Initial Environmental Examination

September 2014

SRI: Integrated Road Investment Program – Project 2

Western Province

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

CURRENCY EQUIVALENTS

(as of 12 September 2014)

Currency unit	–	Sri Lanka rupee (SLRe/SLRs)
SLRe1.00	=	$ 0.00767
$1.00	=	SLR 130.300

ABBREVIATIONS

ABC	-	Aggregate Base Coarse
AC	-	Asphalt Concrete
ADB	-	Asian Development Bank
CBO	-	Community Based Organizations
CEA	-	Central Environmental Authority
DSDs	-	Divisional Secretary Divisions
DOFC	-	Department of Forest Conservation
DWLC	-	Department of Wild Life Conservation
EC	-	Environmental Checklist
EIA	-	Environmental Impact Assessment
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

NOTE

In this report, "$" refers to US dollars unless otherwise stated.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

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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 tranches implemented over ten years.

2. The succeeding tranche roads of iROAD are located in Ratnapura and Kegalle districts of Sabargamuwa Province, Kandy, Matale and Nuwara Eliya districts of Central Province, Anuradhapura and Polonnaruwa districts of North Central Province, Puttalam and Kurunegala districts of North West Province and Kaluthara district of Western Province. In the Western Province, iRoad program will develop a total of 83 rural roads with a total length of 276 km. All these roads are in Kalutara District of Western Province. These roads have been selected for financing based on consultations with MOHPS, local authorities, and parliamentarians and a screening criteria on existing road conditions and development needs.

3. The proposed road upgrading will include: improvement and maintenance to all weather standards with single 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 others.

5. As provided in the EARF, no road under iRoad Program will be located inside or adjacent to protected areas including archeological sites of national or international significance. Most environmental impacts attributed to the project and related activities are short-term, site-specific, and easily mitigated. Close coordination with the Department of Wildlife Conservation, Forest Department, and ADB were made in the screening of the roads to ensure the project will cause not significant adverse environmental impacts that will trigger an ADB environment “Category A” tranche or Prescribed Project classification consistent with domestic environmental laws and regulations

6. **Transect Walk.** In developing rural roads, the community participation and consultation has been identified as important. For this project, the participation of communities started at the very initial stage of the project through the transect walk. Transect walks are organized in close

coordination with the Grama Niladari concerned at village level and Divisional Secretary at divisional level. In doing this, the project team and key informants conduct a walk along the road, to listen, to identify issues, and conditions and to ask questions to identify possible solutions. The field assessment was followed by preparation of Environmental Checklist (EC) for each candidate rural road and the IEE was prepared for the particular province while summarizing findings of each EC

7. **Public consultation and disclosure**. Consultations with stakeholders during the environmental examination involved local communities and government agencies such as 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 the rural roads. Annual environmental monitoring reports will be prepared per province and submitted to ADB for disclosure on the ADB website.

A. Physical Environment

1. Physical Environment

8. Based on major climatic zones of the country, Kalutara Districts fall in to low country – wet zones. The climatic environment of the project area is further categorized into agro-ecological zones[1] (AEZ) which are categorized based on climate, soil, natural vegetation and land use pattern of an area. Majority of the roads in Kalutara district are located in WL 1a, WL 1b and WL 2a.

9. WP receives comparatively high annual rainfall. Rainfall distribution is influenced by South West monsoon from May to September when peak rainy season occurs. The average temperature in the province varies 25^0C to 30^0C while high monthly temperature is observed during March to April and around September.

10. **Hydrology:** With respect to hydrology, the entire Kaluthara district is falling within the Kalu Ganga and Benthara River basins. And the delta of both rivers are within the Kaluthara district creating flood conditions around these deltas. Therefore candidate roads to be upgraded of the Kaluthara District cross plenty of streams which are tributaries of Kalu Ganga and Benthara River basins. And also being a district located within the wet zone, flow of these streams is generally steady throughout the year.

11. **Air Quality and Noise.** Since the selected road sections are mostly located within rural areas, major sources of air pollution are not present. The general air quality in the project area is excellent except along unpaved roads and major intersections where temporary deterioration occurs. 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”

2. Natural Disasters

[1] 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* .

12. Kalutara District is severely affected by yearly floods caused by the overflowing of Kalu Ganga River and its tributaries affecting Kalutara, Bandaragama, Dodangoda, Ingiriya, Mdurawala, Bulathsinhala and Palindanuwara DS Divisions. Kalutara district is also landslide prone district identified by NBRO. Palindanuwara, Agalawatta, Bulathsinhala, Matugama and Kalutara divisions are most vulnerable divisions in the Kalutara District.

B. Ecological Environment

13. No national parks, sanctuaries are located along or near any of the project roads in the Kalutara district of Western Province.

C. Social Environment

1. Demographic Characteristics

14. **Population and population density.** .The Department of Census and Statistics estimated mid-year population of Kalutara District in 2012 at 1,217,260 and population density of 773 person/km2.

15. **Ethnicity**. Majority of population in the district are Sinhalese accounting for about 86.7% of the total population followed by Moor and Tamil at roughly 9.2% and less than 4%, respectively.

16. **Household Income.** The mean monthly income in Kaluthara district is Rs 35,780 which are lower than the national of Rs 46,207 in 2013.

17. **Poverty.** The poverty headcount index in Kalutara district is 3 while the national average is 6.7 as of 2013.

2. Infrastructure

18. Majority of the residents, at least 92.9% relies on electricity for lighting and about 6.7% uses kerosene. Piped water supply is enjoyed in 29.2% of the households in Kalutara District. However, majority estimated at 60.2% relies of protected well. About 90% of the total district population have access to private toilets and about 8.9% share this facility with others.

19. Kalutara district is famous among the local and foreign tourists as there are many tourist attraction places with lots of historical, cultural important places and the beautiful beach. The major tourist attractions at Kalutara district include Kalutara Bodhi Temple, Pahiyangala (Prehistoric cave), Rankothkowera temple and Bava Garden at Bentota.

3. Anticipated Environmental Impacts and Proposed Mitigation Measures

20. **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.

21. **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 and (viii) 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) provision of personal protective equipment to all workers.

22. **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.

23. **Greenhouse gas emissions and addressing risk of climate change.** Using the Transport Emissions Evaluation Model for Projects (TEEMP) total annual emission was estimated at 769 tons. 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.

24. **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.

25. **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. 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.

26. **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

27. The proposed iROAD subproject 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 subproject, all of which are localized and temporary in nature and easy to mitigate.

28. The screening criteria ensure no road will cause significant adverse impacts. iROAD ensures no project road will trigger classification as an environment 'Category A' tranche 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 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.

29. Candidate roads are dispersed over the entire province and few road sections are located near or within geologically and hydrologically sensitive entities therefore mitigation measures will be incorporated to designs in order to bare any road related impacts at such locations. No roads are located in or adjacent to environmental sensitive areas declared by the DOFC and DWLC or archaeological sites of national or international significance.

30. The initial environmental examination has discussed various aspects of the proposed rehabilitation and upgrading of 83 road sections comprising 276km length. Contractors are liable to keep the roads in operational status for approximately 3 years after the 2 years of construction period.

31. The IEE recommends to update EMP and EMC with package specific information and locations before commencement of construction activities. In addition EMC should be effectively implemented in order to monitor application of the EMP.

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

I. INTRODUCTION

A. Background

1. 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.

2. 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[2] (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.

3. 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. The first focus was on the Tranche 1, the Southern Province. Tranche 2 focuses on other five provinces as mentioned below for which feasibility studies are currently carried out.

- Sabaragamuwa Province
- Central Province
- North Central Province
- North Western Province
- Western Province (Kalutara District)

4. This document presents the Initial Environmental Examination (IEE) prepared by Environmental and Social Development Division (ESDD) of RDA for Kalutara District of Western Province of Tranche 2 which covers 276km of rural roads to be upgraded and maintained to all weather standards. This report complies the Environmental Assessment and Review Framework (EARF), iROAD MFF, the ADB Safeguard Policy Statement (2009) and Environmental Safeguards Compliance Manual of RDA.

5. As provided in the EARF, no road under Tranche 2 is located inside strict national reserve. No road widening inside legally protected or critical habitat. All project roads adjacent to protected or eco-sensitive areas are limited to existing RoW. Most environmental impacts attributed to the project and related activities are short-term, site-specific, and easily mitigated. Close coordination with the Department of Wildlife Conservation, Forest Department, and ADB were made in the screening of the roads to ensure the project will cause not significant adverse

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

environmental impacts that will trigger an ADB environment “Category A” tranche or Prescribed Project classification consistent with domestic environmental laws and regulations.

6. Accordingly, iRoad program will develop 276km rural roads located within Kalutara District of Western Province. These rural roads are currently governed by Provincial Road Development Authority (PRDA) and Pradeshiya Sabhas (PS, the local Authority) of Western Province. The total length disaggregated to Kalutara District of the province is presented in table I.1. And particular road list is attached in Appendix I.1.

Table I.1: District-wise length of roads in Kaluthara District

District	Number of Roads	Length of Roads (km)
Kalutara	83	275.97
Total	**83**	**275.97**

Source: iRoad Program, RDA

7. As mentioned by Project Implementation Unit (PIU), there will be three contract packages for the district. The contractor will be responsible for construction of the road over 2 years and performance based maintenance for another 3 years.

B. Objectives of the proposed project

8. 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 nationwide economic and social development.

9. Specific objectives of this project are;

- To improve the road condition between rural communities and socioeconomic centers of the Kalutara District of Western Province,
- To upgrade and maintain 276km of rural access roads connecting 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 the increase of 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

10. In order to achieve these objectives, the road network in Kalutara district will be upgraded with the following guidelines:

- Upgrade and maintain the existing roads 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.

C. Objectives of the Initial Environmental Examination

11. As mentioned, this IEE covers upgrading and maintaining 276km of rural roads to all weather standards.

12. 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, natural hazards),
   - Biological Environment (protected forest and wildlife areas, 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)

(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 specified to each contract package 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.

D. Approach, Methodology and Personnel Involved

13. This IEE 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 months of May to July, 2014 by Environmental and Social Development Division (ESDD) of RDA.

14. The field assessment was followed by preparation of Environmental Checklist (EC) for each candidate rural road and the IEE was prepared for the particular district while summarizing findings of each EC.

15. As mentioned, EC was prepared for each road to be upgraded under the iRoad Program. The EC summarizes the following details;

- Road details
- Location information
- Climatic conditions of the project area
- Generic description of the surrounding environment

- Specific description of the road environment considering location of environmentally protected areas, occurrence of road related natural hazards, locations of road side trees, road side utilities and public properties
- Public Consultation
- List of photographs taken along the road

16. Sample ECs are provided appended (appendix I.2) to this IEE report for reference. All ECs prepared for Western Province (Kalutara District) are available at the ESDD-RDA, and PIU upon request.

17. In order to collect the number of road side trees and road side utilities for preparation of ECs, the existing ROW was considered during field assessments as construction activities will be limited to the existing ROW. However for road sections where the existing ROW could not be demarcated, a 2m corridor from the edge of the existing carriageway on the both sides of the road was considered to count number of road side trees and utilities. A wider corridor of 100m to the either sides of the road was studied to explore any environmentally sensitive entity such as forest reserves and sanctuaries. Further public properties such as schools, temples, public wells located within 50m on the either sides of the road from the centerline of the road was taken in to account during field assessments.

18. ESDD of RDA prepared the IEE during the period from June to August, 2014. In preparation of the assessment, findings of each EC within the province was analyzed and summarized. In addition to field data, 1:50,000 topographic map sheets of Survey Department of Sri Lanka were used to identify the land use pattern up to 200m or impact influential area on both sides of the existing center line of the existing road. 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 ESDD was also utilized for the assessment.

19. The field assessment and preparation of EC were carried out by the environmental and social safeguards staff of ESDD while a trained multidisciplinary team including Hydrologist, Biologist/Ecologist, Acting Environment and Social Safeguards officer, Acting Social Impact Awareness officer and Acting Chemist of ESDD, RDA was engaged in preparation of the IEE. This core team was supported by assistant staff members of environment and social dimensions. The support and guidance given by Director and Deputy Directors of ESDD, Senior Project Director - iRoad and Project Director - iROAD of RDA is highly appreciated.

II. DESCRIPTION OF THE PROJECT

A. Location of the project

20. As mentioned, all road sections selected for this project connect rural areas with the trunk road network in Kalutara District in Western Province. Accordingly a road length of 276km in the District will be upgraded and maintained to all weather standards under this project. The administrative divisions including the district and Divisional Secretariat (DS) Divisions falling within particular sections of road are presented in appendix I.1. The respective GNDs crossed by each road are presented in the specific ECs available in ESDD, RDA.

21. Location map attached in appendix II.1 presents the general location of rural roads in Kalutara Districts. And specific location maps for each road is attached in each ECs.

B. Need of the Project

22. As per the Department of Census and Statistics, 87.6% of the total population of Kalutara District are confined to rural areas in year 2013. Most of these areas are connected to nearby cities through minor roads which are maintained by Local Authorities and Provincial Road Development Authority and most of the roads are in degraded conditions. Therefore accessibility to most of such areas is limited and only three wheelers and motor cycles could be operated along most of these roads. This situation has restricted the flow of socio-economic opportunities and barricade access to better infrastructure facilities. However with the development of the country, there are many socio-economic opportunities are created in and around major cities such as Kalutara. However the new development to be effective, it should be assured that the benefits penetrate to the rural regions of the district as well as development potentials available in rural areas should be exposed. Therefore the rural road network plays a major role in transferring these facilities to and from rural areas. However, with the degraded conditions, rural road network finds it difficult to facilitate the accessibility between development hubs and rural regions of the Kalutara Disrict.

23. On the other hand, areas within the Kalu Ganga (stream) basin of Kalutara District, are prone to yearly floods and most of the major roads go under water during such situations. And interior areas loose the access during flooding situations. Therefore there is a need to identify and improve roads which are not inundated and which can serve during flood conditions to access interior areas of the district.

24. After considering the above requirements, the proposed iRoad Program of RDA will improve the transport connectivity between rural communities and socio-economic centers. And under the second tranche of the project, 276km of rural roads in the Kalutara District of Western Province will be upgraded and maintained to all-weather standard which will serve rural communities. Rural roads which connect rural areas and also can serve even during flood conditions have been mostly included to the proposed development. 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

25. The GOSL will be initiating key infrastructure project in the province. In order to sustain and maximize the socio-economic benefits from these investments, it I necessary to build an efficient road network connecting developed centers and under developed areas. Without the iROAD, these flagship projects will not realize the expected benefits and the province will continue to stagnate. 81.8% and 3.2% of the total population of Kalutara district live in rural and estate communities, respectively having poor access to infrastructure facilities and socio-economic opportunities. The Poverty Head Count Index of Kalutara District as of 2013 is 3.1%.

26. In terms of environmental quality, not improving the rural roads will contribute to the further deterioration of the road surface, increase flooding due to lack of cross- and side-drains, and increase erosion due to lack of slope protection. Poor road surface will result to increase in fuel consumption and combustion gas emissions, and increase in noise and dust levels which will result to poorer air quality particularly immediately along the project road. The lack of cross and side drains will increase the risk of damage to life and property on flood prone areas. On areas that are already prone to erosion, the inadequate infrastructure to stabilize the soil will result to loss in agricultural soil and increase sedimentation of receiving bodies of water. Limiting the road improving to the available RoW also minimized the need for vegetation clearing and tree cutting.

2. With Project Alternative

27. With the iRoad program, 276km length of rural roads in Kalutara District 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. Further, with the development roads which are not prone to floods will be improved in order to facilitate access during inundations.

28. 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 Western Province and ultimately for the development of the country.

D. Magnitude of Operations

1. Project Activities

29. The iRoad Program will upgrade and maintain the selected road sections in Kalutara District of Western Province to all-weather standards. The selected rural roads are currently governed by *Pradeshiya Sabhas* (The local Authorities) of Kalutara District and Provincial Road Development Authority (PRDA) of Western Provincial Council. Under the project, rural roads of 276km in Kalutara District has been selected to be upgraded.

30. Selected roads are narrow with varying widths and bad surface condition. Details of these roads i.e. length, widths and surface type are provided in each ECs.

31. As mentioned, it is proposed to upgrade and maintain selected roads in Kalutara District to all weather standards under iRoad Program. For selected 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. The 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;

- The widening of roads will be carried out only if there is sufficient ROW.
- If the existing surface is asphalt; it will be overlaid with the AC.
- 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 AC.
- 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.

(Source: PIU, iRoad Program, RDA)

32. Proposed typical designs details including cross sections are attached in appendix II.2.

33. Improvement on cross-drainage 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. Several road sections as identified in Chapter IV of this report are located in flood prone areas. The proposed road design in these sections were modified to withstand frequent inundations (please refer to Appendix II.2).

34. The proposed improvement will be limited along the existing ROW, no building or temporary structure will be fully or partially affected by the Program

2. Requirement of Construction Material

35. 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.

36. Based on engineering estimates prepared for each road for Kalutara District approximate quantities of material required for the district is given in Table II.1.

Table II.1: Approximate Material Requirement for Kaluthara District

District	Aggregate (m^3)	Sand (m^3)	Sub base (m^3)	Asphalt (t)
Kalutara	23,450	34,570	25,750	125,750

Source: iRoad Program, RDA

III. POLICY AND LEGAL FRAMEWORK

A. Legal Framework

1. National Environmental Act and other applicable regulation

37. 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.

38. 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"[3] 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.

39. 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.

40. 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.

41. 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 III.1 below.

[3] 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

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

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

Legislation	Relevance and main content	Authorizing institution
	protection and conservation of fauna and flora of Sri Lanka and their habitats; for the prevention of commercial and other misuse of such fauna and flora and their habitats for conservation of biodiversity of Sri Lanka; and to provide for matters connected there with.	
Forest Act No. 34 of 1951	This act is to consolidate and amend the law relating to the conservation , protection and management of forest and forest resources for the control of felling and transport of timber and Forest and for matters connected therewith or incidental thereto.	Department of Forest
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
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
Soil Conservation Act, No. 25 of 1951 and Amended No. 24 of 1996	This Act makes provisions for the enhancement of productive capacity of soil; to restore degraded land for the prevention and mitigation of soil erosion; for the conservation of soil resources and protection of land against damage by floods, salinity, alkalinity, water logging; and to provide for matters connected therewith or incidental thereto	Department of Agriculture
Explosives Act No. 36 of 1976	To provide control of explosions and regulations of matters connected with explosive activities related with the project.	Ministry Of Defense
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

Legislation	Relevance and main content	Authorizing institution
Flood Protection Ordinance No. 04 of 1924, No 22 of 1955	An ordinance for protection of areas subjected to damage from floods. This includes declaration of flood areas, preparation of schemes for flood protection and other rules and regulations regarding flood in the country	Irrigation Department
Crown Land Ordinance Act No. 1947	An ordinance to make provision for the grant and disposition of crown lands in Sri Lanka; for the management and control of such lands and the foreshore; for the regulation of the use of the water of lakes and public streams; and for other matters incidental to or connected with the matters related to proposed project	Land Commissioners Department
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
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
Sri Lanka Land Reclamation and Development Corporation Act 15 of 1968 as amended by Act No 52 of 1982	This act established Sri Lanka Land Reclamation and Development Corporation which grants permission for the public to fill marshy land subject to provision of storm water drainage.	Sri Lanka Land Reclamation and Development Corporation
National Thoroughfares Act, No. 40 of 2008	This act is known as RDA act which provide for planning, design construction, development, maintenance and administration an integrated public road network in Sri Lanka.	Road Development Authority

Legislation	Relevance and main content	Authorizing institution
Urban Development Authority (UDA) Law No 41 of 1978 and Urban Development Projects (Special Provisions) Act No 2 of 1980	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
Town and country planning ordinance No. 13 of 1946 and The Town & Country Planning (Amendment) Act, No. 49 of 2000	This regulates the National Physical Plan with transport as the main component	National Physical Planning Department (NPPD) under the Ministry of Urban Development and Defense
Buddhist Temporalities Ordinance No. 19 of 1931	This act provides necessary assistance to administer and protect the property of Viharas, interventions to settle disputes regarding property of Viharas and makes recommendations to release money to be paid as compensation in respect of property of Viharas acquired by government for any development project	Department of Buddhist Affairs
Cemeteries and burial grounds ordinance No. 9 of 1899 and amendments	The act regulates any disturbance, removal of burial, monuments and use of such areas for development project	Local Government Authority
Antiquities Ordinance No. 9 of 1940 and amendments	The act regulate activities of projects located in close proximity of any archeological reserves	Department of Archaeology

42. Under the NEA (No). 47 and some of the laws and regulations listed in Table III.1 above, there are specific requirements for clearances, permits and licenses required for road projects as listed in Table III.2 below.

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

Project stage	Approvals	Project related activity	Relevant agency
Pre-Construction	Environment clearance	Implementation of the project	Central Environment Authority

Project stage	Approvals	Project related activity	Relevant agency
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	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 P 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 systems, land filling, dredging activities	Department of Irrigation, Department 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.

2. Environmental Protection License (EPL)

43. 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.

44. 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.

45. 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.

46. 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

47. 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

48. 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.

49. 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.

50. 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.

51. 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.

52. **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.

53. 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.

54. 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.

55. 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.

56. 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.

57. 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.

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

59. 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.

60. 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.

61. 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.

62. 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

63. Selected roads to be upgraded under iRoad Program are scattered in Kalluthara Districts of Western Province. This chapter describes the general environment in the districts and along the corridor of impact particularly along which environmental or social sensitive entities are observed. In addition, ECs prepared for each road summarizes the environmental profile with specific chainage-wise information and supported with photographs. Sample ECs are provided in Appendix I.2.

A. Physical Environment

1. Climate, land use, terrain and Soil

64. Based on major climatic zones of the country, Kalutara District belong to low country – wet zone.

65. The climatic environment of the project area is further categorized into 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 Project roads

Agro-ecological Zone	Roads (ID) falls in to agro-ecological zone	75% expectancy value of rainfall (mm)	Description (Land use, Terrain, Soil groups)
WL1a	3,5,6,7,8,20,22,23, 24,25,26,27,28,29, 30,31,32,36,37,39, 43,44,45,51,52,53, 54,70,71,73,76,82, 85,107,119,123	>3200	Tea, Rubber, Mixed Home Garden, Paddy , Export Agricultural Crops (Cinnamon) Rolling , Undulating And Hilly RYP,RYP Soils With Semi Prominent A1 Horizon & LHG Soils
WL1b	9,10,11,12,14,15,1 7,21,34,35,36,37,4 0,41,43,53,68,94,1 00,107,109,111,12 0,121,122,	>2800	Rubber, Mixed home gardens, Paddy Undulating & rolling RYP & LHG soils
WL2a	2,12,15,16,35,46,4 7,48,49,50,56,57,5 8,59,60,61,63,64,6 5,66,67,86,87,91,9 5,104,105,111,114, 115,116	>2400	Rubber, Tea, Coconut, Mixed home gardens, Paddy, Export Agricultural Crops, Rolling, Undulating and flat RYP, LHG & Bog and Half - Bog soils

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

66. Rainfall pattern of Kalutara Province is influenced by south west monsoon from May to September when peak rainy season occurs. During the rest of the year, there is also considerable precipitation due to convective rains. The average annual precipitation is about 1,000 to 3,000 mm. Rainfall distribution is also influenced by the second inter-monsoon from

October to November (Source: http://www.meteo.gov.lk/). The average temperature in the province varies from 25-30°C with high humidity levels.

2. Hydrology

67. Kaluthara district consists of catchments of Kalu Ganga River and Benthara rivers. The delta of both Rivers basin covers the majority of the area of the Kalutara District and candidate roads cross numerous streams. Table IV.2 presents the major streams that are located within the project area of each road.

