

**Ministry of Highways, Ports and Shipping
Road Development Authority**



**SRI: Integrated Road Investment Program
Tranche II**

Sabaragamuwa Province

**Initial Environmental Examination
(IEE)**

Final Report

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

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List of Abbreviations

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

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 implanted over ten years. Tranche 1 focuses on the Southern Province and succeeding tranches will cover: Sabaragamuwa, Kaluthara District of Western Province, Central, North Western and North Central Provinces.

2. The first tranche focused on Southern Province. The succeeding Tranches focus on Sararagamuwa, Central, North Central, North Western, and Western Provinces. The iRoad Program will upgrade and maintain selected road sections in Sabaragamuwa Province to all-weather standards. The selected rural roads are currently governed by *Pradeshiya Sabhas* (The local Authorities) of Ratnapura and Kegalle Districts and Provincial Road Development Authority (PRDA) of Sabaragamuwa Provincial Council. Under the project, rural roads of 254.97km in Ratnapura District and 217.12km in Kegalle District have been selected to be upgraded.

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

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

5. Project roads for Sabaragamuwa Province included under the investment program were selected based on the following screening criteria on environment safeguards: (i) no project roads that will cause significant environmental impacts that would trigger classification as an

environment 'Category A' tranche in accordance with the ADB's SPS (2009) will be included; and (ii) no project roads falling in part or whole inside or adjacent to a protected area will be selected under the investment program.

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

7. Public consultation and disclosure. Consultations with stakeholders during the environmental examination involved local communities and government agencies like the Department of Wildlife Conservation (DWLC) to ensure no encroachment inside or near protected areas. Forest Department (FD) after consultation granted the clearance for road improvement near or within forest areas. During project implementation, signboards with project information detailing the nature of construction works, road length, construction period, name of contractor, contract sum and contact information for reporting complaints or grievances will be posted in three languages (Sinhala, Tamil and English) for rural roads. For the national roads there will be sign boards on period of works and contact information for reporting complaints or grievances in three languages. Annual environmental monitoring reports will be prepared per province and submitted to ADB for disclosure on the ADB website.

Physical Resources

8. **Climate.** The project districts Ratnapura and Kegalle Districts belong to low country – wet, mid country - wet and up country – wet zones while the southern part of the Ratnapura District falls in to the mid country - intermediate zone and low country – dry zone well.

9. **Rainfall.** Rainfall pattern of Sabaragamuwa Province is influenced by southwest monsoon from May to September when peak rainy season and convective rains the rest of the year.

10. **Hydrology.** Kegalle district consists of catchments Kelani River, Ma Oya and Attanagalu Oya rivers while Kalu Ganga, Walawe, and Gin Ganga covers Ratnapura. The Kelani River basin covers the majority of the area of the Kegalle District and Kalu Ganga in Ratnapura.

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

12. **Natural Disasters.** Ratnapura and Kegalle Districts were classified as modest level of landslide hazard areas. From 1974-2008 Ratnapura and Kegalle Districts recorded 6,685 landslides affecting 30,541 persons and 1,195 landslides and 6,685 persons, respectively. Several project roads have historical occurrence of slope failures. The Kalu Ganga has a history of overflowing affecting Kiriella, Kuruwita, Elapatha and Ratnapura DS Divisions. In contrast, no severe flood situation was recorded in Kegalle District.

Protected areas and Biodiversity

13. 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 are found along the project roads. No strict nature reserves, national parks or sanctuaries are located along or near any of the project roads in Sabaragamuwa province.

Socio-Economic Status.

14. **Population and population density.** Population. Majority of population in all two districts are living in rural areas. Second highest category is the estate population. Kegalle district shows the highest population density than Ratnapura district, i.e. 497 persons per km².

15. **Ethnicity.** majority of population in these two districts is Sinhalese accounting for 86.8%, and 85.6%, in Ratnapura and Kegalle districts, respectively.

Main economic activities

16. **Agriculture.** Agriculture is the prominent economic activity and carried out very successfully in these two districts with 43.0% in Ratnapura and 18.8% in Kegalle are engaged in this sector.

17. **Industries.** In Ratnapura district, there are 6,450 industrial establishments and out of total employed population, 27.5% of them are engaged in this sector. Ratnapura town area is famous for gem industry. There are 6,931 industrial establishments in Kegalle district employing 35.3% of the total population and the Bogala graphite is one of the most notable mine and it contribute half of the total mineral export of Sri Lanka.

18. **Tourism.** Several tourism areas and activities are located in the project districts. The mountain Sri Pada -Adam's Peak is a place of religious importance to the Buddhists, Hindus and Muslims. The Pilgrimage season starts on Poya (full moon) day in December and runs until the start of the southwest Monsoon in April. Bopath Ella, Sinharaja Forest Reserve, and Udawalawe National Park are another tourists attracted places in the district. Elephant Orphanage of Pinnawala is famous among local and foreign tourists. Pottery and Thalkola handicrafts have been identified as potential industries in the district.

19. **Education.** In general, the project area population are well educated with 42% completing secondary education, and about 15% and 11% achieving ordinary and advance general certificates.

20. **Household income.** The average monthly household income in Ratnapura and Kegalle are Rs. 22,741 and 18,062 which are lower than the national figure of Rs 46,207 in 2013.

21. **Poverty.** The poverty headcount indexes in Kegalle and and Ratnapura are 6.7 and 10.4 while the national average is 6.7 as of 2013.

Anticipated Environmental Impacts and Proposed Mitigation Measures

22. **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.

23. **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; and (vii) alteration of hydrology due to siltation of streams. 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 and (xi) provision of personal protective equipment to all workers.

