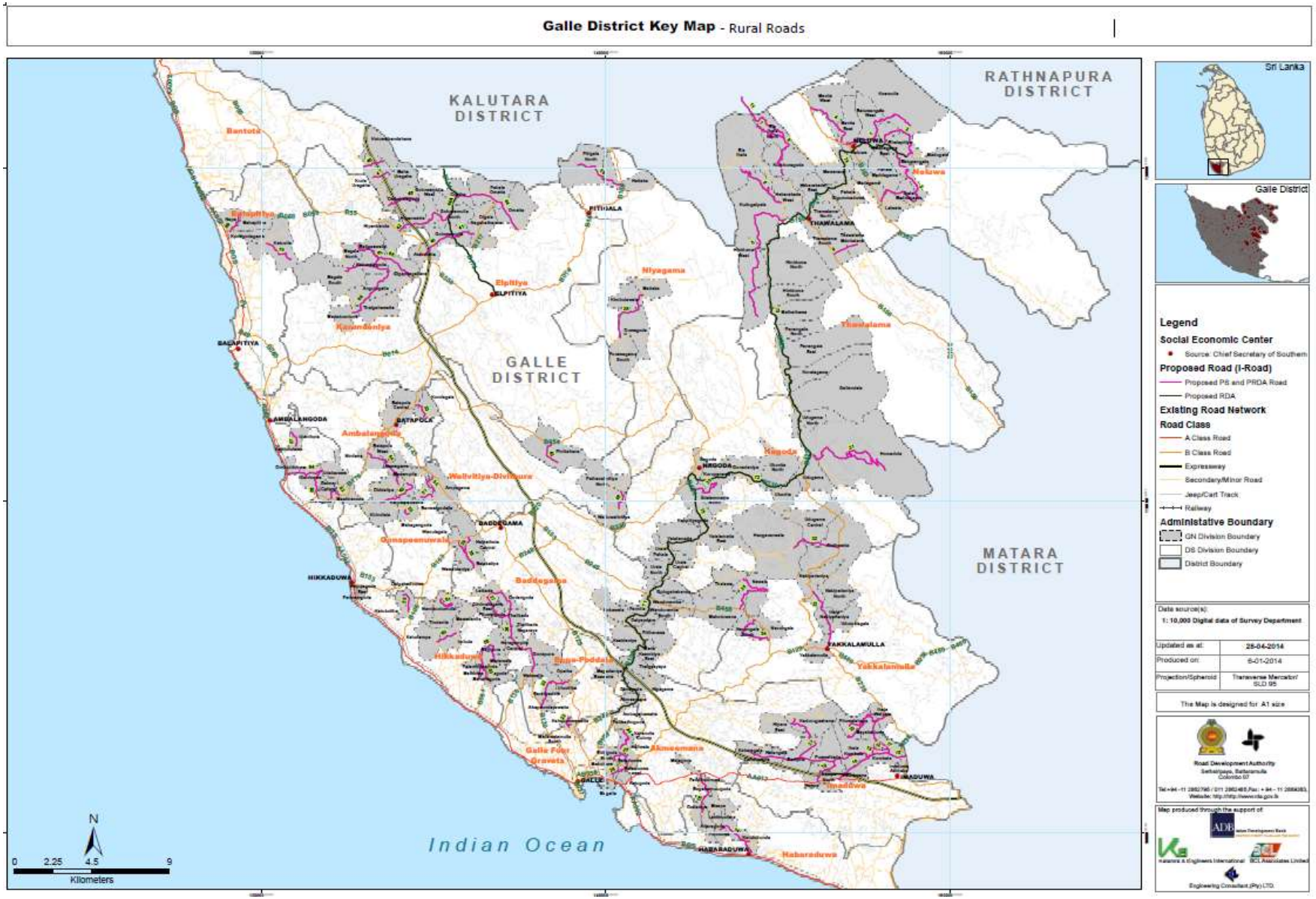
Appendix 2.1: General Location Maps

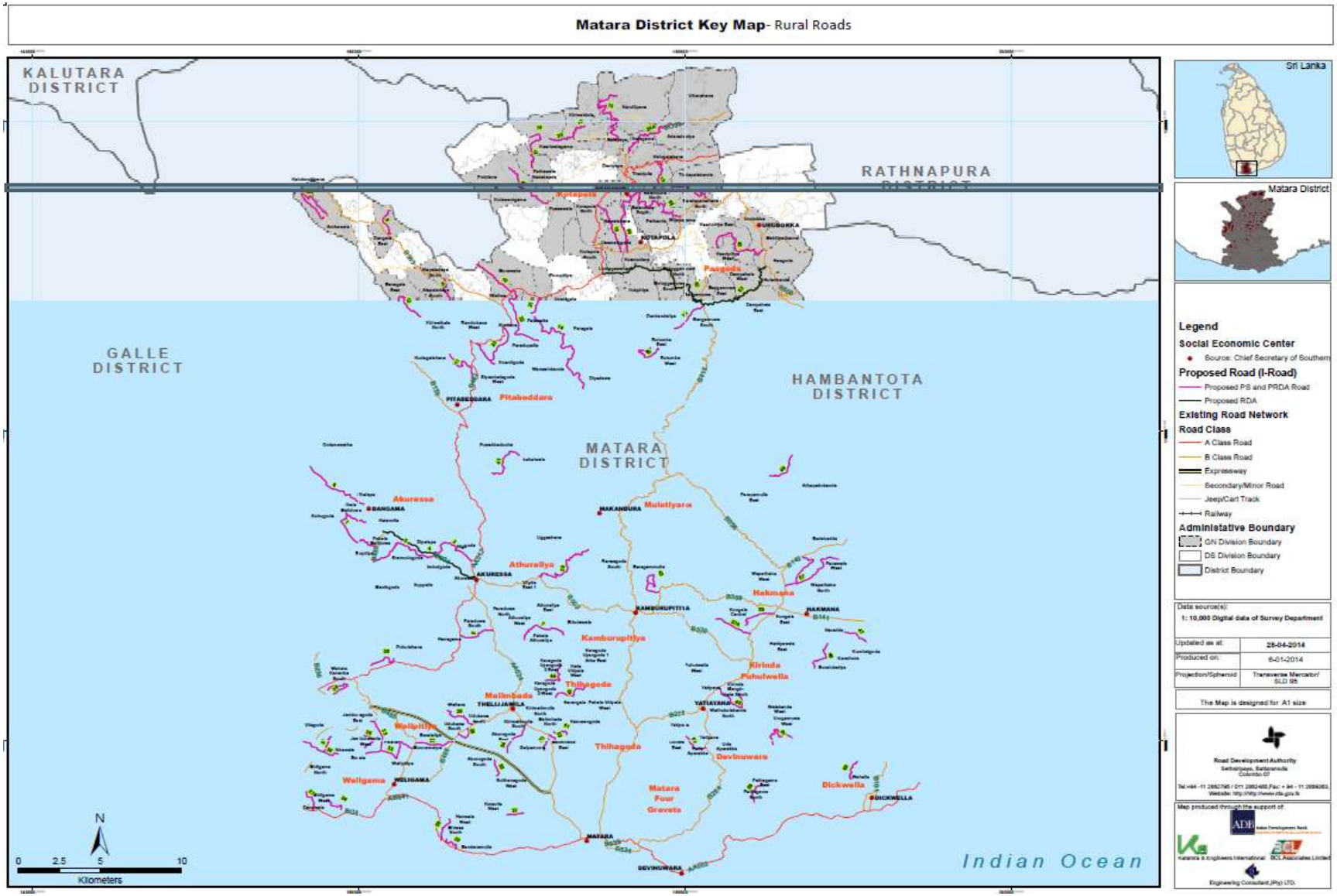


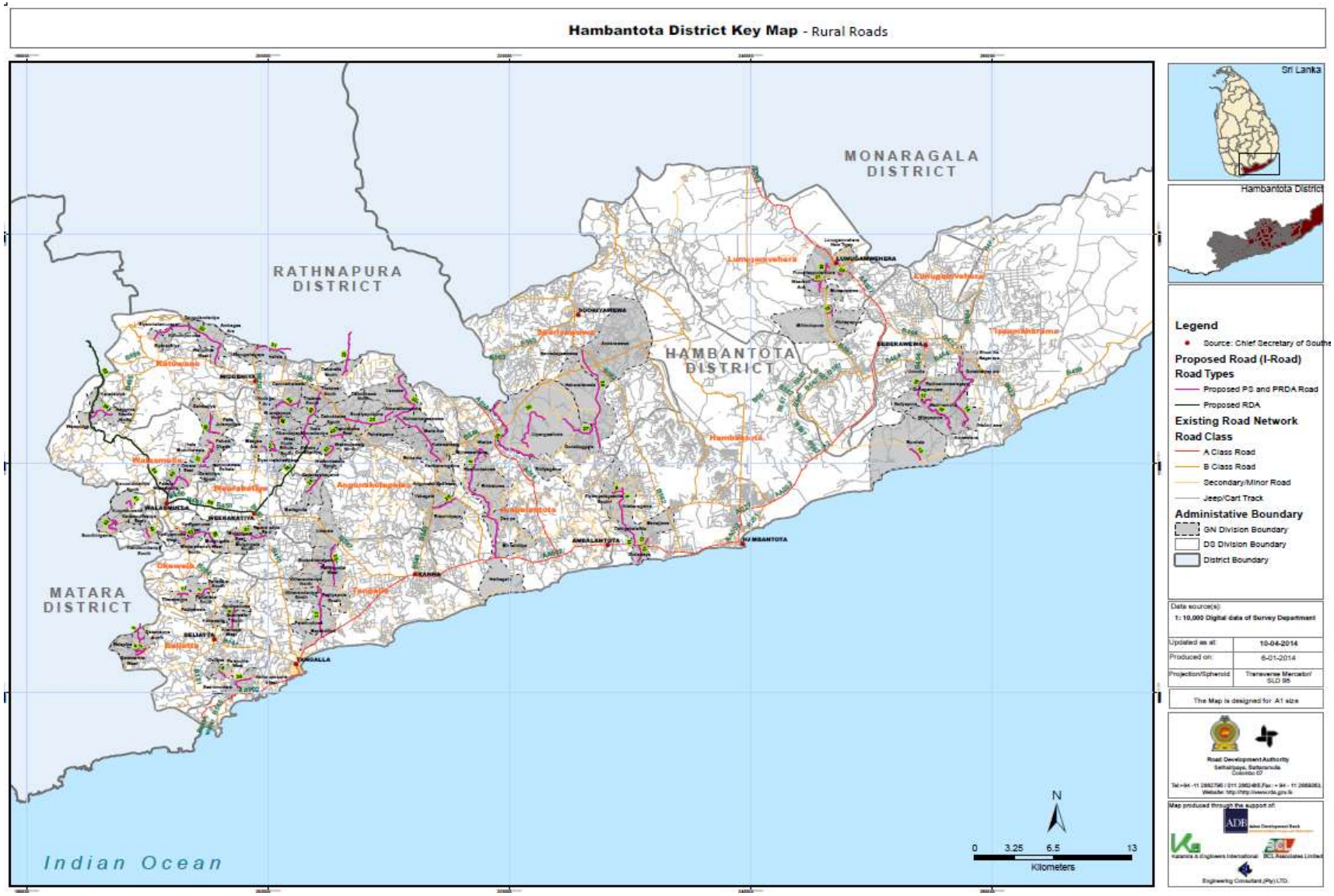
Galle District OPRC Map



Matara & Hambantota District OPRC Map

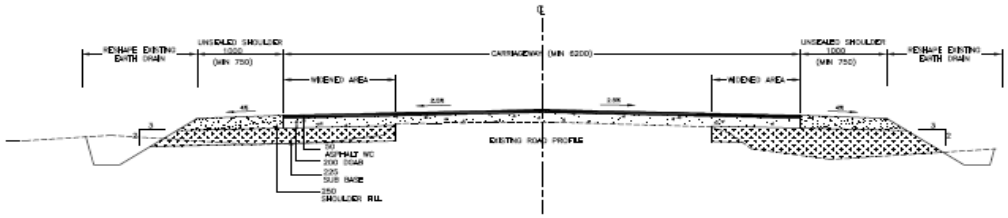

Galle District Key Map - Rural Roads
KALUTARA DISTRICT
RATHNAPURA DISTRICT
GALLE DISTRICT
MATARA DISTRICT
Indian Ocean
Bentota
Elpitiya
Hiyagama
Thawalama
Nelawa
Kanandoliya
Ambalangoda
Wellvitiya-Divitura
Higoda
Gonapeenuwala
Baddegama
Hikkaduwa
Dunn-Poddala
Yakkalamulla
Galle Fort
Gravata
Akmeemana
Imaduwa
Habaraduwa
N
0 2.25 4.5 9
Kilometers
Sri Lanka
Galle District
Legend
Social Economic Center
Source: Chief Secretary of Southern
Proposed Road (I-Road)
Proposed PS and PRDA Road
Proposed RDA
Existing Road Network
Road Class
A Class Road
B Class Road
Expressway
Secondary/Minor Road
Jeep/Cart Track
Railway
Administative Boundary
GN Division Boundary
DS Division Boundary
District Boundary
Data source(s):
1: 10,000 Digital data of Survey Department
Updated as at: 28-04-2014
Produced on: 6-01-2014
Projection/Spheroid: Transverse Mercator/ SLD 95
The Map is designed for A1 size
Road Development Authority
Sethsiripaya, Battaramulla
Colombo 07
Map produced through the support of
ADB
Asian Development Bank
Engineering Consultant (Pty) LTD


Matara District Key Map- Rural Roads
KALUTARA DISTRICT
RATHNAPURA DISTRICT
GALLE DISTRICT
HAMBANTOTA DISTRICT
MATARA DISTRICT
Kotapola
Pasgoda
Pitabeddara
Akuressa
Mulatiyana
Athuraliya
Hakmana
Kamburupitiya
Thihagoda
Malimbada
Kirinda Puhulwella
Devinuwara
Matara Four Gravets
Dickwella
Weligama
Indian Ocean
N
0 2.5 5 10
Kilometers
Sri Lanka
Matara District
Legend
Social Economic Center
Source: Chief Secretary of Southern
Proposed Road (I-Road)
Proposed PS and PRDA Road
Proposed RDA
Existing Road Network
Road Class
A Class Road
B Class Road
Expressway
Secondary/Minor Road
Jeep/Cart Track
Railway
Administative Boundary
GN Division Boundary
DS Division Boundary
District Boundary
Data source(s):
1: 10,000 Digital data of Survey Department
Updated as at: 28-04-2014
Produced on: 6-01-2014
Projection/Spheroid: Transverse Mercator/ SLD 95
The Map is designed for A1 size
Road Development Authority
Map produced through the support of:
ADB
Kalaroo & Engineers International
BCL Associates Limited
Engineering Consultant (Pvt) LTD

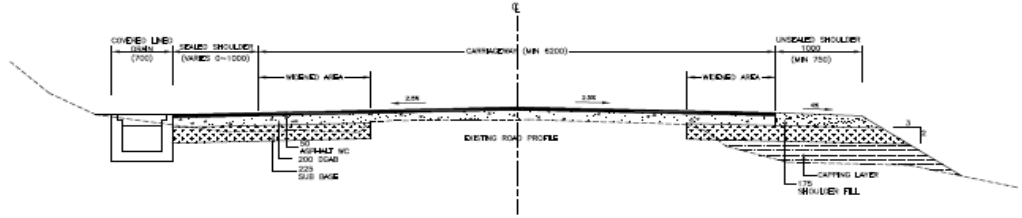

Hambantota District Key Map - Rural Roads
MONARAGALA DISTRICT
RATHNAPURA DISTRICT
HAMBANTOTA DISTRICT
MATARA DISTRICT
Indian Ocean
Sri Lanka
Hambantota District
Legend
Source: Chief Secretary of Southe
Proposed Road (I-Road)
Road Types
Proposed PS and PRDA Road
Proposed RDA
Existing Road Network
Road Class
A Class Road
B Class Road
Secondary/Minor Road
Jeep/Cart Track
Administative Boundary
GN Division Boundary
DS Division Boundary
District Boundary
Data source(s):
1: 10,000 Digital data of Survey Department
Updated as at: 10-04-2014
Produced on: 6-01-2014
Projection/Spheroid: Transverse Mercator/ SLD 95
The Map is designed for A1 size
Road Development Authority
Sethsiripaya, Battaramulla
Colombo 07
Map produced through the support of:
ADB
Asian Development Bank
Kanamo & Engineers International
BCL Associates Limited
Engineering Consultant (Pty) LTD.
N
0 3.25 6.5 13
Kilometers

Appendix 2.2: Proposed Cross Sections

PROPOSED TYPICAL SECTIONS FOR RDA ROAD



SECTION A – (COMMON)



SECTION B – (HILLY & ROLLING TERRAIN)

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
2. SELECT DRAINS AS PER SITE CONDITION FOR DRAIN DETAILS REFER DRAWING NO. DS–01
3. FOR TOE WALL DETAILS REFER DRAWING NO. S–05
4. INTERFACING DETAILS WITH ADJACENT BUILDINGS/LANDS SHOULD BE DECIDED ACCORDING TO THE SITE CONDITIONS.
5. MINIMUM THICKNESS OF DGAB SHOULD BE 100m TOP OF THE EXISTING PAVEMENT.
6. MINIMUM THICKNESS OF THE GRANULAR CAPPING LAYER SHOULD BE 100m, IF THE THICKNESSES < 100mm USE GRANULAR SUB BASE.
7. ISOLATED BASE FAILURE SECTION SHOULD BE RECTIFIED PRIOR TO EXISTING PAVEMENT STRENGTHENING.

LEGEND:

	ASPHALT WEARING COURSE	WC
	DENSE GRANULAR AGGREGATE BASE	DGAB
	GRANULAR SUB BASE (CBR>30%)	GS
	GRANULAR CAPPING (CBR>10%)	GC
	SHOULDER FILL	

ADB FUNDED
I ROAD PROJECT
SOUTHERN PROVINCE

CLIENT: DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority

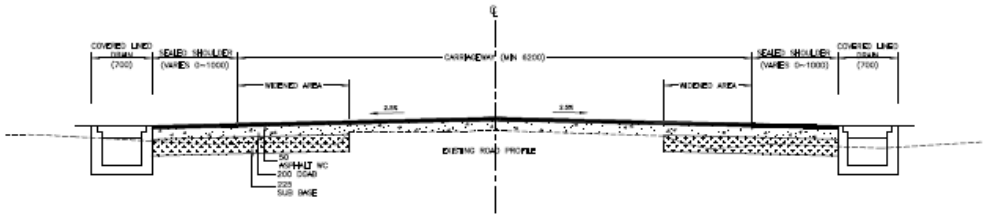
No. REVISION DATE

CONSULTANT: In Association with and
KATAHIRA & ENGINEERS INTERNATIONAL
ENGINEERING CONSULTANTS LTD.
BANGLADESH CONSULTANTS LTD.

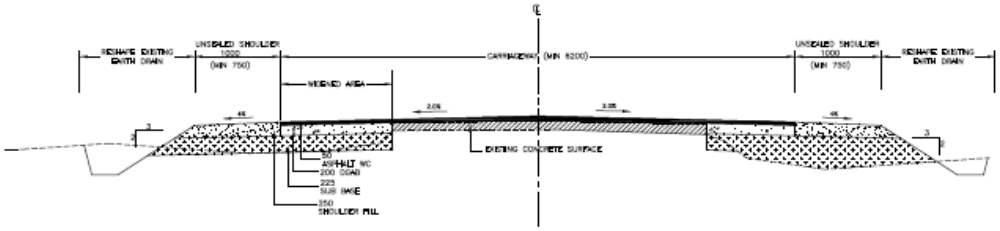
DRAWING TITLE: TYPICAL CROSS SECTION FOR RDA ROAD
DWG. No. T–RDA–01

DES.
DRW.
CHK.
DATE 03–04–2014

PROPOSED TYPICAL SECTIONS FOR RDA ROAD



SECTION C – (URBAN AREA)



SECTION D – (OVERLAY FOR CONCRETE ROAD)

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
2. SELECT DRAINS AS PER SITE CONDITION FOR DRAIN DETAILS REFER DRAWING NO. DS–01
3. FOR TOE WALL DETAILS REFER DRAWING NO. S–05
4. INTERFACING DETAILS WITH ADJACENT BUILDINGS/LANDS SHOULD BE DECIDED ACCORDING TO THE SITE CONDITIONS.
5. MINIMUM THICKNESS OF DGAB SHOULD BE 100m TOP OF THE EXISTING PAVEMENT.
6. MINIMUM THICKNESS OF THE GRANULAR CAPPING LAYER SHOULD BE 100m, IF THE THICKNESSES < 100mm USE GRANULAR SUB BASE.
7. ISOLATED BASE FAILURE SECTION SHOULD BE RECTIFIED PRIOR TO EXISTING PAVEMENT STRENGTHENING.

LEGEND:

	ASPHALT WEARING COURSE	WC
	DENSE GRANULAR AGGREGATE BASE	DGAB
	GRANULAR SUB BASE (CBR>30%)	GS
	GRANULAR CAPPING (CBR>10%)	GC
	SHOULDER FILL	

ADB FUNDED
I ROAD PROJECT
SOUTHERN PROVINCE

CLIENT: DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority

No.	REVISION	DATE

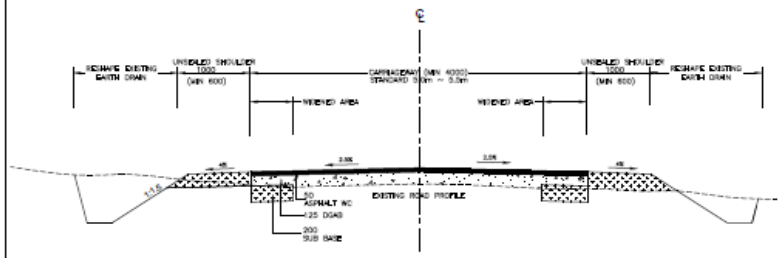
CONSULTANT: KATAHIRA & ENGINEERS INTERNATIONAL In Association with ENGINEERING CONSULTANTS LTD. and BANGLADESH CONSULTANTS LTD.