Table IV.2: Road Sections that Cross or Located Near Rivers and Streams, Kalutara District

Road ID	Hydrologically important area
2	End point (1+400km, 3 - l) near the Bolgoda environment protection areas (Aluth ella)
3	Streams are crossing the road at 3+200km, 4+200Km and 5.100Km while these streams are flowing parallel to road at Ch 2+500 RHS and 3+300 - 3+700RHS.
5	The road crosses streams at 2+500, 2+700, 3+500, 4+100 and 4+900 while some streams flow parallel to road at 0+700 and from 1+000 to 1+300.
6	The road crosses streams at 0+300, 0+800, 1+200, 1+500, 2+100 and 4+900 while some streams flow parallel to road at 4+100 and from 4+200 to 5+300.
7	At 3+000 - 3+100km, 3+300 - 3+400km, 3+400 - 3+500km irrigation canals are crossing the road and at 2+900 - 3+000m Wewella ela crossing the road.
8	At 1+500 - 1+600km there is an irrigation canal crossing the road.
9	The road ends near Kalu ganga at 2+850
11	Streams crossing 0+100km, 0+500 - 0+600km
14	Stream running parallel RHS from 0+000 - 0+500km, 1+000 - 1+100km. The same stream crossing at 1+700km - 1+800. Stream crossing 2+400 - 2+500
15	At 1+100 - 1+200km, 1+300 - 1+400km, 1+600 - 1+700km, 1+700 - 1+800km, 2+100 - 2+200km, 2+200 - 2+300km streams and irrigation canals are crossing the road.
16	There is a irrigation canal cross the road at 1+100km
17	The streams are crossing following locations of the road; Ch 0+200km, 2+400km, 3+500km Large stream.
21	The streams are crossing at 0+200km,2+000km
23	At 0+100m, 3+800 3+900km, 4+800km, 5+700km irrigation canal crossing the road and at 0+800 - 0+900m, 2+900 - 3+000km, 8+900 - 9+500km Kuda river cross the road.
24	The streams are crossing following locations of the road; Ch 0+100km,0+300km, 0+400km,0+800km, 1+200km,1+400km, 1+800km,2+000km,3+000km,3+700km
25	The following streams could be observed within 0.4km - 0.5km on(LHS), 2.0km - 2.1km on (RHS) - Canal
26	Road crosses only one stream at 1+100.
27	The following streams could be observed within 0.000km-0.100km on(RHS), 0.100km-0.200km on (LHS), 0.300km-0.400km on (RHS), 2.700km-2.800km on (LHS), 2.800km-2.900km on(LHS), 3.800km-3.900km on (LHS), Water tank could be observed within 1.800km-1.900km
28	The following streams could be observed within 0.00km-0.100km 0n(RHS), 0.300km-0.400km on(LHS), 0.800km-0.900km 0n(LHS), 2.100km-2.200km on(LHS), 2.600km-2.700km on (LHS), 2.800km-2.900km on(LHS), 4.000km-

Road ID	Hydrologically important area
	4.100km on(RHS), 4.200km-4.300km on(LHS)
29	The streams are crossing following locations of the road; Ch 0+100km,2+100km, 6+100km,8+100km, 9+900km,11+200km
30	There is a minor stream at 1.300km - 1.400km RHS of the road. The streams are crossing the road at following chainages;1.400 - 1.500km, 1.500 - 1.600km, 2.000km - 2.100km, 2.500km - 2.600km, 3.700km - 3.800km, 3.800km - 3.900km, 4.200km - 4.300km, 5.800km - 5.900km, 6.200km - 6.300km, 6.600km - 6.700km.
31	Streams are observed in following chain ages in either side of the road. 0+000 - 0+100 (RHS),0+800 - 0+900 (RHS), 1+500 - 1+600 (LHS), 1+600-1+700 (RHS)
32	The minor streams were observed following chainages in either side of the road. 0.800 - 0.900km(LHS), 1.300 - 1.400km(RHS), 2.200km- 2.300km(RHS), 3.700km- 3.800km(RHS), 3.900km- 4.000km(RHS)
34	Road crosses miner streams at 0+800,1+200, 1+500, 1+600, 2+000, 2+100,2+500.
35	The road crosses one stream at 0+800 while one stream flows parallel to road at 1+600.
36	At 0+100 0+200m, 0+500 - 0+600m, 1+200 - 1+300km, 1+800 - 1+900km, 2+800 - 2+900km, 3+600 - 3+700km irrigation canal crossing the road and at 0+600 - 0+700km Delkanda river, 4+000 - 4+100km a stream cross the road.
37	The stream is crossing at 0+100km
40	Road crosses streams at 0+200 , 0+300, 1+100, 3+300, 4+000,4+400, 5+000, and there is a side drain from 1.2 to 1.3 LHS
43	The streams are crossing the road; 0.100km, 0.500km, 2.000 km Weherawatta Ela , 3.900km Small stream, 3.100km Small stream, 3.300km Small stream, 3.800km Stream & anicut
45	Kalu ganga at 3+370 (end point of the roaad)
46	Streams could be observed at 300m-400m on LHS and 1300m-1400m on LHS
48	Stream could be observed at 2km-2.1km on RHS
50	Stream within 2.9km-3.0km is crossing the road. Streams which were adjacent to the road were observed within 1.1km-1.3km.
52	The road crosses streams at 0+500 and 4+100.
54	The following streams are crossing the road; 0.100km, 5.100km
56	A stream crosses the road at 0+280km
70	The road runs parallel to Kalu ganga from 1+700 - 2+000km
73	Stream is crossing the road at 0+700km and 4+400km.
85	Road crosses minor streams at 0+800km and 3+000km. A stream run parallel to the road at 2+400km and 2+600km
91	Road run parallel to sea
94	Road cross the stream at 1+200km
95	A tributary to Bolgoda lake cross the road at 2+800km
105	A stream crossing 1+830
122	Road traverse parallel to a tributary of Bolgoda river at 0+200 - 0+300km

3. Air Quality and Noise

68. Since the selected road sections are mostly located within rural areas, major sources of air pollution are not present. The general air quality in the project area is excellent except along unpaved roads and major intersections where temporary deterioration occurs. An extract from

the National Environmental (Ambient Air Quality) Regulations, declared in 1994 is presented in Table IV.3.

Table IV.3: 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)
Note:
PM 10 – particulate matter < 10 µm
NAAQS – National Ambient Air Quality Standards (NAAQS)

69. Vehicle Emission Test (VET) became mandatory in 15th July 2008 in order to enforce the environmental standards on vehicle emission provided in 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.

70. 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. Occurrence of Natural Disasters in the Project Area

71. **Landslides:** Based on the landslide hazardous zoning maps of National Building Research Organization (NBRO), Kalutara District has been identified as a landslide prone district. Further, these prone areas consist of landslides which are most likely to occur where there is danger and potential threat to life and property exist. In addition, this district is comprised of expected landslide areas and locations with modest level of landslide hazard (Please refer appendix IV.1 for landslide hazard zoning map).

72. Palindanuwara, Agalawatta, Bulathsinhala, Matugama and Kalutara divisions are most vulnerable divisions in the Kalutara District. During field reconnaissance carried out by ESDD, RDA to each road, major landslides were not observed. However some road related slope failures and also sites which were previously stuck by landslides were observed along the candidate roads. Table IV.4 below summarizes such locations identified during field reconnaissance.

Table IV.4: Candidate roads along which slope failures and previously occurred landslides observed

District	Roads (Road ID) located within land slide areas
Kalutara	3, 5, 7, 23, 24, 26, 52, 28, 29, 8, 54

73. **Floods:** Kalutara is one of the districts severely affected by yearly floods causing damage to life and properties. Floods are caused by the overflowing of Kalu Ganga and its tributaries affecting Kalutara, Bandaragama, Dodangoda, Ingiriya, Madurawala, Bulathsinhala and Palindanuwara DS Divisions. In severe flood situations, the river mouth is widened to drain out the flood water to the sea. Table IV.5 presents flood prone areas recorded in each road during the field inspections.

Table IV.5: Project roads which are prone to floods

District	Roads (Road ID) located within flood prone areas
Kalutara	7, 10, 11, 12, 14, 23, 24, 26, 29, 35, 37, 43, 45, 54, 60, 61, 62, 65, 64, 66, 67, 95, 94, 109, 41, 122, 9, 100, 43, 70

B. Ecological Environment

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

74. Both manmade habitats i.e., home gardens, paddy fields, plantations of tea, rubber, coconut and cinnamon, and natural or semi natural habitats i.e., marshland, streams, 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.

75. According to information of Department of Wildlife Conservation any of candidate roads of Kalutara District are not falling within or adjacent to protected areas such as sanctuaries, national parks, nature reserve and strict nature reserves.

76. With respect to forest areas, following candidate roads are located within or adjacent to the sensitive forest areas which are declared by Department of Forest Conservation (DOFC) of Sri Lanka.

Table IV.6: Declared Forest areas located within or adjacent to project roads

Road ID	Road name	Length of the road-km	Name of the sensitive area	Proximity
6	Athwelthota Ambegoda via Bampara Road	5.00	A forest patch locally known as Walamita Wanguwa	A forest patch is located on RHS of the road from 2+200 to 2+600
23	Polegoda Ihala Welgama Paragoda via Wadigangoda road	9.20	Forest reserve	The road traverses adjacent to a forest reserve
24	Ihala Kudaligama Iddagoda road	3.90	Forest patch	A forest patch is located on either side of road from 1+800-2+800
26	Bogahawaththa to Gallakpahala road	2.85	Mahagama forest reserve	About 1.20km section of the road is located within the forest
28	Niggaha Agirikanaththa Via Gawaragiriya road	5.05	Delgama Yatiyampitiya proposed forest reserve	About 1km of the road is located within the forest

Road ID	Road name	Length of the road-km	Name of the sensitive area	Proximity
29	From Malwatta junction Meegahakumbura Heenela Diwalakada Kalugala Malwattha road	11.60	Diwalkada proposed forest reserve	The forest is located on either side of the road
30	From Ratnapura Panadura Road to Akkara 100 New Town to Sagara Palansooriya Collage Road via Batugampala	6.90	Kirigala forest Plantation	Kirigala forest Plantation is located for about 250m on either side of the road
52	From Maddegama to Thalpadiwala road across Meegahathenna (Nawalalkanda road)	4.70	Proposed forest reserve	The road traverses through a forest areas from 0.00 to 0+300 and from 0+740 to 1+440 and from 1+96 to 3+00
91	From Sri Gunarathna road up to Pinwatta Station road (Parallel road to Galle road)	3.20	Coastal zone	From about 0+300km to 3.20km the road is within the Coastal zone

77. Department of Forest granted a general approval for improvement of all roads under this project which are falling within or adjacent to sensitive forest areas through letter No. EMD/EIA/RD/rural roads/2014 dated 27 Aug 2014 (attached in appendix IV.2).

78. The road number 91 from about 0+300km to the end is located within the coastal zone. The Coastal Zone is defined in the Coast Conservation Act as that area lying within a limit of three hundred meters landwards of the Mean High Water Line and a limit of two kilometres 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 kilometres, 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.

C. Socio - Economic Environment

1. Condition of road infrastructures

79. Roads are the main transportation mode in Kalutara districts. There are two “A” class” roads and 24 “B” class roads located within or crossing the district. There is plenty of C, D, and E class roads (local authority roads) in the districts. The Southern Expressway traverses through Velipenna, Dodangoda and Gelanigama of Kalutara dist. In addition to roads, rail transport is also a prominent transportation mode with Kalutara as popular railway stations in District.

80. The government policy plan under Mahinda Chinthanaya aims to develop the road system by constructing new expressways and rehabilitating existing roads to improve the socio

– economic condition of the backward areas of the country. Accordingly, Road Development Authority (RDA) of Ministry of Port, Highways and Shipping planned to upgrade 83 rural roads (276km) in Kalutara district under iRoad Program. Objective of this program is to expose rural areas which have development potentials to new development opportunities while providing access to rural communities in order to improve their socio – economic standards.

81. According to the Department of Census and Statistics, majority of population are living in rural areas, i.e. 87.6% in Kalutara (Refer table IV.7 for details). During the field reconnaissance it was observed that proposed road improvement roads are poor or very poor due to inadequate road maintenance and are too narrow. People in the area have to spend more time to reach working places, hospitals, schools, and markets, which are mostly situated far from their villages. Agriculture is the prominent economic activity in these two districts and poor road network make it difficult for farmers to transport agricultural products to market. Moreover, vehicle owners have to bear higher vehicle operating cost due to dilapidated road condition.

2. Population and population density

82. Table IV.7 shows the distribution of population by sectors and population density. Majority of population in districts are living in rural areas. Second highest category is the urban population. Kalutara district shows high population density i.e. 773 persons per km^2.

Table IV.7: Distribution of Population by Sector

District	Total Population	Population by sector (%)			Population Density (persons/km^2)
		Urban	Rural	Estate	
Kalutara	1,217,260	9.2	81.8	3.2	773

Source: Department of Census and Statistics, 2012

83. **Population by ethnicity:** With regard to ethnicity, majority of population in Kalutara district is Sinhalese i.e. 86.7%. Ethnic category such as Moor, Tamil and Others are 9.2%, 4 % and 0.1% respectively. In terms of gender segregation, out of total population, 51.5% accounting for 626,479 are female and 48.5%, accounting for 590,781 are male.

3. Main economic activities

84. **Agriculture:** Agriculture is not prominent economic activity in the district. As per the Department of Census and Statistics (2012), only 19.3% of the total population is engaged in agricultural sector. Paddy, Rubber, Coconut and Oil Farm are the main agricultural crops in the districts. According to the Department of Census and Statistics, Kalutara district has 33,701 acres of cultivated paddy lands. The district has 73,764 acres of cultivated rubber land and 17,717 acres of tea land as well.

85. During the field reconnaissance it was observed that majority of proposed roads are traversing through large and small scale rubber, tea Oil Farm lands and the proposed roads will facilitate easy access of workers to these areas.

86. **Industries:** In Kalutara district, there are 7,065 industrial establishments and out of total employed population, 29% of them are engaged in this sector. Majority of the operating industries are related to agriculture processing and garment manufacturing.

87. Kalutara district is famous among the local and foreign tourists as there are many tourist attraction places with lots of historical, cultural important places and the beautiful beach. There are seven major tourist attractions at Kalutara district;

- Kalutara Bodhi (Temple)
- Pahiyangala (An prehistoric cave)
- Weheragala Kanda
- Rankothkowera temple
- Aluthgama Kande Viharaya.
- Bava Garden at Bentota

4. Education

88. Table IV.8 shows the distribution of the population by education attainment in Kalutara district. Education categories like General Certificate of Education – Ordinary Level (G.C.E. - O/L), G.C.E – Advance Level (A/L), Degree and above shows considerably good situation in Kalutara district.

Table IV.8: Distribution of Population by Educational Attainments

District	Educational attainment					
	No schooling	Primary	Secondary	G.C.E. (O/L)	G.C.E.(A/L)	Degree and above)
Kalutara	2.6	21.1	39.5	19.6	14.6	2.6

Source: Department of Census and Statistics, 2012

5. Household income

89. As per 'Household Income and Expenditure Survey - 2009/10' of the Department of Census and Statistics, the monthly mean and median household income of Kalutara district is given below.

Table IV.9: Mean and Median Monthly Household Income by District -2009/10

District	Average monthly income	
	Mean (Rs)	Median (Rs)
Kalutara	35,780	27,511

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

90. **Poverty Situation:** The poverty Head Count Index of Kalutara district has declined from 6 percent in 2009 to 3.1 percent in 2013. During this period poverty has been decreased by 48.3% in the district. This is due to majority of employed population engaging in industrial and service sector employments (29.2% in industrial sector and 51.6% in service sector).

Table IV.10: Poverty Headcount Index of Kalutara District

District	Poverty Headcount Index	
	Year – 2009	Year - 2013
Kalutara	6	3.1

Source: Household Income and Expenditure Survey – 2013, Department of Census and Statistics

6. Existing Infrastructure facilities

91. **Energy source of households:** In the project district, electricity is the main source of household lighting accounting for 92.9% of the total households. Kerosene is the second major source accounting for 6.7% of the households.

Table IV.11: Principle Type of Household Lighting Source - 2012

District	Electricity from national grid	Kerosene	Other
Kalutara	**92.9**	**6.7**	**0.5**

Department of Census and statistics, 2012.

92. **Drinking water:** As shown in Table IV.12, majority of households in Kalutara district use protected well water at 60.2% of the total households. Pipe born water is the second largest source as 29.2% of the total household use this. Table IV.12 shows source of drinking water in Kaluthara District.

Table IV.12: Source of Drinking water

District	Protected well	Unprotected well	Pipe born water	Other (River/tank/ streams/Bottled water)	Tube wells
Kalutara	60.2	5.8	29.2	1.6	3.2

Source: Department of Census and statistics, 2012.

93. **Sanitary Facilities:** As shown in Table IV.13 majority of households in Kalutara district use private toilets at. 90.7%. There are 8.9% households in the district sharing the toilets with other families.

Table IV.13: Type of Toilets - 2012

District	Private	Sharing with others	Common/Public toilets
Kalutara	**90.7**	**8.9**	**0.1**

Source: Department of Census and statistics, 2012.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES

94. 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 designed based on environment best practices to minimize the adverse impacts or manage to acceptable limits while enhancing the beneficial impacts of the project.

A. Pre - construction phase

1. Project induced natural hazards

95. **Impacts due to Landslides:** As Kalutara District is identified as landslide prone and there is the risk of landslide if natural slopes are disturbed and land use is altered by the construction activities during extreme rainfall events.

96. However as the road improvement is restricted to the available ROW, natural slopes along the project roads will not be disturbed and land use exterior to the ROW will not change. The risk of landslide occurrence is minimum due these design features. Prior consent will be obtained from National Building Research Organization (NBRO) for roads along which landslide prone areas and special attention will be made in road design incorporating recommendation of NBRO.

97. **Road construction in flood prone areas:** As described in Chapter 4, most of the roads in Kalutara District are located within flood prone areas and improvements in the hydraulic structures will address this issue. Culverts and bridges design will have adequate capacities considering the local hydrology, historical high flood levels, and required flood return periods. Coordination with the Irrigation Department in collecting information and checking the adequacy of design and conducting construction operations during dry weather flow will be practiced. RDA requires a 50 year flood return period in culvert designs and a 100 year flood return period for designing bridges.

2. Shifting of Utility Supply Lines

98. For the road upgrading works, electricity power lines, telephone lines, and water supply mains located closer to the ROW will be shifted. Such utility facilities available within the existing ROW are identified in ECs and the exact number of utilities to be shifted will be updated during the preparation of specific EMPs. Proper co-ordination with the relevant service providing authorities in advance and supervision during shifting will help to reduce any impacts to relevant utility supply lines. 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. Landslides during construction stage

99. Since the proposed upgrading is restricted to the available ROW, minimal disturbance to the road side natural slopes is expected and possibility of project induced landslides is minimal. Proper coordination will be maintained with NBRO for roads which already have landslides or

slope failures. The contractor's activities will not lead to landslides and if any such incident occurs will immediately inform RDA and provide suitable means to prevent damage adjacent land and property.

2. Hydrological impacts

100. The construction of culverts and bridges may temporarily block or divert streams, disturbing the natural drainage pattern and create flooding condition in the area. Improperly stored construction materials can block natural drainage pattern.

101. The contractor will take all measures necessary or as directed by the Engineer to keep all drainage paths and drains clear at all times particularly in Ratnapura District. Temporary storage of material will made only in approved sites by the engineer where natural drainage is not disturbed. All waste will be disposed at locations approved by the Local Authority. If flooding or stagnation of water is caused by contractor's activities, contractors shall provide suitable means to prevent loss of access to any land or property and prevent damage to land and property.

102. No material including excavated soil will 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 to nearby water bodies and agricultural lands. The contractor will ensure that not to damage or block any manmade drainage canal even for temporary basis. If blocked, the contractor will remove such debris without any delay.

3. Increase of local air pollution, noise and vibration

103. Earthworks, pavement improvement operations, quarry operations, operation of hot mix plants, operation of construction vehicles and operation of plants during construction period will emit dust and fumes, which will contribute to local air pollution.

104. 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. Sensitive receptors like schools, hospitals, and places of worship are particularly vulnerable to nuisance from noise. Structures located near the roads are at risk to structural damage like cracks due to construction vibration.

105. The impact of construction noise, vibration and emissions at sensitive areas will 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. Precondition survey should be carried out if requested by the engineer at identified locations.
- Regular sprinkling of water to dampen the construction surface will reduce the emission of dust.

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

106. In order to upgrade roads, clearing of roadside vegetation within the ROW, 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 debris along the road edge. These activities could cause temporary erosion and siltation of nearby water bodies, drainage canals, and irrigation systems.

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

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

- Reuse of waste soil for refilling of borrow pits if any
- 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 debris 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.

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

109. Labour camps may need to be established near the road alignment and improper sanitation, wastewater and solid waste disposal risk contaminating nearby surface water sources. Stagnant water from the labor camp can create mosquito breeding and vector for communicable diseases to the workers and host communities. Social conflicts may arise due to use of illicit liquor and unpleasant behavior which causes inconvenience to local community.

110. Labour camps will be located at least 100m away from the major water resources. Proper sanitary facilities will be provided to the labour camps and proper way of disposing any

wastewater and other waste matter generated from the camps as agreed with the Public Health Inspector (PHI) will be strictly observed.

111. Maximize recruiting of local labor to minimize the need for migrant workers and avoid potential and health conflicts with the host community. Awareness programs should be conducted targeting workers as well as local community in order to minimize and avoid any such conflicts.

6. Disruption to Traffic/Transportation

112. 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.

113. 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.

7. Biological impacts

114. **Impact on Protected Areas and Sensitive Ecosystems:** There are no anticipated impacts on the protected areas and sensitive ecosystems. No project road is located in or within 100m of any wildlife reserve such as strict nature reserve, nature reserve, national park and sanctuary.

115. **Impacts on terrestrial flora:** During the construction stage loss of vegetation within the ROW is inevitable. Most of the trees that will be affected are Kithul (Caryota urens), Jack (*Artocarpus heterophyllus*), and Mango (*Mangifera indica*). Mahogany (*Swetenia macrophylla*) and other vulnerable species will not be cleared through minor geometric realignment. This could aggravate the erosive processes especially during the rainy season.

116. All construction works will be carried out in a manner that the destruction or disruption of vegetation is minimal. A compensatory tree planting program will be developed at a rate of at least three (3) good specimens of tree species planted for each tree removed. If there no space available along the road for tree planting, these trees will be planted on home gardens, schools, government institutions, private institutes and government institutes in the project area.

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

118. **Impacts on terrestrial fauna:** No road is encroaching wildlife areas or forest lands. Hence there will be no direct impact on such areas. Still three is a possibility of occurring indirect impacts near forest areas during construction stage.

119. The free movement and natural behavior of animals near forest areas could be disturbed during the construction stage due to workers, construction noise and frequent movement of construction vehicles.

120. Further poaching and hunting will be carried out by workers if the worker camps are located close to the forest areas. 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.

121. No solid waste or spoil dumping sites, hot mix plants and worker camps should be located within or close to the forest areas. Collection of flora and fauna or their parts from natural forest and carrying out of any other illegal activity should not be allowed. 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.

122. Consent could be obtained from Department of Forest Conservation (DOFC) before start construction works within the areas under their jurisdiction. If any guidelines issued, it should be adhered.

123. **Impact on aquatic fauna and flora:** There will be soil erosion from stock piles, excavation, oil and grease from construction vehicles which will deteriorate the water quality of the receiving water body including increase in turbidity leading to temporary impairment to sustain aquatic fauna and flora.

124. This impact could be mitigated through proper siting; 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. No solid waste will be dumped into water bodies.

8. Establishment of invasive species

125. 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.

126. 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.

9. Impacts Due to Extraction and Transportation of Construction Materials

127. Sources of construction materials such as soil/metal could be obtained from the quarry and borrow sites. Extraction and transportation of materials from such sites will cause noise,

vibration, dust, induced slope failure, negative visual impacts, creation of mosquito breeding sites, and damage to private properties and minor roads. Heavy trucks transporting materials to construction sites will cause disturbances to local traffic, damage minor roads, and increase dust and noise nuisance.