24. **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 debris, provision of road safety appurtenances in the road design, and avenue plantation to control noise.

25. Greenhouse gas emissions and addressing risk of climate change. Using the Transport Emissions Evaluation Model for Projects (TEEMP) total annual emission was estimated at 33 tons. The projected variations in temperature and precipitation the project roads indicated vulnerability to landslide triggered by increased precipitation and flood. Key engineering measures taken to address these risks in the design are: i) increase in embankment height, ii) construction of new side and lead away drains, iii) construction of new culverts or widening of existing ones and iv) construction of new bridges which amounts to Rs. 229.13 million (about 1.76 million US\$) of approximately 2% of the total civil works costs.

26. 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.

27. Environmental Management Plan. A standard EMP was prepared as part of the IEE report, 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. 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.

28. 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

29. 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.

30. 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.

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

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

I. INTRODUCTION

A. Background

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 Divisions¹ (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 (Kaluthara District)

4. This document presents the Initial Environmental Examination (IEE) prepared by Environmental and Social Development Division (ESDD) of RDA for Sabaragamuwa Province of Tranche 2 which covers 472.09km of rural roads to be upgraded and maintained to all weather standards. This report complies with the Environmental Assessment and Review Framework (EARF) iROAD MFF, the ADB Safeguard Policy Statement (2009), and the Environmental Compliance Manual of RDA.

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

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 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 254.97km and 217.12km rural roads located within Ratnapura and Kegalle districts respectively of Sabaragamuwa Province. These rural roads are currently governed by Provincial Road Development Authority (PRDA) and Pradeshiya Sabhas (PS, the local Authority) of Sabaragamuwa Province. The total length disaggregated to two districts; Ratnapura and Kegalle 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 Sabaragamuwa Province

District	Number of Roads	Length of Roads (km)
Ratnapura	38	254.97
Kegalle	63	217.12
Total	101	472.09

Source: i Road Program, RDA

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

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 nation wide economic and social development.

Specific objectives of this project are;

- To improve the road condition between rural communities and socioeconomic centers of the Sabaragamuwa Province,
- To upgrade and maintain 472.09km of rural access roads in Sabaragmuwa 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

9. In order to achieve these objectives, the road network in Ratnapura and Kegalle districts will be upgraded with the following guidelines:

- Upgrade and maintain the existing roads to all weather standards
- 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

10. As mentioned, this IEE covers upgrading and maintaining 472.09km of rural roads to all weather standards.

11. 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 etc...),
 - 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 etc...)
- (ii) Identify beneficial and potential adverse impacts on the existing environment during preconstruction, construction and operational phases of the project
- (iii) Propose effective mitigation measures to avoid/ minimize the project induced adverse impacts while enhancing the beneficial impacts, and;
- (iv) Formulate an effective Environmental Management Plan (EMP) which is common for all roads and will be 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

12. 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.

13. 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.

14. As mentioned, EC was prepared for each road to be upgraded under the i Road 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 etc...
- Public Consultation
- List of photographs taken along the road

15. Sample ECs are provided appended (Appendix I.2) to this IEE report for reference. All ECs prepared for the Sabaragamuwa Province are available at the ESDD of RDA, and PIU upon request.

16. 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 to 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, and 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.

17. 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.

18. 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 – i Road, and Project Director – i Road of RDA is highly appreciated.

II. DESCRIPTION OF THE PROJECT

A. Location of the project

19. As mentioned, all road sections selected for this project connect rural areas with the trunk road network in Ratnapura and Kegalle Districts in Sabaragamuwa Province. Accordingly a road length of 254.97km in Ratnapura District and 217.12km in Kegalle 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.

20. Location maps attached in appendix II.1 presents the general location of rural roads in Ratnapura and Kegalle Districts respectively. And specific location maps for each road is attached in each ECs.

B. Need of the Project

21. Sri Lanka is currently driven to be a strategically important economic center by means of naval, aviation, commercial, energy and knowledge hub serving as a link between east and west using its geographical location effectively. Accordingly, an accelerated development program is undertaken by the Government of Sri Lanka (GOSL) by means of socio-economic and social infrastructure development. Sabaragamuwa Province is one of the key provinces which is targeted to implement major development projects in order to facilitate economic and social infrastructure development of the country. Ruwanpura (Colombo - Ratnapura) Expressway, Eheliyagoda Town Development Project and construction of bypass roads to both Ratnapura and Kegalle Townships in order to increase transport efficiency are some of such major development projects offered to the Sabaragamuwa Province. However, to increase the effectiveness of the development, it should be assured that the benefits penetrate to the rural regions of the province as well as development potentials available in rural areas should be exposed. On the other hand 45.4% and 28.0% of the labor force in Ratnapura and Kegalle districts respectively are engaged in agriculture based employments mainly rubber cultivation, rubber tapping, tea cultivation and tea related employments and majority of them are restricted to rural areas (Department of Census and Statistics, 2012). In order to obtain a reasonable price for their products it is necessary to transport them to better markets which are mostly found in urban centers. In this regard, connectivity of these areas with the trunk road network is significant however it is found that the rural road network is still in dilapidated condition and not accessible in all weather conditions. Thus this situation fails to facilitate an efficient connectivity. On the other hand, a significant portion of the labor force is engaged in gem industry especially in Ratnapura District which is again confined to rural areas which needs better accessibility. Therefore, after identifying the existing situation, the government intends to select rural communities according to the population, development potentials, and the distance to trunk roads to extend the development benefits to rural areas. To address the connectivity issues for these communities.