DRAWING TITLE: TYPICAL CROSS SECTION FOR RDA ROAD

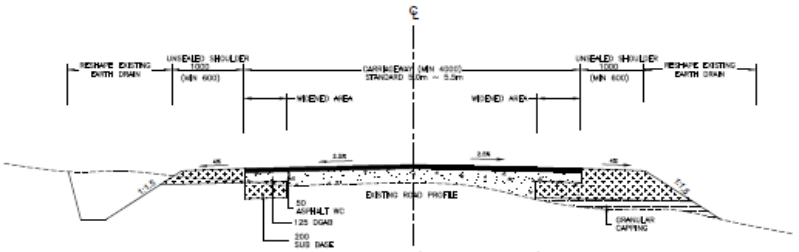
DES: DRW: CHK:

DWG. No. TY–RD–02 DATE 03–01–2014

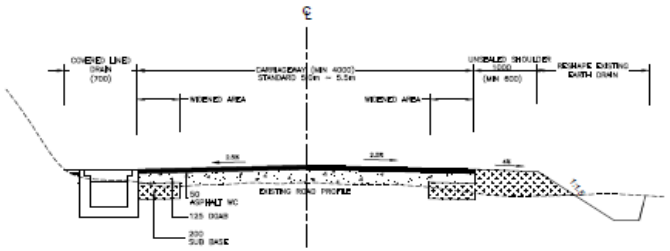
PROPOSED TYPICAL SECTIONS FOR PRDA ROAD



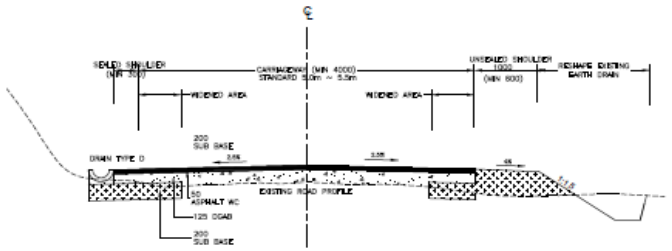
SECTION A – (COMMON)



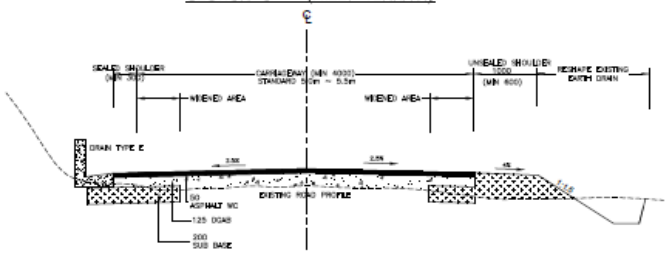
SECTION B – (ROLLING TERRAIN)



SECTION C – (HILLY TERRAIN)



SECTION D – (HILLY TERRAIN)



SECTION E – (HILLY TERRAIN)

LEGEND:

	ASPHALT WEARING COURSE	WC
	DENSE GRANULAR AGGREGATE BASE	DGAB
	GRANULAR SUB BASE (CBR>30%)	GS
	GRANULAR CAPPING (CBR>10%)	GC
	SHOULDER FILL	

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
2. SELECT DRAINS AS PER SITE CONDITION FOR DRAIN DETAILS REFER DRAWING NO. DS–01
3. FOR TOE WALL DETAILS REFER DRAWING NO. S–05
4. IF THE SPECIFIED MINIMUM DIMENSIONS SHOWN IN THE DRAWING CAN NOT BE MAINTAINED DUE TO ROW RESTRICTIONS THE DIMENSIONS CAN BE REDUCED SUBJECT TO THE APPROVAL OF THE ENGINEER.
5. INTERFACING DETAILS WITH ADJACENT BUILDINGS/LANDS SHOULD BE DECIDED ACCORDING TO THE SITE CONDITIONS.
6. MINIMUM THICKNESS OF DGAB SHOULD BE 100m TOP OF THE EXISTING PAVEMENT.
7. MINIMUM THICKNESS OF THE GRANULAR CAPPING LAYER SHOULD BE 100m, IF THE THICKNESSES < 100mm USE GRANULAR SUB BASE.
8. ISOLATED BASE FAILURE SECTION SHOULD BE RECTIFIED PRIOR TO EXISTING PAVEMENT STRENGTHENING.

ADB FUNDED
I ROAD PROJECT
SOUTHERN PROVINCE

CLIENT: DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority

CONSULTANT: KATAHIRA & ENGINEERS INTERNATIONAL in Association with ENGINEERING CONSULTANTS LTD. and BANGLADESH CONSULTANTS LTD.

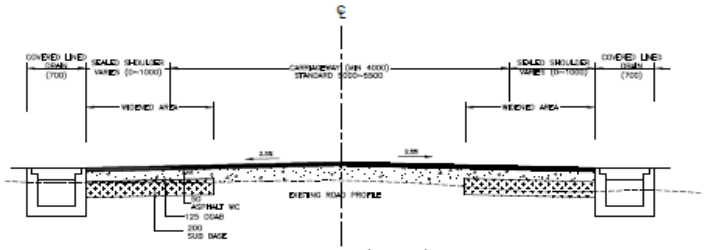
DRAWING TITLE: TYPICAL CROSS SECTION FOR PRDA ROAD

DWG. No. T–PRDA–01

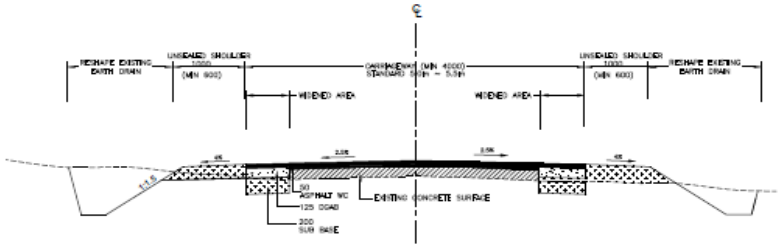
DES: DRW: CHK: DATE: 03–04–2014

No. REVISION DATE

PROPOSED TYPICAL SECTIONS FOR PRDA ROAD



SECTION F – (URBAN)



SECTION G – (OVERLAY FOR CONCRETE ROAD)

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
2. SELECT DRAINS AS PER SITE CONDITION FOR DRAIN DETAILS REFER DRAWING NO. DS–01
3. FOR TOE WALL DETAILS REFER DRAWING NO. S–05
4. IF THE SPECIFIED MINIMUM DIMENSIONS SHOWN IN THE DRAWING CAN NOT BE MAINTAINED DUE TO ROW RESTRICTIONS THE DIMENSIONS CAN BE REDUCED SUBJECT TO THE APPROVAL OF THE ENGINEER.
5. INTERFACING DETAILS WITH ADJACENT BUILDINGS/LANDS SHOULD BE DECIDED ACCORDING TO THE SITE CONDITIONS.
6. MINIMUM THICKNESS OF DGAB SHOULD BE 100m TOP OF THE EXISTING PAVEMENT.
7. MINIMUM THICKNESS OF THE GRANULAR CAPPING LAYER SHOULD BE 100m, IF THE THICKNESSES < 100mm USE GRANULAR SUB BASE.
8. ISOLATED BASE FAILURE SECTION SHOULD BE RECTIFIED PRIOR TO EXISTING PAVEMENT STRENGTHENING.

LEGEND:

	ASPHALT WEARING COURSE	WC
	DENSE GRANULAR AGGREGATE BASE	DGAB
	GRANULAR SUB BASE (CBR>30%)	GS
	GRANULAR CAPPING (CBR>10%)	GC
	SHOULDER FILL	

ADB FUNDED
I ROAD PROJECT
SOUTHERN PROVINCE

CLIENT: DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority

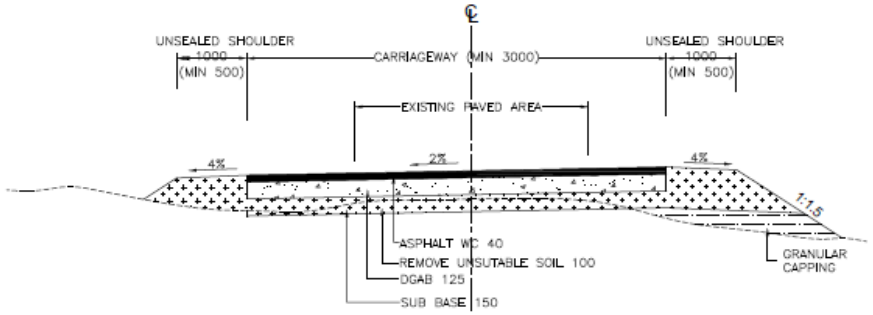
No. REVISION DATE

CONSULTANT: In Association with and
KATAHIRA & ENGINEERS INTERNATIONAL
ENGINEERING CONSULTANTS LTD.
BANGLADESH CONSULTANTS LTD.

DRAWING TITLE: TYPICAL CROSS SECTION FOR PRDA ROAD

DES.
DRW.
CHK.
DWG. No. TS–PRD–02
DATE 07–04–2011

PROPOSED TYPICAL SECTIONS FOR GRAVEL ROAD



SECTION A – (GRAVEL SURFACE)

LEGEND:

	ASPHALT WEARING COURSE	WC
	DENSE GRANULAR AGGREGATE BASE	DGAB
	GRANULAR SUB BASE (CBR>30%)	GS
	GRANULAR CAPPING (CBR>10%)	GC
	SHOULDER FILL	
	BLINDING LAYER (GRADED AGGREGATE)	
	ROACK FILL (MAXIMUM SIZE 250mm)	
	QUERRY FINE	
	C30 CONCRETE	

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
2. SELECT DRAINS AS PER SITE CONDITION FOR DRAIN DETAILS REFER DRAWING NO. DS–01
3. FOR TOE WALL DETAILS REFER DRAWING NO. S–05
4. IF THE SPECIFIED MINIMUM DIMENSIONS SHOWN IN THE DRAWING CAN NOT BE MAINTAINED DUE TO ROW RESTRICTIONS THE DIMENSIONS CAN BE REDUCED SUBJECT TO THE APPROVAL OF THE ENGINEER.
5. INTERFACING DETAILS WITH ADJACENT BUILDINGS/LANDS SHOULD BE DECIDED ACCORDING TO THE SITE CONDITIONS.
6. MINIMUM THICKNESS OF DGAB SHOULD BE 100m TOP OF THE EXISTING PAVEMENT.
7. MINIMUM THICKNESS OF THE GRANULAR CAPPING LAYER SHOULD BE 100m, IF THE THICKNESSES < 100mm USE GRANULAR SUB BASE.
8. ISOLATED BASE FAILURE SECTION SHOULD BE RECTIFIED PRIOR TO EXISTING PAVEMENT STRENGTHENING.

ADB FUNDED
I ROAD PROJECT
SOUTHERN PROVINCE

CLIENT:
DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority

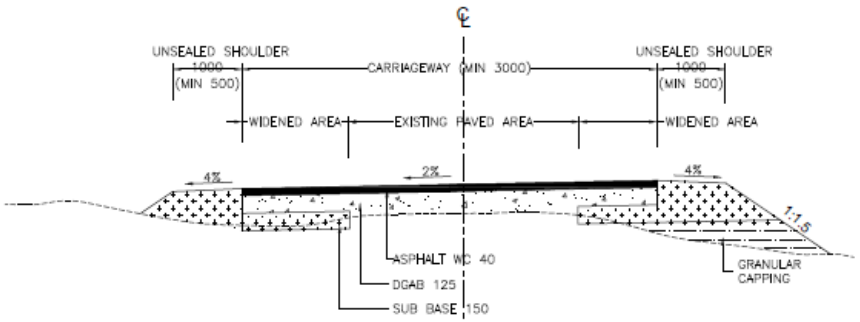
No.	REVISION	DATE

CONSULTANT:
KATAHIRA & ENGINEERS INTERNATIONAL In Association with ENGINEERING CONSULTANTS LTD. and BANGLADESH CONSULTANTS LTD.

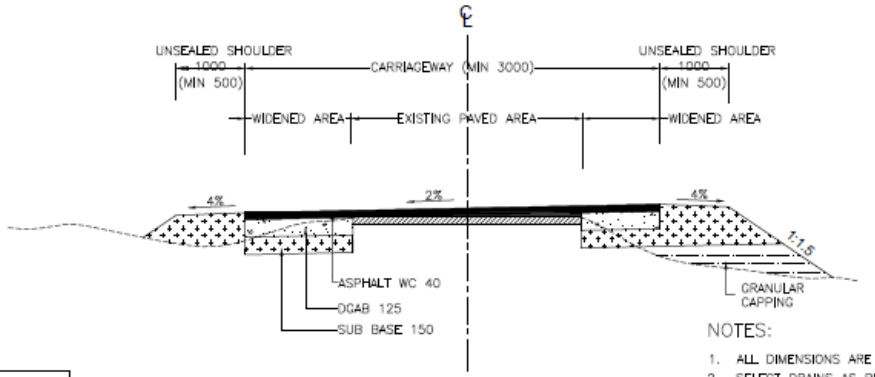
DRAWING TITLE:
TYPICAL CROSS SECTION FOR PS ROAD

DES:
DRW:
CHK:
DWG. No. T–PS–01
DATE 03–04–2014

PROPOSED TYPICAL SECTIONS FOR MACADAM ROAD



SECTION B – (RECONSTRUCTION FOR MACADAM SURFACE)



SECTION C – (OVERLAY FOR MACADAM SURFACE)

LEGEND:

	ASPHALT WEARING COURSE	WC
	DENSE GRANULAR AGGREGATE BASE	DGAB
	GRANULAR SUB BASE (CBR>30%)	GS
	GRANULAR CAPPING (CBR>10%)	GC
	SHOULDER FILL	
	BLINDING LAYER (GRADED AGGREGATE)	
	ROACK FILL (MAXIMUM SIZE 250mm)	
	QUERRY FINE	
	C30 CONCRETE	

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
2. SELECT DRAINS AS PER SITE CONDITION FOR DRAIN DETAILS REFER DRAWING NO. DS–01
3. FOR TOE WALL DETAILS REFER DRAWING NO. S–05
4. IF THE SPECIFIED MINIMUM DIMENSIONS SHOWN IN THE DRAWING CAN NOT BE MAINTAINED DUE TO ROW RESTRICTIONS THE DIMENSIONS CAN BE REDUCED SUBJECT TO THE APPROVAL OF THE ENGINEER.
5. INTERFACING DETAILS WITH ADJACENT BUILDINGS/LANDS SHOULD BE DECIDED ACCORDING TO THE SITE CONDITIONS.
6. MINIMUM THICKNESS OF DGAB SHOULD BE 100m TOP OF THE EXISTING PAVEMENT.
7. MINIMUM THICKNESS OF THE GRANULAR CAPPING LAYER SHOULD BE 100m, IF THE THICKNESSES < 100mm USE GRANULAR SUB BASE.
8. ISOLATED BASE FAILURE SECTION SHOULD BE RECTIFIED PRIOR TO EXISTING PAVEMENT STRENGTHENING.

ADB FUNDED
I ROAD PROJECT
SOUTHERN PROVINCE

CLIENT: DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority

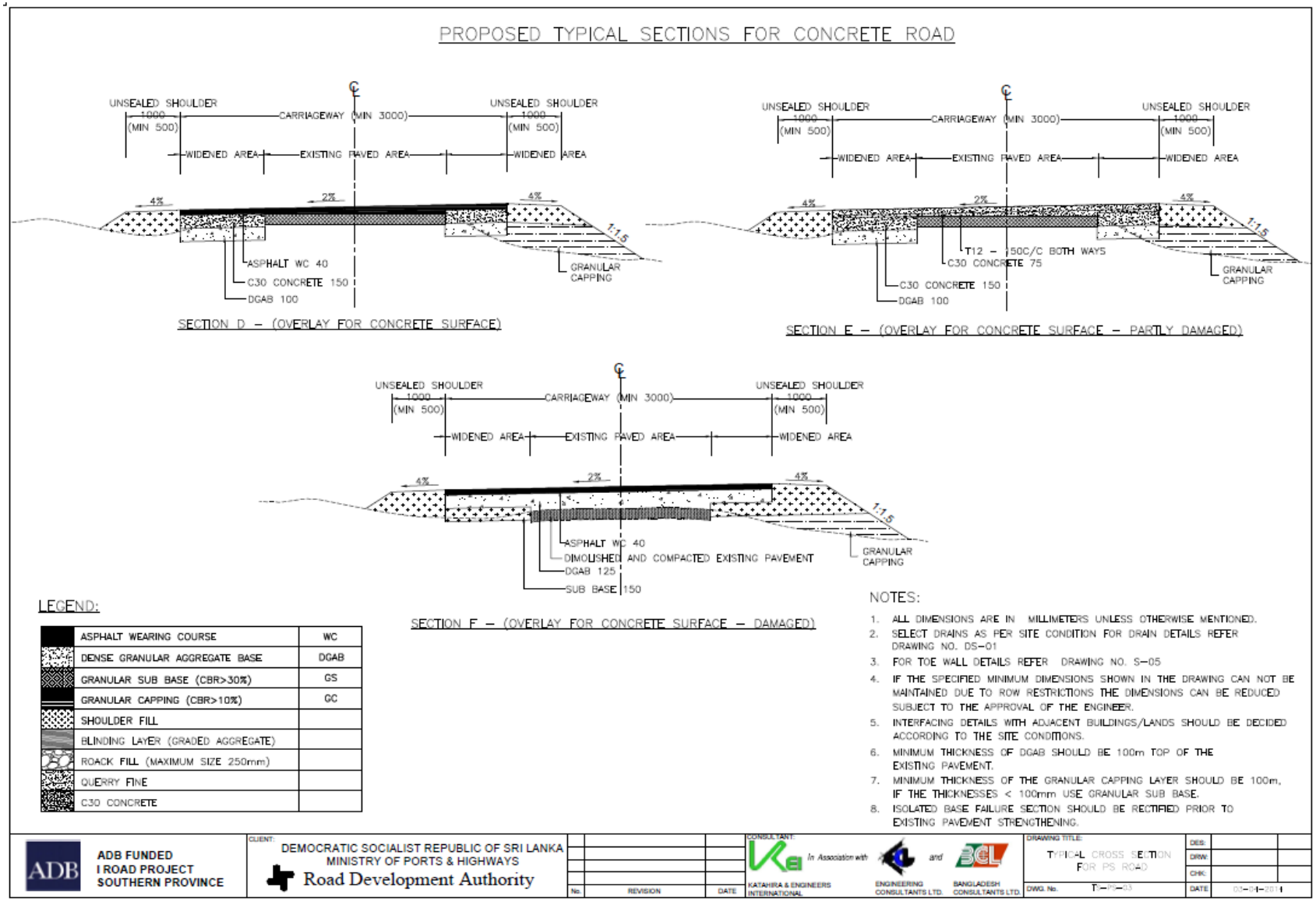
No.	REVISION	DATE

CONSULTANT: KATAHIRA & ENGINEERS INTERNATIONAL in Association with ENGINEERING CONSULTANTS LTD. and BANGLADESH CONSULTANTS LTD.

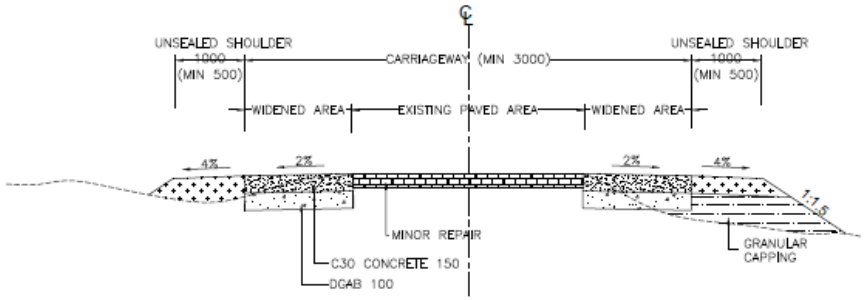
DRAWING TITLE: TYPICAL CROSS SECTION FOR PS ROAD

DWG. No. T–PS–02

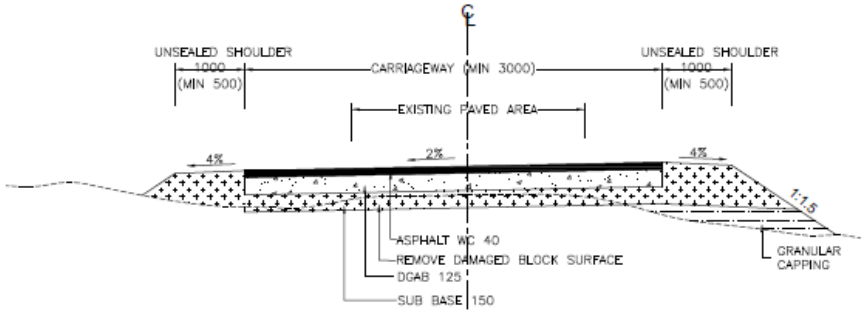
DES:	
DRW:	
CHK:	
DATE:	03–04–2014


PROPOSED TYPICAL SECTIONS FOR CONCRETE ROAD
UNSEALED SHOULDER
1000
(MIN 500)
CARRIAGEWAY (MIN 3000)
WIDENED AREA
EXISTING PAVED AREA
4%
2%
1:1.5
ASPHALT WC 40
C30 CONCRETE 150
DGAB 100
GRANULAR CAPPING
SECTION D – (OVERLAY FOR CONCRETE SURFACE)
T12 – 150C/C BOTH WAYS
C30 CONCRETE 75
SECTION E – (OVERLAY FOR CONCRETE SURFACE – PARTLY DAMAGED)
ASPHALT WC 40
DIMOLISHED AND COMPACTED EXISTING PAVEMENT
DGAB 125
SUB BASE 150
SECTION F – (OVERLAY FOR CONCRETE SURFACE – DAMAGED)
LEGEND:
ASPHALT WEARING COURSE WC
DENSE GRANULAR AGGREGATE BASE DGAB
GRANULAR SUB BASE (CBR>30%) GS
GRANULAR CAPPING (CBR>10%) GC
SHOULDER FILL
BLINDING LAYER (GRADED AGGREGATE)
ROACK FILL (MAXIMUM SIZE 250mm)
QUERRY FINE
C30 CONCRETE
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
2. SELECT DRAINS AS PER SITE CONDITION FOR DRAIN DETAILS REFER DRAWING NO. DS–01
3. FOR TOE WALL DETAILS REFER DRAWING NO. S–05
4. IF THE SPECIFIED MINIMUM DIMENSIONS SHOWN IN THE DRAWING CAN NOT BE MAINTAINED DUE TO ROW RESTRICTIONS THE DIMENSIONS CAN BE REDUCED SUBJECT TO THE APPROVAL OF THE ENGINEER.
5. INTERFACING DETAILS WITH ADJACENT BUILDINGS/LANDS SHOULD BE DECIDED ACCORDING TO THE SITE CONDITIONS.
6. MINIMUM THICKNESS OF DGAB SHOULD BE 100m TOP OF THE EXISTING PAVEMENT.
7. MINIMUM THICKNESS OF THE GRANULAR CAPPING LAYER SHOULD BE 100m, IF THE THICKNESSES < 100mm USE GRANULAR SUB BASE.
8. ISOLATED BASE FAILURE SECTION SHOULD BE RECTIFIED PRIOR TO EXISTING PAVEMENT STRENGTHENING.
ADB FUNDED
I ROAD PROJECT
SOUTHERN PROVINCE
CLIENT:
DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority
No. REVISION DATE
CONSULTANT:
In Association with and
KATAHIRA & ENGINEERS INTERNATIONAL
ENGINEERING CONSULTANTS LTD.
BANGLADESH CONSULTANTS LTD.
DRAWING TITLE:
TYPICAL CROSS SECTION FOR PS ROAD
DES:
DRW:
CHK:
DWG. No. T–PS–03
DATE 03–04–2014

PROPOSED TYPICAL SECTIONS FOR BLOCK PAVED ROAD



SECTION G – (BLOCK PAVED SURFACE – GOOD CONDITION)



SECTION H – (BLOCK PAVED SURFACE – DAMAGED)

LEGEND:

	ASPHALT WEARING COURSE	WC
	DENSE GRANULAR AGGREGATE BASE	DGAB
	GRANULAR SUB BASE (CBR>30%)	GS
	GRANULAR CAPPING (CBR>10%)	GC
	SHOULDER FILL	
	BLINDING LAYER (GRADED AGGREGATE)	
	ROACK FILL (MAXIMUM SIZE 250mm)	
	QUERRY FINE	
	C30 CONCRETE	

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
2. SELECT DRAINS AS PER SITE CONDITION FOR DRAIN DETAILS REFER DRAWING NO. DS–01
3. FOR TOE WALL DETAILS REFER DRAWING NO. S–05
4. IF THE SPECIFIED MINIMUM DIMENSIONS SHOWN IN THE DRAWING CAN NOT BE MAINTAINED DUE TO ROW RESTRICTIONS THE DIMENSIONS CAN BE REDUCED SUBJECT TO THE APPROVAL OF THE ENGINEER.
5. INTERFACING DETAILS WITH ADJACENT BUILDINGS/LANDS SHOULD BE DECIDED ACCORDING TO THE SITE CONDITIONS.
6. MINIMUM THICKNESS OF DGAB SHOULD BE 100m TOP OF THE EXISTING PAVEMENT.
7. MINIMUM THICKNESS OF THE GRANULAR CAPPING LAYER SHOULD BE 100m, IF THE THICKNESSES < 100mm USE GRANULAR SUB BASE.
8. ISOLATED BASE FAILURE SECTION SHOULD BE RECTIFIED PRIOR TO EXISTING PAVEMENT STRENGTHENING.