128. This could be mitigated by using quarry and borrow sites approved by Geological Survey and Mines Bureau (GSMB). Spoils will not be dumped along road side and near water bodies. Spoils, top soil and denuded materials will be reused for restoring borrow 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.

10. Requirement of lands for the road upgrading

129. The 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 lands will be taken after negotiating with land owners with an involvement of a third party. During construction, temporary occupation of privately owned land may be required for stock pilling, and use as yards. If such a necessity occurs the contractor with the concurrence of project staff will sign a temporary occupation contract with the owner.

11. Safety of Workers and Public

130. Construction activities pose potential hazards to both workers and public. Safety to workers and the public will 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 Equipment (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.

12. Management of Construction Debris/Waste

131. Debris can be generated by dismantling of existing pavement. Collected dust and unused iron bars or damaged support structures constitute significant wastes. Mitigation for solid waste from construction camp has been given in construction camp section.

132. The existing bitumen surface can be utilized for paving of cross roads, access roads, and paving works in construction sites and camps, temporary traffic diversions, haulage routes, etc.

133. All excavated materials from roadway, shoulders, verges, drains, cross drainage and the like may be used for backfilling embankments, filling pits, and landscaping to the extent feasible. Unusable debris material should be suitably disposed off at pre-designated disposal locations, with approval of the concerned authority. The bituminous wastes shall be disposed in an environmentally accepted manner as follow:

- Unusable and surplus materials, as determined by the Project Engineer, will be removed and disposed off-site.
- Unproductive/wastelands shall be selected for dumping sites.
- Away from residential areas and located at downwind side of these locations.
- Dumping sites do not contaminate any water sources, rivers etc, and
- Dumping sites have adequate capacity equal to the amount of debris generated.
- Public perception and consent from the village about the location of debris disposal site has to be obtained before finalizing the location.
- Form works will be re-used to the extent possible, more than 20 times as dictated by good practice. All stripped formworks will be examined for any damage and rectified in the workshop for re-use. Rectification includes plugging holes, and straightening bent steel props.

C. Operational Phase

1. Impacts on water resources

134. Improvements to the road drainage will result in improved storm water flows and reduce the frequency of blockages from occurring. Risks to the public health caused by stagnant water bodies 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.

135. In addition, improper handling of chemicals used for maintenance works such as paints, pesticides, and asphalt will degrade nearby water bodies. Proper handling of such chemicals under strict supervision will minimize risk of water pollution during the maintenance period.

2. Occurrence of landslides

136. Regardless of road related activities, landslides could occur along the candidate roads which could block the access and damage the road surface. In such case, the contractor is responsible for clearing the road and restoring the access immediately after informing PIU and relevant Executive Engineer of RDA and necessary measures will be adopted complying with the recommendations of NBRO.

3. Disposal of unsuitable material

137. 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 debris. Collected materials will be properly disposed to avoid to avoid blocking of drainage.

4. Extraction of material for repairing and maintenance works

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

5. Pedestrian and commuter safety

139. 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 will 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

140. 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.

6. Air quality and noise

141. 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. Necessary traffic signs and signals will be installed in sensitive areas such as schools, temples to warn drivers and avoid making unnecessary horn.

D. Positive Impacts of the Project

1. Socio - economic benefits

142. Following socio-economic benefits are expected to transfer to the affected population 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 Western Province will boost economic activities including potential growth in industries, tourism, gem industry and agriculture in lagging areas.

- Good road network 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

143. The Transport Emissions Evaluation Model for Projects (TEEMPT) developed by Clear Air Asia[4] with support from ITDP, ADB, Cambridge Systematics and the United Nations Environment Programme (UNEP) – Global Environment Facility (GEF) Scientific and Technical Advisory Panel. TEEMP is an excel-based, free-of-charge spreadsheet models to evaluate emissions impacts of transport projects.

144. TEEMPT was utilized to assessed 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.

2. Key road upgrading features

145. iROAD Programme will upgrade 83 rural roads with a total aggregated length of 276 kms in Kaluthara. No land acquisition will be allowed and all improvements will be limited to the existing 1-lane configuration with 3-3.50m carriageway with an asphalt concrete surface. Road roughness will decrease from the general condition of 8.0 m/km to 2.5 m/km. 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.

146. Traffic forecast were taken from the economic analysis for each road section disaggregated into vehicle types and share to the annual average daily traffic.

147. 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.

3. Estimated Carbon Emissions

[4] 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.

148. For each kilometer of rural road upgrading, CO_2 emission from construction is estimated at 11 tons[5]. Total annual emission without the project is estimated at 769 tons.

149. 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 the following climate risks:

- **Increased precipitation.** Seasonal runoff may lead to erosion and siltation of water courses, ponds and reservoirs. Risk of flooding and precipitation induced landslide events as there are existing hazards associated with heavy precipitation in the some of the project roads.
- **Flood.** Climate change is projected to influence the frequency and intensity of flood events. Existing engineering designs may not take into consideration the impact of climate change on the risks from flooding. A more localised and in-depth assessment must be carried out.
- **Onshore Category 1 Storms**. The project is located in a region which has experienced Category 1 storms in the recent past. A high exposure means that between 1968 and 2009 there have been at least one Category 1 storm in the region based on post-processed data from UNEP/ GRID-Europe. On the Saffir-Simpson Hurricane Scale a category 1 storm is characterised by sustained winds in excess of 119 km/hr (33 m/s). Even this least intense storm can still produce plenty of damage and be life threatening. The region may also be susceptible to lower intensity but more frequent tropical storms as well as less frequent higher-intensity storms. Existing engineering designs may not take into consideration the impact of climate change on the risks from tropical or extra tropical storms. If coastal surges and high winds are identified as a potential problem for the project, it is recommended that a more localised and in-depth assessment is carried out.
- **Sea Level Rise.** Some recent research suggests that global sea levels could be 0.75 to 1.9m higher by the end of the century. Local changes in ocean density/dynamics and land movements can also add to, or lessen, the effects of sea level rise at a given location. Sea level rise has the potential to accelerate the rate of coastal erosion. Changes in erosion regimes also impact the rate of sedimentation in other areas, particularly in estuarine and other tidal settings.
- **Temperature Increase.** There is a potential for an increase in incidences where current design standards will not be sufficient. The design, operational and maintenance standards should be reviewed - take into consideration current impacts of high temperatures as well as potential future changes. Heatwaves put stress on roads and other transport links.
- **Natural Hazards.** a) Landslide Triggered by Precipitation. All roads and road sections 10km off the coastal areas are potentially susceptible to low to medium levels of landslide risk; b) Coastal Erosion. Coastal erosion has been identified as a major hazard in many coastal areas of Sri Lanka, ; c)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.

[5] R. Shantini (2006). "Impact of Sri Lankan Rural Roads on Greenhouse Gas Emissions & Mitigation and Climate Change – A Case Study." http://www.rshanthini.com/tmp/CP551SD/RuralRoadandGHG.pdf

150. 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 the succeeding Table.

Table. V.1: Cost of Climate Adaption Measures (LKR.million)- Western Province

District	Increase Embankment Height	New Side and Lead away drains	New/Widening Culverts	New Bridges	Total
Kaluthara	34.57	166.75	670.21	13.5	885.03
Total	34.57	166.75	670.21	13.5	885.03

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

A. Environmental Management Plan

151. 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.

152. A standard EMP was prepared as part of the IEE report (appendix VI.1), however, contract package specific EMP's will be prepared by the contractor in 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 (Please refer to appendix VI.2 for standard EMC). 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. Furthermore the contractor will also be responsible for updating EMP if there are any significant changes in the project site conditions or engineering design.

B. Grievance Redress Mechanism

153. 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.

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

Grama Niladari of the area	Chairman
Representative of PIU	Secretary
Representative of Supervision Consultant	Member
Representative of Contractor	Member
A community member/religious leader	Member
Woman representative from the local community	Member

155. At the DS Level GRC members will be:

Divisional Secretary of the area	Chairman
Representative of PIU	Secretary
Grama Niladari	Member
Representative of Supervision Consultant	Member
Representative of Contractor	Member
Representative of a social organization (NGO/CBO) of the area	Member
A community member/religious leader	Member
Woman representative from the local community	Member

156. 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.

157. Recommended steps with timeline on the operation of the GRM is provided in Figure VI.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.

158. The flow chart of the GRM is presented in Figure VI.1.

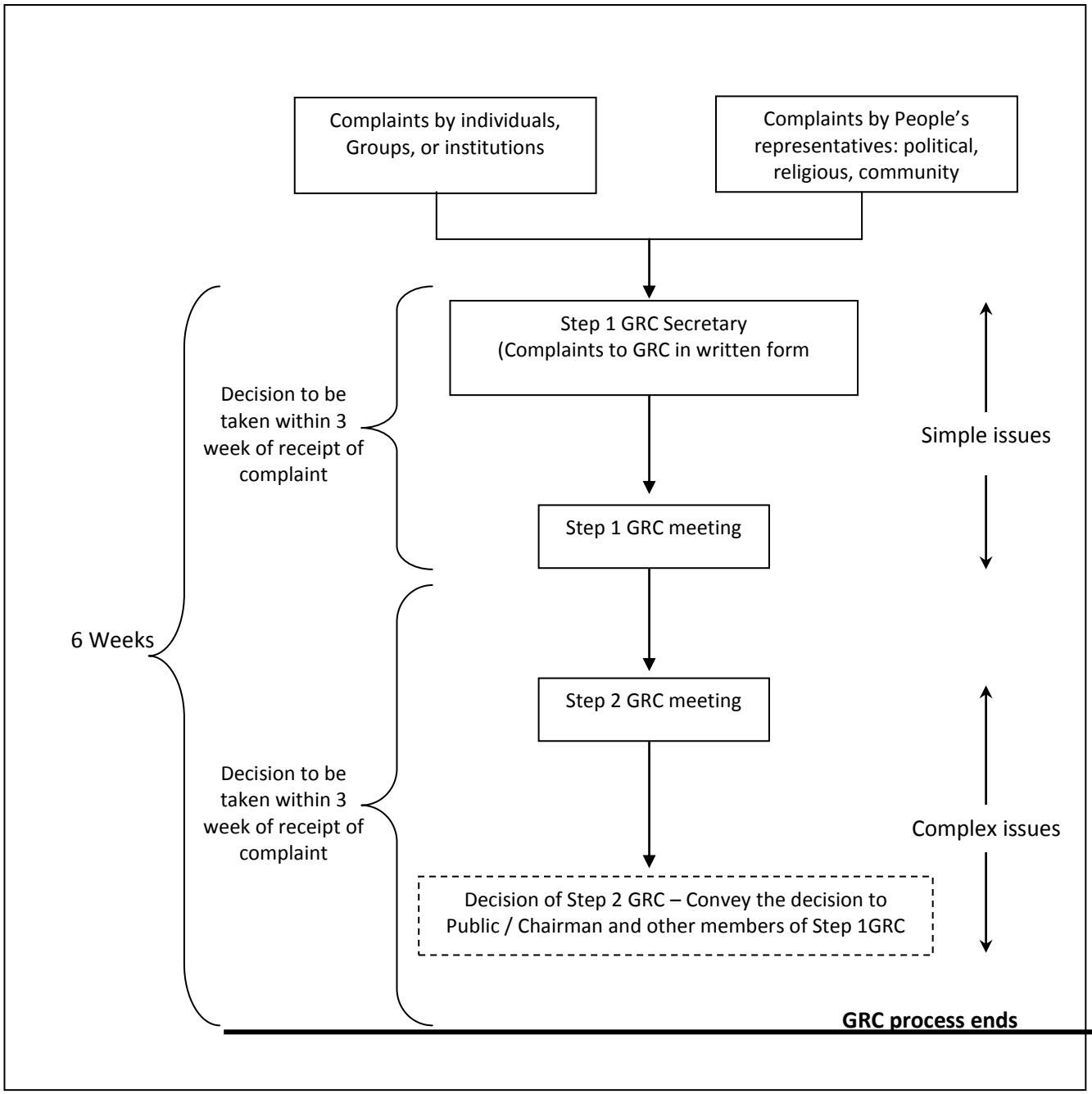


Figure VI. 1: GRM process

VII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Public consultation process

159. Along with the field assessment for preparation of the ECs, ESDD carried out public consultation in each road. Objective of this activity was to understand the viewpoints of the public especially regarding environmental issues along the road 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. Here, special consideration was paid to explore locations which are susceptible to floods and landslides along roads. The public consulted in each road and their views are given in the particular ECs which are attached in Volume II of this report.

160. People in the project area (a total of 92 males and 31 females) have positive ideas about the road development and their ideas indicate the importance of the road network development in the Western 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
- Road safety during natural hazardous 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

161. In addition, ESDD consulted government organizations such as Department of Forest Conservation (DOFC), Department of Wildlife Conservation (DWLC) and National Building Research Organization (NBRO) in order to obtain their views on roads located within or adjacent to declared forests, wildlife areas and landslide prone areas respectively and to confirm the locations of such protected areas with respect to particular roads. And DWLC confirmed that there is no project road falling within or adjacent to protected areas while DOFC granted approval over the road improvement within or adjacent to sensitive forest areas.

Table VII. 1: A summary of Consultations Held for iRoads in Western Province

Location/DSD	Male	Female	Key Issues
Kalutara District			
Horana	9	4	Inadequate drainage, erosion, low road embankment, flood prone near Mawakoya
Mathugama	8	5	Inadequate culvert, flood height during rain season reaches 2m, narrow width, poor road surface, flood prone near Kalu Ganga and Ritikati Wella
Palindanuwara	6	4	Poor road surface, narrow width, sharp bends, flood prone during rainy season, landslide prone , steep slopes
Ingiriya	6	1	Poor road surface, muddy during rainy season, narrow width, lack drainage, water stagnation

Location/DSD	Male	Female	Key Issues
Kalutara	2	0	Road near Aluth Ella, Kalu Ganga, and Wijemanna bridge are flooded during rainy season
Wallawita	4	2	Inadequate culvert
Palindanuwara	3	0	Narrow width, poor road surface, inadequate culvert
Dodagonda	9	4	Poor road surface, inadequate side drain, flood prone particularly near Kalu Ganga and Arappalakanda junction
Panadura	8	2	Lack of drainage facility, narrow width,
Bulathsinhala	21	2	Lack of drainage facility, erosion prone, flood prone near Kukule Ganga
Bandaragama	8	2	Poor drainage maintenance, low road embankment, need additional culverts and side drains, narrow width
Madurawala	2	1	Inadequate drainage
Millaniya	2	2	Narrow width, inadequate side drains
Beruwala	1	2	Paddy fields along road is submerged during rainy seasom, narrow width, need additional culverts

B. Disclosure of information

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

163. According to the requirements of the ADB environment policy statement, the draft IEE will be disclosed in ADB website before the Management Review Meeting (MRM) or equivalent meeting or approval of the respective tranche.

C. Transect Walk

164. In developing rural roads, the community participation and consultation has been identified as important. For this project, the participation of communities started at the very initial stage of the project through the transect walk. Transect walks are organized in close coordination with the Grama Niladari concerned at village level and Divisional Secretary at divisional level. In doing this, the project team and key informants conduct a walk along the road, to listen to identify issues, and conditions and to ask questions to identify possible solutions. Following figure details the stages of participatory project preparation.

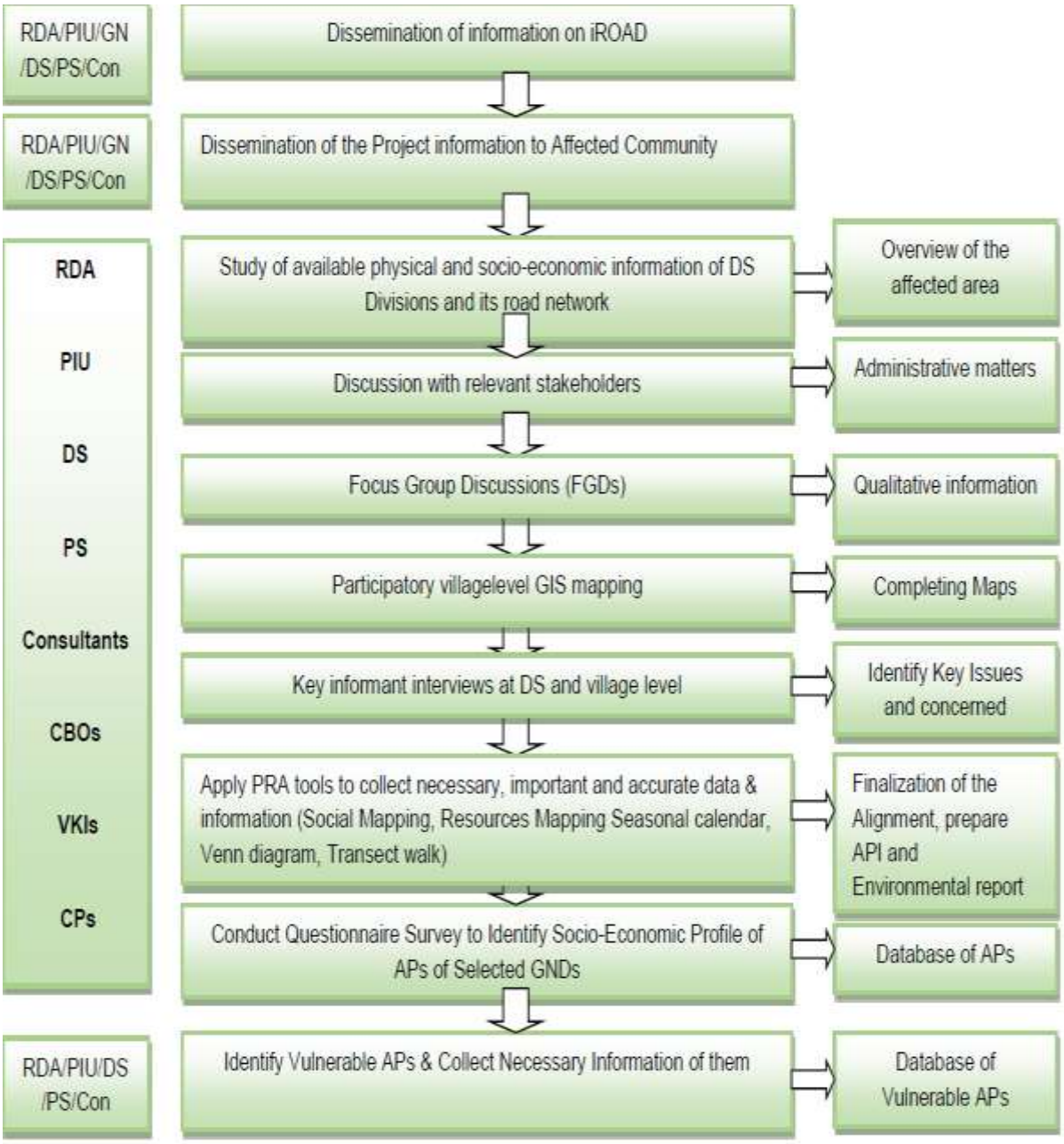


Figure VII.1: Stages of participatory project preparation

Source: Page 41, Appendix 3, Resettlement Framework, Integrated Road Investment Program

165. The transect walk for the Kalutara district of Western province was carried out by the Social safeguards consultant. The outcome of the transect walk carried out for district was prepared on August 2014. The reports are available for reference at PIU. The transect walk conducted for road code 12 and road code 68 of Kalutara district are attached in appendix VII.1 as samples.

Figure VII.2: Transect walk in Kalutara

Figure VII.3: Transect walk in Kalutara

VIII. CONCLUSION AND RECOMMENDATIONS

166. The information on existing social environment suggests that agriculture is a main occupation for most of rural population in the Kalutara district of Western province and poverty and unemployment still prevails in the region. The public consultation confirmed that the roads cannot be used during rainy seasons due to inundations and lack of connectivity within the region. Further it was noted that occurrence of road related landslides also hinders the accessibility. Thus, the public welcome this development project and expect an improvement to their socio economic situation with the project.

167. This Initial Environmental Examination has discussed various aspects of the proposed rehabilitation and upgrading of 83 road sections comprising 276km length. Contractors are liable to keep the roads in operational status for approximately 3 years after the 2 years of construction period.

168. As discussed, candidate roads are dispersed over the entire province and few road sections are located near or within geologically and hydrologically sensitive entities therefore mitigation measures will be incorporated to designs in order to bare any road related impacts at such locations. No roads are located in or adjacent to protected areas declared by the DWLC while DOFC granted clearance for project roads falling within or adjacent to sensitive forest areas.

169. Further the IEE recommends to update EMP and EMC with package specific information and locations before commencement of construction activities. In addition EMC should be effectively implemented in order to monitor application of the EMP.