22. The proposed i Road Program of RDA will improve the transport connectivity between rural communities and socio-economic centers. And under the second tranche of the project, 472.09km of the Sabaragamuwa Province will be upgraded and maintained to all-weather standard which will serve rural communities. Improved connectivity will ultimately benefit the targeted communities by increased flow of economic opportunities and accessibility to developed markets and therefore it is expected to increase income generation possibilities of rural communities. This will ultimately enhance the socio-economic development of such communities which will be a positive drive to development of the country.

C. Analysis of Alternatives

1. No Project Alternative

23. The GOSL will be initiating key infrastructure project in the province and as previously mentioned includes the Ruwanpura (Colombo - Ratnapura) Expressway, Eheliyagoda Town Development Project and construction of bypass roads to both Ratnapura and Kegalle Townships. In order to sustain and maximize the socio-economic benefits from these investments, it is 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. About 91.6% and 6.6% of the total population of Kegalle district, and 81.8% and 9.3% in Ratnapura District live in rural and estate communities, respectively having poor access to infrastructure facilities and socio-economic opportunities. The Poverty Head Count Index of Kegalle and Ratnapura Districts as of 2013 are 6.7% and 10.4%, respectively.

24. 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

25. With the i Road program, 472.09km length of rural roads in Sabaragamuwa Province will be upgraded and maintained to all-weather standard improving accessibility of rural communities to socio-economic centers will be increased and enhance income generation avenues. Improvements in road roughness, drainage, and strengthening against erosion will have their corresponding environmental benefits. However, the projected increase in traffic may increase the total emissions, traffic noise, and road crash.

D. Magnitude of Operations

1. Project Activities

26. The iRoad Program will upgrade and maintain selected road sections in Sabaragamuwa Province to all-weather standards. The selected rural roads are currently governed by *Pradeshiya Sabhas* (The local Authorities) of Ratnapura and Kegalle Districts and Provincial Road Development Authority (PRDA) of Sabaragamuwa Provincial Council. Under the project, rural roads of 285.97km in Ratnapura District and 255.66km in Kegalle District have been selected to be upgraded.

27. 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.

28. As mentioned, it is proposed to upgrade and maintain selected roads in Ratnapura and Kegalle Districts 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, i Road Program, RDA)

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

30. Improvements on cross- and side-drainage of the particular roads will be considered in locations where structures have been badly damaged or rectification of the drainage is significantly required. 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).

31. 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

32. 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.

33. Based on engineering estimates prepared for each road for Sabaragamuwa Province, approximate quantities of material required for each package are given in Table II.1.

Table II.1: Material Requirement for each package of Sabaragamuwa Province

District	Package	Aggregate (m ³)	Sand (m ³)	Sub base (m ³)	Asphalt (t)
Ratnapura	Package 1	4,880	5,788	31,706	33,963
	Package 2	6,142	5,778	11,697	43,727
	Package 3	6,967	7,690	34,400	41,653
Kegalle	Package 1	10,339	14,885	6,084	49,196
	Package 2	5,433	8,211	11,697	36,848
	Package 3	5,865	8,839	6,012	30,099

Source: i Road Program, RDA

III. POLICY AND LEGAL FRAMEWORK

A. Legal Framework

1. National Environmental Act and other applicable regulation

34. 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.

35. 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"² 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.

36. 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.

37. 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.

² 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

38. 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.

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	Department of Wildlife Conservation

Legislation	Relevance and main content	Authorizing Institution
	EIA/IEE which provide for the protection and conservation of fauna and flora of Sri Lanka and their habitats; for the prevention of commercial and other misuse of such fauna and flora and their habitats for conservation of biodiversity of Sri Lanka; and to provide for matters connected there with.	
Forest Act No. 34 of 1951	This act is to consolidate and amend the law relating to the conservation , protection and management of forest and forest resources for the control of felling and transport of timber and Forest and for matters connected therewith or incidental thereto.	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
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

Legislation	Relevance and main content	Authorizing Institution
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
Urban Development Authority (UDA) Law No 41 of 1978 and Urban Development Projects (Special Provisions) Act No 2 of 1980	<p>This law provides for the establishment of an UDA to promote integrated planning and implementation of economic, social and physical development of certain areas as may be declared by the minister to be urban development areas and for matters connected with the relevant project activities.</p> <p>Urban Development Projects (Special Provisions) Act No 2 of 1980 is an act to provide for the declaration of lands urgently required for carrying out urban development projects and to provide for matters connected there with relevant project activities.</p>	Urban Development Authority (UDA) under the ministry of Urban Development and Defence

Legislation	Relevance and main content	Authorizing Institution
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

39. 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 Stage Note: Although clearances and approval should be obtained during preconstruction stage it is valid throughout the project cycle. However this should be renewed before expiry date	Environment clearance	Implementation of the project	Central Environment Authority
	Clearance from Coast Conservation and coastal resources management department	Development activities in coastal areas	Coast Conservation and coastal resources management department
	Industrial Mining License (IML)	Operation of quarries, borrow areas and other material extraction sites	Geological Survey and Mines Bureau
	Environmental Protection License (EPL)	Operation of material extraction site including operation of asphalt plants, treatment plants etc.	CEA
	Local Government Authority Trade license and machinery permits	Deciding waste disposal sites, material storage and sites for worker camps and other project stations Trade license should be obtained for asphalt plants, batching plants, quarries etc.	Respective Provincial Council, Local authorities and respective Pradeshiya Sabha
	Explosive Permits	Blasting activities	Ministry of Defence

Project stage	Approvals	Project Related Activity	Relevant Agency
	Approval for removal of trees	Road clearance for construction	Forest department, CEA and local authorities
	Disturbance to Paddy Lands	Ground preparation for ROW and side drains	Commissioner of Agrarian Services
Construction stage	Consent from relevant government agencies	Construction of bridges, culverts and other drainage 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 etc.