ADB FUNDED
I ROAD PROJECT
SOUTHERN PROVINCE

CLIENT: DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority

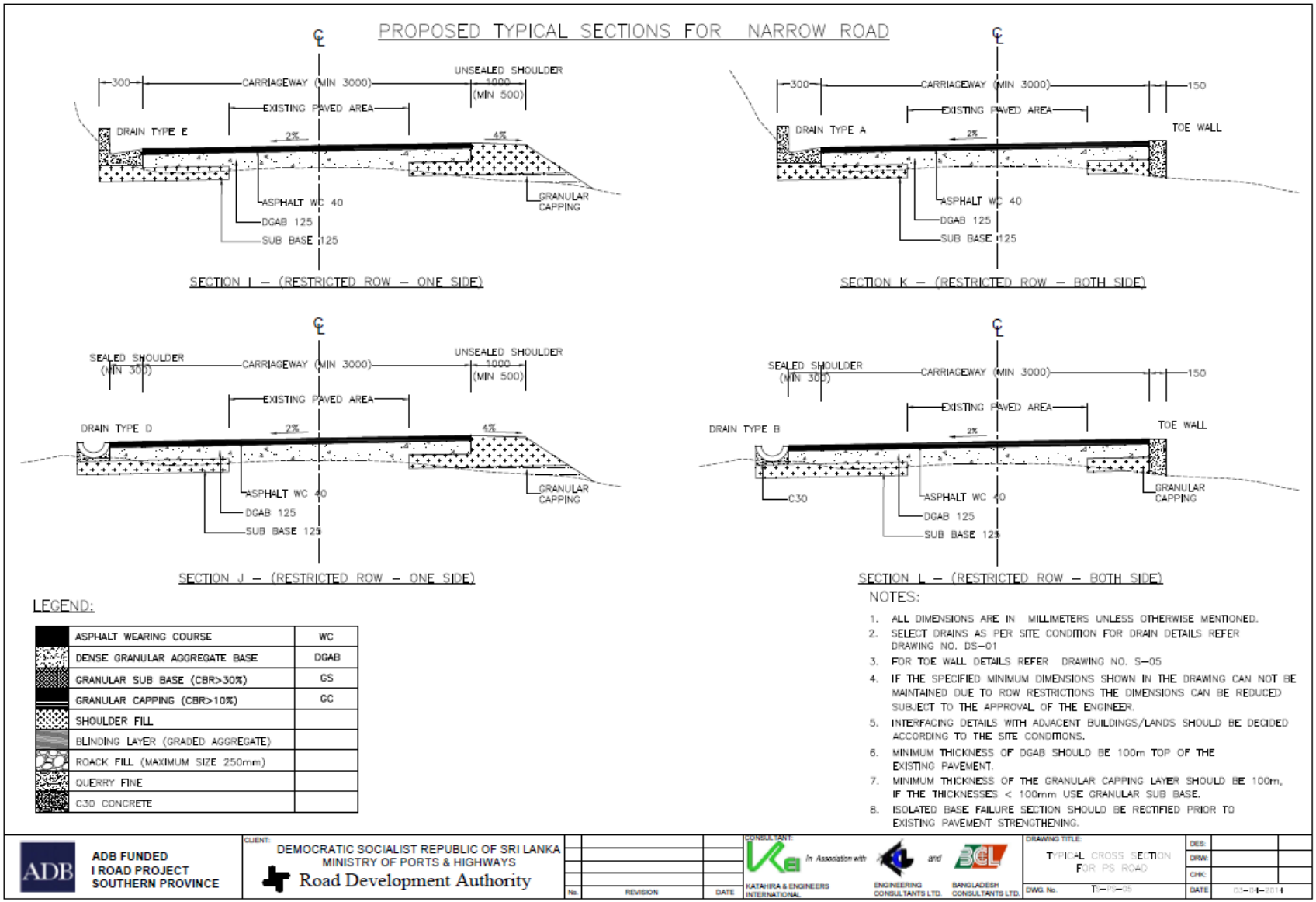
No.	REVISION	DATE

CONSULTANT: KATAHIRA & ENGINEERS INTERNATIONAL In Association with ENGINEERING CONSULTANTS LTD. and BANGLADESH CONSULTANTS LTD.

DRAWING TITLE: TYPICAL CROSS SECTION FOR PS ROAD

DWG. No. T–C–01

DES:	
DRW:	
CHK:	
DATE:	03–04–2014


PROPOSED TYPICAL SECTIONS FOR NARROW ROAD
300
CARRIAGEWAY (MIN 3000)
UNSEALED SHOULDER 1000 (MIN 500)
EXISTING PAVED AREA
DRAIN TYPE E
2%
4%
ASPHALT WC 40
DGAB 125
SUB BASE 125
GRANULAR CAPPING
SECTION I – (RESTRICTED ROW – ONE SIDE)
300
CARRIAGEWAY (MIN 3000)
150
EXISTING PAVED AREA
DRAIN TYPE A
2%
TOE WALL
ASPHALT WC 40
DGAB 125
SUB BASE 125
SECTION K – (RESTRICTED ROW – BOTH SIDE)
SEALED SHOULDER (MIN 300)
CARRIAGEWAY (MIN 3000)
UNSEALED SHOULDER 1000 (MIN 500)
EXISTING PAVED AREA
DRAIN TYPE D
2%
4%
ASPHALT WC 40
DGAB 125
SUB BASE 125
GRANULAR CAPPING
SECTION J – (RESTRICTED ROW – ONE SIDE)
SEALED SHOULDER (MIN 300)
CARRIAGEWAY (MIN 3000)
150
EXISTING PAVED AREA
DRAIN TYPE B
2%
TOE WALL
C30
ASPHALT WC 40
DGAB 125
SUB BASE 125
GRANULAR CAPPING
SECTION L – (RESTRICTED ROW – BOTH SIDE)
LEGEND:
ASPHALT WEARING COURSE WC
DENSE GRANULAR AGGREGATE BASE DGAB
GRANULAR SUB BASE (CBR>30%) GS
GRANULAR CAPPING (CBR>10%) GC
SHOULDER FILL
BLINDING LAYER (GRADED AGGREGATE)
ROACK FILL (MAXIMUM SIZE 250mm)
QUERRY FINE
C30 CONCRETE
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
2. SELECT DRAINS AS PER SITE CONDITION FOR DRAIN DETAILS REFER DRAWING NO. DS–01
3. FOR TOE WALL DETAILS REFER DRAWING NO. S–05
4. IF THE SPECIFIED MINIMUM DIMENSIONS SHOWN IN THE DRAWING CAN NOT BE MAINTAINED DUE TO ROW RESTRICTIONS THE DIMENSIONS CAN BE REDUCED SUBJECT TO THE APPROVAL OF THE ENGINEER.
5. INTERFACING DETAILS WITH ADJACENT BUILDINGS/LANDS SHOULD BE DECIDED ACCORDING TO THE SITE CONDITIONS.
6. MINIMUM THICKNESS OF DGAB SHOULD BE 100m TOP OF THE EXISTING PAVEMENT.
7. MINIMUM THICKNESS OF THE GRANULAR CAPPING LAYER SHOULD BE 100m, IF THE THICKNESSES < 100mm USE GRANULAR SUB BASE.
8. ISOLATED BASE FAILURE SECTION SHOULD BE RECTIFIED PRIOR TO EXISTING PAVEMENT STRENGTHENING.
ADB FUNDED
I ROAD PROJECT
SOUTHERN PROVINCE
CLIENT:
DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority
No. REVISION DATE
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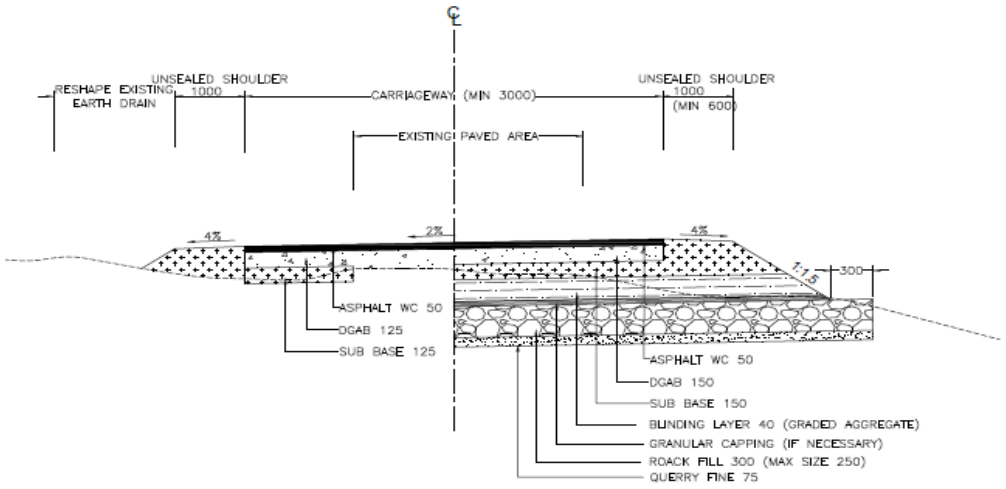
DRAWING TITLE:
TYPICAL CROSS SECTION FOR PS ROAD
DES:
DRW:
CHK:
DWG. No. T–PS–05
DATE 03–04–2014

PROPOSED TYPICAL SECTIONS FOR WEEK SOIL AREA



SECTION M – (FOR MARSHY & WEAK SOIL AREA)

LEGEND:

	ASPHALT WEARING COURSE	WC
	DENSE GRANULAR AGGREGATE BASE	DGAB
	GRANULAR SUB BASE (CBR>30%)	GS
	GRANULAR CAPPING (CBR>10%)	GC
	SHOULDER FILL	
	BLINDING LAYER (GRADED AGGREGATE)	
	ROACK FILL (MAXIMUM SIZE 250mm)	
	QUERRY FINE	
	C30 CONCRETE	

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
2. SELECT DRAINS AS PER SITE CONDITION FOR DRAIN DETAILS REFER DRAWING NO. DS–01
3. FOR TOE WALL DETAILS REFER DRAWING NO. S–05
4. IF THE SPECIFIED MINIMUM DIMENSIONS SHOWN IN THE DRAWING CAN NOT BE MAINTAINED DUE TO ROW RESTRICTIONS THE DIMENSIONS CAN BE REDUCED SUBJECT TO THE APPROVAL OF THE ENGINEER.
5. INTERFACING DETAILS WITH ADJACENT BUILDINGS/LANDS SHOULD BE DECIDED ACCORDING TO THE SITE CONDITIONS.
6. MINIMUM THICKNESS OF DGAB SHOULD BE 100m TOP OF THE EXISTING PAVEMENT.
7. MINIMUM THICKNESS OF THE GRANULAR CAPPING LAYER SHOULD BE 100m, IF THE THICKNESSES < 100mm USE GRANULAR SUB BASE.
8. ISOLATED BASE FAILURE SECTION SHOULD BE RECTIFIED PRIOR TO EXISTING PAVEMENT STRENGTHENING.

ADB FUNDED
I ROAD PROJECT
SOUTHERN PROVINCE

CLIENT: DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority

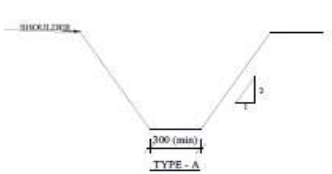
CONSULTANT: KATAHIRA & ENGINEERS INTERNATIONAL In Association with ENGINEERING CONSULTANTS LTD. and BANGLADESH CONSULTANTS LTD.

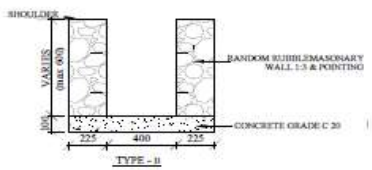
DRAWING TITLE: TYPICAL CROSS SECTION FOR PS ROAD

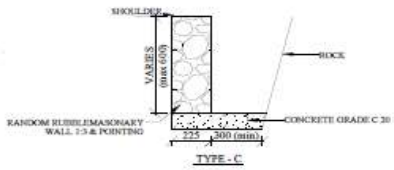
DWG. No. T–PS–06

DES: DRW: CHK: DATE: 03–04–2014

No. REVISION DATE

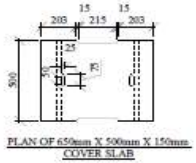


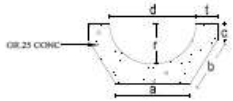


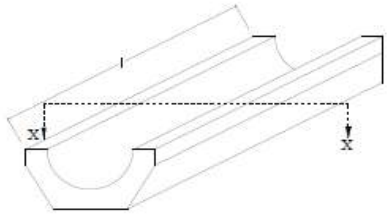


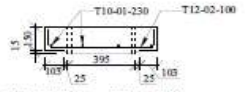
EARTH DRAIN
SCALE : 1:25

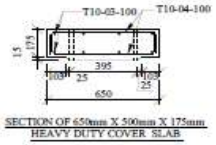
MASONRY RUBBLE LINED DRAIN
SCALE : 1:25







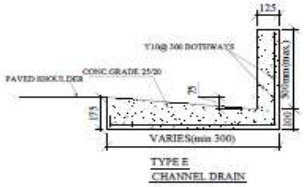


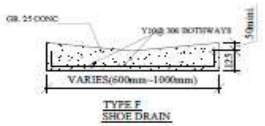


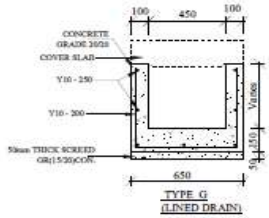
DETAIL OF COVER SLAB
(SCALE 1:25)

TYPE	DIAMETER	THIKNESS (t)	LENGTH (l)	a	b	c	d/2 (r)	R/F
9"	225	50	600	216	140	40	112	R6
12"	300	50	600	250	160	75	150	R6

PRECAST OPEN CHANNEL DRAIN (TYPE D)
SCALE : 1:10







REINFORCEMENT CONCRETE DRAINS
SCALE : 1:25

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DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
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ENGINEERING CONSULTANTS LTD.
BANGLADESH CONSULTANTS LTD.

No.	REVISION	DATE

DRAWING TITLE: TYPICAL DRAIN SECTIONS
DWG. No. DS-01
DES.
DRW.
CHK.
DATE 03-04-2014

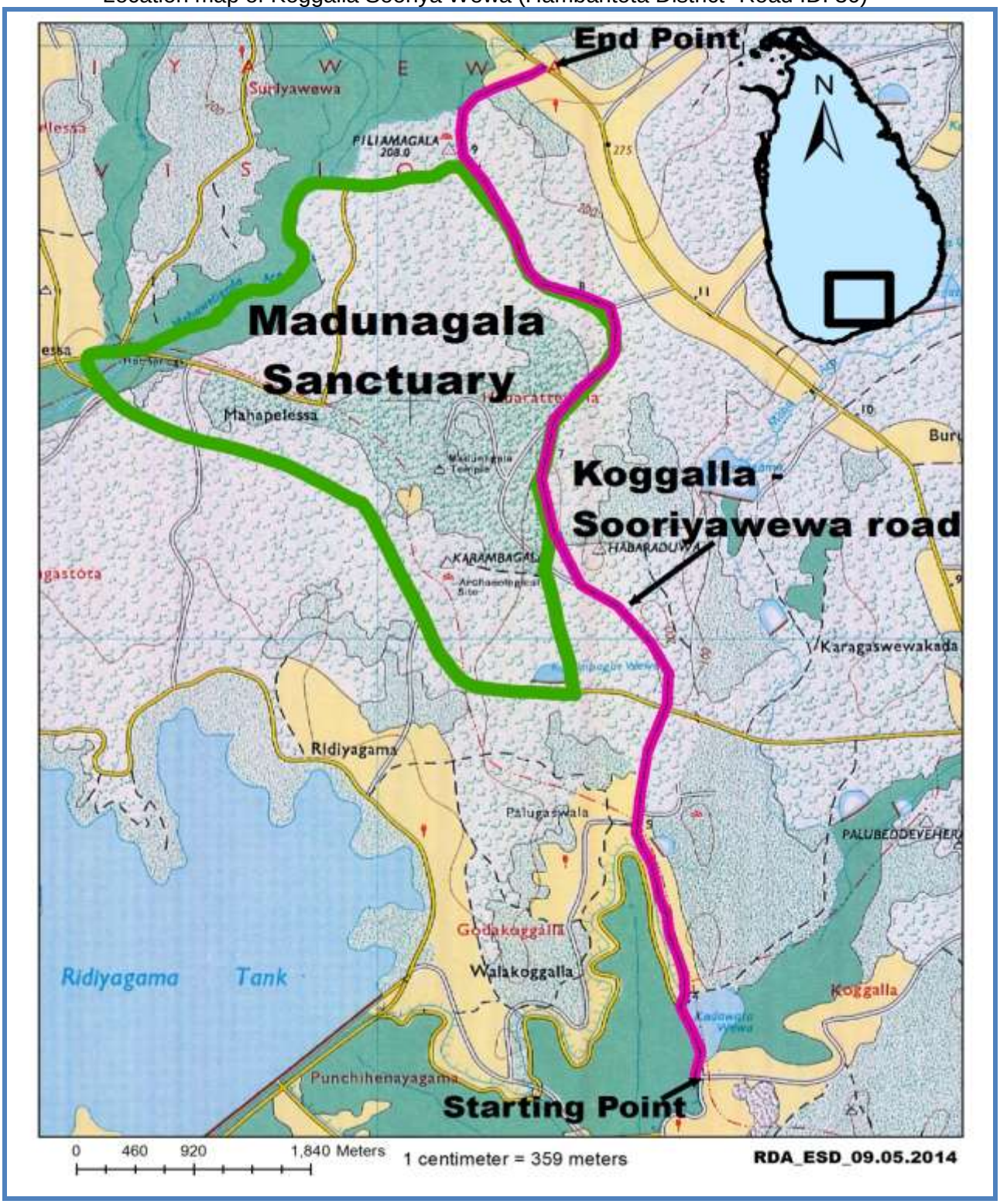
Appendix 2.3:Material Required for i Road Program

ALL Quantities are Provisional					
ITEM	DESCRIPTION	UNIT	QUANTITIES FOR EACH DISTRICT		
			GALLE	MATARA	HAMBANTOTA
1	Aggregate base, dense graded (37.5 mm)	Cu.m	50	50	50
2	Aggregate (20mm)	Cu.m	50	50	50
3	Asphalt concrete , cold mix	tonne	10	10	10
4	Bitumen emulsions, (CRS 1,CRS 2, CSS1)	ltr	100	100	100
5	Bitumen prime coat, cutback MC 30	ltr	100	100	100
6	Bitumen, straight run, 60/70 penetration	ltr	100	100	100
7	Bitumen, straight run, 80/100 penetration	ltr	100	100	100
8	Block,cement,400*200*100 mm	nr	500	500	500
9	Brick, hand-cut	nr	500	500	500
10	Cement, ordinary Portland	tonner	2.5	2.5	2.5
11	Concrete pipe, reinforced 600 mm diameter	lm	4.88	4.88	4.88
12	Concrete pipe, reinforced 900 mm diameter	lm	4.88	4.88	4.88
13	Concrete pipe, reinforced 1200 mm diameter	lm	4.88	4.88	4.88
14	Concrete, Grade 15	Cu.m	3	3	3
15	Concrete, Grade 20	Cu.m	3	3	3
16	Concrete, Grade 25	Cu.m	3	3	3
17	Concrete, Grade 30	Cu.m	3	3	3
18	Formwork, timber (smooth)	Sq.m	50	50	50
19	Pipe, PVC, 160 mm diameter (Type 600)	lm	50	50	50
20	Reinforcement, high-yield steel, Grade 460/425	Kg	100	100	100
21	Reinforcement, mild steel, Grade 250	Kg	100	100	100
22	Rubble, 100 -150 mm	Cu.m	50	50	50
23	Rubble, 150 -225 mm	Cu.m	50	50	50
24	River Sand	Cu.m	10	10	10
25	Timber, Class 2,Sri Lanka Timber Corporation	Cu.m	5	5	5
26	Precast concrete paving slabs 450*450*50mm	Nos	200	200	200
27	Paint, emulsion	Ltr	100	100	100
28	Paint, enamel	Ltr	100	100	100
29	Auto diesel	Ltr	100	100	100
30	Petrol	Ltr	100	100	100
31	Kerosene Oil	Ltr	100	100	100