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

LIST OF ROADS TO BE UPGRADED UNDER I-ROAD PROGRAM

KALUTHARA DISTRICT- WESTERN PROVINCE
RURAL ROAD LIST

Item No	D.S Division	Road ID No	Road Name	Road Category	Road Length (Km)	Sub Total
1	**Kaluthara**	**2**	Kawatayagoda Pahala Rd	PS	2.15	**18.80**
2		**56**	From Gold View Estate to End of Korosduwa Road	PS	1.40	
3		**57**	Wilegoda Rosawatta by Road	PS	0.90	
4		**58**	From Wijemanna Mawatha to Pushparama Road	PS	0.95	
5		**59**	From Duwa Temple Road Vilegoda Via Aluth Para	PS	1.00	
6		**60**	Kuda Wskaduwa Estern Lintal Watta Main Road	PS	1.80	
7		**61**	From Araliya Uyana Road to Palathota Main Road	PS	0.95	
8		**63**	Wijayagama road	PS	1.00	
9		**64**	Kudagonaduwa Thuduwa road	PRDA	2.45	
10		**65**	From Thibiriya junction to Moranthuduwa Ayurweda junction	PS	1.50	
11		**66**	From Kalapugama junction to Palpola road	PRDA/PS	2.65	
12		**67**	From Paraduwa Bogaha junction to Gunagoda Road	PS	2.05	
13	**Palindanuwara**	**54**	Morapitiya New road to 1st mile post via Rankoth mawatha	PS	4.60	**26.00**
14		**5**	From Addaragoda Weepalla Rd via Wedigoda	PS	6.50	
15		**6**	Athwelthota Ambegoda via Bampara Rd	PS	5.00	
16		**8**	Boralugoda Thiniyawala Road	PS	5.90	
17		**3**	Bellana Panadadukanda Rd	PS	4.00	
18	**Walallawita**	**7**	Nerihena Wewalla Yattapatha	PS	4.30	**33.25**
19		**51**	Pannila Kannangara Mw,Halwala via Galathara	PS	4.75	
20		**52**	From Maddegama to Thalpadiwala road across Meegahathenna (Nawalalkanda road)	PS	4.70	
21		**53**	Walallawita Uthumgama via Koopiyawatta road	PRDA	14.60	
22		**107**	Malliwatta rd via Paraigama, Elagiriya	PS	4.90	
23	**Agalawatta**	**76**	Pimbura Halowita Road	PS	3.1	**8.60**
24		**82**	Kirimetidola Kirillahendeniya Via Kewitiyagala road	PS	2.8	
25		**85**	Dapiligoda Diyawana Road	PS	2.7	
26	**Mathugama**	**34**	Katugahahena Hospital Rd to Kosgahakanda Junction via St. George Watta	PS	3.35	**20.61**
27		**35**	Kurudippita Road(HAA rd to	PS	2.65	

Item No	D.S Division	Road ID No	Road Name	Road Category	Road Length (Km)	Sub Total
			Meegama- Galmaththa Road)			
28		**36**	Mahawatta Junction to Soldarakada Junction.	PS	3.90	
29		**37**	Walipanna Junction to Rameeya Junction Road.	PS	2.10	
30		**39**	Bodhiyakanda junction to Mulatiyana rd	PS	2.61	
31		**40**	Walkandala junction to Wellatha junction	PRDA/PS	6.00	
32	**Dodangoda**	**10**	Wellahandiya Main Rd Lomant Watta Galketiya via Gamagoda	PS	2.00	**14.46**
33		**11**	From Imbulagoda Rd to Bolossagama	PS	1.36	
34		**12**	From Diyagama Serupita Rd to Liyanagoda Junction	PS	1.30	
35		**14**	From Thebuwana Arappalakanda factory to Ayurweda hospital	PS	3.00	
36		**15**	From Wilpatha to Magurugoda via Thalliyadda road	PS	3.50	
37		**68**	Wilpatha Puhabugoda akkara 18 via puhabugoda road	PS	3.30	
38	**Panadura**	**16**	Kiriberiya Mandawala Rd	PS	2.45	**9.55**
39		**86**	From Fonseka road, Soloman road Across Kaviraja Mawatha Galthude	MC	1.75	
40		**87**	From Galthude Samagi Mawatha - Rathanagiriya Watta road to Hirana Temple	PS	2.15	
41		**91**	From Sri Gunarathna road up to Pinwatta Station road (Parallel road to Galle road)	MC	3.20	
42	**Horana**	**17**	From Olaboduwa Main Rd to Mahawatta Ju; Dehigaspitiya (From Mahawatta Junction to Maharagama Horana Rd)	PS	3.75	**20.05**
43		**20**	From thalgahawila rd to Kirigala junction, Gurugada, Munagama East Grama Niladari Division to Gurugoda padukka Rd	PS	2.70	
44		**21**	Moragahahena Uduwa Kanishta Vidyalaya via Kananwila	PS	3.40	
45		**120**	Korale Ima Junction via Mohottigoda Jayadada Road		5.00	
46		**121**	Thalagala Gonapala Road - Kiribathkuduwa via Ankuttawala Road		3.50	
47		**122**	Pokunuvita - Aguruwatita via Shanthi Mawatta		1.70	
48	**Ingiriya**	**30**	From Ratnapura Panadura Rd to Akkara 100 New Town to Sagara Palansooriya Collage Rd via Batugampala	PS	6.90	**18.44**
49		**31**	Boralugoada Rd to Poruwadanda	PS	2.82	

Item No	D.S Division	Road ID No	Road Name	Road Category	Road Length (Km)	Sub Total
			Jun via Manana Sudarshanaramaya.			
50		**32**	Kotigala Ju. To Karauda Village via Kurana Akkara 60 Rd	PS	4.04	
51		**119**	kadanapitiya sawgus junction to Degamthilaka Mawatha	PS	2.55	
52		**123**	Ratmalgoda Veerananda Mawatta - Ratnapura Hoarana Road		2.13	
53	**Bulathsinhala**	**22**	Ihala Welgama Kallumale Bulathsinhala road	PRDA/PS	5.18	**55.41**
54		**23**	Polegoda Ihala Welgama Paragoda via Wadigangoda road	PS	9.20	
55		**24**	Ihala Kudaligama Iddagoda road	PS	3.90	
56		**25**	Polegoda P.S. Junction to Immilla Junction	PS	2.15	
57		**26**	Bogahawaththa to Gallakpahala rd	PS	2.85	
58		**27**	Halwathura(from School junction) Mugunakolahena Delmalla	PS	4.43	
59		**28**	Niggaha Agirikanaththa Via Gawaragiriya	PS	5.05	
60		**29**	From Malwatta junction Meegahakumbura Heenela Diwalakada Kalugala Malwattha road	PS	11.60	
61		**70**	Pahala Naragala Dewamulla Gangaramaya Kokhena Temple Road	PS	2.55	
62		**71**	From Govinna Kota road to Govinna Weralugusthotupola rd	PS	3.00	
63		**73**	Paruthalvila Bakamunawatta Heenpandala Paragoda Road	PS	5.50	
64	**Madurawela**	**43**	Yala junction to werawaththa Naragala road	PRDA	4.00	**11.55**
65		**44**	From Kandana to Ilimba road	PS	3.40	
66		**45**	From Ilimba junction to Ilimba thotupola road	PS	3.40	
67		**100**	Thumminigoda Road (From Madurawala 458 Bus Route to Raigama Anguruwathoda Bus Route)	PS	0.75	
68	**Bandaragama**	**109**	Bellanthudawa Galkade Junction to Panadura Rathnapura Nambapana Road	PS	2.85	**9.00**
69		**111**	Atalugama Mubarak Mawath	PS	1.30	
70		**114**	Alubomulla Batadombathudawa Retiyalagoda Via Maswatta	PS	1.50	
71		**115**	Arukgoda Indrasara Mawatha to(Pulungas Junction) Thimbiriya Junction	PS	1.40	
72		**116**	Rukgaha Bus road Retiyalagoda Belikele Via Alubomulla.	PS	1.95	

Item No	D.S Division	Road ID No	Road Name	Road Category	Road Length (Km)	Sub Total
73	**Millaniya**	**9**	New chattle Tamil school Road	PS	2.85	**11.85**
74		**41**	Millaniya Lenawara sidurangalaWatta via Horana	PS	2.80	
75		**94**	Panape Ketagoda Millaniya Road	PS	4.30	
76		**95**	Pelpola Paragasthota To Kepu Ela road. (Dhammathilaka Nahimi Mawatha)	PS	1.90	
77	**Beruwela**	**46**	From Weragala Akkara 50 Rd to Katukurudugahalanda Rd	PS	1.90	**18.40**
78		**47**	Walathara - Munhena Kurudugasmulla Rd	PS	4.15	
79		**48**	Danwattagoda Kalawila Main Rd	PS	2.60	
80		**49**	Youngama Main Rd	PS	2.65	
81		**50**	Yatadola Krushikarma junction to Ragalawela Bothaldeniya Via Dewalakanda Halkandawila road	PS	3.30	
82		**104**	Kendagahawila Wella junction to Yatawala Pothuwila main road (Near the Dola)	PS	1.80	
83		**105**	Payagala north Galle road to Matiyanamulla Gorakaduwa Tsunami House	PS	2.00	
TOTAL					**275.97**	**275.97**

SAMPLE ENVIRONMENTAL CHECKLISTS

INTEGRATED ROAD INVESTMENT PROGRAMME (iROAD), ROAD DEVLOPMENT AUTHORITY

Road Name: Bellana - Panadadukanda road
Road ID: 3
District Name: Kaluthara
DSD & G NDs:

DSD	GNDs
Palindanuwara	Bellana

Total Length of the road: 4+00km

The proposed improvement for the road starts at Agalawattha - Baduraliya road near the work shop of Road Development Authority. The road surface is comprised of mainly deteriorated macadam while some sections are concrete slabs and gravel, and the Macadam surface is degraded. The carriageway of the road section varies between 2.75m to 3.70m while the ROW ranges within 4.2m - 4.8m. The road traverses through cultivations of tea, rubber, cinnamon and home gardens. The road ends in Panadadukanda Junction with connecting Agalawattha, Bellana, Palawattha road.

Climatic Conditions

Temperature	High: 30 °C Low: 27 °C
Humidity	High: 83% Low: 65%
Rainfall Rainy Season	>3200 mm/year From May to September

(Source: performance report district secretariat kalutara, 2012)

Location of the Road and Generic description of Environment

No:	Type of Ecosystem	Yes	No	Explanation
1.	Type of Terrain (Plain/ Undulating/ Hilly/ Mountainous etc.) (Explain the topography of the area and how many km of the road are located in the hilly area)	√		Altitude: Maximum elevation -200m at 2+8km Minimum elevation -23m at 0+400 km In general undulating to hilly terrain could be observed along the road trace.
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)?		√	
3.	Inhabited Area	√		This road traverses through residential lands in following areas; From 0+000 to 0+400 (RHS) From 0+700 to 1+500 (either side) From 2+800 to 3+300 (RHS) From 3+500 to 5+100 (LHS)
4.	Agricultural Land	√		Tea, rubber and cinnamon cultivations are present
5.	Barren Land		√	

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)	√		The entire district has generally been identified as landslide prone by National Building Research Organization (NBRO) of Sri Lanka. Active landslides were observed during the field reconnaissance at 0+300km to 0+700km on LHS to the road.
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)	√		Streams are crossing the road at 3+200km, 4+200km and 5.100km while streams are flowing parallel to road at 2+500 on RHS and 3+300 - 3+700 on RHS.
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)		√	During the field reconnaissance, such areas were not mentioned by the local community.
4.	Are there any trees with a dbh of 30 cm or more within the existing ROW (within two fences on either sides) or within 2 m corridor from the edge of the carriageway on either side (if the existing ROW is not clear)? (If yes attach list of trees indicating the location (Right or Left side)and the chainage)	√		32 (LHS) and 18 (RHS) trees are located within 2m corridor on either side from the edge of the existing carriageway and all trees may be felled due to the improvement of the road. However based on engineering estimations prepared for this particular road, only 22 trees will be felled due to construction activities. *(Please refer section v for information)* Tree replanting with suitable native species as specified in Environmental Management Plan (EMP) is recommended to compensate the impact due to trees removal.
5.	Along the road and within 100 m of the road shoulder, are there any Faunal habitat areas, Faunal breeding ground, bird migration area, or other similar areas? (If yes, specify details of habitat with chainage)		√	During the field reconnaissance, such areas were not observed along the study corridor
6.	Along the road and within 100m of the road shoulder is there any evidence of Flora and Fauna		√	During the field reconnaissance, such areas were not observed along the study corridor

No.	Parameter/ Component	Yes	No	Explanation
	species that are classified as endangered / threatened species?			
7.	Are there any utility structures[6] within 2 m on either side from the edge of carriage way or within the existing ROW of the road? (If yes, attach list with chainage)	√		10 number of telephone poles and 43 number of electrical poles on Right Hand Side (RHS) and 14 number of telephone poles and 42 number of electrical poles on Left Hand Side (LHS) were observed along the road. Water supply pipe lines are not located along the road. *Please refer section D i for information.*
8.	Are there any religious, cultural or community structures/buildings[7] within 50 m on either side from the centre line of the road alignment? (If yes attach list with chainage)	√		A School is observed within the study area. *Please refer to section D11.* However none of these structures will be affected due to the road improvement. It is recommended to implement mitigation measures as specified in the EMP to minimise impacts due to degradation of air quality and noise at these sensitive receptors.

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)	√		Public was consulted during field reconnaissance carried out for preparation of the Environmental Checklist. Please refer to the annex 1 for the list of public consulted and their views
2.	Any suggestion received in finalizing the alignment and road related environmental issues	√		Public expressed the need of improving the drainage along the road and Land slide area
3.	If suggestions received, were they incorporated into the design?	√		The environment checklist will be forwarded to design team for further consideration.

C. Please attach the following:

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

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

Chainage (Km)	Utility structure	LHS	RHS
0+000 – 0+100	Electric pole Telephone pole	1 -	1 6
0+100 - 0+200	Telephone pole	2	1
0+200 – 0+300	Telephone pole	-	1
0+300 – 0+400	Electric pole Telephone pole	1 3	- -
0+700 -0+800	Electric pole Telephone pole	2 -	1 1
0+800 - 0+900	Telephone pole	-	1
0+900 -1+000	Telephone pole	-	1
1+000-1+100	Telephone pole	1	-
1+100 -1+200	Telephone pole	-	1
1+400 -1+500	Electric pole Telephone pole	- 1	3 -
3+100 - 3+200	Electric pole	-	1
3+700 - 3+800	Electric pole	-	1
4+000 - 4+100	Electric pole	-	2
4+100 - 4+200	Electric pole	-	1
4+300 - 4+400	Telephone pole	1	-
4+500 - 4+600	Electric pole Telephone pole	1 1	- 1
4+600 - 4+700	Telephone pole	2	-
4+700 - 4+800	Telephone pole	1	1
4+900 - 5+000	Electric pole	-	2
5+000 - 5+100	Electric pole Telephone pole	- -	- 1
Total		**56**	**53**

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

Chainage (km)	Location	Right	Left
3+700	Walikanda Primary School		√

III. Project location map is attached in annex 2

IV. Photographs of the project area showing at least 2 m on either side from centre line of road alignment are attached in annex 3.

V. List of trees with 30cm DBH or more located within the existing ROW or within 2m on either side of the road from the edge of the carriageway as required in B.4.

Chainage (m)	LHS			RHS		
	Common Name	Botanical name	No. of trees	Common Name	Botanical name	No. of trees
0.00-0.100	-			Jak	*Artocarpus heterophyllus*	1
0+500-0+600	Coconut	*Cocos nucifera*	3			
0+600-0+700	Mango Coconut	*Mangifera indica* *Cocos nucifera*	1 1			
0+700-0+800	Coconut	*Cocos nucifera*	2	-		
0+800-0+900	Mango	*Mangifera indica*	1	-		-
0+900-1+000	Coconut Mahogani	*Cocos nucifera* *Swietenia*	2 1			

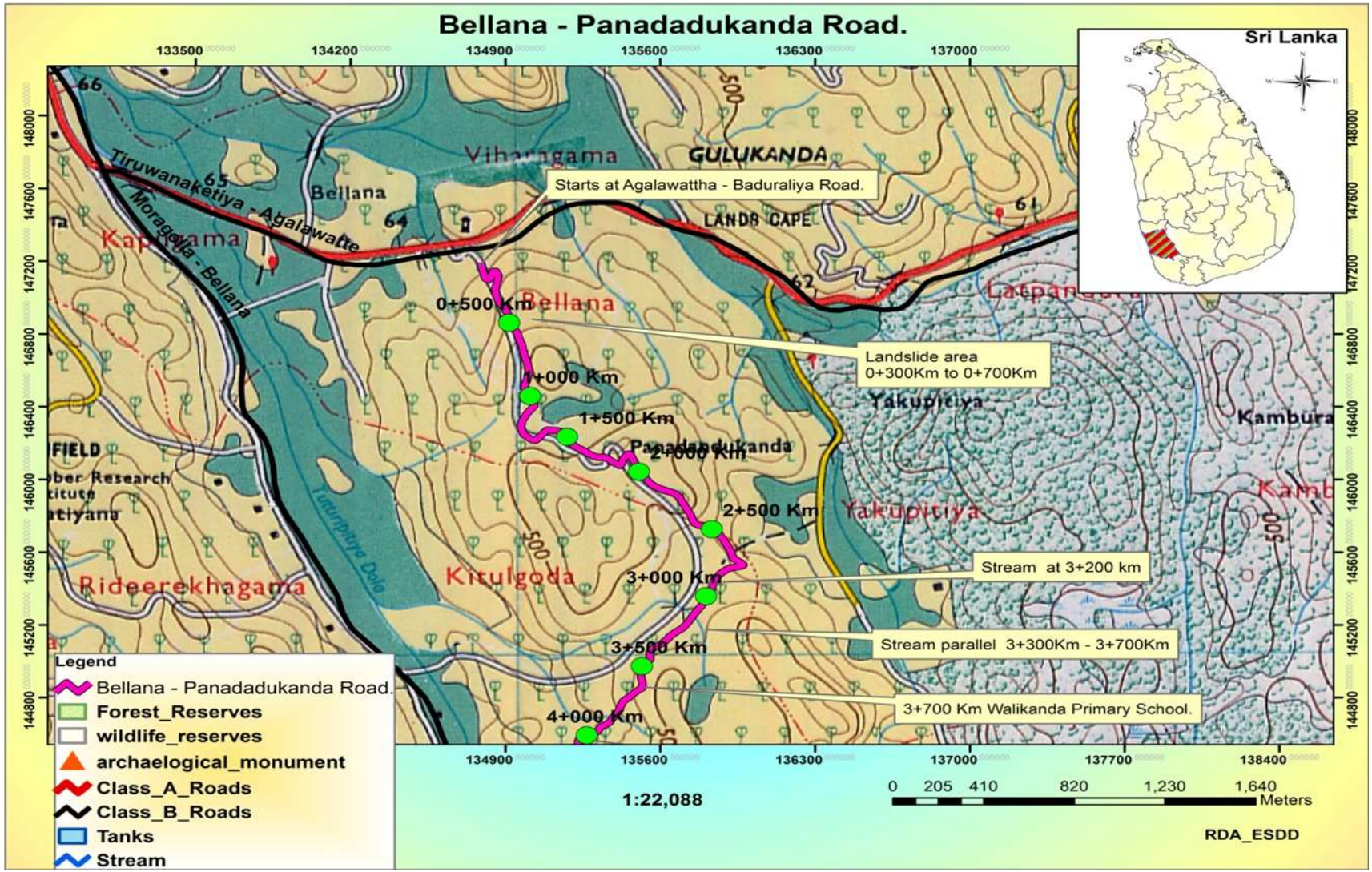
Chainage (m)	LHS			RHS		
	Common Name	Botanical name	No. of trees	Common Name	Botanical name	No. of trees
	Rumbutan	*macrophylla Nephelium lappaceum*	1			
1+000-1+100	Coconut	*Cocos nucifera*	1	-		
1+100-1+200	-		-	Coconut	*Cocos nucifera*	1
1+200-1+300				Mango	*Mangifera indica*	1
1+300-1+400	-		-	-		
1+400-1+500	-			Mahogani Lunumidella	*Swietenia macrophylla* *Melia dubia*	1 1
1+500-1+600	Canon ball tree	*Couroupita guianensis*	1	Lunumidella	*Melia dubia*	1
1.600-1.700	Mahogani Jak Hawari Nuga	*Swietenia macrophylla* *Artocarpus heterophyllus* *Alstoniya macrophylla*	1 2 3	Jak	*Artocarpus heterophyllus*	1
1+900-2+000				Kithul	*Caryota urens*	1
2+100-2+200	Mahogani Jak	*Swietenia macrophylla* *Artocarpus heterophyllus*	1 3	-		-
2+200-2+300	Mahogani	*Swietenia macrophylla*	1	-		-
2+300-2+400	Jack Bread fruit	*Artocarpus heterophyllus* *Artocarpus altilis*	1 1	-		-
2+400-2+500				Rubber Hawari nuga	*Hevea brasiliensis* *Alstonia macrophylla*	5 1
2+500-2+600				Rubber Hora	*Hevea brasiliensis* *Dipterocarpus zeylanicus*	1 1
Total			**32**			**18**

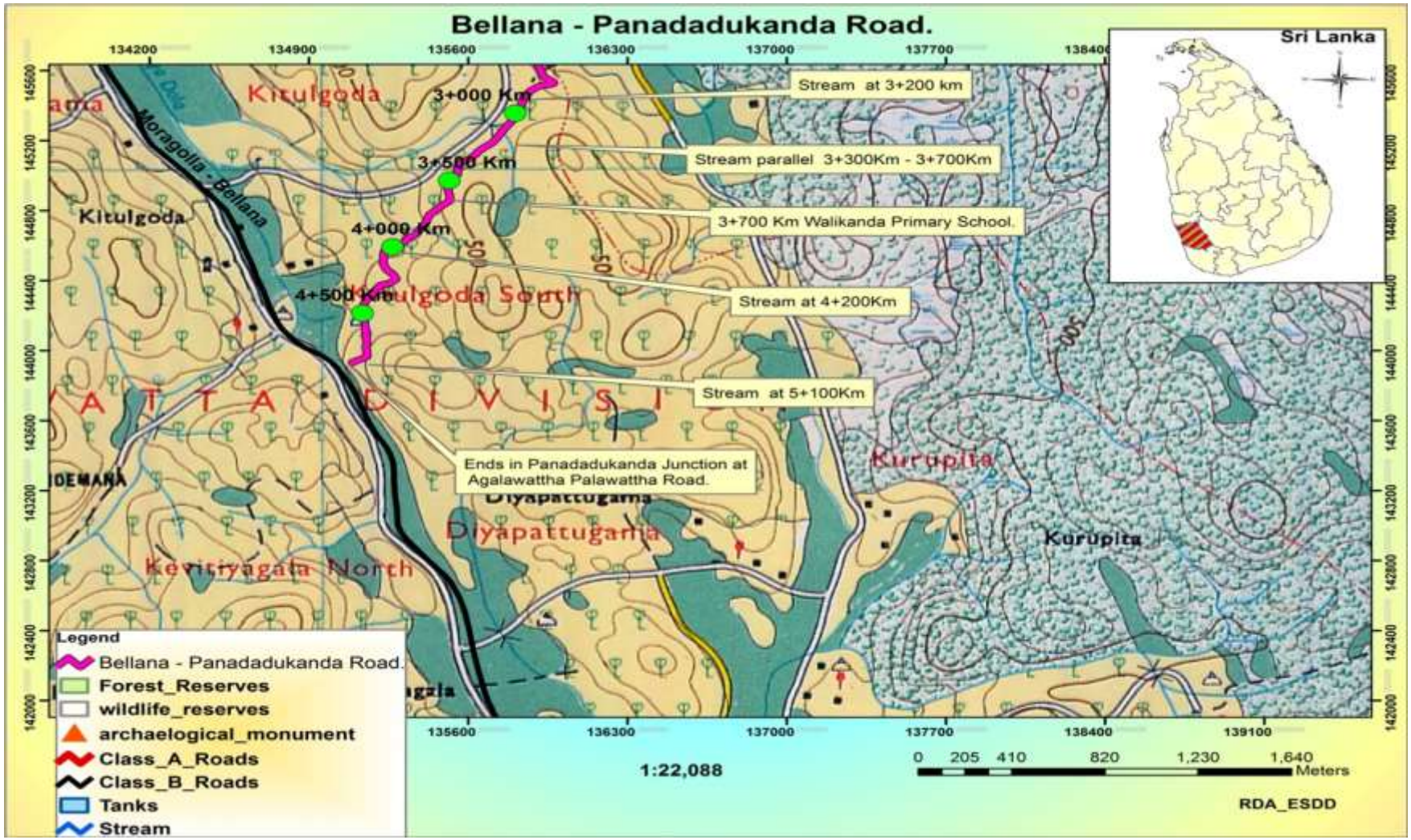
Public Consultation - Bellana - Panadadukanda Road

Name of the Respondent	Sex	Address	Views
Mrs. Kamala Gamage	Female	Paladadukanda, Bellana	Road development is good. There is a land slide area at 0+300km to 0+700km on LHS and it occurred during the last rainy season. Please pay special attention to this area when developing this road.

Mr. M.K Dharmadasa	Male	Paladadukanda, Bellana	There are no flooded sections along the road. Road development is essential. Storm water is flowing on the road during rains, it may cause road degradation. So road construction should address drainage of the road and culverts should be improved properly.
Mr. V.V Siripala	Male	Paladadukanda, Bellana	This road development is very essential. During last month members of our community organization repaired this road. However we could not finish it. This road surface is in very poor condition in some places at least a bicycle could not travel along this road.

Annex 2: Project Location Map




Bellana - Panadadukanda Road.
Sri Lanka
Stream at 3+200 km
Stream parallel 3+300Km - 3+700Km
3+700 Km Walikanda Primary School.
Stream at 4+200Km
Stream at 5+100Km
Ends in Panadadukanda Junction at Agalawattha Palawattha Road.
3+000 Km
3+500 Km
4+000 Km
4+500 Km
Kitulgoda
Kitulgoda South
Kurupita
Diyapattugama
Keviliyagala North
Legend
Bellana - Panadadukanda Road.
Forest_Reserves
wildlife_reserves
archaelogical_monument
Class_A_Roads
Class_B_Roads
Tanks
Stream
1:22,088
0 205 410 820 1,230 1,640
Meters
RDA_ESDD

ENVIRONMENTAL CHECKLIST

INTEGRATED ROAD INVESTMENT PROGRAMME (iROAD), ROAD DEVLOPMENT AUTHORITY

Road Name: From Addaragoda Weepalla road via Wedigoda road
Road ID: 5
District Name: Kaluthara
DSD & G NDs:

DSD	GNDs
Palindanuwara	Addaragoda Kalugala

Total Length of the road: 6.500km

The proposed road section starts at Addaragoda Weepalla junction and ends at Rathnapura Atwelthota road. Road surface is mainly gravel while some sections are macadam and concrete. Macadam sections are found from 0+0km to 0+1km; from 0+7km to 0+85km and from 6+400km to 6+650km. Concrete slabs sections are found from 0+8km to 0+9km; from 1+400km to 1+800km; from 2+500km to 2+600km; from 3+500km to 3+600km; from 3+800km to 3+900km and from 4+200km to 4+300km. The road traverses through an undulating to hilly area. At the starting point, the width of carriageway and the Right of Way (ROW) are 2.7m and 4.0m and at the end point it is 3.0m and 4.3m respectively. The road crosses streams at 2+500, 2+700, 3+500, 4+100 and 4+900 while some streams flow parallel to road at 0+700 and from 1+000 to 1+300. There are rock outcrops at 0+500, 2+100 and 3+700. Buddha Shrine is observed at 2+300. Road traverses through home gardens, tea, rubber and thick vegetation lands on either side of the road.