2. Environmental Protection License (EPL)

40. 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.

41. 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.

42. 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.

43. 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

44. 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

45. 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.

46. 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.

47. 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.

48. 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.

49. **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.

50. 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.

51. 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.

52. 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.

53. 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.

54. 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.

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

56. 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.

57. 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.

58. 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.

59. 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

60. Selected roads to be upgraded under iRoad Program are scattered in Ratnapura and Kegalle Districts of Sabaragamuwa 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 II.2.

A. Physical Environment

1. Climate, land use, terrain and soil

61. Based on major climatic zones of the country, Ratnapura and Kegalle Districts belong to low country – wet, mid country - wet and up country – wet zones. The southern part of the Ratnapura District falls in to the mid country - intermediate zone and low country – dry zone as well.

62. 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 candidate roads

District	Agro-ecological Zone	Roads (ID) falls in to agro-ecological zone	75% expectancy value of rainfall (mm)	Description (Land use, Terrain, Soil groups)
Ratnapura	WM1a	3,10,11,12,13,25	>3300	Tea, Natural Forest Mountainous, Steeply Dissected, Hilly And Rolling RYP Soils With Semi Prominent A1 Horizon & Lithosol Soils
	WM1b	3,10,30,31,33-A, 33-B,38,40	>2900	Tea, Natural Forest, Mixed Home Gardens Steeply Dissected, Hilly & Rolling RYP Soils With Semi Prominent A1 Horizon & Lithosol Soils
	WL1a	7,8,11,12,14,14A, 16,17,19, 19-A, 20,21,22,28,29, 30,38,39,40	>3200	Tea, Rubber, Mixed Home Garden, Paddy , Export Agricultural Crops (Cinnamon) Rolling , Undulating And Hilly RYP,RYP Soils With Semi Prominent A1 Horizon & LGH Soils
	WL2a	1,3,21,23,26,27, 30	>2400	Rubber , Tea , Coconut ,Mixed Home Garden , Paddy , , Export Agricultural Crops(Cinnamon) Rolling , undulating and flat RYP , LHG & bog and half – bog soils
Kegalle	IM2a	4,5,31,32,34,35	>1800	Export Agricultural Crops, Mixed Home Gardens, Tea, Vegetables

District	Agro-ecological Zone	Roads (ID) falls in to agro-ecological zone	75% expectancy value of rainfall (mm)	Description (Land use, Terrain, Soil groups)
				Steep, Hilly And Rolling RBL & RYP Soils
	IM2b	5,32,33	>1,600	Natural forest, Mixed home gardens, Paddy, Tea, Vegetables very steep, hilly & rolling RBL,IBL,RYP, LHG, & Lithosol soils
	IL1b	34,36	>1100	Coconut, Paddy, Mixed Home Gardens, Export Agricultural Crops Rolling, Undulating & Flat RYP, RBL, RBE, LHG & Regosol Soils
	IL1c	36	>1,300	Mixed home gardens, Rubber, Paddy, Sugar cane Rolling, Undulating & flat RBL, RBE, LHG & IBL soils
	DL1a	37	>1100	Mixed Home Gardens, Paddy, Forest Plantations, Scrub, Sugar Cane, Natural Forest Rolling & Undulating RBE & LHG Soils
	WL2b	28,30,31,32,33,34,35,36,37,38,39,40,41 (parts I to IV),42,45,46,52,57,59,60,61,64,65,66,68,69,	>2,200	Rubber, Coconut, Mixed home gardens, Paddy Steepy dissected, rolling & undulating RYP, RYP soils with strongly mottled sub-soil, RBL & LHG soils
	WL3	62	>1,700	Coconut, Fruit Crops, Mixed home gardens, Paddy Rolling & Undulating RYP soils with soft and hard laterite, LHG & Regosol soils
	WM2b	43, 44, 48, 50, 54, 56, 51, 53, 55	>1,400	Mixed home gardens, export agriculture crops, tea, paddy, rubber, steepy, hilly and rolling, undulating and steep, RBL, IBL, LHG soils

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

63. Rainfall pattern of Sabaragamuwa Province is influenced by southwest 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 4,000 to 5,000 mm. Rainfall distribution is also influenced by the second inter-monsoon from October to November wherein in the Weweltalawa Estate in Yatiyantota, Kegalle District records 1,219 mm. (Source: <http://www.meteo.gov.lk/>). The average temperature in the province varies from 24-35°C with high humidity levels.

2. Hydrology

64. **Kegalle District:** Kegalle district consists of catchments Kelani River, Ma Oya and Attanagalu Oya rivers. The Kelani River basin covers the majority of the area of the Kegalle 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, Kegalle District