Appendix 4: Ecologically sensitive areas

Location map of Boondala-Meda Para (Hambantota District- Road ID. 10)

Location map of Koggalla Sooriya Wewa (Hambantota District- Road ID. 36)



Appendix 5: Adaptation Measures and Costs

Climate adaptation measures in Galle

Road no./name	Climate risk	Cause of Risk	Adaptation measures taken in design	Costs for adaptation measures Rs.
36	damage of road due to flooding	Crosses Gin Ganga stream	Road No: 36 Road Name:Wackwella – Ginimallagaha 1.Raising embankment height by 2.0m at the section liable for flooding 2.Provision of new longitudinal drains and lead away drains 3.Construction of new culverts and widening of existing culverts	 2.795M 1.37M 2.872M 1.5M
40, 42, 45	damage of road due to flooding	Crosses a tributary of Benthara Ganga	Road No: 40 Road Name:Goluwamulla - Atakohota 1 Provision of new longitudinal drains and lead away drains 2. Construction of new culverts and widening of existing culverts Road No: 42, Road Name:Amuna Junction - Maitrigama 1. Provision of new longitudinal drains and lead away drains 2. Construction of new culverts and widening of existing culverts 3.Construction of small bridge Road No: 45, Road Name: Galparaya Road 1. Raising embankment height by 1.0m at the sections liable for flooding 2. Provision of new longitudinal drains and lead away drains 3.Construction of new culverts and widening of existing culverts 4.Construction of small bridge	 1.35M 2.775M 7.66M 2.577M 1.5M 1.634M 1.811M 1.758M 1.5M

Road no./name	Climate risk	Cause of Risk	Adaptation measures taken in design	Costs for adaptation measures Rs.
70	damage of road due to flooding and water stagnation, blockage and damage of drainage structures	Crosses a marshy area	Road No: 70 Road Name:Thannahengoda Road 1. Risk is too low, hence adaptations measure is not necessary. Protection measures will be considered during construction phase	
73, 75	Flooding	Runs adjacent to Gin Ganga	Road No: 73 Road Name:Udugama Hiniduma (B429) Road No: 75 Road Name:Wanduraba Yatalamatta Nagoda (454) 1. Risk is too low, hence adaptations measure is not necessary. 2. Taken under OPRC	
14, 64, 69, 55	coastal erosion and tsunami	Located near the coast	Road No: 14 Road Name:Taramulla – Allalagoda Road, 1.Raising embankment height by 0.75 m at the sections liable for coastal erosion 2. Provision of new longitudinal drains and lead away drains 3.Construction of new culverts and widening of existing culverts Tsunami risk is too low Road No: 64 Road Name:Galduwa – Aranya Road 1 Raising embankment height by 1.2 m at the sections liable for coastal erosion 2.Length of new longitudinal drain and leader way drains 3.Embankment protection with gabions Tsunami risk is too low Road No: 69 Road Name:Hatharaman Junction – Pasman Junction 1. Raising embankment	5.835M 4.827M 2.577M 1.182M 0.809M 5.236M 0.273M 0.497M

Road no./name	Climate risk	Cause of Risk	Adaptation measures taken in design	Costs for adaptation measures Rs.
			height by 1.5 m at the sections liable for coastal erosion 2 Provision of new longitudinal drains and lead away drains Tsunami risk is too low Road No: 55 Road Name: Not in the current list	

Climate Adaptation Measures in Matara

Road no./name	Climate risk	Cause of Risk	Adaptation measures taken in design	Costs for adaptation measures (RS.)
2, 7	damage of road due to flooding and water stagnation, blockage and damage of drainage structures	Crosses a marshy area	Road No: 2 Road Name:Poramba School – Diyalape Junction via Hikgoda 1. . Raising embankment height by 1.5 m and by 3.0 m at the sections liable for flooding. 2. Provision of new longitudinal drains and lead away drains 3.Construction of new culverts and widening of existing culverts Road No: 7 Road Name: Sri SudarshiPirivena Junction to BibulewelaShramadana Road 1. Raising embankment height by 1.5 m and by 3.0 m at the sections liable for flooding. 2. Provision of new longitudinal drains and lead away drains 3.Construction of new culverts and widening of existing culverts	1.783m 0.577M 5.832M 2.104M 0.577M 5.833M
18, 19	damage of road due to flooding	Crosses a tributary of Gin Ganga	Road No: 18 Road Name:Kiriwellagama Market to Dewala Road 1 Raising embankment height	1.143M

Road no./name	Climate risk	Cause of Risk	Adaptation measures taken in design	Costs for adaptation measures (RS.)
			by 1.5 m and by 2.5 m at the sections liable for flooding. 2. Provision of new longitudinal drains and lead away drains 3.Construction of new culverts and widening of existing culverts Road No: 19 Road Name:Kiriwalladola Junction to Hingurarahena 1 Raising embankment height by 1.5 m and by 2.5 m at the sections liable for flooding. 2. Provision of new longitudinal drains and lead away drains 3.Construction of new culverts and widening of existing culverts	0.221M 2.243M 0.735M 2.2M 4.57M
21, 22, 23, 51	damage of road due to flooding	Crosses Nilwala river	Road No: 21 Road Name:PorupitiyaAnnasigalawila 1. Raising embankment height by 0.5 m at the sections liable for flooding 2. Provision of new longitudinal drains and lead away drains 3.Construction of new culverts and widening of existing culverts Road No: 22 Road Name:Millalle via Aluwana Sankassa to MaddeAla Road 1 Raising embankment height by 1.5 m and by 2.5 m at the sections liable for flooding. 2. Provision of new longitudinal drains and lead away drains 3.Construction of new culverts and widening of existing culverts	0.206M 2.644M 3.033M 7.158M 4.415M 10.6M 1.996M 2.2M

Road no./name	Climate risk	Cause of Risk	Adaptation measures taken in design	Costs for adaptation measures (RS.)
			Road No: 23 Road Name:WeliwaPahuruthota – Neel Ella 1. Raising embankment height by 0.5 m and by 1.5 m at the sections liable for flooding 2.Provision of new longitudinal drains and lead away drains 3.Construction of new culverts and widening of existing culverts Road No: 51 Road Name:AgawaththaThalgahagoda for JayawardhanaMawatha (Wellithota) 1. Raising embankment height by 0.8 m at the sections liable for flooding 2.Construction of new culverts and widening of existing culverts	8.859M 1.157M 2.854M
32, 33, 35, 44, 48, 58	damage of road due to flooding	Located within Nilawala flood plain	Road No: 32 Road Name:Welipitiya Junction- Addarawela 1. Raising embankment height by 1`.0 m and by 0.5 m at the sections liable for flooding 2. Provision of new longitudinal drains and lead away drains 3.Construction of new culverts and widening of existing culverts Road No: 33 Road Name:Jaburegoda - Bodhirukkaramaya 1. Raising embankment height by 0.8 m at the sections liable for flooding 2.Construction of new culverts and widening of existing culverts	 1.398M 1.684M 2.927M 1.739M 3.163M

Road no./name	Climate risk	Cause of Risk	Adaptation measures taken in design	Costs for adaptation measures (RS.)
			Road No: 35 Road Name:JamburagodaHeelelgoda junction - Bodduwa 1. Raising embankment height by 0.8 m at the sections liable for flooding 2.Construction of new culverts and widening of existing culverts Road No: 44 Road Name:Narangalgoda – PalliyaGedara 1. Raising embankment height by 1.0 m at the sections liable for flooding 2. Provision of new longitudinal drains and lead away drains 3.Construction of new culverts and widening of existing culverts Road No: 48 Road Name:Samagimawtta via Siridewapriyamawatha 1. Raising embankment height by 1.0 m at the sections liable for flooding 2. Provision of new longitudinal drains and lead away drains 3.Construction of new culverts and widening of existing culverts Road No: 58 Road Name: Sri Piyarathanamawatha (Kakuluwangodamawatha) 1. Raising embankment height by 1.5 m at the sections liable for flooding 2.Construction of new culverts and widening of existing culverts	3.16M 2.940M 2.712M 0.408M 5.664M 2.879M 1.59M 1.526M 3.933M 3.927M

Road no./name	Climate risk	Cause of Risk	Adaptation measures taken in design	Costs for adaptation measures (RS.)
27	damage of road due to flooding	Crosses PolwattaOya stream	Road No: 27 Road Name:Denuwala – KapuwattajayaWijayagama 1. Raising embankment height by 1.0 m and by 1.5 m at the sections liable for flooding 2.Construction of new culverts and widening of existing culverts	 2.0M 2.575M
34	damage of road due to flooding	Crosses a stream	Road No: 34 Road Name:Pathegama – Kudalumulla for KurubawilaPitaduwaThdukola Gammadda 1. Raising embankment height by0.8 m and by 1.0 m at the sections liable for flooding 2.Construction of new culverts and widening of existing culverts	 1.49M 3.625M
27, 28, 29, 34	Coastal erosion and Tsunami	Located near the coast	Road No: 27 Road Name:Denuwala – Kapuwatta Jaya Wijayagama 1. Raising embankment height by0.3 m and by 1.0 m at the sections liable for coastal erosion 2.Construction of new culverts and widening of existing culverts Road No: 28 Road Name:Yatapila – Udahahena - Henwala 1. Raising embankment height by0.3 m and by 1.0 m at the sections liable for coastal erosion 2.Construction of new culverts and widening of existing culverts Road No: 29 Road Name:Udupila Junction	 2.0M 2.575M 1.859M 2.89M 3.095M 2.94M

Road no./name	Climate risk	Cause of Risk	Adaptation measures taken in design	Costs for adaptation measures (RS.)
			– UdupilaVihandagoda - Bandaramulla 1. Raising embankment height by 1.0 m at the sections liable for coastal erosion 2.Construction of new culverts andwidening of existing culverts Road No: 34 Road Name:Pathegama – Kudalumulla for KurubawilaPitaduwaThdukola Gammadda 1. Raising embankment height by0.8 m and by 1.0 m at the sections liable for coastal erosion 2.Construction of new culverts and widening of existing culverts	1.49M 1.49 M 3.625M

Climate adaptation measures in Hambantota

Road no./name	Climate risk	Cause of risk	Adaptation measures taken in design	Costs for adaptation measures
12	damage of road due to flooding	Located near Walawe River mouth	Road No: 12 Road Name:Godawaya junction to Temple Road 1.Construction of new culverts and widening of existing culverts	1.667M
14	damage of road due to flooding	Runs adjacent to KirindiOya	Road No: 14 Road Name:Magama Road 1. . Raising embankment height by0.3 m and by 0.6 m and 5.0 m at the sections liable for flooding 2.Construction of new culverts and Gabions	14.454M 59.255M
22, 25	damage of road due to flooding	Runs along service road of an irrigation canal	Road No: 22 Road Name:uswewa – Binkama Road 1. Raising embankment height by0.3 m and by 2.0 m and 2.5 m at the sections liable for flooding	5.715M

Road no./name	Climate risk	Cause of risk	Adaptation measures taken in design	Costs for adaptation measures
			2.Construction of new culverts and widening of existing culverts Road No: 25 Road Name:Uswewa via PahalagamaSooriyaPokuna junction 1. Raising embankment height by0.3 m at the sections liable for flooding 2.Construction of new culverts and widening of existing culverts	1.470M 6.515M 2.686M
6	damage of road due to flooding	Crosses a stream	Road No: 6 Road Name:Agulmaduwa - Aranwela 1.Construction of new culverts and widening of existing culverts 2. Construction of small bridge	2.225M 5.0M
27, 30	damage of road due to flooding	Located near Ridiyagama irrigation tank	Road No: 27 Road Name:Ridiyagama – Kahabodawila – Thuduwamulla Road 1. Raising embankment height by0.4 m at the sections liable for flooding 2.Provision of new longitudinal drain and leader way drains 3.Construction of new culverts and widening of existing culverts Road No: 30 Road Name:Thuduwamulla – HabarakthawalaGodaKoggalla Road 1.Raising embankment height by1.5 m at the sections liable for flooding 2.Construction of new culverts and widening of existing culverts	2.146M 0.548M 11.685M 1.456M 13.00M
28	damage of road due to flooding	Runs along service road of Eke Ela irrigation canal	Road No: 28 Road Name:Hathagalahandiya – DeniyaPingama to Athbatuwa to HadunkatuwaGamaralagamaHandiya 1.Raising embankment height by1.0 m at the sections liable for flooding 2.Construction of new culverts and widening of existing culverts	3.372M 13.564M
29	damage of road due to flooding	Runs parallel to Walawe river and ends at Ridiyagama irrigation tank	Road No: 29 Road Name:Ridiyagama Livestock farm to Gangawalana Road 1.Raising embankment height by1.0 m at the sections liable for flooding 2. Construction of new culverts and widening of existing culverts	0.911M 8.7M

Road no./name	Climate risk	Cause of risk	Adaptation measures taken in design	Costs for adaptation measures
38, 47	damage of road due to flooding	Section of the road runs along service road of Muruthawela left bank canal	Road No: 38 Road Name:Bariyar junction to Galwadiya 4th Mile post 1.Raising embankment height by1.0 m at the sections liable for flooding 2.Construction of new culverts and widening of existing culverts Road No: 47 Road Name:KudabibulaLidagawa Road 1.Construction of new culverts and widening of existing culverts	 1.974M 5.393M 1.47M
39	damage of road due to flooding and water stagnation, blockage and damage of drainage structures	Runs near Warapitiya tank	Road No: 39 Road Name:Warapitiya Hospital to Karadeniya Road 1.Raising embankment height by1.0 m at the sections liable for flooding 2.Construction of new culverts and widening of existing culverts	 2.524M 6.043M
49	damage of road due to flooding and water stagnation, blockage and damage of drainage structures	Runs along the bund of Pinntetiya tank	Road No: 49 Road Name:Gonadeniya – Kaluwagahayaya – Talawa 1.Raising embankment height by1.0 m at the sections liable for flooding 1.Construction of new culverts and widening of existing culverts	 5.2 m 2.90M
53	damage of road due to flooding and water stagnation, blockage and damage of drainage structures	Runs along the bund of Warapitiya tank	Road No:53 Road Name: Risk is too low hence adaptation measure is not necessary.	
10, 12, 19	Coastal erosion and Tsunami	Located near the coast	Road No: 10 Road Name:Boondala – Meda Para 1. Construction of new culverts and widening of existing culverts.	 1.667M

Road no./name	Climate risk	Cause of risk	Adaptation measures taken in design	Costs for adaptation measures
			(Tsunami Risk is too low hence adaptation measure is not necessary) Road No: 12 Road Name:Godawaya junction to Temple road 1. Construction of new culverts and widening of existing culverts. (Risk is too low hence adaptation measure is not necessary.) Road No: 19 Road Name:WeewavilaAra 01st cross road 1. Construction of new culverts and widening of existing culverts. (Tsunami Risk is too low hence adaptation measure is not necessary.)	 1.667M 1.667M
33	Tsunami	Located near the coast	Road No: 33 Road Name:Pattiyapola - Marakolliya 1. Raising embankment height by1.0 m at the sections liable for flooding 2.Construction of new culverts and widening of existing culverts (Tsunami Risk is too low hence adaptation measure is not necessary)	 2.824M 5.80M

Appendix 6.1: Standard EMP for Rural Roads

Environmental Management Plan
Upgrading of Rural Roads to all Weather Standards
District:
Road Name:
Road ID:
Total length:

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
I	**Design and Preconstruction Stage**					
1.	Climate Change Consideration and Vulnerability screening	○ Compliance to climate change vulnerability check point given under IEE and adoption of necessary mitigative measures as may be required ○ Efforts shall be made to plant additional trees for increasing the carbon sink. The trees may be planted with help of DoF (Department of Forest) and space for additional planting will be explored with the help of DoF, Divisional Secretary (DS) and Community Based Organizations (CBO).	Throughout the subproject and other possible areas of tree planting	Design costs.	PIU, Design consultants	Project Implementation Unit (PIU)
2.	Clearing of vegetation and removing trees	○ All efforts shall be taken to avoid tree cutting wherever possible. ○ Requisite permission from DoF shall be obtained for cutting of roadside trees ○ Cut trees shall be handed over to the Timber Corporation. ○ Provision of Compensatory Afforestation shall be made on 1:3.ratio basis. ○ Only native species with the consent	Throughout the subproject area	Costs for tree removal. Costs for compensatory tree replanting.	Contractor	PIU, Project Implementation Consultant (PIC), DoF

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		of DoF will be selected for replanting and locations for tree replanting will be as closer as possible to the tree removed. o And if road side space for replanting is not available, other possible locations such as schools, public areas will be explored with the help of DoF, DS and CBOs of the area. o Provision shall be made for additional compensatory tree plantation. o Any leftover of trees shall be removed and disposed in approved manner.				
3.	Shifting of utilities	o The proposed Right of Way (ROW) shall be clearly demarcated on the ground. o All efforts will be made to minimize shifting of utilities o Utility shifting shall be planned in consultations and concurrence of the relevant service provider. o Required permissions and necessary actions will be taken from relevant service provider on a timely basis for removing and shifting utility structures before road construction activities begin. o The public/users of the particular service should be aware well in advance about the timing of the shifting/removal of the relevant utility lines when the service will be disrupted	Utility poles located along either the side of the road which may be shifted due to the road improvement	Costs to cover shifting and reconstruction of utilities and common property resources must be included under project costs.	Contractor	PIU, PIC, CEB, Sri Lanka Telecom, NWS&DB, Community based water supply schemes if any
4.	Impacts to common properties	o All efforts will be made to minimize shifting of common properties. o Structures with religious importance will not be damaged o Any common property built within the	Throughout the road with special attention to any common	Costs of removing and repairing common properties	Contractor	PIU, PIC

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		existing ROW and to be removed due to road improvement will be reconstructed as to the satisfactory level to the relevant owner	property to be shifted			
5.	Hydrology and Drainage	○ Provision of adequate cross drainage structure shall be made to ensure smooth passage of water and maintaining natural drainage pattern of the area. Here, special attention should be paid for flood prone areas if any. ○ The discharge capacity of the cross drainage structure shall be designed accordingly. ○ Provision of adequate drainage structures shall be made in water stagnant/logging areas. ○ The construction work near water body shall be planned preferably in dry season so that water quality of the water channel is not affected due to siltation and rain water runoff. ○ Provision of additional cross drainage structure shall be made in the areas where nearby land is sloping towards road alignment on both the sides.	Near all drainage crossings, rivers, streams and tanks.	Included in project costs.	PIU, Design consultants	PIU, SRRDA
II.	→ **Construction Stage**					
6.	Sourcing and transportation of construction material	→ **Borrow Earth:** ○ The borrow earth shall be obtained from borrow pits which are operated with GSMB and CEA approvals. ○ And if new borrow pits are opened for the subproject, necessary approvals and licenses should be obtained from GSMB and CEA. And all conditions laid down in such licenses should be strictly adhered.	Throughout the subproject area with special attention to borrow pits and quarries	To be included under contractors costs	Contractor	PIU, PIC

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		○ All completed borrow pits should be rehabilitated to satisfy conditions given mining license of GSMB ○ Borrowing earth from agricultural land shall be minimized to the extent possible. Further, no earth shall be borrowed from already low-lying areas. → **Aggregate :** ○ The stone aggregate shall be sourced from existing licensed quarries ○ Copies of consent/ approval / rehabilitation plan for use of existing source will be submitted to PIU through PIC. ○ Topsoil to be stockpiled and protected for use at the rehabilitation stage. → **Transportation of Construction Material** ○ Existing tracks / roads are to be used for hauling of materials to the extent possible. ○ The vehicles deployed for material transportation shall be spillage proof to avoid or minimize the spillage of the material during transportation.				
7.	Loss of Productive Soil, erosion and land use change	○ The top soil from the productive land (borrow areas, road widening areas etc.) shall be preserved and reused for plantation purposes. ○ It shall also be used as top cover of embankment slope for growing vegetation to protect soil erosion. ○ Shrubs shall be planted in loose soil area. ○ It shall be ensured that the land taken on lease for access road, construction camp and temporary office of the storage facilities is restored back to	Throughout the subproject area and camps sites, storage areas and temporary offices	To be included under contractors costs	Contractor	PIU, PIC

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		its original land use before handing it over to land owner.				
8.	Slope protection and stablilization	○ Slope protection measures must be carried out using appropriate engineering and bio-engineering measures in combination with drainage improvement measures were appropriate ○ Only native plant species will be selected for the bio-engineering works ○ Follow up watering and maintenance of the plants must be carried out to ensure the survival of the plants and success of the slope stabilization	In project areas falling inside hilly terrain	To be included under contractors costs	Contractor	PIU, PIC
8.	Compaction and Contamination of Soil	○ To prevent soil compaction in the adjoining productive lands beyond the ROW, the movement of construction vehicles, machinery and equipment shall be restricted to the designated haulage route. ○ The productive land shall be reclaimed after construction activity. ○ Fuel and lubricants shall be stored at the predefined storage location. ○ The storage area shall be paved with gentle slope to a corner and connected with a chamber to collect any spills of the oils. ○ All efforts shall be made to minimise the waste generation. Unavoidable waste shall be stored at the designated place prior to disposal. ○ To avoid soil contamination at the wash-down and re-fuelling areas, “oil interceptors” shall be provided. Oil and grease spill and oil soaked materials are to be collected and stored in	Throughout the project area with special attention to paddy and other agricultural lands	To be included under contractors costs	Contractor	PIU, PIC