Climatic Conditions

Temperature	High: 30 °C Low: 27 °C
Humidity	High: 83% Low: 65%
Rainfall Rainy Season	>3200 mm/year From May to September

(Source: performance report district secretariat kalutara, 2012)

A. Location of the Road and Generic description of Environment

No:	Type of Ecosystem	Yes	No	Explanation
1.	Type of Terrain (Plain/ Undulating/ Hilly/ Mountainous etc.) (Explain the topography of the area and how many km of the road are located in the hilly area)	√		Altitude: Maximum elevation -114m at 0+1km Minimum elevation -39m at 6+38km In general undulating to hilly terrain could be observed along the road trace.
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)?		√	However areas of thick vegetation observed from 5+400 to 5+600 on LHS.

No:	Type of Ecosystem	Yes	No	Explanation
3.	Inhabited Area	√		This road traverses through residential lands in following areas; From 0+300 to 0+400 (LHS) From 0+800 to 0+1100 (LHS) From 1+700 to 2+200 (LHS) From 2+400 to 2+800 (LHS) From 3+300 to 3+400 (LHS) From 3+900 to 4+300 (Both Side) From 4+700 to 5+200 (LHS) From 5.600 to 6+300 (LHS) From 6+500 to 6+800 (LHS)
4.	Agricultural Land	√		Tea and rubber cultivations are present in the project area.
5.	Barren Land		√	

B. Specific description of the Road Environment

No.	Parameter/ Component	Yes	No	Explanation
1.	Are there any areas with landslide or erosion problems along the road? (If yes, indicate the location whether Right or Left side and the chainage)	√		The entire district has generally been identified as landslide prone by National Building Research Organization (NBRO) of Sri Lanka. However road related active landslides were not observed during the field reconnaissance. A slope failure was observed at 2+600, 3+400 and 5+500 LHS to the road.
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)	√		The road crosses streams at 2+500, 2+700, 3+500, 4+100 and 4+900. Streams flow parallel to road at 0+700 and from 1+000 to 1+300.
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)	√		Water stagnation area is located between 0+800 to 1+000 due to insufficient culvert openings.
4.	Are there any trees with a dbh of 30 cm or more within the existing ROW (within two fences on either sides) or within 2 m corridor from the edge of the carriageway on either side (if the existing ROW is not clear)? (If yes attach list of trees indicating the location (Right or Left side)and	√		10 trees were observed within the existing ROW during the field reconnaissance. Please refer section v for information. However based on engineering

No.	Parameter/ Component	Yes	No	Explanation
	the chainage)			estimations prepared for this particular road, only 14 trees will be felled due to construction activities. Tree replanting with suitable native species as specified in Environmental Management Plan (EMP) is recommended to compensate the impact due to trees removal.
5.	Along the road and within 100 m of the road shoulder, are there any Faunal habitat areas, Faunal breeding ground, bird migration area, or other similar areas? (If yes, specify details of habitat with chainage)		√	During the field reconnaissance, such areas were not observed.
6.	Along the road and within 100m of the road shoulder is there any evidence of Flora and Fauna species that are classified as endangered / threatened species?		√	During the field reconnaissance, such areas were not observed.
7.	Are there any utility structures[8] within 2 m on either side from the edge of carriage way or within the existing ROW of the road? (If yes, attach list with chainage)	√		10 electric poles on LHS and 2 electric poles and one telephone pole on RHS are present on either sides of the road. pipe lines are not located along the road. *Please refer to section D1*
8.	Are there any religious, cultural or community structures/buildings[9] within 50 m on either side from the centre line of the road alignment? (If yes attach list with chainage)	√		There is a Buddha shrine is located within the study area. However this structures will not be affected due to the road improvement. *Please refer to section D11.*

C. Public Consultation

No.	Consultation Activities	Yes	No	Remarks
1.	Consultation with local community was conducted before finalizing the alignment. (Attach list of people met and dates)	√		Public was consulted during field reconnaissance carried out for preparation of the Environmental Checklist. Please refer to the annex 1 for the list of public consulted and their views

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

No.	Consultation Activities	Yes	No	Remarks
2.	Any suggestion received in finalizing the alignment and road related environmental issues	√		Public expressed the need of improving the drainage along the road and flood areas were mentioned from 0+800 to 1+000 due to insufficient culvert mouth.
3.	If suggestions received, were they incorporated into the design?	√		The environment checklist will be forwarded to design team for further consideration.

D. Please attach the following:

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

Chainage (m)	Utility structure	LHS	RHS
0+000 – 0+100	Electric pole Telephone pole	- -	2 1
0+500 - 0+600	Electric post	1	-
0+700 - 0+800	Electric post	1	-
1+300 -1+400	Electric post	1	-
2+300 - 2+400	Electric post	1	-
2+400 - 2+500	Electric post	1	-
2+600 -2+700	Electric post	1	-
3+100 – 3+200	Electric post	1	-
4+300 – 4+400	Electric post	2	-
4+800 – 4+900	Electric post	1	-
Total		**10**	**3**

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

Chainage/ GPS	Location	Right	Left
2 + 300	Buddha shrine		√

III. Project location map is attached in annex 2

IV. Photographs of the project area showing at least 2 m on either side from centre line of road alignment are attached in annex 3.

V. List of trees with 30cm DBH or more located within the existing ROW or within 2m on either side of the road from the edge of the carriageway as required in B.4.

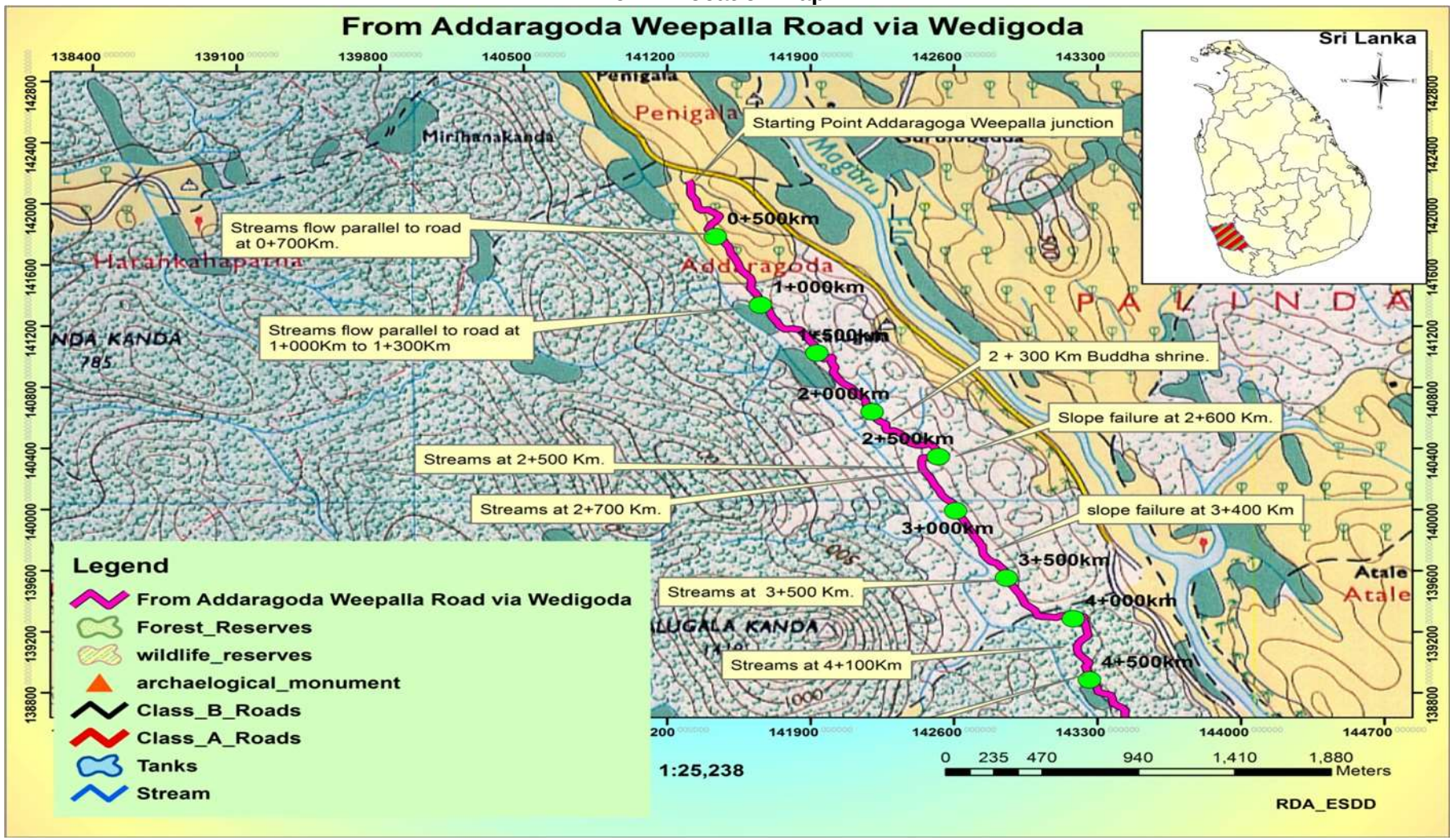
Chainage (m)	LHS			RHS		
	Common Name	Botanical name	No. of trees	Common Name	Botanical name	No. of trees
0+400 – 0+500	Milla	*Vitex pinnata*	1			
0+900-0+1000				 Jak Unknown	*Artocarpus heterophyllus*	1 1

Chainage (m)	LHS			RHS		
	Common Name	**Botanical name**	**No. of trees**	**Common Name**	**Botanical name**	**No. of trees**
1+500 – 1+600				Rubber	*Hevea brasilensis*	1
2+800 – 2+900	Unknown		1			
3+400 – 3+500	Mahogani	*Swietenia macrophylla*	1			
4400 – 4500	Rubber	*Hevea brasilensis*	4			
Total			7			3

Annex 1: Public Consultation - From Addaragoda Weepalla Rd via Wedigoda Road

Name of the Respondent	Sex	Address	Views
Mr. Ratnasira Sumanasekara	Male	Kalugala Gurulubadda	This road development is very essential. Because this road is very narrow and bad condition. Which creates lot of difficulties to School children. It is very difficult for two vehicles to pass from each other due to road narrowness. Sharp slopes need to be aligned when developing this road.
Mr. M.K Nandawathi	Female	Kalugala Gurulubadda	There is flooded sections area from 0+800 to 1+000 due to insufficient culvert mouth during rainy seasons. This area took about 2m of flood level . If development of this road, which area should focus special attention when increasing culvert mouth and elevation of the road.
Mr. K.U.V Sumathipala	Male	Kalugala Gurulubadda	This road development is very essential. Because all rainy water is flowing on the road during rainy season which may cause to quickly road degradation. So Road construction should address drainage of the road and culverts should be improved properly.

Annex 2: Location Map



Annex 3: Photographs of From Addaragoda Weepalla road via Wedigoda Road

Plate 2: Starting point of the road

Plate 3 The road runs through thick vegetation area

Plate 4: Settlements adjacent to road.

Plate 5: Stream at ch 2.500km

Plate 6: End point at Rathnapura Atwelthota road

ENVIRONMENTAL CHECKLIST
INTEGRATED ROAD INVESTMENT PROGRAMME (i ROAD),
ROAD DEVLOPMENT AUTHORITY

Road Name: Nerihena Wewalla Yattapatha road
Road ID: 7
District Name: Kalutara
DSD & GNDs:

DSD	GNDs
Walallawita	843 - B Yattapatha

Total Length of the Road : 4.600km

Yattapatha Wewalla Nerihena Road starts forming a junction with Pelawattha - Neluwa road, at 9th mile post Junction. The carriageway and the Right of way (ROW) at the starting point is 2.4m and 4.6m respectively while at the end point it is 2.7m, ROW is 4m respectively. The road surface is concrete (from starting point to 0+200m, 0+700 - 2+400km, 3+000 - 3+100km, from 0+200m - 0+700km, 2+400 - 2+700km) and gravel (from 3+100 - end point).
The road traverse through undulating terrain. An irrigation canal crosses the road at 3+000 - 3+100km, 3+300 - 3+400km, 3+400 - 3+500km sections and Wewella Ela crosses at 2+900 - 3+000m. Road related active landslide was observed within 1+000 - 1+100km section (LHS). At 3+000 - 3+100m community hall and a buddha shrine was observed on LHS. The road passes through an area consists with settlements, agriculture lands, home gardens, tea lands, rubber lands and cinnamon cultivations. The road ends joining with Baduraliya - Pelawattha road at Nerihena Junction.

Climatic Conditions

Temperature- ^{o}C	High: 30 Low: 27
Humidity	High: 83% Low: 65%
Rainfall	> 3200 mm/year
Rainy Season	From May to September

(Source: The national Atlas of Sri Lanka, 2007 - Survey Department of Sri Lanka)

A. Location of the Road and Generic description of Environment

No:	Type of Ecosystem	Yes	No	Explanation
1.	Type of Terrain (Plain/ Undulating/ Hilly/ Mountainous etc.) (Explain the topography of the area and how many km of the road are located in the hilly area)	√		Altitude: Maximum elevation - 89m at 3+6km Minimum elevation - 48m at 6+37km In general plain to undulating terrain along the project site
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)?		√	

No:	Type of Ecosystem	Yes	No	Explanation
3.	Inhabited Area	√		From the start to end scattered settlements and home gardens are observed.
4.	Agricultural Land	√		Rubber, tea and cinnamon cultivation are present
5.	Barren Land		√	

B. Specific description of the Road Environment

No.	Parameter/ Component	Yes	No	Explanation
1.	Are there any areas with landslide or erosion problems along the road? (If yes, indicate the location whether Right or Left side and the chainage)	√		The entire district has generally been identified as landslide prone by National Building Research Organization (NBRO) of Sri Lanka. However road related active landslide was observed only at 1+000 - 1+100km (LHS) during the field reconnaissance and it was observed that this was a slope failure.
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)	√		Irrigation canal crossing the road at 3+000 - 3+100km, 3+300 - 3+400km, 3+400 - 3+500km and Wewella ela crossing the road at 2+900 - 3+000m.
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)		√	During the field reconnaissance, such areas were not mentioned by the people.
4.	Are there any trees with a dbh of 30 cm or more within the existing ROW (within two fences on either sides) or within 2m corridor from the edge of the carriageway on either side (if the existing ROW is not clear? (If yes attach list of trees indicating the location (Right or Left side)and the chainage)	√		82 trees are located within 2m corridor on either side from the edge of the existing carriageway. *Please refer section Dv.* However based on engineering estimations prepared for this particular road, only 26 trees will be felled due to construction activities. Tree replanting with suitable native specified in environmental Management plan (EMP) is recommended to compensate the impact due to trees removal.

No.	Parameter/ Component	Yes	No	Explanation
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)		√	During the field reconnaissance, such areas were not observed along the study corridor.
6.	Along the road and within 100m of the road shoulder is there any evidence of Flora and Fauna species that are classified as endangered / threatened species?		√	During the field reconnaissance, such species were not observed along the study corridor.
7.	Are there any utility structures[10] within 2 m on either side from the carriageway line of the road alignment? (If yes, attach list with chainage)	√		60 Electric poles on LHS, 58 on RHS are present on either sides of the road. No pipe lines and telecommunication lines are located along the road. *please refer to section D1*
8.	Are there any religious, cultural or community structures/buildings[11] within 50 m on either side from the centre line of the road alignment? (If yes attach list with chainage)	√		There is a community hall and Buddha shine are located within the study area. *Please refer to section D2.* However none of these buildings will be affected due to the road improvement. However, it is recommended to implement mitigation measures as specified in the EMP.

C. Public Consultation

No.	Consultation Activities	Yes	No	Remarks
1.	Consultation with local community was conducted before finalizing the alignment. (Attach list of people met and dates)	√		Public was consulted during field reconnaissance carried out for preparation of the Environment checklist. Please refer to the annex 1 for the list of public consulted and their views.
2.	Any suggestion received in finalizing the alignment and road related environment issues.	√		Public expressed the need of improving the drainage along the road.
3.	If suggestions received, were they incorporated into the design?	√		The environment checklist will be forwarded to design team for further consideration.

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

D. Please attach the following:

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

Chainage (Km)	Utility structure	LHS	RHS
0+000 – 0+100	Electric post	2	2
0+100 – 0+200	Electric post	1	1
0+200 – 0+300	Electric post	2	1
0+300 – 0+400	Electric post	4	3
0+400 – 0+500	Electric post	-	3
0+500 – 0+600	Electric post	-	2
0+600 – 0+700	Electric post	1	3
0+700 – 0+800	Electric post	2	1
0+800 - 0+900	Electric post	2	1
0+900 – 1+000	Electric post	4	1
1+000 – 1+100	Electric post	-	2
1+100 – 1+200	Electric post	-	3
1+200 – 1+300	Electric post	-	3
1+300 – 1+400	Electric post	-	3
1+400 – 1+500	Electric post	1	3
1+500 – 1+600	Electric post	-	4
1+600 –1+700	Electric post	2	3
1+700 – 1+800	Electric post	1	2
1+800 - 1+900	Electric post	2	-
1+900 – 2+000	Electric post	2	-
2+000 – 2+100	Electric post	2	-
2+100 – 2+200	Electric post	1	1
2+300 – 2+400	Electric post	3	-
2+400 – 2+500	Electric post	1	-
2+500 – 2+600	Electric post	1	2
2+600 –2+700	Electric post	3	-
2+700 – 2+800	Electric post	2	1
2+800 - 2+900	Electric post	2	1
3+000 – 3+100	Electric post	1	1
3+100 – 3+200	Electric post	2	-
3+200 – 3+300	Electric post	3	-
3+300 – 3+400	Electric post	2	-
3+400 – 3+500	Electric post	1	-
3+500 – 3+600	Electric post	-	3
3+600 –3+700	Electric post	-	2
3+700 – 3+800	Electric post	1	2
3+800 - 3+900	Electric post	-	1
3+900 – 4+000	Electric post	2	1
4+000 – 4+100	Electric post	2	-
4+100 – 4+200	Electric post	1	-
4+300 – 4+400	Electric post	3	-
4+400 – 4+500	Electric post	1	1

4+500 – 4+600	Electric post	-	1
Total		**60**	**58**

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

Chainage /GPS	**Location**	**Right**	**Left**
3+000 - 3+100	Community hall and Buddha Shine		√

III. Project location Map is attached in annex 2.

IV. Photographs of the project area showing at least 2 m on either side from centre line of road alignment are attached in annex 3.

V. List of trees with 30cm DBH or more located within 2m on either side of the road or within the existing ROW as required in B.4.

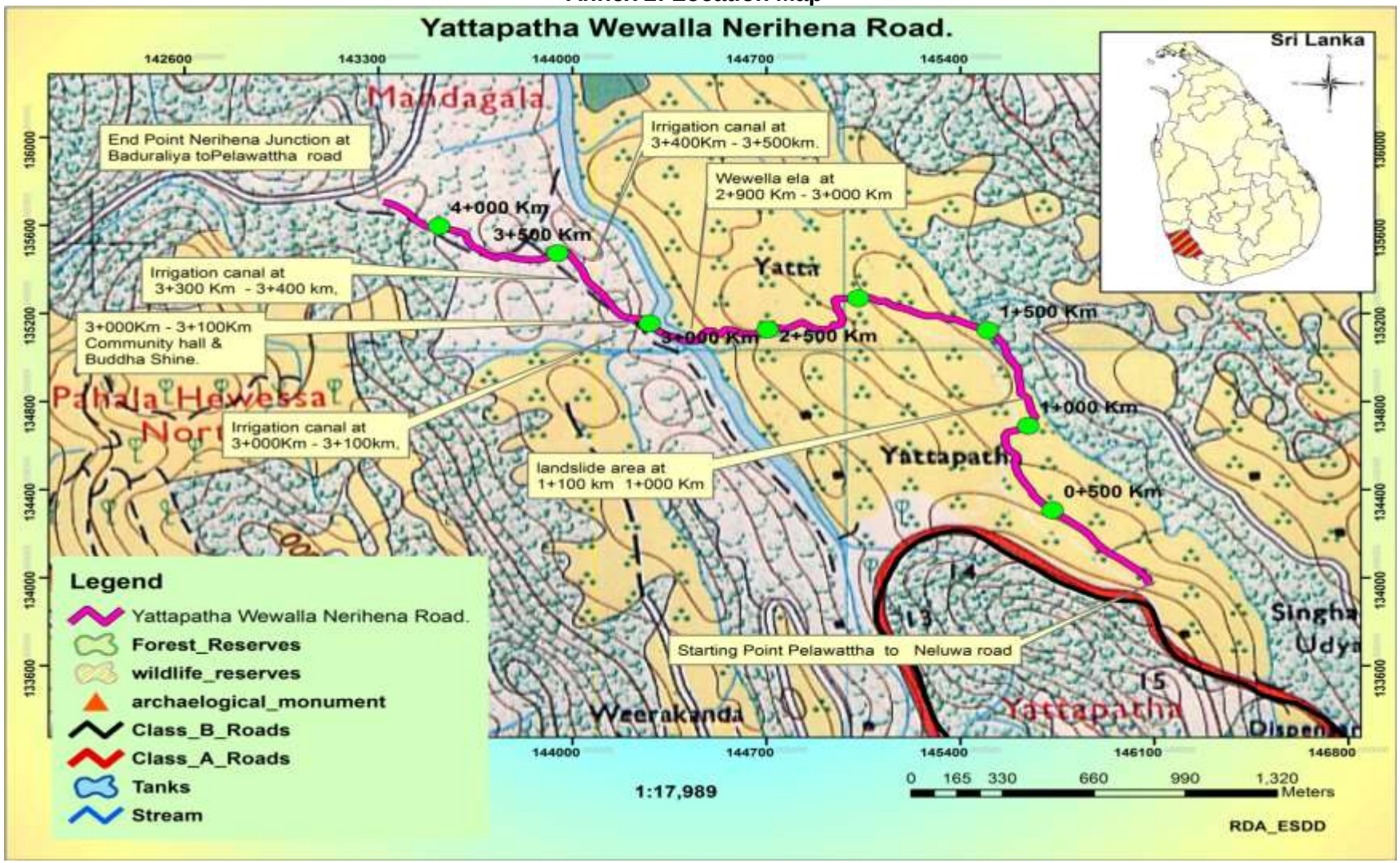
Chainage (km)	**LHS**			**RHS**		
	Common Name	**Botanical name**	**No. of trees**	**Common Name**	**Botanical name**	**No. of trees**
0+400 – 0+500	Mahogany Kithul	*Swietenia macrophylla* *Caryota urens*	3 1			
1+600 – 1+700	Kithul	*Caryota urens*	1			
1+700 – 1+800	Avocado	*Persea americana*	1			
1+800 - 1+900						
1+900 – 2+000	Jak	*Artocarpus heterophyllus*	1	Mara Jak	*Artocarpus heterophyllus*	4 1
2+000 – 2+100				Mahogany	*Swietenia macrophylla*	4
2+300 – 2+400				Jak Ginkuru	*Artocarpus heterophyllus* *Alstonia macrophylla*	1 1
2+400 – 2+500	Unknown Ginikuru Wal Del	*-Alstonia macrophyllas* *Artocarpus mariannensis*	4 2 1	Kithul	*Caryota urens*	2
2+500 – 2+600	Unknown	-	4	Jak	*Artocarpus heterophyllus*	1
2+600 – 2+700	Unknown	-	1	Kithul	*Caryota urens*	1
2+700 – 2+800						
2+800 - 2+900	Acacia	*Acasia spp*	1			
3+100 – 3+200	Walehela Doba	*Cassia spp.* *Calophyllum inophyllym*	2 1			

Chainage (km)	LHS			RHS		
	Common Name	Botanical name	No. of trees	Common Name	Botanical name	No. of trees
3+200 – 3+300				Unknown Mahogany Ginikuru	-*Swietenia macrophylla* *Alstonia macrophylla*	2 3 3
3+300 – 3+400	Jack Kithul	*Artocarpus heterophyllus* *Caryota urens*	11 1	Kithul Unknown	*Caryota urens* -	1 1
3+400 – 3+500	Jack Kithul	*Artocarpus heterophyllus* *Caryota urens*	1 6	Kithul	*Caryota urens*	4
3+500 – 3+600	Mahogani	*Swietenia macrophylla*	1			
3+600 – 3+700	Mango Unknown Jak Kithul	*Mangifera indica* - *Artocarpus heterophyllus* *Caryota urens*	4 1 1 1			
3+700 – 3+800	Mango	*Mangifera indica*	1			
3+800 - 3+900	Mahogany	*Swietenia macrophylla*	1			
3+900 – 4+000				Jak	*Artocarpus heterophyllus*	1
Total			**52**			**30**

Annex 1: Public Consultation of Nerihena Wewalla Yattapatha road

Name of the Respondent	Age	Sex	Address	Views
L.D.Leelarathne	50	Male	Sinharaja adawiya, Yattapatha.	It is good to develop this road. Road is in a very poor condition. The present situation of culverts and drainage are not sufficient to carry away the storm water. The area is inundated during rainy days.
H. Dayarathna	38	Male	Sinharaja adawiya, Yattapatha.	The culverts are not sufficient to flow rainy water. During the rains the area is getting flooded and road is in a poor condition
K.S.Somali	35	Female	Nerihena, Pahalahewawissa	Road is in poor condition. Culverts are not sufficient to flow rainy water.