Road ID	Hydrologically sensitive area
1	Road runs parallel to a minor stream (tributary of Kelani River) from 1.3km to 1.8km (LHS) and from 1.2km to 1.4km (RHS). Road crosses minor streams located from 1.3km to 1.4km
3	Streams were observed within 2.1 - 2.2km (Road is near to minor stream of Walihil Oya on LHS), 1.2km-1.3km (minor stream on RHS)
4	Streams (tributaries of Kelani River) were observed within; 0.2 - 0.4km, 0.7 - 0.8km, 1.2 - 1.8km and 2.5 -2.6km running parallel to the road. Road crosses tributaries of Kelani river within 1.3 - 1.4km and 1.9 - 2.5km.
5	Streams were observed at, 2.7 - 2.8km, 3.4-3.5km, 3.4-3.5km and 4.0km-4.1km crossing the road. And also minor waterfalls were observed within 3.8km-3.9km 5.3km-5.5km and 6.4km-6.5km.
6	The road crosses a stream at 1.8km
10	Road crosses streams within 1.8 - 1.9km
11	Road crosses Ritigaha oya at 0.1 - 0.2km and 2.4 - 2.5km
12	Road runs parallel to Gurugoda stream from 0.0km to 0.3km. Road crosses canals at 0.7km, 1.5km, 2.5km and 4.4km
14	Road crosses streams at 0.1km, 0.4km, 1.1km, 2.5km, 3.4km and 4.0km
15	Road crosses tributary of Kelani river at 0.1km and 1.5km and runs parallel from starting of the road to the end on RHS
16	Road crosses Karanagama stream at 1.0km and its tributaries at 0.7km, 2.7km and 3.2km
18	Road crosses streams at 0.8km, 1.4km, 2.0km, 2.3km and 2.7km
19	Road runs parallel to Aladeniya Ela (a stream) from starting to 0.1km (RHS) and crosses it at 0.1km. Road crosses tributaries of Aladeniya Ela at 0.5km, 1.2km, 1.7km and other minor streams 1.9km, 2.3km and 2.6km
20	Gurugoda oya flows at the starting point. Minor streams are observed at 1.1 - 1.2, 1.5 - 1.6, 2.1 - 2.2, 2.5 - 2.6, 5.2 - 5.3, 6.2 - 6.3, 7.4 - 7.5 and 8.2 - 8.3km. Road runs parallel to Wangadai Molgaha ela stream from 2.2km to 2.3km on RHS
22	Road crosses streams within; 0.4 - 0.5, 1.3 - 1.4, 1.6 - 1.7, 2.0 - 2.1km
24	Road runs parallel to Indurana water stream (3.3 - 3.4)km (RHS) and two other minor streams at 0.2 - 0.3 (RHS) and 3.2 - 3.3km (LHS)
26	Road crosses minor streams at 0.1km, 1.0km and 2.2km
27	Streams were observed within 0.3 -0.4 and 2.6 - 2.7km
28	Stream is crossed at 1.4km
31	Stream is crossed at 2.9km
32	Two minor streams are crossed at 0.2 – 0.3km and 1.4 – 1.5km
33	Road crosses Gurugoda Oya within 3.4 - 3.5km
35	Road crosses a tributary of Gurugoda Oya at the starting point
38	Streams are crossed at 0.6 – 0.7km, 1.0 – 1.1km, 1.8 – 1.9km. Also there are two streams flow parallel to the road on 0.7 – 1.0km and 1.2 – 1.3 km (RHS) of the road.
43	Kuda Oya joins to Maoya on RHS of the road at the starting point. Streams are found at 0.1 -0.2, 1.4 -1.6, 2.1 -2.2km
45	Ma Oya is found adjacent to the road at 0.8km on RHS.
50	The following minor streams are crossing the road; 0.5 – 0.6km, and minor stream runs parallel to the road within 1.4km (RHS) and 4.1 – 4.2 (RHS)

51	An irrigation canal is flowing on RHS and LHS of the road within 2.2km-2.3km, 2.9-3.0km and 3.5-3.6km
54	Ma Oya is crossed by the road at 1.9km
60	Within 0.4 – 0.5km, a minor stream is crossed and from 0.8 to the end (RHS) there is a Bisowala Ella stream.
65	Road crosses minor stream at 0.1km and from 0.2 to 1.2km Kahagalla Oya (a stream) is observed which is a tributary of Maha Oya.
70	Streams are crossed at 2.2km and 2.5km.

65. **Ratnapura District:** The major catchments located in Ratnapura District are of Kalu Ganga, Walawe, and Gin Ganga streams. The Kalu Ganga catchment is the largest covering almost the entire district while the Walawe Ganga catchment is located in the southern part of the district and consists of seasonal streams. Perennial streams are observed in Kalu Ganga catchment as it is located within the wet zone. Table IV.3 below presents the candidate roads in Ratnapura District that crossed or located along rivers and streams.

Table IV.3: Road Sections that Cross or Located Near Rivers and Streams, Ratnapura District

Road ID	Streams crossed by the road
1	Tributaries of Wey Ganga (stream) at 0.0km and 5.8km and other minor tributaries at 2.1km, 2.9km, 3.9km, 4.3km, 5.8km, and 7.2km
2	Minor tributaries of Walawe Ganga (River) 1.9km, 3.5km, 4.8km, 5.5km, 6.1km, 7.1km and 10.2km
3	Road crosses minor tributaries of Wey Ganga basin at 0.325km, 0.55km, 1.7km, 1.9km, 2.3km, 4.0km, 4.8km, 5.9km, and 8.8km
4	Minor tributaries of Walawe Ganga basin at 1.9km, 3.5km, 4.8km, 5.5km, 6.1km, 7.1km and 10.2km
5	Minor tributary of Walawe Ganga basin at 2.4km
7	Road crosses minor tributaries of Kalu Ganga (a river) within 3.2-3.4km, 5.6-5.7km and 6.2-6.3km
8	Road crosses Kolon alla stream at 0.35km
10	Road crosses Weddagala river at 0.15km and two streams at 9.3 - 9.4km and 11.1 - 11.2km. Road runs parallel to Kudawa river from 6.2km to 6.7km (RHS)
11	Road crosses minor tributaries of Kuru Ganga (stream) at 1.1Km, 1.5Km and 15.3Km
12	Road crosses Kuru Ganga at 0.4Km and its tributaries at 0.9Km and 2.3Km
13	Road crosses Dummavilla ela 7.0km, Rathganga river 8.2km, Kudawa ganga 8.7km, Laguwawa ganga 11.2km, Negalme ela 11.5km, Nawadi ela 12.5km, Kadan ela 12.9km, Mapalana ella 14.4km, Minuwan Kandura oya 15.6km, Kaluganga 16.5km
14	Road crosses minor tributaries of Kalu Ganga at 0.8Km and 1.5Km
16	Road crosses minor tributaries of Kalu Ganga within 0.1-0.2km and 0.4-0.5km sections. A causeway is located within 2.3km to 2.4km
17	Section from Muruthangala Dewrumpitiya estate via Kaluandura: Road crosses minor streams at following locations of the road. 3.1-3.2, 3.3-3.4km (Paragahadola stream). Road runs adjacent to the Getahetta ela stream (RHS) from 0.7-0.8km
20	Road crosses tributaries of Kalu Ganga at 0.2Km, 1.0Km, 1.6Km, 2.1Km, 2.19Km, 2.25Km, 2.6Km, 2.8Km, 3.0Km, 3.5Km, 3.6Km, 3.7Km, 3.9Km, 4.4Km, 4.7Km, 4.8Km, 4.9Km, 5.0Km, 5.1Km and 5.3Km