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		labelled containers (Labelled: WASTE OIL; and hazardous sign be displayed) and sold off to relevant parties. o Any land degraded due to construction activities should be restored to the satisfactory level of the owner				
9.	Establishment of Construction Camp, temporary office and storage area	o Construction camp sites and storage areas shall be located away from any local human settlements, water bodies and forested areas (minimum 0.2 km away) and preferably located on land which is not productive (barren/waste lands presently). If these are not possible private land maybe taken on lease as standard practice. o The construction camps, office and storage areas shall have provision of adequate water supply, sanitation and all requisite infrastructure facilities. o The construction camps, office and storage areas shall have provision of septic tank/soak pit of adequate capacity so that it can function properly for the entire duration of its use. o All construction camps shall have provision of rationing facilities particularly for kerosene/LPG so that dependence on firewood for cooking is avoided to the extent possible. o The construction camps, office and storage areas shall have provision of health care facilities for adults, pregnant women and children. o Personal Protective Equipments (PPEs) such as helmet, boots, earplugs for workers, first aid and fire fighting equipments shall be available	Throughout the subproject area with special attention to labour camps, storage areas and office premises	To be included in contractor's cost	Contractor	PIU, PIC, LA

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		at construction sites before start of construction. An emergency plan shall be prepared to fight with any emergency like fire. o Provision shall be made for domestic solid waste disposal in acceptable manner. The solid waste shall be handed over to the waste collecting system of the Local Authority (LA) of the area and wastewater should be disposed with the approval of the PIC. o Provision of paved area for unloading and storage of fuel oil, lubricant oil, away from storm water drainage.				
10.	Construction Debris and waste	o Excavated materials from roadway, shoulders, verges, drains, cross drainage will be used for backfilling embankments, filling pits, and landscaping. o Unusable debris material and removed pavements of roads should be suitably disposed off at pre-designated disposal locations, with approval of the concerned authority such as LA/DS. o The bituminous wastes shall be disposed in secure manner and environmentally accepted manner eg. Disposed in a pit that is covered properly and adequate revegetation is carried out or others. o In establishing disposal sites, unproductive/wastelands shall be selected with the help the PIC and villagers. The dumping site should be of adequate capacity. It should be located without causing nuisance to residential areas. Dumping sites	Throughout the subproject area and all disposal sites	To be included under contractors costs	Contractor	PIU, PIC

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		should also be away from water bodies to prevent any contamination of these bodies.				
11.	Air and Noise Quality and vibration	○ Vehicles delivering loose and fine materials like sand and aggregates shall be covered. ○ Dust suppression measures such as water sprinkling, shall be applied in all dust prone locations such as unpaved haulage roads, earthworks, stockpiles and asphalt mixing areas. ○ Batching plants and asphalt (hot mix) should be operated with necessary licenses (Environmental Protection License (EPL) and trade license) and plants shall be located at least 0.2 km away and in downwind direction of the human settlements and should not disturb normal life of residents. ○ Material storage areas shall also be located downwind of the habitation area. ○ Hot mix plant shall be fitted with stack of adequate height (30m) or as may be prescribed in the EPL to ensure enough dispersion of exit gases. ○ Diesel Generators (DG) shall also be sound proof or fitted with stack of adequate height. ○ Construction vehicles and machineries shall be periodically maintained. ○ 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.	Throughout the subproject road with special attention to schools, hospitals and religious places	To be included under contractors costs	Contractor	PIU, PIC

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		○ No construction along community areas will be permitted during night time ○ Contractor shall take appropriate action to ensure that construction works do not result in damage to adjacent properties due to vibration. If any damages occur, contractor will be responsible for rectifying the damage. ○				
12.	Tree plantation	○ Compensatory afforestation shall be made on 1:3.ratio basis. ○ Only native species should be selected with the consent of DoF for replanting ○ Additional trees shall be planted wherever feasible. ○ Follow up maintenance of planted saplings will be carried out for a minimum of 3 years	Throughout the road.	To be included under contractors costs	Contractor	PIU, PIC
13.	Ground Water and Surface Water Quality and Availability	○ The contractor shall arrange for water required during construction in such a way that the water availability and supply to nearby communities remains unaffected. ○ Water intensive activities shall not be undertaken during dry period to the extent feasible. ○ Provision shall be made to link side drains with the nearby ponds for facilitating water harvesting if feasible. ○ Preventive measures such as proper storage of unsuitable soil, construction chemicals, servicing construction vehicles in approved sites, slope stabilisation, etc shall be taken for prevention of siltation and pollution of	Throughout road with special attention to streams, tanks and marshes	To be included under contractors costs	Contractor	PIU, PIC

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		water bodies.				
14.	Occupational Health and Safety	○ The requisite PPE (helmet, mask, boot, hand gloves, earplugs) shall be provided to the construction workers and it should be ensured that labourers use PPE during working hours. ○ Workers' exposure to noise will be restricted to less than 8 hours a day. Workers duty shall be regulated accordingly. ○ First aid facility should be readily available at every construction site throughout the construction period ○ Septic tank or mobile toilets fitted with anaerobic treatment facility shall be provided at construction camp/temporary office/storage areas. ○ Domestic solid waste at construction camp shall be properly collected and handed over to the solid waste collecting system of LA. ○ Records on health and safety related accidents measures taken to address must be maintained	Throughout the road	Costs to be borne by Contractor	Contractor	PIU, PIC
15.	Traffic Management and Road Safety	○ Identify the areas where temporary traffic diversion may be required. ○ Prepare appropriate traffic movement plan approved by PIU and RDA for ensuring continued safe flow of traffic, pedestrians and all road users during construction. ○ Wherever, cross drainage structure work require longer construction time and road is to be blocked for longer duration, the PIC shall define appropriate measures for traffic diversion before the start of the	Throughout the subproject area	To be included in contractor's cost	Contractor	PIU, PIC

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		construction. o Adequate signboards shall be placed much ahead of diversion site to caution the road users. The road signs should comply with the Road Safety Manual of RDA. o It is proposed to discuss with the Department of Railways for providing adequate safety measures at unmanned railway crossing where applicable. Adequate clearly visible sign shall be provided on both sides of the railway crossing. o 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 to enhance the road safety where necessary at the completion of the project o Monitor and record road crashes during construction and maintenance stages and take appropriate remedial actions				
16.	Impacts on Biodiversity	o No solid waste or spoil dumping sites, hot mix plants and worker camps should be located within or close to the protected areas. o Prior approval should be taken from the relevant department for entrance or temporary alteration of properties belongs to such areas. o 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	Near forest reserves, national parks, sanctuaries if any	To be included in contractor's cost	Contractor	PIU, PIC

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		specified time period. o Restrictions on the daily working hours between daylight and sunset must be enforced in sites near protected areas or wildlife zones o Conditions which may be required by the DWLC for roads located adjacent or close to protected areas must be met o For roads falling near protected areas or MER areas appropriate measures such as posting of information sign boards on the presence of wildlife, speed controls such as speed bumps etc. must be installed as appropriate o Other measures to facilitate wildlife movement across the road such as exclusion fences may be installed with advise of DWLC o Ensure that construction timing of cross drains and bridges will not affect the migration or breeding of aquatic species. The contractor will seek guidance from pertinent agencies to identify rivers and creeks harbouring sensitive aquatic life. o Ensure that the timing of tree removal does not coincide with breeding season of birds or other fauna if the trees are being used by birds and other fauna				
17.	Road reconstruction within flood prone areas	o 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 PIC to keep all drainage paths and drains clear of blockage at all times.	Flood prone areas crossed by the roads if any	To be included in contractor's cost	Contractor	PIU, PIC

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		○ If flooding or stagnation of water is caused by contractor's activities, contractor shall compensate for any loss of income or damage as a result. ○ When working in flood prone areas during rainy season the contractor shall avoid storing materials, chemicals and other items of work in areas where those can be washed away by the floods.				
III	**→ Post Construction and Operational Stage**					
18.	Hydrology and Drainage	○ Regular removal/cleaning of deposited silt shall be done from drainage channels and outlet points before the monsoon season. ○ Renovation of the drainage system by repairing removing encroachments/ congestions shall be regularly conducted	At project road locations with drainage structures	To be covered under road maintenance costs.	Contractor (during maintenance period) and RDA	PIU/RDA
19.	Air and Noise Quality	○ Placing sign boards for speed limitation and honking restrictions to be enforced near sensitive locations. ○ Removal of dust & mud collected on road surface to avoid dust emanation ○ Strategically locating compensatory plantation along sensitive noise receptors to provide additional attenuation ○ Installation of noise and dust barriers if levels are found to exceed required standards.	Throughout the road	construction cost and maintenance cost	Contractor (during maintenance period) and RDA	PIU/RDA
20.	Site restoration	○ All construction camp/temporary office/material storage areas are to be restored to its original conditions or as agreed with the land owner. ○ The borrow areas rehabilitation will be as per the conditions laid down in	All locations of construction camps/tempora ry office/ material storage, and	To be borne by the contractor	Contractor (during maintenance period) and RDA	PIU/RDA

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		GSMB approval.	borrow areas			
21.	Tree replanting	○ Contractor to undertake survivability assessment and report to PIU the status of compensatory tree plantation. ○ Additional plants should be planted for dead plants if any	Tree replanted areas	To be borne by the contractor	Contractor (during maintenance period) and RDA	PIU/RDA
22.	Occupational Health and Safety	○ The requisite PPE (helmet, mask, boot, hand gloves, earplugs) shall be provided to the construction workers and it should be ensured that labourers use PPE during working hours. ○ First aid facility should be readily available at the construction site ○ Septic tank or mobile toilets fitted with anaerobic treatment facility shall be provided at construction camp/temporary office/storage areas. ○ Domestic solid waste at construction camp shall be properly collected and handed over to the solid waste collecting system of LA. ○ Records on health and safety related accidents measures taken to address must be maintained	Throught project road and camp sites if any	To be borne by the contractor	Contractor (during maintenance period) and RDA	PIU/RDA

Appendix 6.2: Sample EMC for Rural Roads

I. Environmental Monitoring Checklist during Design and Pre-Construction Stage
Upgrading of Rural Roads to all Weather Standards

District:
Road Name:
Road ID:
Total length:
Report No. and date:
Completed by:

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
1..	Climate Change Consideration and Vulnerability screening	○ Compliance to climate change vulnerability check point given under IEE and adoption of necessary mitigative measures as may be required ○ Efforts shall be made to plant additional trees for increasing the carbon sink. The trees may be planted with help of DoF (Department of Forest) and space for additional planting will be explored with the help of DoF, Divisional Secretary (DS) and Community Based Organizations (CBO).	Throughout the subproject and other possible areas of tree planting		
2..	Clearing of vegetation and removing trees	○ All efforts shall be taken to avoid tree cutting wherever possible. ○ Requisite permission from DoF shall be obtained for cutting of roadside trees ○ Cut trees shall be handed over to the Timber Corporation. ○ Provision of Compensatory Afforestation shall be made on 1:3.ratio basis. ○ Only native species with the consent of DoF will be selected for replanting and locations for tree replanting will be as closer as possible to the tree removed. ○ And if road side space for replanting is not available, other possible locations such as schools, public areas will be	Throughout the subproject area		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		explored with the help of DoF, DS and CBOs of the area. o Provision shall be made for additional compensatory tree plantation. o Any leftover of trees shall be removed and disposed in approved manner.			
3.	Shifting of utilities	o The proposed Right of Way (ROW) shall be clearly demarcated on the ground. o All efforts will be made to minimize shifting of utilities o Utility shifting shall be planned in consultations and concurrence of the relevant service provider. o Required permissions and necessary actions will be taken from relevant service provider on a timely basis for removing and shifting utility structures before road construction activities begin**.** o The public/users of the particular service should be aware well in advance about the timing of the shifting/removal of the relevant utility lines when the service will be disrupted	Utility poles located along either the side of the road which may be shifted due to the road improvement		
4. 7.77	Impacts to common properties	o All efforts will be made to minimize shifting of common properties. o Structures with religious importance will not be damaged o Any common property built within the existing ROW and to be removed due to road improvement will be reconstructed as to the satisfactory level to the relevant owner	Throughout the road with special attention to any common property to be shifted		
5.	Hydrology and Drainage	o Provision of adequate cross drainage structure shall be made to ensure smooth passage of water and maintaining natural drainage pattern of the area. Here, special attention should be paid for flood prone areas if any. o The discharge capacity of the cross drainage structure shall be designed accordingly. o Provision of adequate drainage structures shall be made in water stagnant/logging areas. o The construction work near water body shall be planned preferably in dry season so that water quality of the water channel is not affected due to siltation and rain water runoff. o Provision of additional cross drainage structure shall be made in the areas where nearby land is sloping towards road	Near all drainage crossings, rivers, streams and tanks.		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		alignment on both the sides.			
6.	Grievance Redress	○ Maintaining records of all environment related grievances raised, if any, and the actions taken to address them through the village level grievance redress committee (GRC) and PIU as applicable	All project roads.		

NOTE: Each report must enclose photographs to demonstrate the mitigation measures implemented

II. Environmental Monitoring Checklist during Construction Stage
Upgrading of Rural Roads to all Weather Standards

District:
Road Name:
Road ID:
Total length:
Report No. and date:
Completed by:

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
1.	Sourcing and transportation of construction material	**Borrow Earth:** o The borrow earth shall be obtained from borrow pits which are operated with GSMB and CEA approvals. o And if new borrow pits are opened for the subproject, necessary approvals and licenses should be obtained from GSMB and CEA. And all conditions laid down in such licenses should be strictly adhered. o All completed borrow pits should be rehabilitated to satisfy conditions given mining license of GSMB o Borrowing earth from agricultural land shall be minimized to the extent possible. Further, no earth shall be borrowed from already low-lying areas. **Aggregate :** o The stone aggregate shall be sourced from existing licensed quarries o Copies of consent/ approval / rehabilitation plan for use of existing source will be submitted to PIU through PIC. o Topsoil to be stockpiled and protected for use at the rehabilitation stage. **Transportation of Construction Material** o Existing tracks / roads are to be used for hauling of materials to the extent possible.	Throughout the subproject area with special attention to borrow pits and quarries		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		○ The vehicles deployed for material transportation shall be spillage proof to avoid or minimize the spillage of the material during transportation.			
2.	Loss of Productive Soil, erosion and land use change	○ The top soil from the productive land (borrow areas, road widening areas etc.) shall be preserved and reused for plantation purposes. ○ It shall also be used as top cover of embankment slope for growing vegetation to protect soil erosion. ○ Shrubs shall be planted in loose soil area. ○ It shall be ensured that the land taken on lease for access road, construction camp and temporary office of the storage facilities is restored back to its original land use before handing it over to land owner.	Throughout the subproject area and camps sites, storage areas and temporary offices		
3.	Slope protection and stablilization	○ Slope protection measures must be carried out using appropriate engineering and bio-engineering measures in combination with drainage improvement measures were appropriate ○ Only native plant species will be selected for the bio-engineering works ○ Follow up watering and maintenance of the plants must be carried out to ensure the survival of the plants and success of the slope stabilization	In project areas falling inside hilly terrain		
3.	Compaction and Contamination of Soil	○ To prevent soil compaction in the adjoining productive lands beyond the ROW, the movement of construction vehicles, machinery and equipment shall be restricted to the designated haulage route. ○ The productive land shall be reclaimed after construction activity. ○ Fuel and lubricants shall be stored at the predefined storage location. ○ The storage area shall be paved with gentle slope to a corner and connected with a chamber to collect any spills of the oils. ○ All efforts shall be made to minimise the waste generation. Unavoidable waste shall be stored at the designated place	Throughout the project area with special attention to paddy and other agricultural lands		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		prior to disposal. o To avoid soil contamination at the wash-down and re-fuelling areas, “oil interceptors” shall be provided. Oil and grease spill and oil soaked materials are to be collected and stored in labelled containers (Labelled: WASTE OIL; and hazardous sign be displayed) and sold off to relevant parties. o Any land degraded due to construction activities should be restored to the satisfactory level of the owner			
4.	Establishment of Construction Camp, temporary office and storage area	o Construction camp sites and storage areas shall be located away from any local human settlements, water bodies and forested areas (minimum 0.2 km away) and preferably located on land which is not productive (barren/waste lands presently). If these are not possible private land maybe taken on lease as standard practice. o The construction camps, office and storage areas shall have provision of adequate water supply, sanitation and all requisite infrastructure facilities. o The construction camps, office and storage areas shall have provision of septic tank/soak pit of adequate capacity so that it can function properly for the entire duration of its use. o All construction camps shall have provision of rationing facilities particularly for kerosene/LPG so that dependence on firewood for cooking is avoided to the extent possible. o The construction camps, office and storage areas shall have provision of health care facilities for adults, pregnant women and children. o Personal Protective Equipments (PPEs) such as helmet, boots, earplugs for workers, first aid and fire fighting equipments shall be available at construction sites before start of construction. An emergency plan shall be prepared to fight with any emergency like fire. o Provision shall be made for domestic solid waste disposal in acceptable manner. The solid waste shall be handed over to the waste collecting system of the Local Authority (LA) of the area and wastewater should be disposed with the	Throughout the subproject area with special attention to labour camps, storage areas and office premises		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		approval of the PIC. o Provision of paved area for unloading and storage of fuel oil, lubricant oil, away from storm water drainage.			
5.	Construction Debris and waste	o Excavated materials from roadway, shoulders, verges, drains, cross drainage will be used for backfilling embankments, filling pits, and landscaping. o Unusable debris material and removed pavements of roads should be suitably disposed off at pre-designated disposal locations, with approval of the concerned authority such as LA/DS. o The bituminous wastes shall be disposed in secure manner and environmentally accepted manner. o In establishing disposal sites, unproductive/wastelands shall be selected with the help the PIC and villagers. The dumping site should be of adequate capacity. It should be located without causing nuisance to residential areas. Dumping sites should also be away from water bodies to prevent any contamination of these bodies.	Throughout the subproject area and all disposal sites		
6. 7.77	Air and Noise Quality and vibration	o Vehicles delivering loose and fine materials like sand and aggregates shall be covered. o Dust suppression measures such as water sprinkling, shall be applied in all dust prone locations such as unpaved haulage roads, earthworks, stockpiles and asphalt mixing areas. o Batching plants and asphalt (hot mix) should be operated with necessary licenses (Environmental Protection License (EPL) and trade license) and plants shall be located at least 0.2 km away and in downwind direction of the human settlements and should not disturb normal life of residents. o Material storage areas shall also be located downwind of the habitation area. o Hot mix plant shall be fitted with stack of adequate height (30m) or as may be prescribed in the EPL to ensure enough dispersion of exit gases. o Diesel Generators (DG) shall also be sound proof or fitted	Throughout the subproject road with special attention to schools, hospitals and religious places		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		with stack of adequate height. o Construction vehicles and machineries shall be periodically maintained. o 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. o Contractor shall take appropriate action to ensure that construction works do not result in damage to adjacent properties due to vibration. If any damages occur, contractor will be responsible for rectifying the damage. o No construction along community areas will be permitted during night time			
7.	Tree plantation	o Compensatory afforestation shall be made on 1:3.ratio basis. o Only native species should be selected with the consent of DoF for replanting o Additional trees shall be planted wherever feasible. o Follow up maintenance of planted saplings will be carried out for a minimum of 3 years	Throughout the road.		
8.	Ground Water and Surface Water Quality and Availability	o The contractor shall arrange for water required during construction in such a way that the water availability and supply to nearby communities remains unaffected. o Water intensive activities shall not be undertaken during dry period to the extent feasible. o Provision shall be made to link side drains with the nearby ponds for facilitating water harvesting if feasible. o Preventive measures such as proper storage of unsuitable soil, construction chemicals, servicing construction vehicles in approved sites, slope stabilisation, etc shall be taken for prevention of siltation and pollution of water bodies.	Throughout road with special attention to streams, tanks and marshes		
9.	Occupational Health and Safety	o The requisite PPE (helmet, mask, boot, hand gloves, earplugs) shall be provided to the construction workers and it should be ensured that labourers use PPE during working hours. o Workers' exposure to noise will be restricted to less than 8	Throughout the road		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		hours a day. Workers duty shall be regulated accordingly. o First aid facility should be readily available at every construction site throughout the construction period o Septic tank or mobile toilets fitted with anaerobic treatment facility shall be provided at construction camp/temporary office/storage areas. o Domestic solid waste at construction camp shall be properly collected and handed over to the solid waste collecting system of LA. o Records on health and safety related accidents measures taken to address must be maintained			
10.	Traffic Management and Road Safety	o Identify the areas where temporary traffic diversion may be required. o Prepare appropriate traffic movement plan approved by PIU and RDA for ensuring continued safe flow of traffic, pedestrians and all road users during construction. o Wherever, cross drainage structure work require longer construction time and road is to be blocked for longer duration, the PIC shall define appropriate measures for traffic diversion before the start of the construction. o Adequate signboards shall be placed much ahead of diversion site to caution the road users. The road signs should comply with the Road Safety Manual of RDA. o It is proposed to discuss with the Department of Railways for providing adequate safety measures at unmanned railway crossing where applicable. Adequate clearly visible sign shall be provided on both sides of the railway crossing. o 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 to enhance the road safety where necessary at the completion of the project o Monitor and record road crashes during construction and maintenance stages and take appropriate remedial actions	Throughout the subproject area		
11.	Impacts on	o No solid waste or spoil dumping sites, hot mix plants and	Near forest		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
	Biodiversity	worker camps should be located within or close to the protected areas. o Prior approval should be taken from the relevant department for entrance or temporary alteration of properties belongs to such areas. o 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. o Restrictions on the daily working hours between daylight and sunset must be enforced in sites near protected areas or wildlife zones o Conditions which may be required by the DWLC for roads located adjacent or close to protected areas must be met o For roads falling near protected areas or MER areas appropriate measures such as posting of information sign boards on the presence of wildlife, speed controls such as speed bumps etc. must be installed as appropriate o Other measures to facilitate wildlife movement across the road such as exclusion fences may be installed with advise of DWLC o Ensure that construction timing of cross drains and bridges will not affect the migration or breeding of aquatic species. The contractor will seek guidance from pertinent agencies to identify rivers and creeks harbouring sensitive aquatic life. o Ensure that the timing of tree removal does not coincide with breeding season of birds or other fauna if the trees are being used by birds and other fauna	reserves, national parks, sanctuaries if any		
12.	Road reconstruction within flood prone areas	o 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 PIC to keep all drainage paths and drains clear of blockage at all times. o If flooding or stagnation of water is caused by contractor's activities, contractor shall compensate for any loss of income or damage as a result.	Flood prone areas crossed by the roads if any		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		○ When working in flood prone areas during rainy season the contractor shall avoid storing materials, chemicals and other items of work in areas where those can be washed away by the floods.			
13.	Grievance Redress	○ Maintaining records of all environment related grievances raised, if any, and the actions taken to address them through the village level grievance redress committee (GRC) and PIU as applicable	All project roads.		