Annex 2: Location Map



Annex 3: Photographs of the Nerihena Wewalla Yattapatha road

Plate 5: Starting point of the road

Plate 2: Poor gravel road Section through 0+200 - 0+700km

Plate 3: 2+500 - 2+600 Gravel road section

Plate 4: Road at 2+800 - a dilapidated section

Plate 5: Road crosses Wewala Ela at 2+900 - 3+000km

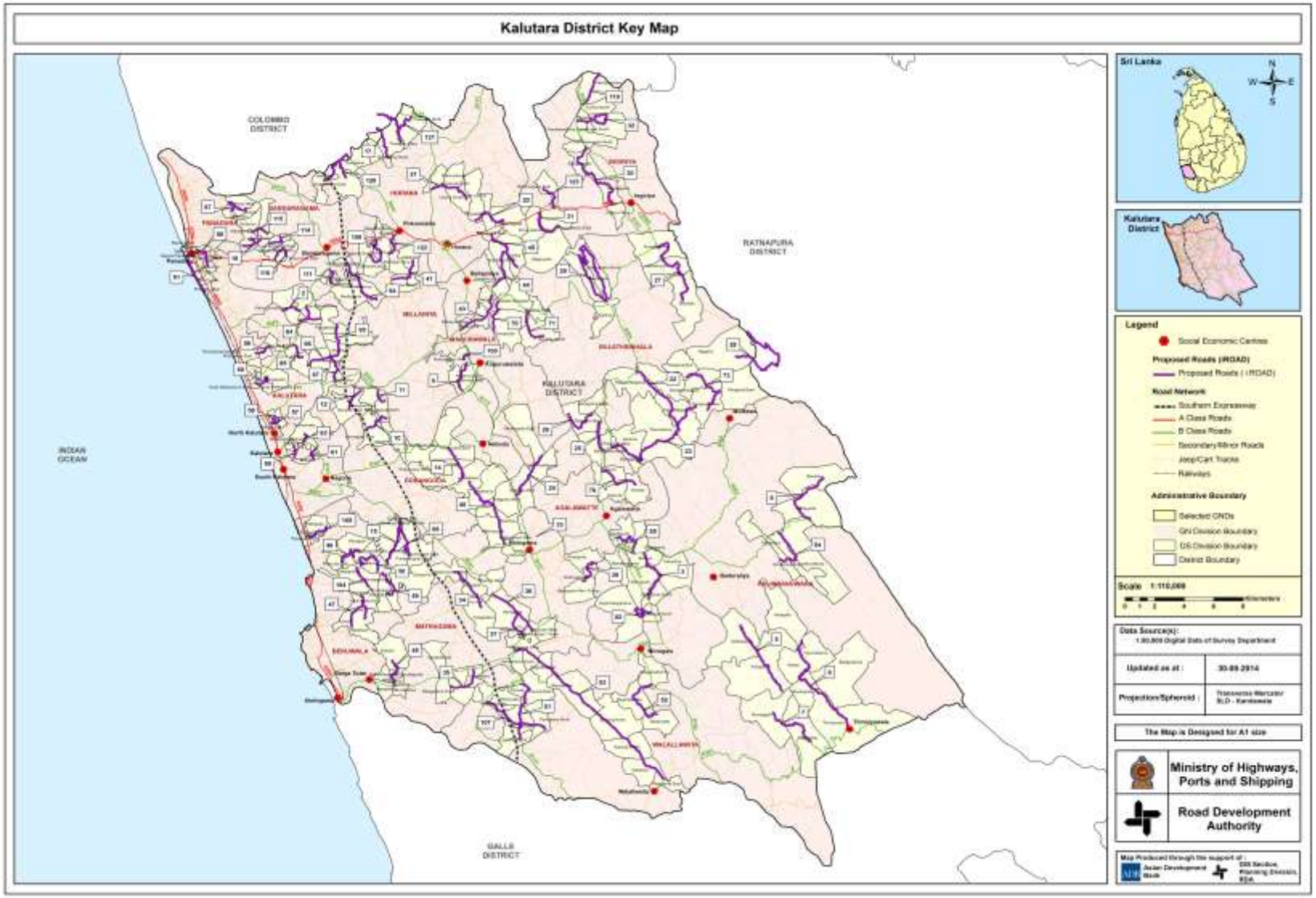
Plate 6 : Earth road section at 3+000km

Plate 7 : Buddha shine at 3+000 - 3+100km (LHS)

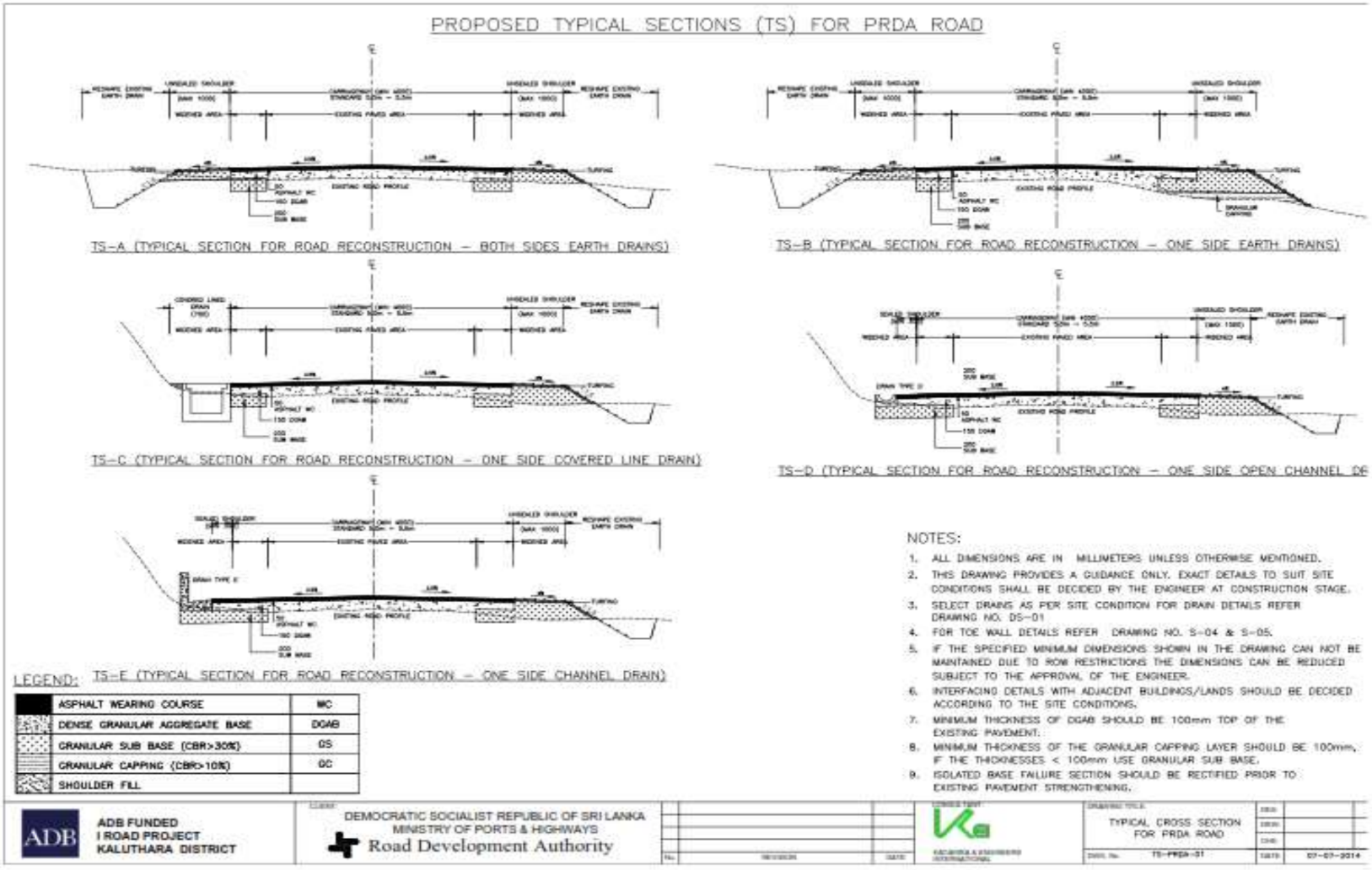
Plate 8 : Poor cross drainage structures - 3+400 - 3+500km

Plate 9 : End point of the road

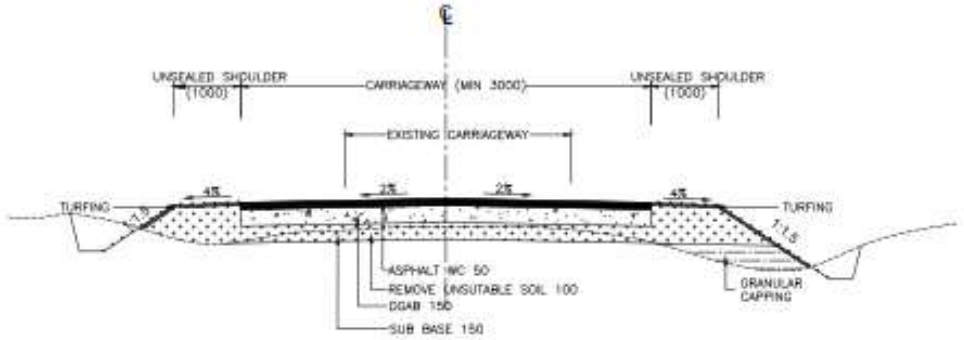
GENERAL LOCATION MAP



PROPOSED CROSS SECTIONS



PROPOSED TYPICAL SECTIONS (TS) FOR GRAVEL ROAD



TS-A (TYPICAL SECTION FOR GRAVEL SURFACE

LEGEND:

ASPHALT WEARING COURSE	WC
DENSE GRANULAR AGGREGATE BASE	DGAB
GRANULAR SUB BASE (TYPE I-CBR>30%)	GS
GRANULAR CAPPING (TYPE II-CBR>10%)	GC
SHOULDER FILL	
BLINDING LAYER (GRADED AGGREGATE)	
ROCK FILL (MAXIMUM SIZE 250mm)	
QUARRY FINE	
C30 CONCRETE	
INTERLOCKING BLOCK	

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
2. THIS DRAWING PROVIDES A GUIDANCE ONLY. EXACT DETAILS TO SUIT SITE CONDITIONS SHALL BE DECIDED BY THE ENGINEER AT CONSTRUCTION STAGE.
3. SELECT DRAINS AS PER SITE CONDITION FOR DRAIN DETAILS REFER DRAWING NO. DS-01
4. FOR TOE WALL DETAILS REFER DRAWING NO. S-04 & S-05.
5. IF THE SPECIFIED MINIMUM DIMENSIONS SHOWN IN THE DRAWING CAN NOT B MAINTAINED DUE TO ROW RESTRICTIONS THE DIMENSIONS CAN BE REDUCED SUBJECT TO THE APPROVAL OF THE ENGINEER.
6. INTERFACING DETAILS WITH ADJACENT BUILDINGS/LANDS SHOULD BE DECIDED ACCORDING TO THE SITE CONDITIONS.
7. MINIMUM THICKNESS OF THE GRANULAR CAPPING LAYER SHOULD BE 100mm IF THE THICKNESSES < 100mm USE GRANULAR SUB BASE.

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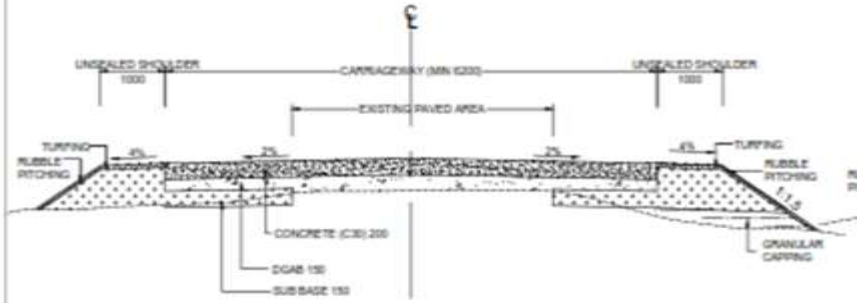
TYPICAL CROSS SECTION FOR PS ROAD

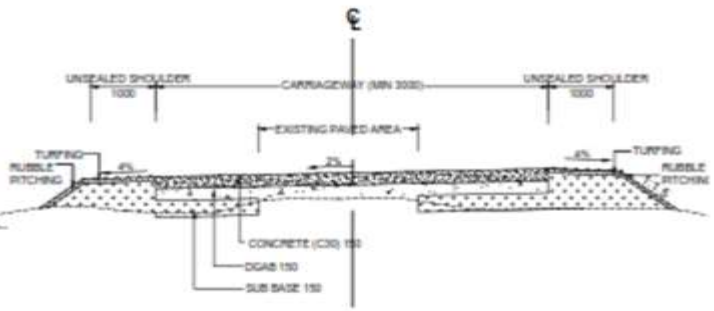
TS-PS-01

07-07-2014

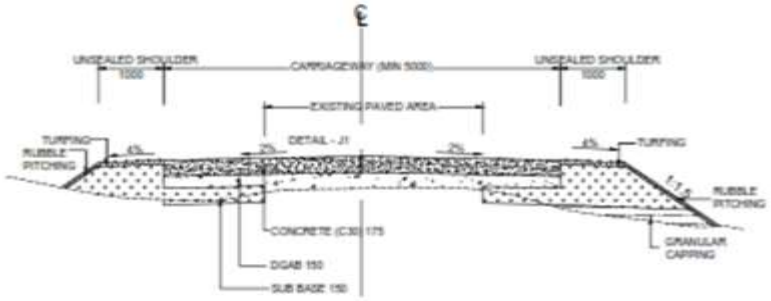
PROPOSED RIGID PAVEMENT TYPICAL SECTIONS FOR INUNDATING AREA



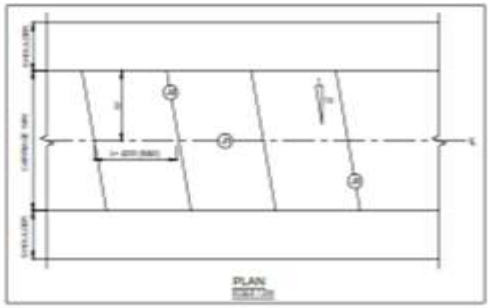
RTS-A (RIGID TYPICAL SECTION FOR RDA ROADS)



RTS-C (RIGID TYPICAL SECTION FOR PS ROADS)



RTS-B (RIGID TYPICAL SECTION FOR PRDA ROADS)



	CONCRETE C30	
	DENSE GRANULAR AGGREGATE BASE	**DGAB**
	GRANULAR SUB BASE (TYPE I-CBR>30%)	**GS**
	GRANULAR CAPPING (TYPE II-CBR>10%)	**GC**
	SHOULDER FILL	
	BLINDING LAYER (GRADED AGGREGATE)	
	ROCK FILL (MAXIMUM SIZE 250mm)	
	QUARRY FINE	

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
2. THIS DRAWING PROVIDES A GUIDANCE ONLY. EXACT DETAILS TO SUIT SITE CONDITIONS SHALL BE DECIDED BY THE ENGINEER AT CONSTRUCTION STAGE.
3. SELECT DRAINS AS PER SITE CONDITION FOR DRAIN DETAILS REFER DRAWING NO. DS-01
4. FOR TOE WALL DETAILS REFER DRAWING NO. S-04 & S-05

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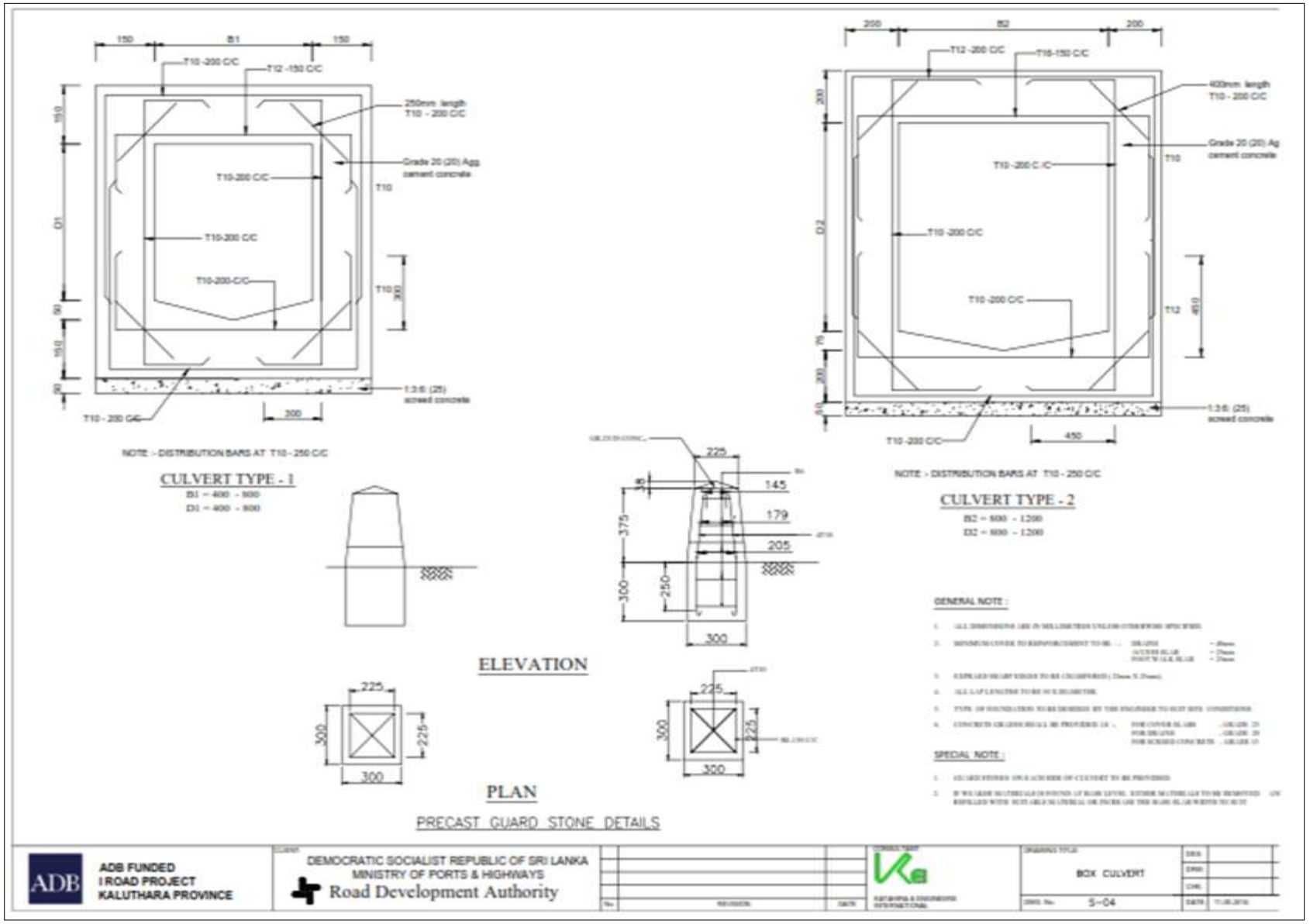
RIGID PAVEMENT
TYPICAL SECTIONS


CULVERT TYPE - 1
NOTE :- DISTRIBUTION BARS AT T10 - 250 C/C
CULVERT TYPE - 2
NOTE :- DISTRIBUTION BARS AT T10 - 250 C/C
ELEVATION
PLAN
PRECAST GUARD STONE DETAILS
GENERAL NOTE :
SPECIAL NOTE :
ADB FUNDED
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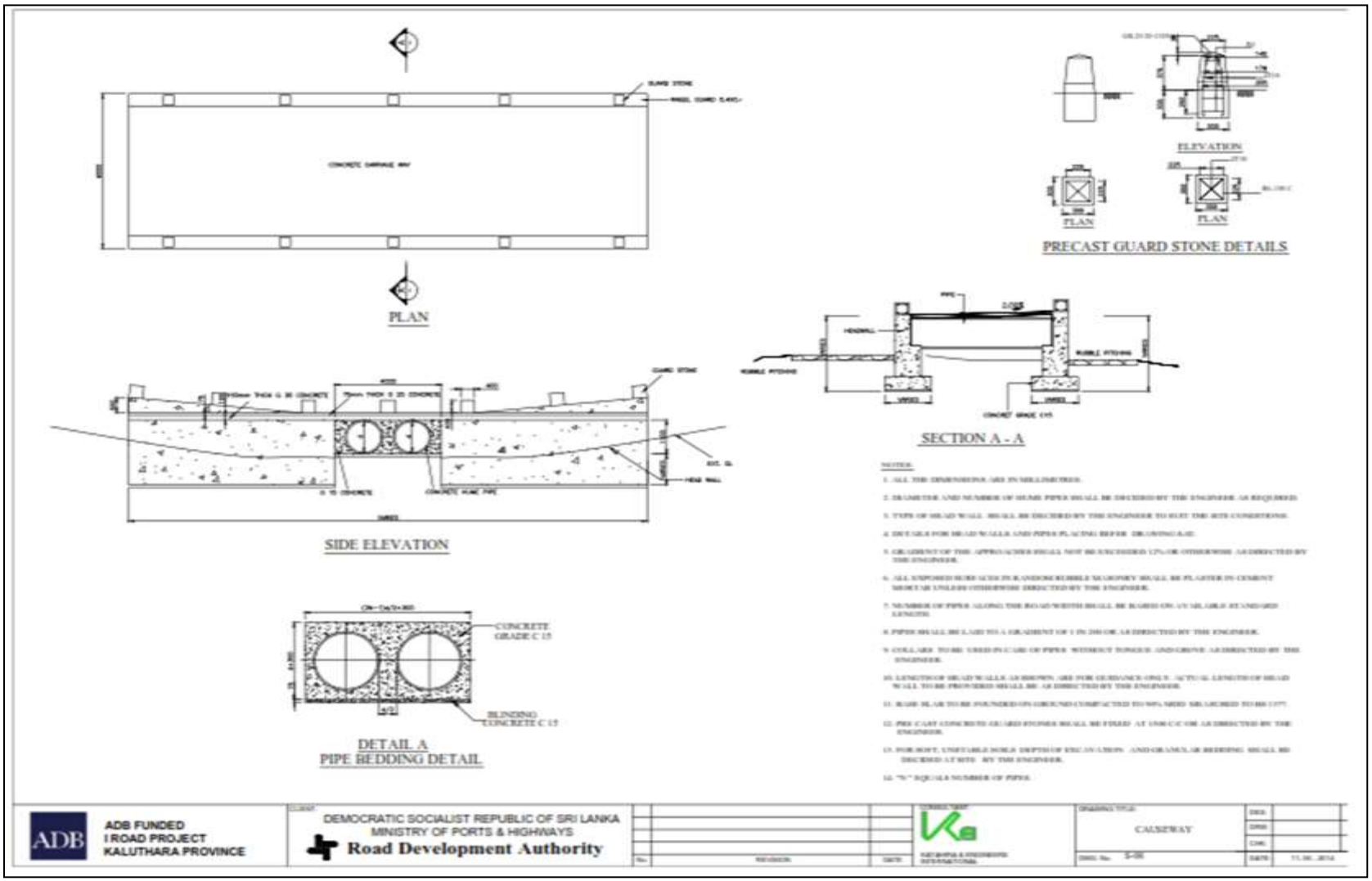
DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority
BOX CULVERT
S-04