21	Road crosses Denawaka Ganga at 0.2km, 2.4km, 3.3km and runs parallel to the stream at the end of the road to the RHS
22	Road crosses Wey Ganga at 0.4km
23	Road crosses Panawenna ela (a stream) at 0.0km and a stream at 4.9km
25	Road crosses Alupola Dola at (1.45- 1.9)km, 3.05km and 3.95km
26	Road crosses two tributaries of Rakwana stream at 2.8km, 4.4km and Rakwana stream at 3.8km
27	Road traverses across the following streams; Gabbale Ela at 1.0km and 1.4km, Digandara Ela at 3.4km, Unknown streams at 4.8km, 5.1km and 7.5km, Rakwana Ela at 7.65km
28	Road crosses a minor stream at 1.6Km
29	Road crosses Nirieli oya (a stream) at 0.9km and its tributaries at 0.5 - 0.8km and 1.2 - 1.4km. Nirieli oya is observed parallel to the road at 1.6km and within 2 to 2.3km on RHS
30	Road crosses Sidurupitiya river at 0.35km
31	Road crosses streams at 0.1, 0.9, 2.8, 3.1, 3.8, 4.2, 13.0, 18.3, 6.4 and a river at 12.3km
32	Road crosses a minor stream located at 6.9Km
33	Road crosses minor streams located at 4.0Km and 4.3Km
34	Road crosses minor streams located at (0.6-1.6)Km, 3.8Km, 4.1Km and 3.4km
35	Road crosses Kosgaha dola (minor stream) at 1.6km and Pili ela (minor stream) at 2.3km
38	A tributary of Kukule Ganga (a stream) runs parallel to the road on LHS from 7.2 to 8.4 (about 25 to 50m away from road edge) and very close to the road from 8.4 to 8.7km
39	Road starts adjacent to Kalu Ganga and crosses Ma dola (minor stream) at 3.8km and Pussella dola (a tributary of Kalu ganga) at 0.4km

3. Air Quality and Noise

66. 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.4.

Table IV.4: 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)

67. 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.

68. 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

69. **Landslides:** Based on the landslide hazardous zoning maps of National Building Research Organization (NBRO), Ratnapura and Kegalle Districts have been identified as landslide prone districts. 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, these districts are comprised of expected landslide areas and locations with modest level of landslide hazard (Please refer appendix IV.1 for landslide hazard maps).

70. Ratnapura District is the one of districts which records highest number of people affected due to landslides and the number of people affected during the period from year 1974 to 2008 falls to the range of 6,685 to 30,541. On the other hand, Kegalle district falls to the range 1,195 – 6,685 (Source: www.desinventar.lk). As per NBRO, most of landslides occurred in the province are as a result of human activity as well as due to natural causes. And it is revealed that 4/5th of landslides occur due to human activity.

71. 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.5 below summarizes such locations identified during field reconnaissance.

Table IV.5: Candidate roads along which slope failures and previously occurred landslides observed

No.	Road ID	Sensitive area
Ratnapura District		
1	1	3.8km (RHS)
2	7	1.6-1.7 km (LHS), 4.7 - 4.8km (RHS), 4.9 - 5.0km (RHS), 5.6-5.7km (LHS)
3	8	2.1km
4	10	0.5 - 0.6km (RHS), 0.9 - 1.1km (RHS), 7.0 - 7.1km (LHS), 8.0 - 8.9km (RHS), 9.0 - 9.1 km (LHS), 9.3 - 9.4km (LHS)
5	17	0.9 -1.1km (LHS)
6	25	0.8km (RHS), 1.0km (RHS), 0.8 - 0.9km (RHS), 1.0 - 1.1km (RHS), 1.7- 1.8km (RHS), 2.5 - 3.3km (RHS)

7	27	1.4km (LHS), 2.2km (LHS), 7.0km (LHS)
8	32	4.8 - 4.9km and 7.5 - 7.6km
Kegalle District		
9	1	0.2km-0.3km
10	6	Road related active landslide at 2.8km on RHS of the road
11	8	Active landslide is observed in between 4.8 - 4.9km RHS.
12	11	0.4km - 0.5km
13	18	Active landslides at 3.9km to 4.2km RHS (minor slope failure).
14	14	slope failures observed at 0.7km & 3.5km
15	33	2.0km and 1 - 2.3km
16	36	3.1 – 3.2km, 3.8 - 3.9km and 4.9 – 5.0km RHS
17	37	2.4 – 2.8km
18	55	1.0km - 1.1km
19	65	Minor slope failures at 3.8km on RHS
20	69	Rock falling at 0.1 and 0.2km

72. **Floods:** Ratnapura 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 Kiriella, Kuruwita, Elapatha and Ratnapura DS Divisions. The most serious flood since 1948 was experience in May 2003 in Ratnapura Town. Walayal Dola, Yatipaluwa Ela and Kotiyangodakanda areas of Kiriella DS Division; Matuwagala, Thunbandahena and Dodampe of Kuruwita DS Division; and Raddalla, Karangoda, Watakeliyagala areas of Elapatha DS Division are flood prone according to DMC.