NOTE: Each report must enclose photographs to demonstrate the mitigation measures implemented

III. Environmental Monitoring Checklist during Post-Construction or Operation Stage
Upgrading of Rural Roads to all Weather Standards

District:
Road Name:
Road ID:
Total length:
Report No. and date:
Completed by:

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
1.	Air and Noise Quality	○ Awareness sign board shall be provided for slow driving near the habitat areas to minimize dust generation due to vehicle movement. Speed limitation and honking restrictions may be enforced near sensitive locations. ○ Strategically locating compensatory plantation along sensitive noise receptors to provide additional attenuation ○ Installation of noise and dust barriers if levels are found to exceed required standards.	Throughout the road		
2.	Site restoration	○ All construction camp/temporary office/material storage areas are to be restored to its original conditions or as agreed with the land owner. ○ The borrow areas rehabilitation will be as per the conditions laid down in GSMB approval.	All locations of construction camps/temporary office/ material storage, and borrow areas		
3.	Tree replanting	○ Contractor to undertake survivability assessment and report to PIU the status of compensatory tree plantation. ○ Additional plants should be planted for dead plants if any	Tree replanted areas		
4.	Hydrology and	○ Regular removal/cleaning of deposited silt shall	At project road		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
	Drainage	be done from drainage channels and outlet points before the monsoon season. o Renovation of the drainage system by repairing removing encroachments/ congestions shall be regularly conducted	locations with drainage structures		
5.	Occupational Health and Safety	o The requisite PPE (helmet, mask, boot, hand gloves, earplugs) shall be provided to the construction workers and it should be ensured that labourers use PPE during working hours. o First aid facility should be readily available at the construction site o Septic tank or mobile toilets fitted with anaerobic treatment facility shall be provided at construction camp/temporary office/storage areas. o Domestic solid waste at construction camp shall be properly collected and handed over to the solid waste collecting system of LA. o Records on health and safety related accidents measures taken to address must be maintained	Throughout project roads and campsites if any		
6.	Grievance Redress	o Maintaining records of all environment related grievances raised, if any, and the actions taken to address them through the village level grievance redress committee (GRC) and PIU as applicable	All project roads.		

NOTE: Each report must enclose photographs to demonstrate the mitigation measures implemented

Appendix 6.3: Environmental Monitoring Plan for Rural Roads

Environmental Component	Project Stage	Parameters	Frequency	Locations	Standards	Rate	Approximate Cost (SLRs)	Implementation	Supervision
Air Quality	Design and Construction stage	TSPM, PM10, NO_x, CO, SO_x, Pb	Design: Once Construction: 3 times per year for 2 years	Minimum 2 locations (Locations to be identified with the help of PIC)	NAAQS of Sri Lanka	Rs 40,000 per location	560,000.00	Contractor through approved monitoring agency	RDA/ESD
	Operation stage	TSPM, PM10, NO_x, CO, HC, Pb, SO_x	Once per year for 3 years	-do-	NAAQS of Sri Lanka	Rs 40,000 per location	240,000.00	Contractor/RDA through approved monitoring agency	RDA/ESD
Water Quality	Design and Construction stage	EC, pH, DO, TSS, BOD, Oil and grease, Lead, E. Coli	Design: Once Construction: 3 times per year for 2 years	Minimum 2 locations (Locations to be identified with the help of PIC)	CEA advisory guidelines	Rs 10,000 per location	140,000.00	Contractor through approved monitoring agency	RDA/ESD
	Operation stage	EC, pH, DO, TSS, BOD, Oil and grease, Lead, E. Coli	Once per year for 3 years	-do-	CEA advisory guidelines	Rs 10,000 per location	60,000.00	Contractor/RDA through approved monitoring agency	RDA/ESD
Noise Levels	Design and Construction stage	dB levels	Design: Once Construction: 3 times per year for 2 years	Minimum 2 locations (Locations to be identified with the help of PIC)	National Environmental (Noise Control) Regulations 1996(no. 924/12)	Rs 10,000 per day	140,000.00	Contractor through approved monitoring agency	RDA/ESD

Environmental Component	Project Stage	Parameters	Frequency	Locations	Standards	Rate	Approximate Cost (SLRs)	Implementation	Supervision
	Operation stage	dB levels	Once per year for 3 years	-do-	National Environmental (Noise Control) Regulations 1996(no. 924/12)	Rs 10,000 per day	60,000.00	Contractor/RDA through approved monitoring agency	RDA/ESD
Flora	Design stage		1 visit	Locations to be identified with the help of PIC	Diversity of existing species	Rs 20,000 per visit	20,000.00	RDA, through recognized community based organization	RDA/ESD
	Construction stage	Replanting of trees	1 visit	Locations to be identified with the help of PIC	Diversity of species replanted	Rs 20,000 per visit	20,000.00	Contractor/RDA	
	Operation stage	Survival of trees	1 visit	-do-	Percentage of survival to be maintained to 100%	Rs 20,000 per visit	20,000.00	Contractor/RDA	RDA/ESD
Fauna	Design stage	Diversity of species	1 visit	Locations to be identified with the help of PIC		Rs 20,000 per visit	20,000.00	Contractor/RDA	RDA/ESD
	Construction stage	Diversity of species	1 visit	-do-		Rs 20,000 per visit	20,000.00	Contractor/RDA	RDA/ESD
	Operation stage	Diversity of species	1 visit	-do-		Rs 20,000 per visit	20,000.00	Contractor/RDA	RDA/ESD
	Total						1,320,000.0 (10,153.80 US$)		

Appendix 6.4: Standard EMP for reconstructed roads of OPRC package

Environmental Management Plan
For Reconstructed Roads under OPRC Package
District:
Road Name:
Road ID:
Total length:

SL. NO.	Project Action/Environmental Attributes	Mitigation Measures	Location/numbers	Costs	Responsible for Implementing	Responsible for Monitoring
I	**Design and Preconstruction Stage**					
1.	Climate Change Consideration and Vulnerability screening	○ Compliance to climate change vulnerability check point given under IEE and adoption of necessary mitigative measures as may be required ○ Efforts shall be made to plant additional trees for increasing the carbon sink. The trees may be planted with help of DoF (Department of Forest) and space for additional planting will be explored with the help of DoF, Divisional Secretary (DS) and Community Based Organizations (CBO).	Throughout the subproject and other possible areas of tree planting	Design costs.	PIU, Design consultants	Project Implementation Unit (PIU)
2.	Clearing of vegetation and removing trees	○ All efforts shall be taken to avoid tree cutting wherever possible. ○ Requisite permission from DoF shall be obtained for cutting of roadside trees ○ Cut trees shall be handed over to the Timber Corporation. ○ Provision of Compensatory Afforestation shall be made on	Throughout the subproject area	Costs for tree removal. Costs for compensatory tree replanting.	Contractor	PIU, Project Implementation Consultant (PIC), DoF

SL. NO.	Project Action/Environmental Attributes	Mitigation Measures	Location/numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		1:3.ratio basis. ○ Only native species with the consent of DoF will be selected for replanting and locations for tree replanting will be as closer as possible to the tree removed. ○ And if road side space for replanting is not available, other possible locations such as schools, public areas will be explored with the help of DoF, DS and CBOs of the area. ○ Provision shall be made for additional compensatory tree plantation. ○ Any leftover of trees shall be removed and disposed in approved manner.				
3.	Shifting of utilities	○ The proposed Right of Way (ROW) shall be clearly demarcated on the ground. ○ All efforts will be made to minimize shifting of utilities ○ Utility shifting shall be planned in consultations and concurrence of the relevant service provider. ○ Required permissions and necessary actions will be taken from relevant service provider on a timely basis for removing and shifting utility structures before road construction activities begin. ○ The public/users of the particular service should be aware well in advance about the timing of the shifting/removal of the relevant utility lines when the service will be disrupted	Utility poles located along either the side of the road which may be shifted due to the road improvement	Costs to cover shifting and reconstructio n of utilities and common property resources must be included under project costs.	Contractor	PIU, PIC, CEB, Sri Lanka Telecom, NWS&DB, Community based water supply schemes if any
4.	Impacts to common	○ All efforts will be made to minimize	Throughout the	Costs of	Contractor	PIU, PIC

SL. NO.	Project Action/Environmental Attributes	Mitigation Measures	Location/numbers	Costs	Responsible for Implementing	Responsible for Monitoring
	properties	shifting of common properties. ○ Structures with religious importance will not be damaged ○ Any common property built within the existing ROW and to be removed due to road improvement will be reconstructed as to the satisfactory level to the relevant owner	road with special attention to any common property to be shifted	removing and repairing common properties		
5.	Hydrology and Drainage	○ Provision of adequate cross drainage structure shall be made to ensure smooth passage of water and maintaining natural drainage pattern of the area. Here, special attention should be paid for flood prone areas if any. ○ The discharge capacity of the cross drainage structure shall be designed accordingly. ○ Provision of adequate drainage structures shall be made in water stagnant/logging areas. ○ The construction work near water body shall be planned preferably in dry season so that water quality of the water channel is not affected due to siltation and rain water runoff. ○ Provision of additional cross drainage structure shall be made in the areas where nearby land is sloping towards road alignment on both the sides.	Near all drainage crossings, rivers, streams and tanks.	Included in project costs.	PIU, Design consultants	PIU
II.	**Construction Stage**					
6.	Sourcing and transportation of construction material	**Borrow Earth:** ○ The borrow earth shall be obtained from borrow pits which are operated with GSMB and CEA approvals. ○ And if new borrow pits are opened for the subproject, necessary approvals	Throughout the subproject area with special attention to borrow pits and quarries	To be included under contractors costs	Contractor	PIU, PIC

SL. NO.	Project Action/Environmental Attributes	Mitigation Measures	Location/numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		and licenses should be obtained from GSMB and CEA. And all conditions laid down in such licenses should be strictly adhered. o All completed borrow pits should be rehabilitated to satisfy conditions given mining license of GSMB o Borrowing earth from agricultural land shall be minimized to the extent possible. Further, no earth shall be borrowed from already low-lying areas. **Aggregate :** o The stone aggregate shall be sourced from existing licensed quarries o Copies of consent/ approval / rehabilitation plan for use of existing source will be submitted to PIU through PIC. o Topsoil to be stockpiled and protected for use at the rehabilitation stage. **Transportation of Construction Material** o Existing tracks / roads are to be used for hauling of materials to the extent possible. o The vehicles deployed for material transportation shall be spillage proof to avoid or minimize the spillage of the material during transportation.				
7.	Loss of Productive Soil, erosion and land use change	o The top soil from the productive land (borrow areas, road widening areas etc.) shall be preserved and reused for plantation purposes. o It shall also be used as top cover of embankment slope for growing	Throughout the subproject area and camps sites, storage areas and temporary offices	To be included under contractors costs	Contractor	PIU, PIC

SL. NO.	Project Action/Environmental Attributes	Mitigation Measures	Location/numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		vegetation to protect soil erosion. o Shrubs shall be planted in loose soil area. o It shall be ensured that the land taken on lease for access road, construction camp and temporary office of the storage facilities is restored back to its original land use before handing it over to land owner.				
8.	Slope protection and stablilization	o Slope protection measures must be carried out using appropriate engineering and bio-engineering measures in combination with drainage improvement measures were appropriate o Only native plant species will be selected for the bio-engineering works o Follow up watering and maintenance of the plants must be carried out to ensure the survival of the plants and success of the slope stabilization	In project areas falling inside hilly terrain	To be included under contractors costs	Contractor	PIU, PIC
9.	Compaction and Contamination of Soil	o To prevent soil compaction in the adjoining productive lands beyond the ROW, the movement of construction vehicles, machinery and equipment shall be restricted to the designated haulage route. o The productive land shall be reclaimed after construction activity. o Fuel and lubricants shall be stored at the predefined storage location. o The storage area shall be paved with gentle slope to a corner and connected with a chamber to collect any spills of the oils. o All efforts shall be made to minimise the waste generation. Unavoidable	Throughout the project area with special attention to paddy and other agricultural lands	To be included under contractors costs	Contractor	PIU, PIC

SL. NO.	Project Action/Environmental Attributes	Mitigation Measures	Location/numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		waste shall be stored at the designated place prior to disposal. o To avoid soil contamination at the wash-down and re-fuelling areas, “oil interceptors” shall be provided. Oil and grease spill and oil soaked materials are to be collected and stored in labelled containers (Labelled: WASTE OIL; and hazardous sign be displayed) and sold off to relevant parties. o Any land degraded due to construction activities should be restored to the satisfactory level of the owner				
9.	Establishment of Construction Camp, temporary office and storage area	o Construction camp sites and storage areas shall be located away from any local human settlements, water bodies and forested areas (minimum 0.2 km away) and preferably located on land which is not productive (barren/waste lands presently). If these are not possible private land maybe taken on lease as standard practice. o The construction camps, office and storage areas shall have provision of adequate water supply, sanitation and all requisite infrastructure facilities. o The construction camps, office and storage areas shall have provision of septic tank/soak pit of adequate capacity so that it can function properly for the entire duration of its use. o All construction camps shall have	Throughout the subproject area with special attention to labour camps, storage areas and office premises	To be included in contractor’s cost	Contractor	PIU, PIC, LA

SL. NO.	Project Action/Environmental Attributes	Mitigation Measures	Location/numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		provision of rationing facilities particularly for kerosene/LPG so that dependence on firewood for cooking is avoided to the extent possible. o The construction camps, office and storage areas shall have provision of health care facilities for adults, pregnant women and children. o Personal Protective Equipments (PPEs) such as helmet, boots, earplugs for workers, first aid and fire fighting equipments shall be available at construction sites before start of construction. An emergency plan shall be prepared to fight with any emergency like fire. o Provision shall be made for domestic solid waste disposal in acceptable manner. The solid waste shall be handed over to the waste collecting system of the Local Authority (LA) of the area and wastewater should be disposed with the approval of the PIC. o Provision of paved area for unloading and storage of fuel oil, lubricant oil, away from storm water drainage.				
10.	Construction Debris and waste	o Excavated materials from roadway, shoulders, verges, drains, cross drainage will be used for backfilling embankments, filling pits, and landscaping. o Unusable debris material and removed pavements of roads should be suitably disposed off at pre-designated disposal locations, with approval of the concerned authority such as LA/DS.	Throughout the subproject area and all disposal sites	To be included under contractors costs	Contractor	PIU, PIC

SL. NO.	Project Action/Environmental Attributes	Mitigation Measures	Location/numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		○ The bituminous wastes shall be disposed in secure manner and environmentally accepted manner. ○ In establishing disposal sites, unproductive/wastelands shall be selected with the help the PIC and villagers. The dumping site should be of adequate capacity. It should be located without causing nuisance to residential areas. Dumping sites should also be away from water bodies to prevent any contamination of these bodies.				
11.	Air and Noise Quality and vibration	○ Vehicles delivering loose and fine materials like sand and aggregates shall be covered. ○ Dust suppression measures such as water sprinkling, shall be applied in all dust prone locations such as unpaved haulage roads, earthworks, stockpiles and asphalt mixing areas. ○ Batching plants and asphalt (hot mix) should be operated with necessary licenses (Environmental Protection License (EPL) and trade license) and plants shall be located at least 0.2 km away and in downwind direction of the human settlements and should not disturb normal life of residents. ○ Material storage areas shall also be located downwind of the habitation area. ○ Hot mix plant shall be fitted with stack of adequate height (30m) or as may be prescribed in the EPL to ensure enough dispersion of exit gases.	Throughout the subproject road with special attention to schools, hospitals and religious places	To be included under contractors costs	Contractor	PIU, PIC

SL. NO.	Project Action/Environmental Attributes	Mitigation Measures	Location/numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		○ Diesel Generators (DG) shall also be sound proof or fitted with stack of adequate height. ○ Construction vehicles and machineries shall be periodically maintained. ○ 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. ○ Contractor shall take appropriate action to ensure that construction works do not result in damage to adjacent properties due to vibration. If any damages occur, contractor will be responsible for rectifying the damage. ○ No construction along community areas will be permitted during night time				
12.	Tree plantation	○ Compensatory afforestation shall be made on 1:3.ratio basis. ○ Only native species should be selected with the consent of DoF for replanting ○ Additional trees shall be planted wherever feasible. ○ Follow up maintenance of planted saplings will be carried out for a minimum of 3 years	Throughout the road.	To be included under contractors costs	Contractor	PIU, PIC
13.	Ground Water and Surface Water Quality and Availability	○ The contractor shall arrange for water required during construction in such a way that the water availability and	Throughout road with special attention to	To be included under	Contractor	PIU, PIC

SL. NO.	Project Action/Environmental Attributes	Mitigation Measures	Location/numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		supply to nearby communities remains unaffected. o Water intensive activities shall not be undertaken during dry period to the extent feasible. o Provision shall be made to link side drains with the nearby ponds for facilitating water harvesting if feasible. o Preventive measures such as proper storage of unsuitable soil, construction chemicals, servicing construction vehicles in approved sites, slope stabilisation, etc shall be taken for prevention of siltation and pollution of water bodies.	streams, tanks and marshes	contractors costs		
14.	Occupational Health and Safety	o The requisite PPE (helmet, mask, boot, hand gloves, earplugs) shall be provided to the construction workers and it should be ensured that labourers use PPE during working hours. o Workers' exposure to noise will be restricted to less than 8 hours a day. Workers duty shall be regulated accordingly. o First aid facility should be readily available at every construction site throughout the construction period o Septic tank or mobile toilets fitted with anaerobic treatment facility shall be provided at construction camp/temporary office/storage areas. o Domestic solid waste at construction camp shall be properly collected and handed over to the solid waste collecting system of LA.	Throughout the road	Costs to be borne by Contractor	Contractor	PIU, PIC

SL. NO.	Project Action/Environmental Attributes	Mitigation Measures	Location/numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		○ Records on health and safety related accidents measures taken to address must be maintained				
15.	Traffic Management and Road Safety	○ Identify the areas where temporary traffic diversion may be required. ○ Prepare appropriate traffic movement plan approved by PIU and RDA for ensuring continued safe flow of traffic, pedestrians and all road users during construction. ○ Wherever, cross drainage structure work require longer construction time and road is to be blocked for longer duration, the PIC shall define appropriate measures for traffic diversion before the start of the construction. ○ Adequate signboards shall be placed much ahead of diversion site to caution the road users. The road signs should comply with the Road Safety Manual of RDA. ○ It is proposed to discuss with the Department of Railways for providing adequate safety measures at unmanned railway crossing where applicable. Adequate clearly visible sign shall be provided on both sides of the railway crossing. ○ 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 to enhance the road safety where necessary at the completion of the project	Throughout the subproject area	To be included in contractor's cost	Contractor	PIU, PIC

SL. NO.	Project Action/Environmental Attributes	Mitigation Measures	Location/numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		○ Monitor and record road crashes during construction and maintenance stages and take appropriate remedial actions				
16.	Impacts on Biodiversity	○ No solid waste or spoil dumping sites, hot mix plants and worker camps should be located within or close to the protected areas. ○ Prior approval should be taken from the relevant department for entrance or temporary alteration of properties belongs to such areas. ○ 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. ○ Restrictions on the daily working hours between daylight and sunset must be enforced in sites near protected areas or wildlife zones ○ Conditions which may be required by the DWLC for roads located adjacent or close to protected areas must be met ○ For roads falling near protected areas or MER areas appropriate measures such as posting of information sign boards on the presence of wildlife, speed controls such as speed bumps etc. must be installed as appropriate ○ Other measures to facilitate wildlife movement across the road such as exclusion fences may be installed with advise of DWLC	Near forest reserves, national parks, sanctuaries if any	To be included in contractor's cost	Contractor	PIU, PIC

SL. NO.	Project Action/Environmental Attributes	Mitigation Measures	Location/numbers	Costs	Responsible for Implementing	Responsible for Monitoring
17	Road reconstruction within flood prone areas	○ 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 PIC to keep all drainage paths and drains clear of blockage at all times. ○ If flooding or stagnation of water is caused by contractor's activities, contractor shall compensate for any loss of income or damage as a result. ○ When working in flood prone areas during rainy season the contractor shall avoid storing materials, chemicals and other items of work in areas where those can be washed away by the floods. ○ Ensure that construction timing of cross drains and bridges will not affect the migration or breeding of aquatic species. The contractor will seek guidance from pertinent agencies to identify rivers and creeks harbouring sensitive aquatic life. ○ Ensure that the timing of tree removal does not coincide with breeding season of birds or other fauna if the trees are being used by birds and other fauna	Flood prone areas crossed by the roads if any	To be included in contractor's cost	Contractor	PIU, PIC
III	**Post Construction and Maintenance Stage**					
18.	Site restoration	○ All construction camp/temporary office/material storage areas are to be restored to its original conditions or as agreed with the land owner. ○ The borrow areas rehabilitation will be as per the conditions laid down in GSMB approval.	All locations of construction camps/temporary office/ material storage, and borrow areas	To be borne by the contractor	Contractor (during maintenance period) and RDA	PIU/RDA