PLAN
SIDE ELEVATION
DETAIL A
PIPE BEDDING DETAIL
CONCRETE GRADE C 15
BLINDING CONCRETE C 15
ELEVATION
PLAN
PLAN
PRECAST GUARD STONE DETAILS
SECTION A - A
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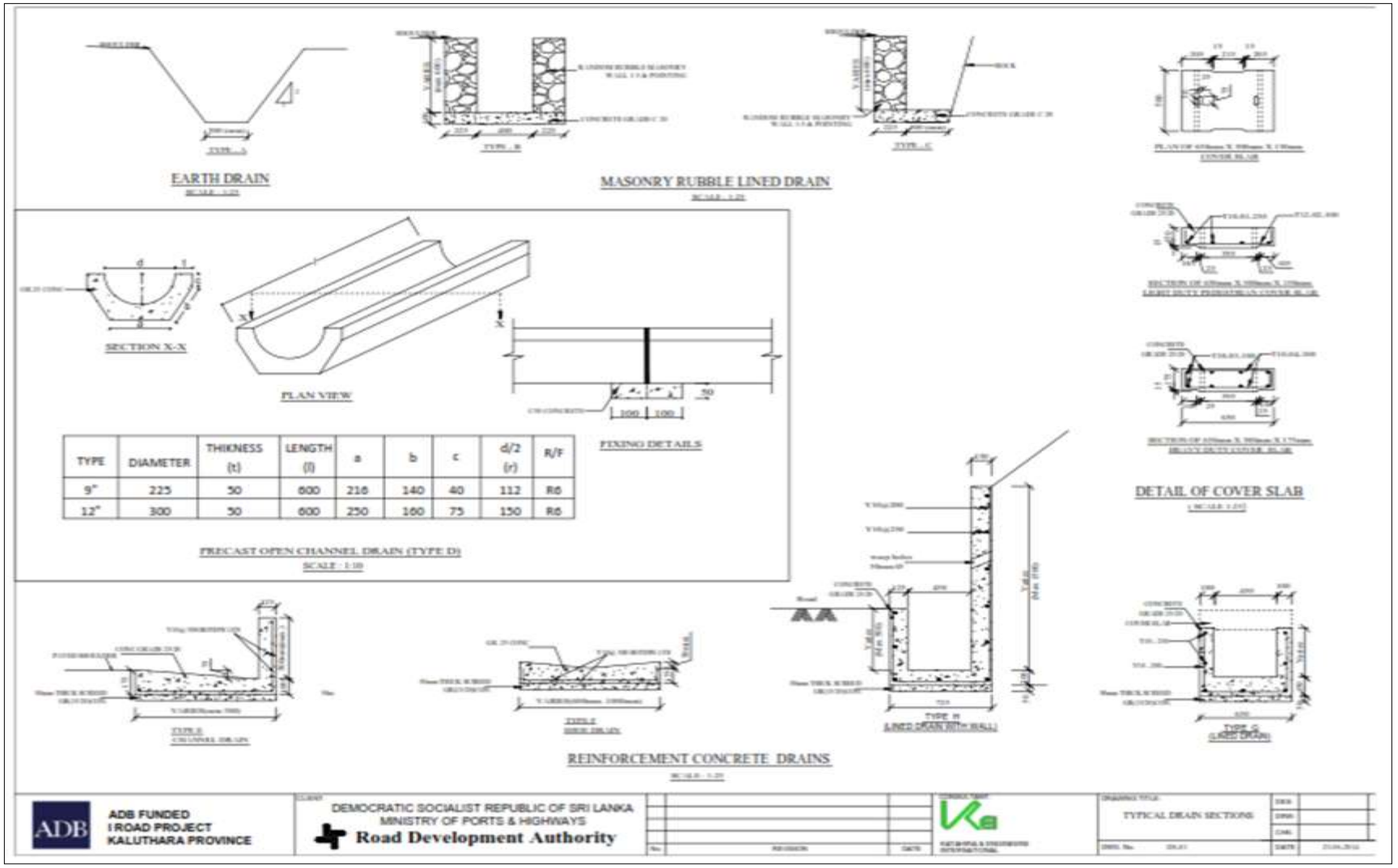
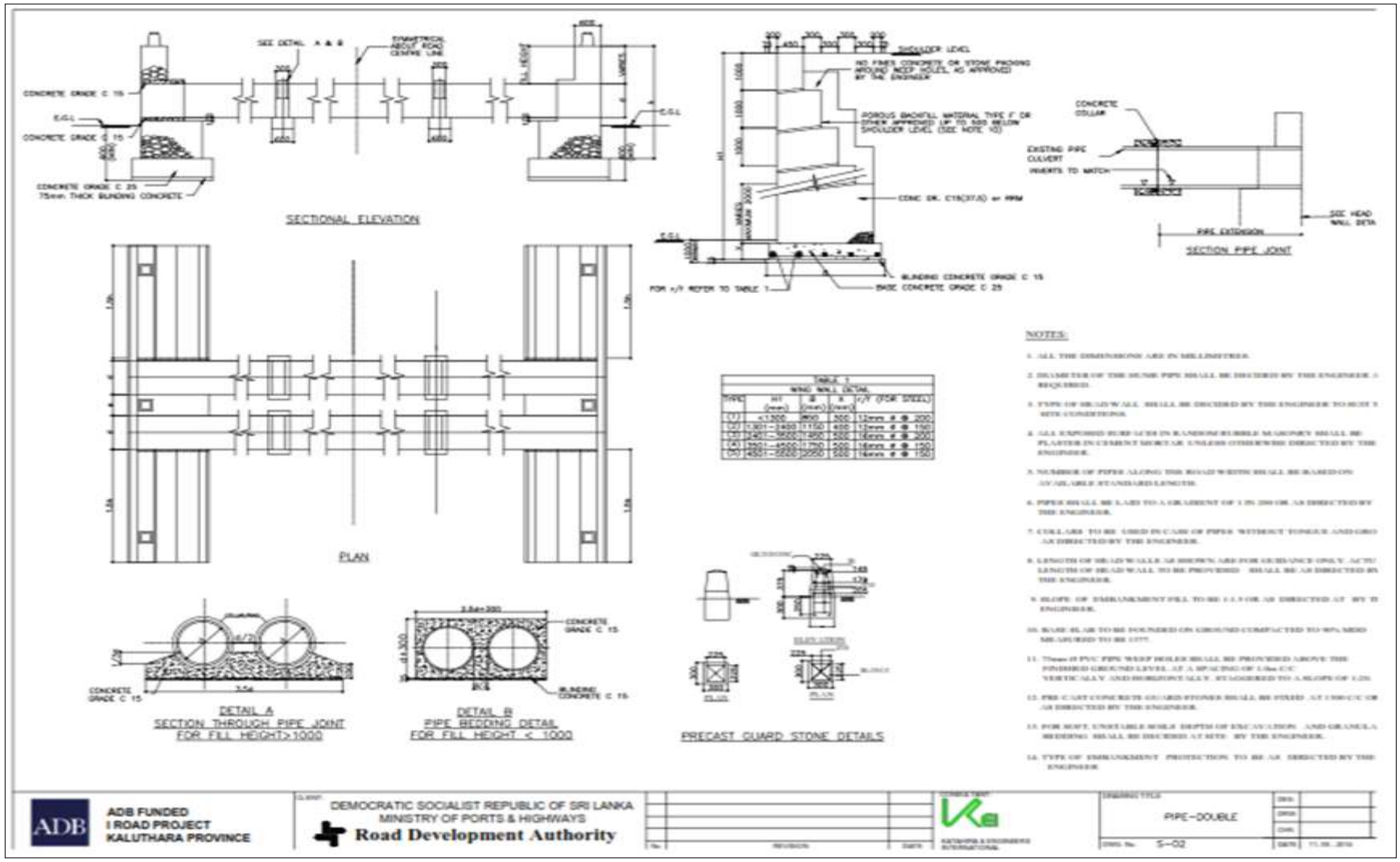
Road Development Authority
CAUSEWAY



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


SECTIONAL ELEVATION
PLAN
SECTION PIPE JOINT
DETAIL A
SECTION THROUGH PIPE JOINT
FOR FILL HEIGHT>1000
DETAIL B
PIPE BEDDING DETAIL
FOR FILL HEIGHT < 1000
PRECAST GUARD STONE DETAILS
NOTES:
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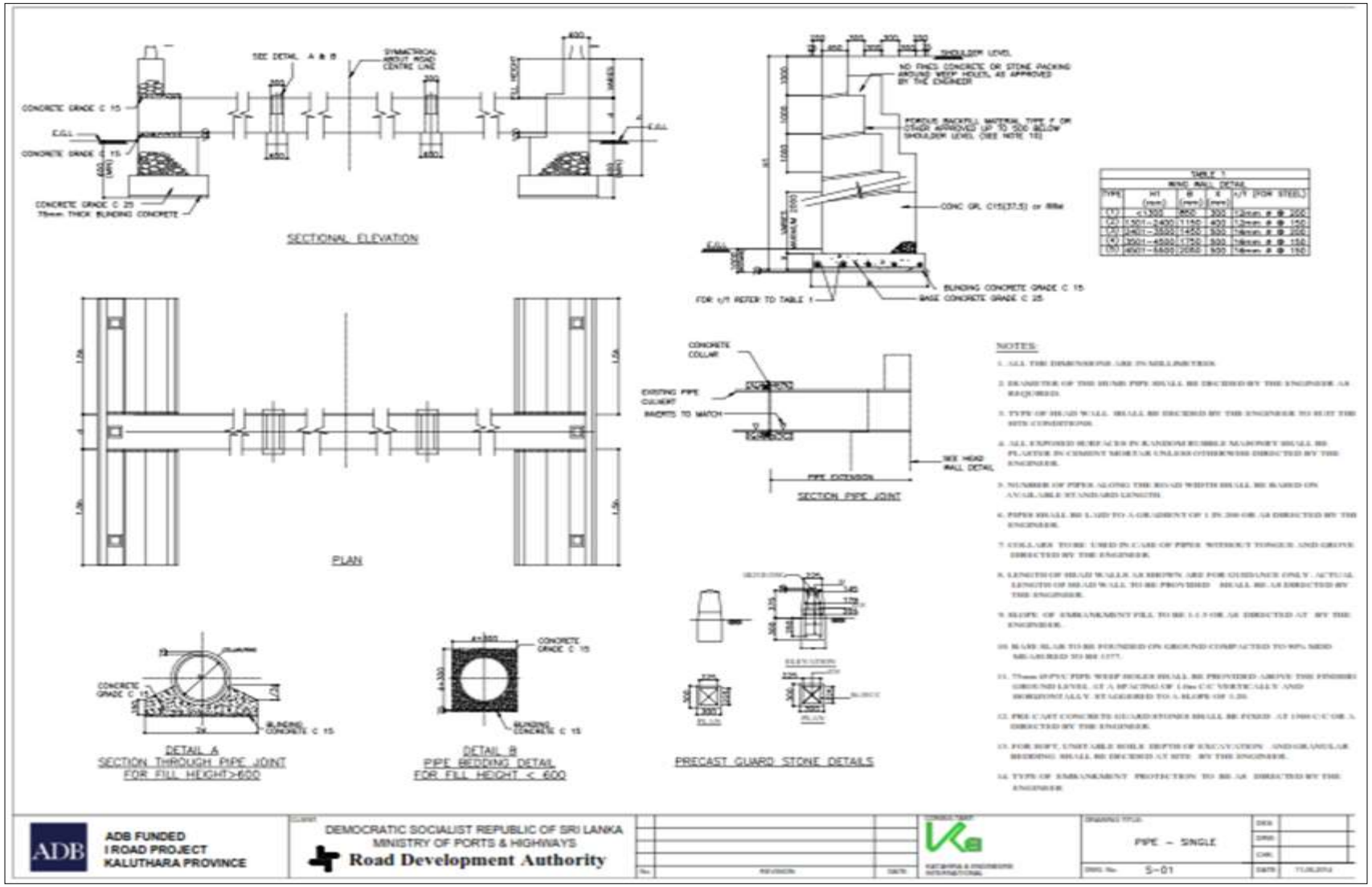
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority
PIPE-DOUBLE
S-02


SECTIONAL ELEVATION
PLAN
DETAIL A
SECTION THROUGH PIPE JOINT
FOR FILL HEIGHT>600
DETAIL B
PIPE BEDDING DETAIL
FOR FILL HEIGHT < 600
SECTION PIPE JOINT
PRECAST GUARD STONE DETAILS
NOTES:
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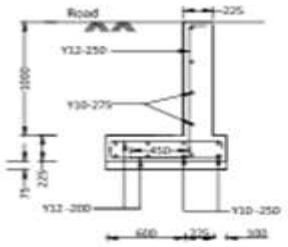
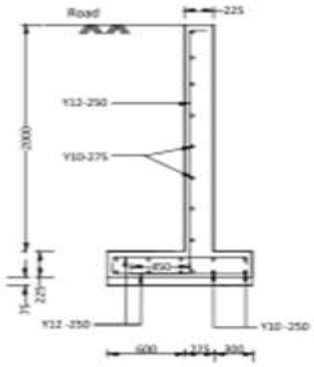
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority
PIPE - SINGLE
S-01



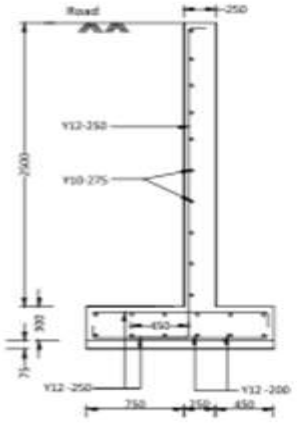
SECTION OF WALL

1m Wall



SECTION OF WALL

2m Wall



SECTION OF WALL

2.5m Wall

NOTES:

1. ALL THE DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
2. THIS DRAWINGS PROVIDES A GUIDANCE ONLY. EXACT DETAILS TO SUIT SITE CONDITIONS, SHALL BE DECIDED BY THE ENGINEER AT CONSTRUCTION STAGE.
3. ALL FOUNDATION PADS SHOULD BE IN GRADE C 20 AND SCREED IN GRADE C15 CONCRETE. SCREED IS 50MM THICK UNLESS OTHERWISE SHOWN.
4. FOUNDATION DEPTHS IN EACH WALL TYPE SHOULD BE AS SHOWN OR AS DIRECTED AT SITE TO SUIT SITE CONDITIONS.
5. CONCRETE GRADE SHALL BE GR. 25/20
6. REINFORCEMENT SHALL BE MILD ROLLED HIGH YIELD STEEL TO BS 4449 WITH MIN fy =460 N/SQMM.
7. CLEAR COVER TO REINFORCEMENT SHALL BE 50 MM.
8. REFER DRAWING S.03 FOR THE DETAIL OF PORUS BACKFILL
9. 75 DIA PVC WEEP HOLES SHALL BE PROVIDED AT 2000 SPACING (STAGGERED AND BE LAID TO A SLOPE OF 1:10)

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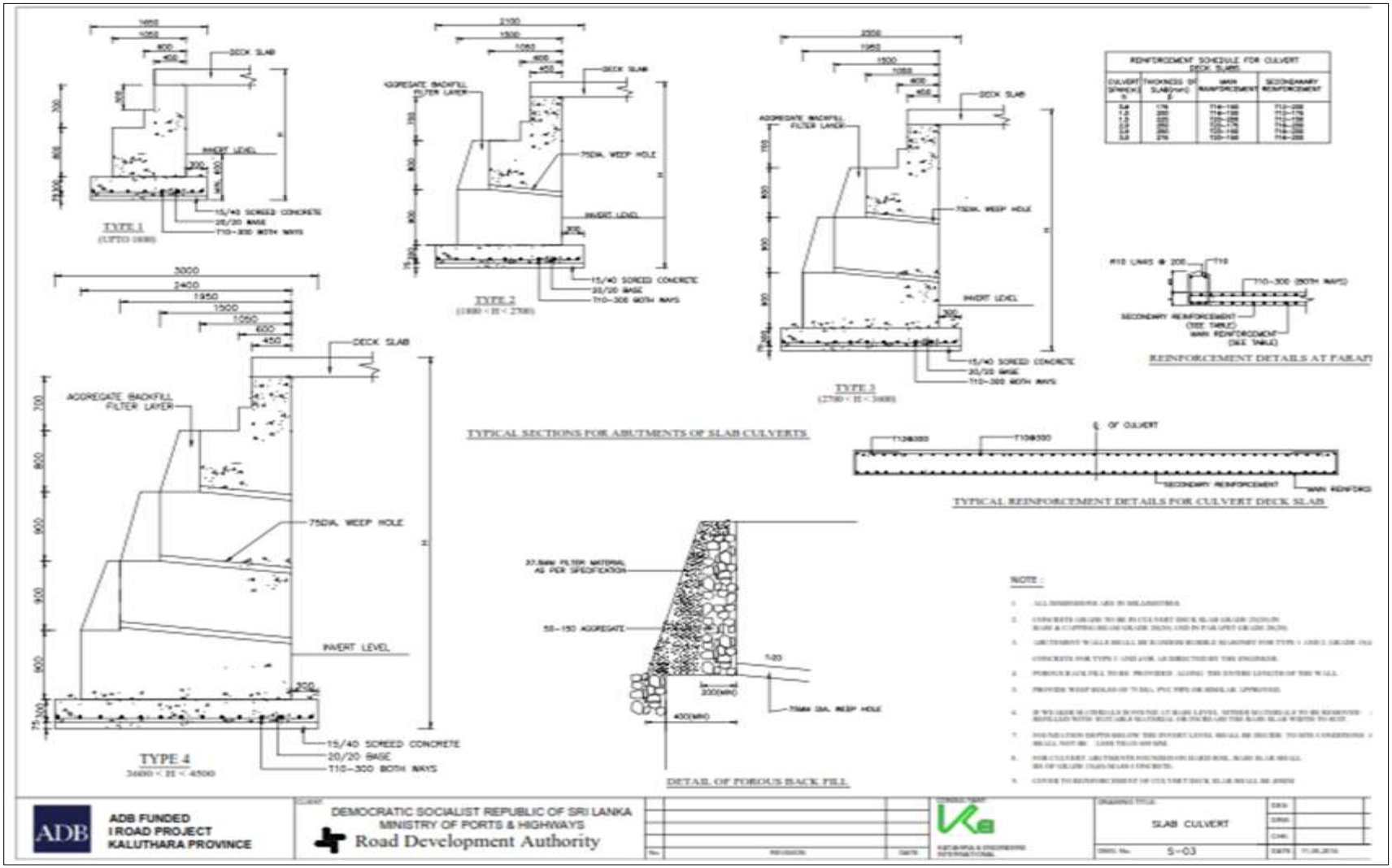
RETAINING WALL
REINFORCED CONCRETE

S - 075 - A


DECK SLAB
INVERT LEVEL
15/40 SCREED CONCRETE
20/20 BASE
T10-300 BOTH WAYS
TYPE 1
AGGREGATE BACKFILL
FILTER LAYER
75DIA. WEEP HOLE
TYPE 2
TYPE 3
TYPE 4
TYPICAL SECTIONS FOR ABUTMENTS OF SLAB CULVERTS
REINFORCEMENT SCHEDULE FOR CULVERT DECK SLABS
REINFORCEMENT DETAILS AT PARAPET
TYPICAL REINFORCEMENT DETAILS FOR CULVERT DECK SLABS
DETAIL OF POROUS BACK FILL
NOTE :
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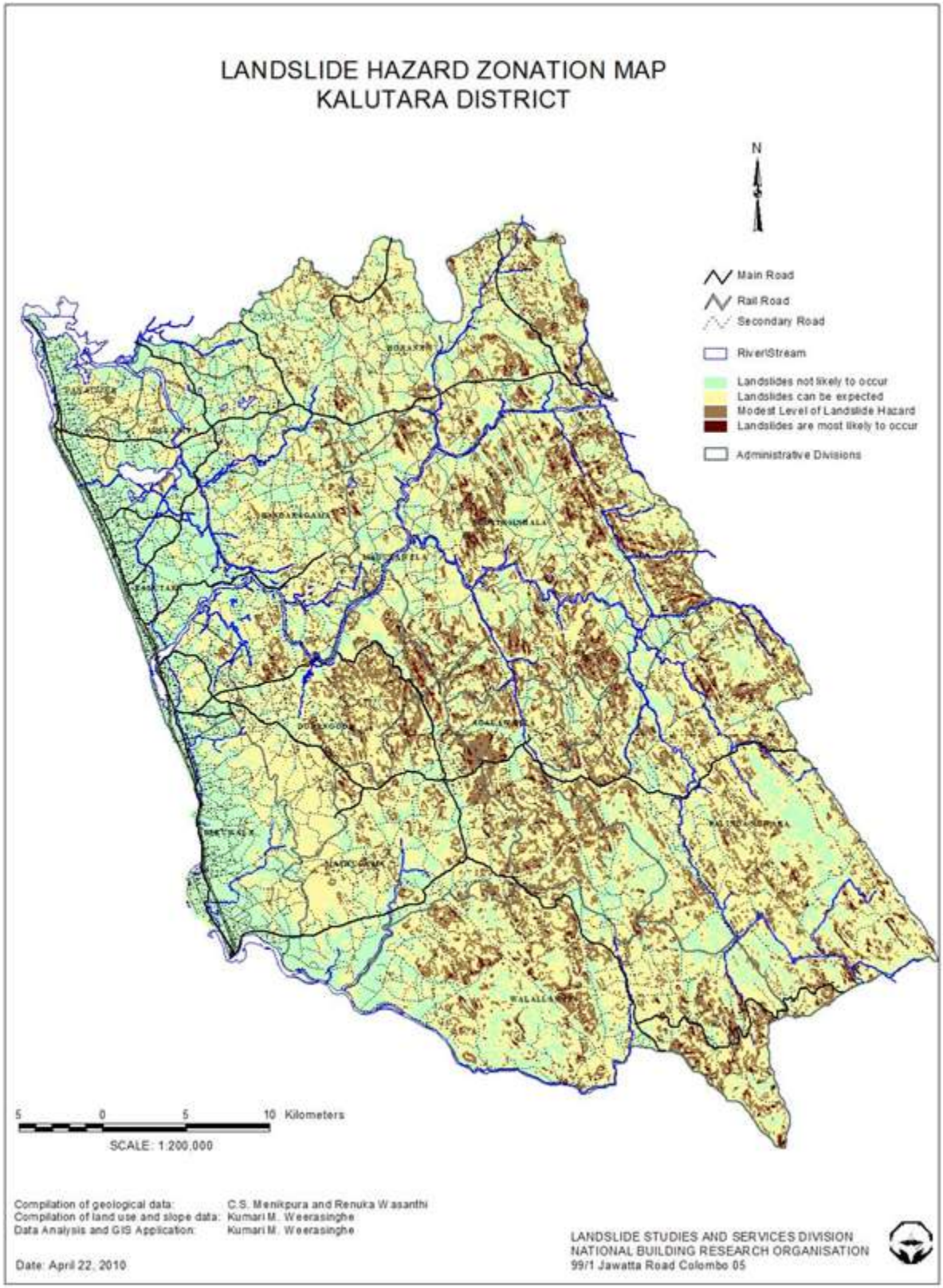
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority
SLAB CULVERT
S-03

LANDSLIDE HAZARDOUS MAP



FOREST APPROVAL LETTER

වන සංරක්ෂණ දෙපාර්තමේන්තුව
வன பரிபாலனத் திணைக்களம்
FOREST DEPARTMENT

ප්‍රධාන කාර්යාලය, සම්පත්පාය, තැ. පෙ. 3, බත්තරමුල්ල, ශ්‍රී ලංකාව.
தலைமை அலுவலகம், "சம்பத்பாய", த. பெ. இல. 3, பத்தரமுல்லை, இலங்கை.
Head Office, Sampathpaya, P. O. Box 3, Battaramulla, Sri Lanka
දුරකථන / தொலைபேசி / Telephones 2866631, 2866632, 2875540
ෆැක්ස් / தொலைநகல் / Fax (94-1) 2866633
E-mail: Forest@slt.lk.