73. In contrast, no severe flood situation was recorded in Kegalle District. Localized flooding occurs however, to spilling of streams with no impacts to properties or life. For example, the starting point of Parawalathenna – Thelaramba (Road ID: 2) of Kegalle District gets inundated due to overflowing of Kelani River. Table IV.6 presents flood prone areas recorded in each road during the field inspections.

Table IV.6: Flood Prone Areas along Project Roads

No.	Road ID	Flood prone area
Ratnapura District		
1	10	Flood plain of Kudawa river at 3.0 - 3.4km and 12.1 - 12.2km
2	26	Crossing point of the stream at 2.8km
3	29	Road sections at 0.8- 1.1km and 1.7 -2.2km
4	30	Road section at 0.3 - 0.9km
5	31	Road sections at 6.8-7.2km, 7.7 -8.1km and 10.9 -11.0km
Kegalle District		
6	9	0.2 - 0.3km, 3.6 – 3.7km, 4.3 – 4.8km
8	19	1.4km – 1.5km and 2.1km – 2.7km.
9	26	Flood prone area at 0.1 – 0.2km
10	24	2.2km to 2.3km and from 2.9km to 3.0km
11	55	1.6km to 1.8km
12	68	1.1 - 1.2km.
13	69	Around 0.1km
14	30	Around 1km
15	32	0.6km – 0.7km, 1.3km -1.4km

16	33	0.2km - 0.3km
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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. No strict nature reserves, nature reserves, national parks and sanctuaries are located along or near to any of the project roads in Sabaragamuwa province. The following forest areas are found within/adjacent to the project area.

2. Forest areas located within/adjacent the Sabaragamuwa Province

75. The summary of forest areas located within/adjacent the project area is presented in the table IV.7.

Table IV.7: Roads within/adjacent to forest areas of Sabaragamuwa Province

Road ID	Road Name	Length of the Road (km)	Name of the forest Area	Length of the Road Section inside the sensitive area (km)
Ratnapura District				
31	Rassagala – Heramitigala – Samanalawaththa – Massenna Road	16	Morahela Conservation Forest reserve	The road is within the forest reserve from around 3+860km to 4+550km & from 5+000km to 6+450km
27	Amunukara Junction to Gabbela Digandala Demuwatha Road	7.8	Nahitimukalana Forest reserve	The forest reserve is located about 60m away from the road from around 3+630 to 4+850km
10	Weddagala – Kudawa – Wewagama Road	12	An adjoining forest patch to the Sinharaja National heritage and wilderness area	The road is within the forest from 4+000km to 5+200km & from 5+500 to 6+400km
7	Dumbara Manana Wathukaragama to Dumbara Kovila main Road	7	Kuttiyakanda Forest reserve	The forest plantation is located about 50m on RHS of the road from 5+520km to 6+570km
Kegalle District				
2.20	Atalawaththa Wangedimole Ela Hedungama	9.65	Lenagalla Forest reserve	The forest reserves is on RHS of the road at 3+300km & 5+400km to 7+100km

	Puhulwala Salgala Welhella			
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76. Rassagala – Heramitigala – Samanalawaththa – Massenna road (road ID: 31) in Ratnapura District is located within Morahela Conservation Forest from 3+860km to 4+650km and from 5+000km to 6+450km. The forest area of 1,190ha has been gazetted in 31st March 1893 under gazette number 5206.

77. Weddagala – Kudawa – Wewagama road (road ID: 10) proposed in Rathnapura District is located within an adjoining forest patch to the Sinharaja National Heritage and Wilderness area from 4+000km to 5+200km and from 5+500km to 6+400km. And the particular road does not cross the Sinharaja National Heritage and Wilderness Area.

78. 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).

C. Socio - Economic Environment

1. Condition of road infrastructures

79. Roads are the main transportation mode in Ratnapura and Kegalle districts. There are nine “A” class” roads and 39 “B” class roads located within or crossing the province. There is plenty of C, D, and E class roads (local authority roads) in the two districts. In 2014, the government granted the approval for the construction of Ruwanpura Expressway which will connect Rathnapura with Sri Lanka’s Expressway Network. In addition to roads, rail transport is also a prominent transportation mode with Polgahawela and Rambukkana are popular railway stations in Kegalle 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 Highways, Ports and Shipping planned to upgrade 38 rural roads (254.97km) in Ratnapura district and 63 rural roads (217.12km) in Kegalle 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. 81.8% in Ratnapura, and 91.6% in Kegalle (Refer table 4.10 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.8 shows the distribution of population by sectors and population density. Majority of population in all two districts are living in rural areas. Second highest category is the estate population. Kegalle district shows the highest population density than Ratnapura district, i.e. 497 persons per km².