SL. NO.	Project Action/Environmental Attributes	Mitigation Measures	Location/numbers	Costs	Responsible for Implementing	Responsible for Monitoring
19.	Disposal of unsuitable material	○ All unsuitable material generated due to maintenance works including soil, vegetation, removed degraded road surface etc... should be disposed only at approved locations	Throughout the road	To be covered under road maintenance costs.	Contractor (during maintenance period) and RDA	PIU/RDA
20.	Hydrology and Drainage	○ Regular removal/cleaning of deposited silt shall be done from drainage channels and outlet points before the monsoon season. ○ Renovation of the drainage system by repairing removing encroachments/ congestions shall be regularly conducted	At project road locations with drainage structures	To be covered under road maintenance costs.	Contractor (during maintenance period) and RDA	PIU/RDA
21.	Degradation of water quality	○ Chemicals used for road maintenance should be carefully handled and stored ○ Storage facilities should sited well away from water bodies ○ Coordinate with CEA to monitor rivers receiving runoff from national roads for heay metals contamination	Throughout the road with special care near water bodies	To be covered under road maintenance costs.	Contractor (during maintenance period) and RDA	PIU/RDA
22.	Air and Noise Quality	○ Placing sign boards for speed limitation and honking restrictions to be enforced near sensitive locations. ○ Removal of dust & mud collected on road surface to avoid dust emanation ○ Strategically locating compensatory plantation along sensitive noise receptors to provide additional attenuation ○ Installation of noise and dust barriers if levels are found to exceed required standards.	Throughout the road	construction cost and maintenance cost	Contractor (during maintenance period) and RDA	PIU/RDA
23.	Extraction of material for road maintenance	○ Construction material shall be purchased only from licensed	Throughout the road	maintenance cost	Contractor (during	PIU/RDA

SL. NO.	Project Action/Environmental Attributes	Mitigation Measures	Location/numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		suppliers			maintenance period) and RDA	
24.	Tree replanting	○ Contractor to undertake survivability assessment and report to PIU the status of compensatory tree plantation. ○ Additional plants should be planted for dead plants if any	Tree replanted areas	To be borne by the contractor	Contractor (during maintenance period) and RDA	PIU/RDA
25.	Road safety	○ 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...	Throughout the road	maintenance cost	Contractor (during maintenance period) and RDA	PIU/RDA
26.	Occupational Health and Safety	○ The requisite PPE (helmet, mask, boot, hand gloves, earplugs) shall be provided to the construction workers and it should be ensured that labourers use PPE during working hours. ○ First aid facility should be readily available at the construction site ○ Septic tank or mobile toilets fitted with anaerobic treatment facility shall be provided at construction camp/temporary office/storage areas. ○ Domestic solid waste at construction camp shall be properly collected and handed over to the solid waste collecting system of LA. ○ Records on health and safety related accidents measures taken to address must be maintained	Throughout the road and campsites if any	maintenance cost	Contractor (during maintenance period) and RDA	PIU/RDA

Appendix 6.5: Sample EMC for reconstructed roads of OPRC package

I. Environmental Monitoring Checklist during Design and Pre-Construction Stage
For Reconstructed Roads under OPRC Package

District:
Road Name:
Road ID:
Total length:
Report No. and date:
Completed by:

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
1..	Climate Change Consideration and Vulnerability screening	○ Compliance to climate change vulnerability check point given under EARF and adoption of necessary mitigative measures as may be required ○ Efforts shall be made to plant additional trees for increasing the carbon sink. The trees may be planted with help of DoF (Department of Forest) and space for additional planting will be explored with the help of DoF, Divisional Secretary (DS) and Community Based Organizations (CBO).	Throughout the subproject and other possible areas of tree planting		
2..	Clearing of vegetation and removing trees	○ All efforts shall be taken to avoid tree cutting wherever possible. ○ Requisite permission from DoF shall be obtained for cutting of roadside trees ○ Cut trees shall be handed over to the Timber Corporation. ○ Provision of Compensatory Afforestation shall be made on 1:3.ratio basis. ○ Only native species with the consent of DoF will be selected for replanting and locations for tree replanting will be as closer as possible to the tree removed. ○ And if road side space for replanting is not available, other possible locations such as schools, public areas will be explored with the help of DoF, DS and CBOs of	Throughout the subproject area		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		the area. o Provision shall be made for additional compensatory tree plantation. o Any leftover of trees shall be removed and disposed in approved manner.			
3.	Shifting of utilities	o The proposed Right of Way (ROW) shall be clearly demarcated on the ground. o All efforts will be made to minimize shifting of utilities o Utility shifting shall be planned in consultations and concurrence of the relevant service provider. o Required permissions and necessary actions will be taken from relevant service provider on a timely basis for removing and shifting utility structures before road construction activities begin**.** o The public/users of the particular service should be aware well in advance about the timing of the shifting/removal of the relevant utility lines when the service will be disrupted	Utility poles located along either the side of the road which may be shifted due to the road improvement		
4. 7.7 7	Impacts to common properties	o All efforts will be made to minimize shifting of common properties. o Structures with religious importance will not be damaged o Any common property built within the existing ROW and to be removed due to road improvement will be reconstructed as to the satisfactory level to the relevant owner	Throughout the road with special attention to any common property to be shifted		
5.	Hydrology and Drainage	o Provision of adequate cross drainage structure shall be made to ensure smooth passage of water and maintaining natural drainage pattern of the area. Here, special attention should be paid for flood prone areas if any. o The discharge capacity of the cross drainage structure shall be designed accordingly. o Provision of adequate drainage structures shall be made in water stagnant/logging areas. o The construction work near water body shall be planned preferably in dry season so that water quality	Near all drainage crossings, rivers, streams and tanks.		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		of the water channel is not affected due to siltation and rain water runoff. ○ Provision of additional cross drainage structure shall be made in the areas where nearby land is sloping towards road alignment on both the sides.			
6.	Grievance Redress	○ Maintaining records of all environment related grievances raised, if any, and the actions taken to address them through the village level grievance redress committee (GRC) and PIU as applicable	All project roads.		

NOTE: Each report must enclose photographs to demonstrate the mitigation measures implemented

II. Environmental Monitoring Checklist during Construction Stage
For Reconstructed Roads under OPRC Package

District:
Road Name:
Road ID:
Total length:
Report No. and date:
Completed by:

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
1.	Sourcing and transportation of construction material	**Borrow Earth:** o The borrow earth shall be obtained from borrow pits which are operated with GSMB and CEA approvals. o And if new borrow pits are opened for the subproject, necessary approvals and licenses should be obtained from GSMB and CEA. And all conditions laid down in such licenses should be strictly adhered. o All completed borrow pits should be rehabilitated to satisfy conditions given mining license of GSMB o Borrowing earth from agricultural land shall be minimized to the extent possible. Further, no earth shall be borrowed from already low-lying areas. **Aggregate :** o The stone aggregate shall be sourced from existing licensed quarries o Copies of consent/ approval / rehabilitation plan for use of existing source will be submitted to PIC through PIC. o Topsoil to be stockpiled and protected for use at the rehabilitation stage. **Transportation of Construction Material** o Existing tracks / roads are to be used for hauling of materials to the extent possible.	Throughout the subproject area with special attention to borrow pits and quarries		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		○ The vehicles deployed for material transportation shall be spillage proof to avoid or minimize the spillage of the material during transportation.			
2.	Loss of Productive Soil, erosion and land use change	○ The top soil from the productive land (borrow areas, road widening areas etc.) shall be preserved and reused for plantation purposes. ○ It shall also be used as top cover of embankment slope for growing vegetation to protect soil erosion. ○ Shrubs shall be planted in loose soil area. ○ It shall be ensured that the land taken on lease for access road, construction camp and temporary office of the storage facilities is restored back to its original land use before handing it over to land owner.	Throughout the subproject area and camps sites, storage areas and temporary offices		
3.	Slope protection and stablilization	○ Slope protection measures must be carried out using appropriate engineering and bio-engineering measures in combination with drainage improvement measures were appropriate ○ Only native plant species will be selected for the bio-engineering works ○ Follow up watering and maintenance of the plants must be carried out to ensure the survival of the plants and success of the slope stabilization	In project areas falling inside hilly terrain		
3.	Compaction and Contamination of Soil	○ To prevent soil compaction in the adjoining productive lands beyond the ROW, the movement of construction vehicles, machinery and equipment shall be restricted to the designated haulage route. ○ The productive land shall be reclaimed after construction activity. ○ Fuel and lubricants shall be stored at the	Throughout the project area with special attention to paddy and other agricultural lands		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		predefined storage location. ○ The storage area shall be paved with gentle slope to a corner and connected with a chamber to collect any spills of the oils. ○ All efforts shall be made to minimise the waste generation. Unavoidable waste shall be stored at the designated place prior to disposal. ○ To avoid soil contamination at the wash-down and re-fuelling areas, “oil interceptors” shall be provided. Oil and grease spill and oil soaked materials are to be collected and stored in labelled containers (Labelled: WASTE OIL; and hazardous sign be displayed) and sold off to relevant parties. ○ Any land degraded due to construction activities should be restored to the satisfactory level of the owner			
4.	Establishment of Construction Camp, temporary office and storage area	○ Construction camp sites and storage areas shall be located away from any local human settlements, water bodies and forested areas (minimum 0.2 km away) and preferably located on land which is not productive (barren/waste lands presently). If these are not possible private land maybe taken on lease as standard practice. ○ The construction camps, office and storage areas shall have provision of adequate water supply, sanitation and all requisite infrastructure facilities. ○ The construction camps, office and storage areas shall have provision of septic tank/soak pit of adequate capacity so that it can function properly for the entire duration of its use. ○ All construction camps shall have provision of rationing facilities particularly for	Throughout the subproject area with special attention to labour camps, storage areas and office premises		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		kerosene/LPG so that dependence on firewood for cooking is avoided to the extent possible. ○ The construction camps, office and storage areas shall have provision of health care facilities for adults, pregnant women and children. ○ Personal Protective Equipments (PPEs) such as helmet, boots, earplugs for workers, first aid and fire fighting equipments shall be available at construction sites before start of construction. An emergency plan shall be prepared to fight with any emergency like fire. ○ Provision shall be made for domestic solid waste disposal in acceptable manner. The solid waste shall be handed over to the waste collecting system of the Local Authority (LA) of the area and wastewater should be disposed with the approval of the PIC. ○ Provision of paved area for unloading and storage of fuel oil, lubricant oil, away from storm water drainage.			
5.	Construction Debris and waste	○ Excavated materials from roadway, shoulders, verges, drains, cross drainage will be used for backfilling embankments, filling pits, and landscaping. ○ Unusable debris material and removed pavements of roads should be suitably disposed off at pre-designated disposal locations, with approval of the concerned authority such as LA/DS. ○ The bituminous wastes shall be disposed in secure manner and environmentally	Throughout the subproject area and all disposal sites		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		accepted manner. ○ In establishing disposal sites, unproductive/wastelands shall be selected with the help the PIC and villagers. The dumping site should be of adequate capacity. It should be located without causing nuisance to residential areas. Dumping sites should also be away from water bodies to prevent any contamination of these bodies.			
6. 7.77	Air and Noise Quality and vibration	○ Vehicles delivering loose and fine materials like sand and aggregates shall be covered. ○ Dust suppression measures such as water sprinkling, shall be applied in all dust prone locations such as unpaved haulage roads, earthworks, stockpiles and asphalt mixing areas. ○ Batching plants and asphalt (hot mix) should be operated with necessary licenses (Environmental Protection License (EPL) and trade license) and plants shall be located at least 0.2 km away and in downwind direction of the human settlements and should not disturb normal life of residents. ○ Material storage areas shall also be located downwind of the habitation area. ○ Hot mix plant shall be fitted with stack of adequate height (30m) or as may be prescribed in the EPL to ensure enough dispersion of exit gases. ○ Diesel Generators (DG) shall also be sound proof or fitted with stack of adequate height. ○ Construction vehicles and machineries shall be periodically maintained. ○ All heavy equipment and machinery shall be fitted in full compliance with the national	Throughout the subproject road with special attention to schools, hospitals and religious places		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		regulation, Noise Control Regulations - Extra Ordinary Gazette No. 924/12 May 1996 amended by Extra Ordinary Gazette 937/7 April 1997. ○ Contractor shall take appropriate action to ensure that construction works do not result in damage to adjacent properties due to vibration.If any damages occur, contractor will be responsible for rectifying the damage. ○ No construction along community areas will be permitted during night time			
7.	Tree plantation	○ Compensatory afforestation shall be made on 1:3.ratio basis. ○ Only native species should be selected with the consent of DoF for replanting ○ Additional trees shall be planted wherever feasible. ○ Follow up maintenance of planted saplings will be carried out for a minimum of 3 years	Throughout the road.		
8.	Ground Water and Surface Water Quality and Availability	○ The contractor shall arrange for water required during construction in such a way that the water availability and supply to nearby communities remains unaffected. ○ Water intensive activities shall not be undertaken during dry period to the extent feasible. ○ Provision shall be made to link side drains with the nearby ponds for facilitating water harvesting if feasible. ○ Preventive measures such as proper storage of unsuitable soil, construction chemicals, servicing construction vehicles in approved sites, slope stabilisation, etc shall	Throughout road with special attention to streams, tanks and marshes		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		be taken for prevention of siltation and pollution of water bodies.			
9.	Occupational Health and Safety	○ The requisite PPE (helmet, mask, boot, hand gloves, earplugs) shall be provided to the construction workers and it should be ensured that labourers use PPE during working hours. ○ Workers' exposure to noise will be restricted to less than 8 hours a day. Workers duty shall be regulated accordingly. ○ First aid facility should be readily available at every construction site throughout the construction period ○ Septic tank or mobile toilets fitted with anaerobic treatment facility shall be provided at construction camp/temporary office/storage areas. ○ Domestic solid waste at construction camp shall be properly collected and handed over to the solid waste collecting system of LA. ○ Records on health and safety related accidents measures taken to address must be maintained	Throughout the road		
10.	Traffic Management and Road Safety	○ Identify the areas where temporary traffic diversion may be required. ○ Prepare appropriate traffic movement plan approved by PIC and RDA for ensuring continued safe flow of traffic, pedestrians and all road users during construction. ○ Wherever, cross drainage structure work require longer construction time and road is to be blocked for longer duration, the PIC shall define appropriate measures for traffic diversion before the start of the construction. ○ Adequate signboards shall be placed much ahead of diversion site to caution the road	Throughout the subproject area		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		users. The road signs should comply with the Road Safety Manual of RDA. ○ It is proposed to discuss with the Department of Railways for providing adequate safety measures at unmanned railway crossing where applicable. Adequate clearly visible sign shall be provided on both sides of the railway crossing. ○ 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 to enhance the road safety where necessary at the completion of the project ○ Records on health and safety related accidents measures taken to address must be maintained			
11.	Impacts on Biodiversity	○ No solid waste or spoil dumping sites, hot mix plants and worker camps should be located within or close to the protected areas. ○ Prior approval should be taken from the relevant department for entrance or temporary alteration of properties belongs to such areas. ○ 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. ○ Restrictions on the daily working hours between daylight and sunset must be enforced in sites near protected areas or wildlife zones	Near forest reserves, national parks, sanctuaries if any		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		○ Conditions which may be required by the DWLC for roads located adjacent or close to protected areas must be met ○ For roads falling near protected areas or MER areas appropriate measures such as posting of information sign boards on the presence of wildlife, speed controls such as speed bumps etc. must be installed as appropriate ○ Other measures to facilitate wildlife movement across the road such as exclusion fences may be installed with advise of DWLC ○ Ensure that construction timing of cross drains and bridges will not affect the migration or breeding of aquatic species. The contractor will seek guidance from pertinent agencies to identify rivers and creeks harbouring sensitive aquatic life. ○ Ensure that the timing of tree removal does not coincide with breeding season of birds or other fauna if the trees are being used by birds and other fauna			
12.	Road reconstruction within flood prone areas	○ 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 PIC to keep all drainage paths and drains clear of blockage at all times. ○ If flooding or stagnation of water is caused by contractor's activities, contractor shall compensate for any loss of income or damage as a result. ○ When working in flood prone areas during rainy season the contractor shall avoid storing materials, chemicals and other items of work in areas where those can be	Flood prone areas crossed by the roads if any		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		washed away by the floods.			
13.	Grievance Redress	○ Maintaining records of all environment related grievances raised, if any, and the actions taken to address them through the village level grievance redress committee (GRC) and PIU as applicable	All project roads.		

NOTE: Each report must enclose photographs to demonstrate the mitigation measures implemented

III. Environmental Monitoring Checklist during Post-Construction or Operation Stage
For Reconstructed Roads under OPRC Package

District:
Road Name:
Road ID:
Total length:
Report No. and date:
Completed by:

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
1.	Site restoration	○ All construction camp/temporary office/material storage areas are to be restored to its original conditions or as agreed with the land owner. ○ The borrow areas rehabilitation will be as per the conditions laid down in GSMB approval.	All locations of construction camps/temporary office/ material storage, and borrow areas		
2.	Disposal of unsuitable material	○ All unsuitable material generated due to maintenance works including soil, vegetation, removed degraded road surface etc... should be disposed only at approved locations	Throughout the road		
3.	Hydrology and Drainage	○ Regular removal/cleaning of deposited silt shall be done from drainage channels and outlet points before the monsoon season. ○ Renovation of the drainage system by repairing removing encroachments/ congestions shall be regularly conducted	At project road locations with drainage structures		
4.	Degradation of water quality	○ Chemicals used for road maintenance should be carefully handled and stored ○ Storage facilities should sited well away from water bodies	Throughout the road with special care near water bodies		
5.	Air and Noise Quality	○ Placing sign boards for speed limitation and honking restrictions to be enforced near sensitive locations. ○ Removal of dust & mud collected on road surface to avoid dust emanation ○ Strategically locating compensatory plantation along sensitive noise receptors to provide	Throughout the road		

SL. NO.	Environmental Attributes	Mitigation Measures	Location	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		additional attenuation ○ Installation of noise and dust barriers if levels are found to exceed required standards.			
6.	Extraction of material for road maintenance	○ Construction material shall be purchased only from licensed suppliers	Throughout the road		
7.	Tree replanting	○ Contractor to undertake survivability assessment and report to PIC the status of compensatory tree plantation. ○ Additional plants should be planted for dead plants if any	Tree replanted areas		
8.	Road safety	○ 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...	Throughout the road		
9.	Grievance Redress	○ Maintaining records of all environment related grievances raised, if any, and the actions taken to address them through the village level grievance redress committee (GRC) and PIU as applicable	All project roads.		
10.	Occupational Health and Safety	○ The requisite PPE (helmet, mask, boot, hand gloves, earplugs) shall be provided to the construction workers and it should be ensured that labourers use PPE during working hours. ○ First aid facility should be readily available at the construction site ○ Septic tank or mobile toilets fitted with anaerobic treatment facility shall be provided at construction camp/temporary office/storage areas. ○ Domestic solid waste at construction camp shall be properly collected and handed over to the solid waste collecting system of LA. ○ Records on health and safety related accidents measures taken to address must be maintained	Throughout project road and campsites if any		

NOTE: Each report must enclose photographs to demonstrate the mitigation measures implemented

Appendix 6.6: Environmental Monitoring Plan for OPRC package

Environmental Component	Project Stage	Parameters	Frequency	Locations	Standards	Rate	Approximate Cost (SLRs)	Implementation	Supervision
Air Quality	Preconstruction stage	TSPM, PM10, NO_x , CO, SO_x , Pb	Once	Minimum 2 locations (Locations to be identified with the help of PIC)	NAAQS of Sri Lanka	Rs 40,000 per location	80,000.00	Contractor through approved monitoring agency	RDA/ESDD
	Construction and operational stages	TSPM, PM10, NO_x, CO, HC, Pb, SO_x	2 times per year for 7 years	-do-	NAAQS of Sri Lanka	Rs 40,000 per location	1,120,000.00	Contractor through approved monitoring agency	RDA/ESDD
Water Quality	Preconstruction stage	EC, pH, DO, TSS, BOD, Oil and grease, Lead, E. Coli	Once	Minimum 2 locations (Locations to be identified with the help of PIC)	CEA advisory guidelines	Rs 10,000 per location	20,000.00	Contractor through approved monitoring agency	RDA/ESDD
	Construction and operational stages	EC, pH, DO, TSS, BOD, Oil and grease, Lead, E. Coli	2 times per year for 7 years	-do-	CEA advisory guidelines	Rs 10,000 per location	280,000.00	Contractor through approved monitoring agency	RDA/ESDD
Noise Levels	Preconstruction stage	dB levels	Once	Minimum 2 locations (Locations to be identified with the help of PIC)	National Environmental (Noise Control) Regulations 1996(no. 924/12)	Rs 10,000 per day	20,000.00	Contractor through approved monitoring agency	RDA/ESDD

Environmental Component	Project Stage	Parameters	Frequency	Locations	Standards	Rate	Approximate Cost (SLRs)	Implementation	Supervision
	Construction and operational stages	dB levels	2 times per year for 7 years	-do-	National Environmental (Noise Control) Regulations 1996(no. 924/12)	Rs 10,000 per day	280,000.00	Contractor through approved monitoring agency	RDA/ESDD
Flora	Preconstruction		1 visit	Locations to be identified with the help of PIC	Diversity of existing species	Rs 20,000 per visit	20,000.00	Contractor through approved monitoring agency	RDA/ESDD
	Construction and operational stages	Replanting of trees and Survival of trees to 100%	1 visit per year for 7 years	-do-	Diversity of species replanted	Rs 20,000 per visit	140,000.00	Contractor through approved monitoring agency	RDA/ESDD
Fauna	Preconstruction	Diversity of species	1 visit	Locations to be identified with the help of PIC		Rs 20,000 per visit	20,000.00	RDA	RDA/ESDD
	Construction and operational stages	Diversity of species	1 visit per year for 7 years	-do-		Rs 20,000 per visit	140,000.00	RDA	RDA/ESDD
	Total						2,120,000.00 (16,307.70 US$)		