මගේ අංකය / எனது இல. / My Ref. EMD/EIA/RD/rural roads/2017
ඔබේ අංකය / உமது இல. / Your Ref.
දිනය / திகதி / Date 2014.08. 27

අධ්‍යක්ෂ, (පරීසරීක සහ සමාජ සංවර්ධන)
මාර්ග සංවර්ධන අධිකාරිය.

ග්‍රාමීය පාරවල් වැඩිදියුණු කිරීමේ වැඩසටහන - මාර්ග සංවර්ධන අධිකාරිය

ඉහත කරුණට අදාළව ඔබේ අංක RDA/DG/07/113, හා 2014.07.25, යන ලිපිය හා අංක RDA/ESD/iroad හා 2014.08.04, හා 2014.08.26 දිනැති ලිපි හා බැඳේ.

02. මෙම වැඩ සටහන යටතේ වැඩි දියුණු කිරීමට යෝජිත මාර්ග වලට ඇතුලත් වන සංරක්ෂණ දෙපාර්තමේන්තුවේ පාලනය යටතේ පවත්නා වනාන්තර තුලින් වැටී ඇති මාර්ග සම්බන්ධව වෙන වෙනම පරීක්ෂා කර නිර්දේශ ඉදිරිපත් කිරීමට කැලෑ ගතවන බව දන්වමි.

03. මෙහි හදිසි අවශ්‍යතාවය සළකා වනාන්තර තුලින් වැටී ඇති මාර්ගවල අමතර කිසිදු අළුත් හෙලි කිරීමකින් හෝ ගස් ඉවත් කිරීමකින් තොරව, දිසා වන නිලධාරී ගේ අධීක්ෂණය යටතේ මෙම කාර්යයන් සිදු කිරීම සඳහා අවසර ලබා දීමේ හැකියාව ඇති බව කාරුණිකව දන්වමි.

මහින්ද සෙනෙවිරත්න
වන සංරක්ෂක
(පරිසර සංරක්ෂණ හා කළමනාකරණ)
වන සංරක්ෂක ජනරාල් වෙනුවට

Translation of the letter

27.08.2014

Director
Environment and Social Development Division
RDA

Program for upgrading of Rural roads - Road Development Authority

This refers to the letter no. RDA/DG/07/113 dated 25th of July 2014 and subsequent letters no RDA/ESD/IROAD dated 4th of August 2014 and 26th of August 2014 on above.

It seems that it will take a long time to inspect and give specific conditions on roads that are within the forest areas.

Therefore, considering the urgency of this program, Forest Department is able to grant approval to carry out the road construction work without using additional lands and removal of any trees within sensitive forest areas and it is recommend to carry out the development work under the supervision of the relevant District forest Officer of the Department of Forest.

Mahinda Senevirathne
Forest Conservator
(Environment Management)
For Conservator General of Forests

STANDARD ENVIRONMENTAL MANAGEMENT PLAN FOR RURAL ROADS

Upgrading of Rural Roads to all Weather Standards – Western Province (Kaluthara District)

This standard Environmental Management Plan (EMP) is the summarized matrix of all possible impacts that may occur during upgrading and maintenance of roads in Kaluthara District to all weather standards under i Road Program of Road Development Authority (RDA). And this EMP should be updated and specified for each contract package before commencement of the project with specific locations for mitigation measures. And the environmental specialist of the Project Implementation Consultant (PIC) of the project is responsible for specifying and updating the EMP for each package. The updated EMP for each contract package should be approved by the Project Implementation Unit (PIU) well in advance to the construction phase.

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

The bidders are advised to carefully consider the EMP requirements when preparing the bid and pricing the items of work. As a thumb of rule it is suggested that the contractor allows 10~15% of construction cost as cost to execute environmental compliance requirements. The prescriptions and clauses detailed in the EMP are integral component of the specifications for relevant item of work unless separate items are included in the Bill of Quantities. Thus separate payments will not be made in respect of compliance with the EMP. In case the Contractor or his sub-contractor/s fails to implement the EMP recommendations after informing in writing, the Engineer will take whatever actions it is deemed necessary to ensure that the EMP is properly implemented. If the contractor or his sub-contractor/s still fails to comply with EMP requirement, the “Engineer” may levy a penalty based on the level of non-compliance, cost incurred to rectify the damages caused by such negligence and/ or recover the cost from contractor’s payments.

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

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 (if the remaining space within ROW is not adequate) will be explored with the help of DoF, Divisional Secretary (DS) and Community Based Organizations (CBO).	Throughout the project 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 DS 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 advice 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. ○ No trees within sensitive forest areas will be felled in roads which traverse across such areas if any.	Throughout the project area	Costs for tree removal. Costs for compensatory tree replanting.	Contractor	PIU, Project Implementation Consultant (PIC), DS, District Forest Officer for roads falling inside forest areas if any

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
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 facilities 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	○ Common properties outside the ROW will not be affected due to road improvement ○ All efforts will be made to minimize shifting of common properties located within the ROW if any. ○ Structures with religious importance will not be touched ○ 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	Costs of removing and repairing common properties	Contractor	PIU, PIC
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. ○ 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.	Near all drainage crossings, rivers, streams and flood prone areas	Included in project costs.	PIU, Design consultants	PIU, SRRDA

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		○ 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.	.			
6.	Landslide impacts	○ Possibility of occurrence of project induced landslides is marginal as the road improvement activities will not touch slopes outside ROW. ○ However prior consent should be obtained from National Building Research Organization (NBRO) for roads along which landslide prone locations are already observed. ○ And special attention should be paid in designing at particular locations of such roads and also recommendation of NBRO if any should be incorporated to the designs	Throughout the project area with special attention to locations which are landslide prone	Included in project costs.	PIU, Design consultants	PIU, SRRDA
II.	**Construction Stage**					
1.	Flood impacts	○ The contractor shall take all measures necessary or as directed by the Engineer to keep all drainage paths and drains clear of blockage at all times. Here special attention should be paid to Kalu Ganga flood prone area. ○ Temporary storage of material should only be within approved sites by the engineer where natural drainage is not disturbed. ○ All wastes should be disposed only at locations approved by the Local Authority of the area. ○ If flooding or stagnation of water is caused by contractor's activities, contractors shall provide suitable means to prevent loss of access to any land or property and prevent damage to land and property. ○ No material including excavated soil should	Throughout the project area with special attention to roads which are prone to floods especially in Kalu Ganga flood prone area	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
		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. ○ 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				
2.	Landslide impact	○ As the improvement will be within the ROW, there will be minimal disturbance to the road side natural slopes and therefore possibility of occurring project induced landslides is minimal. ○ 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. ○ Further contractor's activities shall not lead to create landslides and if any such incident occurs, he should immediately inform RDA and contractors shall provide suitable means to prevent loss of any access and prevent damage to land and property	Throughout the project area with special attention to roads which already have landslides and locations previously stuck by landslides	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
3.	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. ○ No borrow site will be located within sensitive forest area ○ And if new borrow pits are opened for the project, necessary approvals and licenses should be obtained from GSMB and CEA. And all conditions laid down in such licenses should be strictly adhered. ○ All completed borrow pits should be rehabilitated to satisfy conditions given in the industrial 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.	Throughout the project area with special attention to borrow pits and quarries to be used in each package	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
4.	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 project area and camps sites, storage areas and temporary offices	To be included under contractors costs	Contractor	PIU, PIC
5.	Slope protection and stabilization	○ 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 landslide prone	To be included under contractors costs	Contractor	PIU, PIC
6.	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.	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
		○ 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				
7.	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 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 Equipment (PPEs) such as helmet, boots, ear plugs for workers, first aid and firefighting equipment shall be available at construction sites before start of	Throughout the project 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
		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.				
8.	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 if any 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. ○ 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. Further flood prone areas should be avoided in selecting disposal sites	Throughout the project area and all disposal sites	To be included under contractors costs	Contractor	PIU, PIC
9.	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,	Throughout the project road with special attention to schools, hospitals and	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
		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 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 No construction along community areas will be permitted during night time 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.	religious places located along candidate roads			
10.	Tree plantation	o No trees will be felled within sensitive forest areas if any 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.	Throughout the all project roads	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
		○ Follow up maintenance of planted saplings will be carried out for a minimum of 3 years				
11.	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 water bodies.	Throughout the project area with special attention to streams, public wells and marshes	To be included under contractors costs	Contractor	PIU, PIC
12.	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	Throughout the project roads	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
		be maintained				
13.	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. ○ 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
14.	Impacts on sensitive forest areas	○ No solid waste or spoil dumping sites, hot mix plants and worker camps should be located within or close to the sensitive forest areas. ○ Prior approval should be taken from the District Forest Officer of DoF for construction works within such areas ○ No trees will be felled within sensitive forest areas and material extraction within such areas will be prohibited ○ 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	Within or near forest reserves if any	To be included in contractor's cost	Contractor	PIU, PIC, District Forest Officer of DOF

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		enforced in sites near protected areas or wildlife zones ○ Conditions which may be required by the DoF for roads falling or close to sensitive forest areas must be met				
III	**Post Construction and Operational Stage**					
1.	Occurrence of landslides	○ In such case, contractor is responsible for clearing the road and restore the access as soon as possible (during the maintenance period) after informing RDA (PIU and relevant Executive Engineer of RDA). ○ Here, contractor should also comply with recommendations of NBRO if any.	Throughout the project area	To be included in contractor's maintenance cost	Contractor (during maintenance period) and RDA	PIU/RDA
2.	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 included in contractor's maintenance cost	Contractor (during maintenance period) and RDA	PIU/RDA
3.	Air and Noise Quality	○ Placing sign boards for speed limitation and honking restrictions to be enforced near sensitive locations. o 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 project roads	construction cost and maintenance cost	Contractor (during maintenance period) and RDA	PIU/RDA
4.	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
5.	Tree replanting	○ Contractor to undertake survivability assessment and report to PIU the status of	All tree replanted areas	To be borne by the	Contractor (during maintenance	PIU/RDA

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Costs	Responsible for Implementing	Responsible for Monitoring
		compensatory tree plantation. ○ Additional plants should be planted for dead plants if any		contractor	period) and RDA	
6.	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 project roads and camp sites if any	To be borne by the contractor	Contractor (during maintenance period) and RDA	PIU/RDA

SAMPLE ENVIRONMENTAL MONITORING CHECKLIST 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.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
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 (if the remaining space within ROW is not adequate) will be explored with the help of DoF, Divisional Secretary (DS) and Community Based Organizations (CBO).	Throughout the project area 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. ○ No trees within sensitive forest areas will be felled in roads which traverse across such areas if any. ○ Requisite permission from DS 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 advice of DoF will be	Throughout the project area		

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		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. 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.	Impacts to common properties	o Common properties outside the ROW will not be affected due to road improvement o All efforts will be made to minimize shifting of common properties located within the ROW if any. o Structures with religious importance will not be touched 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		

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
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. ○ 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 flood prone areas		
6.	Landslide impacts	○ Possibility of occurrence of project induced landslides is marginal as the road improvement activities will not touch slopes outside ROW. ○ However prior consent should be obtained from National Building Research Organization (NBRO) for roads along which landslide prone locations are already observed. ○ And special attention should be paid in designing at particular locations of such roads and also recommendation of NBRO if any should be incorporated to the designs	Throughout the project area with special attention to locations which are landslide prone		

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.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
1.	Flood impacts	○ The contractor shall take all measures necessary or as directed by the Engineer to keep all drainage paths and drains clear of blockage at all times. Here special attention should be paid to Kalu Ganga flood prone area. ○ Temporary storage of material should only be within approved sites by the engineer where natural drainage is not disturbed. ○ All wastes should be disposed only at locations approved by the Local Authority of the area. ○ If flooding or stagnation of water is caused by contractor's activities, contractors shall provide suitable means to prevent loss of access to any land or property and prevent damage to land and property. ○ 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. ○ 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	Throughout the project area with special attention to roads which are prone to floods especially in Kalu Ganga flood prone area		

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		upstream side of the drainage path			
2.	Landslide impact	○ As the improvement will be within the ROW, there will be minimal disturbance to the road side natural slopes and therefore possibility of occurring project induced landslides is minimal. ○ 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. ○ Further contractor's activities shall not lead to create landslides and if any such incident occurs, he should immediately inform RDA and contractors shall provide suitable means to prevent loss of any access and prevent damage to land and property	Throughout the project area with special attention to roads which already have landslides and locations previously stuck by landslides		
3.	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 project, necessary approvals and licenses should be obtained from GSMB and CEA. And all conditions laid down in such licenses should be strictly adhered. ○ No borrow site will be located within sensitive forest area ○ All completed borrow pits should be rehabilitated to satisfy conditions given in the industrial 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	Throughout the project area with special attention to borrow pits and quarries		

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		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.			
4.	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 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.	Throughout the project area and camps sites, storage areas and temporary offices		

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
5.	Slope protection and stabilization	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 landslide prone		
6.	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 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	Throughout the project area with special attention to paddy and other agricultural lands		
7.	Establishment of	o Construction camp sites and storage areas	Throughout the		

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
	Construction Camp, temporary office and storage area	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. The construction camps, office and storage areas shall have provision of health care facilities for adults, pregnant women and children. Personal Protective Equipment (PPEs) such as helmet, boots, earplugs for workers, first aid and firefighting equipment 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.	project area with special attention to labour camps, storage areas and office premises		

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
8.	Establishment of Construction Camp, temporary office and storage area	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 if any 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. Further flood prone areas should be avoided in selecting disposal sites	Throughout the project area and all disposal sites		
9.	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	Throughout the project road with special attention to schools, hospitals and religious places		

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		in the EPL to ensure enough dispersion of exit gases. o Diesel Generators (DG) shall also be sound proof or fitted 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 No construction along community areas will be permitted during night time 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.			
10.	Tree plantation	o No trees will be felled within sensitive forest areas if any 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.		

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
11.	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 water bodies.	Throughout road with special attention to streams, tanks and marshes		
12.	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		

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
13.	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. ○ 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			
14.	Impacts on sensitive forest areas	○ No solid waste or spoil dumping sites, hot mix plants and worker camps should be located within or close to the sensitive forest areas. ○ Prior approval should be taken from the District Forest Officer of DoF for construction works within such areas ○ No trees will be felled within sensitive forest areas and material extraction within such areas will be prohibited ○ 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	Within or near forest reserves if any		

SL. NO.	Project Action/ Environmental Attributes	Mitigation Measures	Location/ numbers	Compliance status (Complied, partly complied, not complied)	Corrective action proposed if any
		near protected areas or wildlife zones o Conditions which may be required by the DoF for roads falling or close to sensitive forest areas must be met			

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
III	**Post Construction and Operational Stage**				
1.	Occurrence of landslides	○ In such case, contractor is responsible for clearing the road and restore the access as soon as possible (during the maintenance period) after informing RDA (PIU and relevant Executive Engineer of RDA). ○ Here, contractor should also comply with recommendations of NBRO if any.	Throughout the project area		
2.	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		
3.	Air and Noise Quality	○ Placing sign boards for speed limitation and honking restrictions to be enforced near sensitive locations. o 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		

4.	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		
5.	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		
6.	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 project road and camp sites if any		

STANDARD ENVIRONMENTAL MONITORING PLAN (EMOP) FOR THE PERFORMANCE INDICATORS
Rural Road Component – Central Province

This Environmental Monitoring Plan (EMOP) is prepared for a typical rural road located in Central Province. Therefore this EMOP should be updated before commencement of the project with specific locations of monitoring for each candidate road. And the environmental specialist of the Project Implementation Consultant (PIC) of the project is responsible for selection of specific locations of each road with the help of the relevant contractor and updating the EMOP. The updated EMOP for each road should be approved by the Project Implementation Unit (PIU) well in advance to the construction phase and also it should be noted that baseline monitoring should be carried out by the contractor before the construction stage.

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	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						1,320,000.00 (10,153.80 US$)		

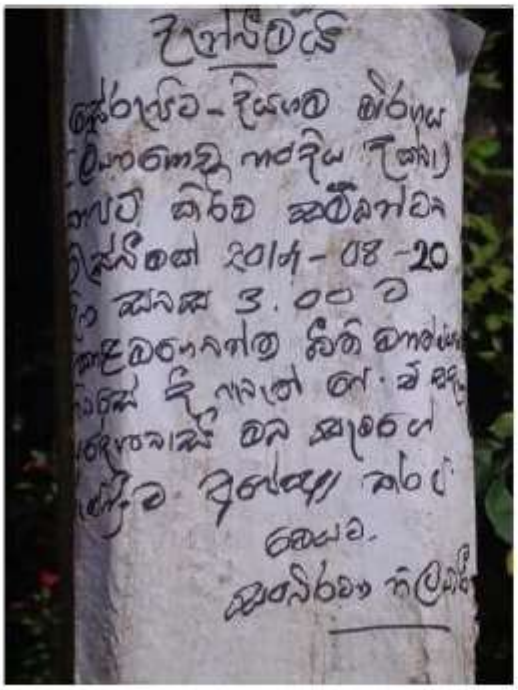
Abbreviations:
TSPM = Total Suspended Particulate Matter, PM10 = Respirable Particulate Matter < 10□m diameter, NO_x = Oxides of Nitrogen, CO = Carbon Monoxide, SO_x = Oxides of Sulphur, Pb = Lead, HC = Hydro Carbons, EC = Electrical Conductivity, DO = Dissolved Oxygen, TSS = Total Suspended Solids, BOD = Biological Oxygen Demand, ESD = Environmental and Social Division, RDA = Road Development Authority.
1$ = SLRs. 130.00 (April, 2014

REPORTS ON TRANSECT WALK

FORMAT FOR RECORDING TRANSECT WALK & CONSULTATIONS WITH THE AFFECTED PERSONS

1) Name of Road:	From Diyagama Serupita road to Liyanagoda Juntion
2) Villages:	Serupita old colony ,Bosewana gama new colony ,Colombagewatta,Liyanagoda
3) GND:	722A Serupita East ,722 Serupita west
4) District:	*Kalutara*
5) Date;	*20th August 2014 at 3.00 p.m*
6) Total Number of Participants in the Transect walk:	*15 Persons with all Officials*
7) Numbers of Participants falling in the following categories:	
Indigenous Person:	None
Disabled:	None
Households losing structure:	None
Women:	Eight
8) Name & Designation of the Key Participants: From RDA/PIU From GND	Please refer attached attendance list
9) Issues and suggestions raised by the Participants- i. Road alignment and design in general	Please refer attached sheet
ii. Road width and land availability	*Road width 20' few narrow sections in the row*
iii. Land owned/used by vulnerable groups of people:	No land adjacent to the ROW is inhabited by a group of vulnerable people
iv. Sensitive locations (forests, cultural properties, etc.):	None

v. Water-related issues (drainage lines, rivers and water crossings, irrigation water courses, other water bodies, etc.):	There are few small culverts along the road and need more culverts(please see attachment)
vi. Suggestion on location of Contractor's camp site:	A specific location could be identified after the contractor's arrival
vii)Suggestion on alternate routes during construction:	There are alternative routes
viii. Road safety-related issues (major junctions, curves, bends, hospitals, schools etc.):	No
ix. Other suggestions (such as regarding cattle crossing, borrow pits, etc.):	None
10) Major Out Comes Of the Transect Walk	
i)Changes/inputs to be incorporated in the design (alignment, road safety, drains, irrigation water crossing etc):	Need drains in both sides of the roads .One small bridge and culverts and side walls .place concrete slabs to access to the houses.
ii)Extent of land take and willingness/un willingness of land owner /users for donation:	Only few people like to donate their lands
iii)Environmental issues to be resolved(ponds, water, logging ,etc:	None
iv)Other issues:	None
11)Brief Summary of consultation held during Transect Walk:	
Major issues discussed during the Consultation	The present road condition affects day to day work. Only one bus is available for transport of people.
Recommendations of the social Safeguard specialist:	There are few bends need to be placed sign boards and speed breakers.



FORMAT FOR RECORDING TRANSECT WALK & CONSULTATIONS WITH THE AFFECTED PERSONS

1) Name of Road:	Wilpatha Puhambugoda Akkara 18 via Puhambugoda road
2) Villages:	Puhambugoda,Akkara18, Oruwathibbagoda,Maragaswila,Eladuwa,Eblert janapadaya,Panditha mulla,Pandeniya
3) GND:	799c/Puhambugoda-west, 799/Puhambugoda East 799/ B Galpoththavila 799 /A/Eladuwa
4) District:	*Kalutara*
5) Date;	*20th August 2014 at 1.00 p.m*
6) Total Number of Participants in the Transect walk:	*16 Persons with all Officials*
7) Numbers of Participants falling in the following categories:	
Indigenous Person:	None
Disabled:	None
Households losing structure:	None
Women:	Ten people
8) Name & Designation of the Key Participants: From RDA/PIU From GND	Please refer attached attendance list
9) Issues and suggestions raised by the Participants- i. Road alignment and design in general	Please refer attached sheet *suggested to maintain in the existing alignment*
ii. Road width and land availability	Several narrow sections in paddy field area
iii. Land owned/used by vulnerable	No land adjacent to the ROW is inhabited by a

groups of people:	group of vulnerable people
iv. Sensitive locations(forests ,cultural properties, etc.):	Paddy field area
v. Water-related issues (drainage lines, rivers and water crossings, irrigation water courses, other water bodies, etc.):	There are few small culverts along the road and need more culverts(please see attachment)
vi. Suggestion on location of Contractor's camp site:	A specific location could be identified after the contractor's arrival
vii) Suggestion on alternate routes during construction:	Road Construction should be done part to part of road .Because there are no alternative routes for akkara 18 people
viii. Road safety-related issues (major junctions, curves, bends, hospitals, schools etc.):	Wilpatha Hospital ,MOH Office Dodangoda
ix. Other suggestions (such as regarding cattle crossing, borrow pits, etc.):	None
10) Major Out Comes Of the Transect Walk	
i)Changes/inputs to be incorporated in the design (alignment, road safety, drains, irrigation water crossing etc):	Need drains in both sides of the roads .and culverts and side walls .place concrete slabs to access to the houses.
ii)Extent of land take and willingness/un willingness of land owner /users for donation:	Majority of people like to donate their lands
iii)Environmental issues to be resolved(ponds, water, logging ,etc:	None
iv)Other issues:	None
11)Brief Summary of consultation held during Transect Walk:	
Major issues discussed during the Consultation	The present road condition is badly affected day to day of people activities. No transport facilities.
Recommendations of the social Safeguard specialist:	There are few bends need to be placed sign boards and speed breakers .