Appendix 7.1: List of Public Consultation

No.	DSD or GND	Road Name	Name of Respondent	Age	Sex	Address	Views
01	Pitabeddara-Morawaka	MorawakaMillawa Road	C.JKarunanayake (Retired teacher)	69	Male	MaponaPola,Polgasvila,Morawaka	• Increases the economic condition of people • Decreases cost of tea transportation • Convenient for school children during the rainy season. • Easy access to towns such asDellawa, Kadihingala, Neluwa etc. due to the road construction • Office workers could reach their work places quicker due to reduced travel time
02	Pitabeddara-Morawaka	MorawakaMillawa Road	W.G. Siriyawathie	51	Female	Kobomella, Polgaswila, Morawaka	• Quick access to Morawaka • Convenient transportation of tea tender leaves and reduced cost of its transportation
03	Pitabeddara-Morawaka	MorawakaMillawa Road	W.F. Fernando	45	Male	Kobomella, Polgaswila, Morawaka	• Easy transportation • Convenient for school children as they can walk to school even during the rainy season. • Extra costsof road repairs could be saved.
04	Pitabeddara-Morawaka	MorawakaMillawa Road	T.W. Jayarathna	44	Male	Kobomella, Polgaswila, Morawaka	• Transport cost could be curtailed • Activities could be done easily and quickly • Development of the villages due to various industries and projects that would come up. • School children could reach schools in time
05	Pitabeddara-Morawaka	MorawakaMillawa Road	S.B. Ariyadasa	65	Male	Oshan, Weliwatta, Polgaswila, Morawaka	• Convenient transportation • Could reach health facilities quickly. • Educational standards will increase due to teachers staying back at the village schools rather than move to the schools in town. • Village development • Strengthening of social links
06	Pitabeddara-Morawaka	MorawakaMillawa Road	K. LiLi	59	Female	Oshan, Weliwatta, Polgaswila, Morawaka	• Quickeraccess to medical facilities • Development of social relations due to village development • Could work in time
07	Pitabeddara-Morawaka	MorawakaMillawa Road	H.T. Aruna	53	Male	OshanWeliwatta, Weliwa, Morawaka	• Easy travelling and transportation of goods • Great advantage for the education sector • Increased unity among villages

No.	DSD or GND	Road Name	Name of Respondent	Age	Sex	Address	Views
08	Pitabeddara-Morawaka	MorawakaMillawa Road	G.H. WasanthaPremalal	39	Male	Polgaswila, Morawaka	• Increased economic activities of village communities • Could maintain the road on Sramadana (community labor contribution) basis
09	Pitabeddara-Morawaka	MorawakaMillawa Road	DilipSanjeewa	34	Male	Akkara 05, Polgaswila, Morawaka	• Development of transport facilities • Work in time • Save time • Rural development
10	Pitabeddara-Morawaka	MorawakaMillawa Road	K.G. Nihal	43	Male	Akkara 05, Polgaswila, Morawaka	• Plantation economy in the area will strengthen, as a result people's economy will increase
11	Pitabeddara-Morawaka	MorawakaMillawa Road	A.V. Somapala	70	Male	Morawaka, Polgaswila, Keranketiya	• Convenient to transport tea tender leaves • Convenient for children's education • Convenient for day to day work
12	Pitabeddara-Morawaka	MorawakaMillawa Road	R.D.Leelawathie	21	Female	No. 247/1, Morawaka Kanda, Akkara 05	• Convenient to transport tea tender leaves • Convenientand quick to reach the main town • Convenient for domestictransportation needs
13	Pitabeddara-Morawaka	Aluwana Road	R.R.J. Chandra	48	Female	Pitawalanda, Weliwa, Morawaka	• Could maintain the good quality of tea tender leaves • Dilapidated road condition reduces the quality of tea tender leaves and weakens the economic strength. • Convenient access to the main road • Due to dilapidated road conditions; public transportation and the economic life of the area is badly affected.
14	Pitabeddara-Morawaka	Aluwana Road	MalaneeHettiarachchi	40	Female	Medawatta, Weliwa, Morawaka	• Tea buyers will be motivated to come to the area and competition among buyers will benefit to strengthen producers economy • Saves time, labor & wealth on a large scale • Active Public transportation will be a great advantage to the community in the area.
15	Pitabeddara-Pahurutota	Aluwana Road	B.L. UpaliSamarasinghe	52	Male	Polgaswatta, Weliwa, Morawaka	• Tea buyers will be motivated to come to the area and competition among buyers will benefit to strengthen producers economy • The existing narrow road along the narrow bridge and dilapidated road condition discourages heavy vehicles entering into the village which badly affect heavy good

No.	DSD or GND	Road Name	Name of Respondent	Age	Sex	Address	Views
							transportation especially tea tender leaves transportation which directly affect the plantation economy in the area, therefore, road development is prerequisite.
16	Pitabeddara-Pahurutota	WeliwaPahuruthotaNilellaRoad	NadeeshaMadushani	23	Female	Hiruni Vasa, 371/D, Kolaberiya,Pahuruthota	• This road being the only way to the houses, development of the road will help to increase the overall development of the area including economic development. • At present the economic development officer is hesitating to come to the area due to the dilapidated road condition
17	Pitabeddara-Morawaka	WeliwaPahuruthotaNilellaRoad	PriyangikaAbewickrama	49	Female	503/B, kolaberiya, Pahurutota, Morawaka	• The tea plantation economy is highly affected due to the dilapidated road condition • Vehicle owners hesitate to travel on this road due the damage it causes to the vehicles
18	Pitabeddara-Morawaka	WeliwaPahuruthotaNilellaRoad	H.G. PrasannaSanjeewa	37	Male	506/D, Kolaberiya, Pahuruthota, Morawaka	• Convenient transportation • Could reach cultivated land within a short time • Convenient for children's education • Patients could reach hospitals soon.
19	Pitabeddara-Kudagalahena	MillagahahenaKudagalahena Road	NilukaRanasinghe	31	Female	182/B2, KudagalaHena, Pitabeddara	• Convenient access to adjoining villages convenient • Helps children's education • Convenient transportation activities
20	Pitabeddara-Kudagalahena	MillagahahenaKudagalahena Road	M.L. Ramyalatha	45	Female	186/B1, Kudagalahena, Pitabeddara	• Lesser or no damage to vehicles • Transportation will be more secure • Can reach other villages soon
21	Pitabeddara-Kudagalahena	MillagahahenaKudagalahena Road	M.L. Nandana	36	Male	151/A1, Kudagalahena, Pitabeddara	• Entire transportation system will become more efficient • School children will benefit moreby saving time • Could reduce vehicular accidents owing to dilapidated road condition
22	Akuressa	LeuPoddeniya Road	SomanandaRanaweera	-	Male	"Samadi", Bopagoda, Akuressa	• Connectivity with other villages could be made through this main road • Activities could be done in time and economically in a more effective manner • Developed road will enhance economic development in the area bysaving time especially for school children and working population

No.	DSD or GND	Road Name	Name of Respondent	Age	Sex	Address	Views
23	Akuressa, Bopagoda	LeuPoddeniya Road	U.H. TeklaNadeeshanee	26	Female	"SamanSevana", R.A. GunawardenaMawatha, KotigahalaWatta, Bopagoda	• Working population could reach their work places on time • Sick people could reach hospitals with conveniently • Efficient economic activities
24	Akuressa, Bopagoda	LeuPoddeniya Road	NiroshaManori	39	Female	542/A, "NiluNivasa", Illawana, Bopagoda, Akuressa	• It is convenient for school children who walk to schools • Very helpful to the plantation economy (Tea, Rubber and cinnamon) • This is a short cut to the main road which connects number of villages • Public transportation on the road will add value to the area
25	Pitabeddara - Kiriwelkele	Derangaladahaya Kanda Mahahena Road	G. Francis	60	Male	Derungala, stage111, Kiriwelkele, Pitabeddara	• Will avoid village isolation • Business vehicles could reach villages without difficulties and it will help the economic development • School children can reach schools on time
26	Pitabeddara	Derangaladahaya Kanda Mahahena Road	T.G. Premawathie	60	Female	Deniyagedara, Derungala, stage111, Pitabeddara	• Strengthening of economic activities • Could reduce travel time • Can reach adjoining villages conveniently.
27	Pitabeddara	Derangaladahaya Kanda Mahahena Road	N.H. Padma	55	Female	Dimuthugama, Kiriwelkele North, Upali's house	• Increased services • Economic development of the village especially for the tea plantation economy
28	Alapaladeniya	Alapaladeniya, Thalapekumbura Road	A.G. Siripala	54	Male	Deniyagedara, Alapaladeniya	• Public transportation will be improved • Could reach adjoining villages soon • Tea plantation economy will be more effective
29	Alapaladeniya	Alapaladeniya, Thalapekumbura Road	InduKumari	24	Female	178/A, AluthGedaraWatta, Alapaladeniya	• Can reach main towns within a shorter period of time • Tea economy will strengthen • Can save time for more education
30	Alapaladeniya	Alapaladeniya, Thalapekum	AnulaGunasekara	60	Female	"Thushara", Alapaladeniya	• Transportation is inter related with all the economic activities of the people especially for economic activities

No.	DSD or GND	Road Name	Name of Respondent	Age	Sex	Address	Views
		bura Road					• Link to adjoining villages • Can reach main town centers • Agro economy will be supported
31	Dangala	DangalaDellawa Road	N.D.G. Wijesiri	-	Male	No.18, Dellawa road, Dangala	• Agro economic development • Increased living conditions • Decreased extra transport cost • More security for elders, children and child bearing ladies
32	Dangala North	DangalaDellawa Road	P.K.Y. Kumudunee	-	Female	No.117, Dellawa road, Dangala	• Increased living condition of the people • Decreased transport cost and travel time • Area development • Agriculture development • More security for elders, children and child bearing ladies • Could reach town centers easily
33	Dangala North	DangalaDellawa Road	A.P. Hemamalee	-	Female	"Sisilasa", Dellawa road, Dangala	• Agriculture upliftment. • Increased living standards • Decreased transport cost and travel time • More security for elders, children and child bearing ladies • Area development
34	Welipitiya-WahalaKananke South	Near Kananke police station up to Dewelagoda Temple road	SandyaLiyanage		Female	"Sri Ramya", WahalaKanake,Imaduwa	• Convenient transportation in the area. • Convenient to transport tea tender leaves and could reduce the cost for transportation of tea tender leaves • Vehicle repairs enormous due to the existing road condition.
35	Welipitiya-WahalaKananke South	Near Kananke police station up to Dewelagoda Temple road	U.G Victor		Male	WeleKade,WahalaKananke, Imaduwa	• This road leads to Galkaduwa,Kodagoda,Embalawatta; so more benefits will attain the people in the area.
36	Welipitiya-WahalaKananke South	Near Kananke police station up to	DayawathieAmarakoonArachchi		Female	Dodangodawatta, WahalaKananke, Imaduwa	• This is the main road that leads to Kodagoda, Dewelagoda temple & to the tea factory ,so most of the sectors will gain out of this

No.	DSD or GND	Road Name	Name of Respondent	Age	Sex	Address	Views
		Dewelagoda Temple road					
37	Welipitiya-	Polhena, Nagahahena , Puhulahena road	P.GRamani		Female	Nugahahena,KanankeKadaweediya	• More convenient to access to the School, Hospital, weekly fair etc. • It is not suitable to even usehired vehicles due to the dilapidated road condition. • More accidents have been happening,therefore an expected decreased in the number of accidents in this area
38	Welipitiya-Puhulhena	Polhena, Nagahahena , Puhulahena road	R.GPiyasena		Male	Puhulhena,KanankeKadaweediya	• Common vehicles such as school vans, three wheelers etc. have stalled at the moment due to the dilapidated road condition. • Lots of obstacles at the transport sector in the area • Development of this road will be a great service to the area.
39	Welipitiya-Puhulhena	Polhena, Nagahahena , Puhulahenaroad	J.V.GThushari		Female	Puhulhena,KanankeKadaweediya	• People of this area are facing so many difficulties due to the dilapidated road condition (It is difficult to go to school for children even on a motor bike.) Therefore many road accidents happen. • If this road could construct very quickly; it will be a great help to the people in this area.
40	Weligama-Welipitiya	JamburegodaBodirukkarama road	J.WSiriyalatha		Female	Hegodawatta, Jamburegoda,Weligama	• This is the main road connecting theWeligama-Imaduwa road at one direction and Addarawela from the other direction. However the dilapidated road condition cause the road to inundate during the rainy season is a big issue in the area. Therefore Road development will be a great help for the people.
41	Weligama-Welipitiya	JamburegodaBodirukkarama road	A.MMallikaAdikari		Female	Hegodawatta, Jamburegoda,Weligama	• It is very difficult to access to the hospital even during an emergency condition due to the inundatedand dilapidated road. • So the road development will be a great help to the people in this area.
42	Weligama-	Jamburegod	DamithVithanavasam		Male	Elgirigewatta,	• If the road is constructed; it will be a great help to the

No.	DSD or GND	Road Name	Name of Respondent	Age	Sex	Address	Views
	Welipitiya	aBodirukkarama road				Horandugoda,Imaduwa	agriculture sector as the biggest paddy field (Jamburugoda) in this area is situated around the proposed road.
43	Weligama-Welipitiya	Jamburegoda, Hilgoda Junction up to Bedduwa road	S.PGammachchige		Male	Henagedarawatta, Jamburagoda, Weligama	• If the road is constructed; it will be a great help to the agriculture sector. • And also it should be developed Thalgaswatta road simultaneously. Then school children & others could be benefitedtoo.
44	Wligama	Jamburegoda, Hilgoda Junction up to Bedduwa road	Jinaseeli Dias		Female	"VikumSevana", JamburegodaWeligama	• It will be very useful if this road developed along with the Thalgaswatta road which connectsto this road which will be an advantage to the people.
45	Weligama	Jamburegoda, Hilgoda Junction up to Bedduwa road	SarojaneeJayawickrama		Female	Mekiliyagahawatta, Jamburagoda, Weligama	• This road is very important for transportation as well as agriculture • It is very difficult to travel on this road during the rainy season • Most of the problems will be solved after the development of this road
46	WeligamaRanamaduragama, Ibbawala	IbbawalaRanamaduragama Road	W.G. Premadasa		Male	Ranamaduragama, Ibbawala	• Road is in a dilapidated condition • School children & people who work in industries and agriculture gain a lot due to the road development
47	Weligama - Ibbawala	IbbawalaRanamaduragama Road	H.W. ChathuraniSenarathna		Female	No.70, Ranamaduragama, Ibbawala, Weligama	• Due to potholes on the road,schooling is inconvenient during rainy season
48	Weligama - Ibbawala	IbbawalaRanamaduragama Road	H.A. Chalet		Female	No. 74, Ranamaduragama, Ibbawala, Weligama	• Roads to the hospitals are in very bad condition • Vehicles travelling on this road is very difficult • Road construction will be very useful for everyone in the area
49	Weligama - Palalla	WelipitiyaAddarawela road	SomawathiePalliyaguru		Female	Ilwatta, Palalla,	
50	Katuwana - Thelalla	31, Thorakolaya ya, Gammaim	W.A. AselaSampath	24	Male	Galthengodehena, Hellala, Middeniya	• This is a short cut to Embilipitiya. Therefore, development of this road is remarkable

No.	DSD or GND	Road Name	Name of Respondent	Age	Sex	Address	Views
		Road					
51	Katuwana - Thelalla	31, Thorakolaya ya, Gammaim Road	W.M. Leelawathie	45	Fem ale	"NadeeshaNivas a" Hellalla, Mulandiyawala	• Public transportation could be started • Agricultural out puts could be transported
52	Katuwana - Thelalla	31, Thorakolaya ya, Gammaim Road	K.G.Samanthika	38	Fem ale	WelipitiyeGedar a, Hellala, Middeniya	• Existing muddy road is not convenient for school children
53	Katuwana - Thelalla	31, Thorakolaya ya, Gammaim Road	H.M. RuwanChamara	15	Male	WalasmulleGed ara, Helalla, Middeniya	• At present nearly 2km distance should have to walk to the village and it will be positively changed after the development
54	Katuwana - Thelalla	31, Thorakolaya ya, Gammaim Road	W.M. Karunarathna	54	Male	ThalaweGedara, Hellala, Middeniya	• New industries will come up. • Expecting to start a coconut mill after the road development
55	Katuwana - Thelalla	31, Thorakolaya ya, Gammaim Road	W. Leelawathie	55	Fem ale	"VajiraNiwasa", Helalla, Middeniya	• Number of retail shops could be started
56	Bundala	Bundala Meda Road	R.G. Ranjith	-	Male	40, "Pethum", Wellagoda, Bundala, Hambantota	• Enormous dust creates health problem especially for children
57	Godawaya	Godawaya Junction up to Temple road	H.M. Ranjith		Male	Vihara road, Godawaya, Ambalantota	• This is the main road to Fishery harbor • Large number of tourist are utilizing this road daily • Development of this road helps to increase tourism industry
58	Manajjawa	ManajjawaL aima	SomadasaRamanaya ka		Male	ThrikunamaleeN ivasa,	• Very difficult to take patients to hospitals. • Road development was a dream or a temporary

No.	DSD or GND	Road Name	Name of Respondent	Age	Sex	Address	Views
		Junction road				Manajjawa, Ambalantota	solution during the past • Development of this road is more than enough for us
59	Udaberagama	From Boralukanda Junction, Uda Baragama to Mahaara Junction	DayarathnaMedagama		Male	MedagamaNivasa, BeragamaJanapadaya, Ambalantota	• It helps to transport agro production • This is a short cut to Kataragama and Hambantota Botanical garden. Therefore, large numbers of tourist (local as well as foreign) are utilizing this road. Development of this road would help to promote tourism in the area
60	Siyambalagaswila South	4 Ela, School Road	K.A. NadeekaKumari		Female	School road, 4 Ela, Beragama, Ambalantota	• This is very much useful for school children, transport agro production, to reach paddy fields etc.
61	Katuwana – Ambagas Ara	32, WelipitiyaAmbagas Ara via Siyarapitiya Road	B.W.A. Sepalika	53	Female	"VipulNiwasa", Ambagas Ara, WelipitiyaMiddeniya	• It is very good if this road is developed
62	Katuwana – Ambagas Ara	32, WelipitiyaAmbagas Ara via Siyarapitiya Road	R. Leelawathie	63	Female	Maragahawatta, Ambagas Ara, GangulanDeniya, Katuwana	• All the difficulties to bring goods to my retail shop will be removed
63	Katuwana – Ambagas Ara	32, WelipitiyaAmbagas Ara via Siyarapitiya Road	L.G. PushpaNishanthie	36	Female	"ShanthieNivasa", Ambagas Ara, GangulanDeniya,nKatuwana	• Could increase my paper production • Outside venders have a chance to come to the village and can sell paper for competitive price
64	Katuwana – Ambagas Ara	32, WelipitiyaAmbagas Ara via Siyarapitiya Road	M. Piyadasa	64	Male	104/10, Duraniyaya,Gangulandeniya, Katuwana	• This is utilized as alternative route when flood at Katuwana river. Therefore, development of this road is very important • Outside venders could come to the village without any obstacles and agro production could sell at competitive price
65	Katuwana – Ambagas Ara	32, WelipitiyaAm	M. Munasinghe	67	Male	113, RikillaparaYaya,	• New industries will come up

No.	DSD or GND	Road Name	Name of Respondent	Age	Sex	Address	Views
		bagas Ara via Siyarapitiya Road				Ambagas Ara, Gangulandeniya	
66	Bope - Poddala	EdirisingheMawatha	C. Kumarasinghe	55	Female	"Indunil", Kithulampitiya	• Road widening could reduce accidents
67	Habaraduwa	Galketiya, Jayasumanaramaya, Goviyapana Junction road	W. Mahinda Rathna	62	Male	No.20, Jayasumanaramaya, Goviyapana, Ahangama	• Land values will be increased • Landdevelopment • Town development
68	Pattiyapola West	Pattiyapola, Akkarawala, Thalunna road	W.H.G. Chandasena	68	Male	Kandegedara, Pattiyapola West	• It is a good suggestion • There were proposals to develop this road. But it was not happened. If this road developed, people could transport their productions to the market in correct time
69	Mahapitiya	From Four way Junction up to Five way junction	E.D. Wickramarathna		Male	Godagama, Kosgoda	• It will be convenient for transportation
70	Elpitiya	Pinikahana, Puwakdola Road	NandaneePathirage	48	Female	Pinikahana, Kanadoowa	• This is the short cut to Baddegama road and to Karapitiya hospital • It is very much use full for school children during the rainy season • It will help to increase business
71	Karandeniya	66, Madakumbura Junction, Kaluwalagoda	K.D. Gunawathie	66	Female	Kaluwalagoda,Udamagalawatta, UragasmanHandiya	• Easy for transportation • Easy to transport agro and industries production
72	Ambalangoda	53, BatapolaDorala junction to Kirimetiya road via Kondagala	L.K. AnuraRohana	43	Male	Kondagala, Batapola	• I am a vehicle owner. I can reduce vehicles' repairing cost • Accidents could be reduced

No.	DSD or GND	Road Name	Name of Respondent	Age	Sex	Address	Views
73	Niyagama	28, Kimbulawala, Porawagama road	LokuhewageRanjanee	49	Female	Kimbulawala, Mattaka	• Easy to transport tea tender leaves • Easy to reach schools • Shorten the transport distance • Save the travel time • Increase business facilities • Could re start closed tea factories
74	Gonapinuwala	49, Kirindiella road	K.L.G. ThilakeSena	62	Male	"Thilake" Manampitiya, Meetiyagoda	• Earlier this was a earth road • Latter it was tarred but not maintained well and difficult to utilize during the rainy season. • Travel time could be reduce if this road developed
75	Baddegama	38, Waulugala, Bataketiya road	M.A. JayanthieKariyawasam	51	Female	Bataketiyagodawatta,Majuwana, Keradewala	• Agro production could transport to the market in time
76	Nagoda	Kurupanawa Meliban Junction, Old Samurdhi Bank Building Via Polkella road	K.K.G. AnushaTharanganee	21	Female	Fanillu Garden, Nagoda	• Easy to transport tea tender lives • Increase transport facilities including public transportation • Industrial development • Road protection for ladies, children and old aged population
77	Devithura	MukthawilaKemingkadaroad	K.K.G. Bramphi	64	Male	Mukthawila junction, Waduweliwitiya North, Kahadoowa	• Nearly 200 vehicles are flying on this route and the development is prerequisite
78	Hikkaduwa	62, WeragodaDadlySenanayake road	Ruwini Wattage	33	Female	DadlySenanayake road, Wijayapura, Weragord	• Could reach main road • Easy to reach town centers • Could controlled soil erosion through roaddevelopment
79	Bentota	Kudauragaha, Galpare road	H.G. ThanujaDilrukshi	29	Female	Galpare road, KudaUragaha, Uragaha	• Easy for transportation • Increase access to agricultural lands • Should protect the road from sand transporters after development of the road
80	Yakkalamulla	From Janahitha tea factory to	SusilaKaranayaka	54	Female	Nadungala South, Kottawagama	• Easy for tea tender leaves transportation • Easy for school children • Easy to sell baby tea plants

No.	DSD or GND	Road Name	Name of Respondent	Age	Sex	Address	Views
		UsbimJanapadaya via NadungalaJanapadaya					