Table IV.8: Distribution of Population by Sector

District	Total Population	Population by sector (%)			Population Density (persons/km ²)
		Urban	Rural	Estate	
Ratnapura	1,082,838	8.9	81.8	9.3	335
Kegalle	836,659	1.8	91.6	6.6	497

Source: Department of Census and Statistics, 2012

83. **Population by ethnicity:** With regard to ethnicity, majority of population in these two districts is Sinhalese i.e. 86.8%, and 85.6%, in Ratnapura and Kegalle districts, respectively. Ethnic category such as Indian Tamil and Sri Lankan Tamil get second and third places. Table IV.9 shows the population data of affected districts by ethnicity.

Table IV.9: Distribution of population by the ethnicity

District	Sinhala		Sri Lankan Tamil		Indian Tamil		Moor		Burgher		Other	
	No	%	No	%	No	%	No	%	No	%	No	%
Ratnapura	924,244	86.8	54,658	5.1	62,595	5.9	21,550	2.0	325	0.03	905	0.1
Kegalle	715,723	85.6	20,250	2.4	41,468	5.0	57,952	6.9	577	0.07	633	0.1

Source: Department of Census and Statistics, 2012

3. Main economic activities

84. **Agriculture:** Agriculture is the prominent economic activity and carried out very successfully in these two districts. As per the Department of Census and Statistics (2012), in Ratnapura district, 43.0% of the total population is engaged in agricultural sector and in Kegalle district is 18.8%. Tea and rubber are the main agricultural crops in these two districts. According to the Department of Census and Statistics, Ratnapura and Kegalle districts have 94,767 and 18,922 acres of cultivated tea lands, respectively. These two respective districts have 54,725 and 87,902 acres of cultivated rubber lands. Paddy cultivation presently faces an uncertain future in Ratnapura district as many farmers are giving up their paddy land and switching to gem mining which is a more productive. Coconut, clove, pepper, coffee and cocoa are also grown well in Kegalle district.

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

Table IV.10: Employment by Major Industry Group - 2013

District	Agriculture	Industry	Services
Ratnapura	43.0	27.5	29.5
Kegalle	18.8	35.3	46.7

Source: Department of Census and Statistics, Labour Force Survey - Annual Report 2013

86. **Industries:** In Ratnapura district, there are 6,450 industrial establishments and out of total employed population, 27.5% of them are engaged in this sector. Ratnapura town area is famous for gem industry. There are 45 garment factories in the district that employ youths in the district. Agricultural related industries such as tea and rubber manufacturing industries and paddy processing centers also prominent industries in the area. There is a well-established tourism industry in this district. The mountain Sri Pada -Adam's Peak is a place of religious importance to the Buddhists, Hindus and Muslims. The Pilgrimage season starts on Poya (full moon) day in December and runs until the start of the South-West Monsoon in April. People from above religious groups come on pilgrimage to worship and make offerings to their deities. Bopath Ella, Sinharaja Forest Reserve, and Udawalawe National Park are another tourists attracted places in the district.

87. There are 6,931 industrial establishments in Kegalle district employing 35.3% of the total population (please refer table IV.10 and IV.11 for details). Mineral is the leading industry in the district. The Bogala graphite is one of the most notable mine and it contribute half of the

total mineral export of Sri Lanka. Elephant Orphanage of Pinnawala is famous among local and foreign tourists. Pottery and Thalkola handicrafts have been identified as potential industries in the district.

Table IV.11: No. of Industrial Establishments

District	No. of industrial establishments	No. of employees
Ratnapura	6,450	42,265
Kegalle	6,931	30,961

Source: Department of Census and Statistics, 2012

88. **Education:** Table IV.12 shows the distribution of the population by education attainment in these two districts. Education categories like General Certificate Examination – Ordinary Level (G.C.E.O/L), General Certificate Examination – Advanced Level (G.C.E-A/L), Degree and above shows considerably good situation in Kegalle district compared to Ratnapura district.

89. During the field reconnaissance, several schools are located along the project roads e.g. Metihakwala Maha Vidyalaya at 2 + 750km on RHS of Hunuwala junction to Metihakwala – Polwatta hena – Hallinna junction road. Prachngadeera Vidyalaya at 4 + 100km on RHS of Panawenna Rubber factory - Panawenna South – Poronuwa road.

Table IV.12: 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)
Ratnapura	5.7	26.2	42.2	14.5	10.0	1.6
Kegalle	3.8	22.7	41.7	17.0	12.5	2.3

Source: Department of Census and Statistics, 2012

90. **Household income:** As per 'Household Income and Expenditure Survey - 2009/10' of the Department of Census and Statistics, the monthly mean and median household income of Ratnapura district is relatively higher than Kegalle district. This is due to largely spread plantation economy, well-established tourism industry and Gem mine and selling.

Table IV.13: Mean and Median Monthly Household Income by District -2013

District	Average monthly income	
	Mean (Rs)	Median (Rs)
Ratnapura	22741	14356
Kegalle	18062	13114

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

91. **Poverty Situation:** Table IV.14 shows poverty headcount index of country and project districts. Kegalle district poverty headcount index is 6.7 and Ratnapura is 10.4.

Table IV.14: Poverty Headcount Index of Affected Provinces and Districts

District	Poverty Headcount Index	
	Year – 2010	Year - 2013
Ratnapura	10.5	10.4
Kegalle	10.8	6.7

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

4. Existing Infrastructure facilities

92. **Energy source of households:** In the project districts, electricity is the main source of household lighting accounting for 81.5% and 86.5% of the households in Ratnapura and Kegalle District, respectively. Kerosene is the second major source accounting for 15.7% and 11.8% of the households, respectively.

Table IV.15: Principle Type of Household Lighting Source - 2012

District	Electricity from national grid	Rural Hydro power projects	Kerosene	Solar power	Other
Ratnapura	81.5	1.4	15.7	1.2	0.1
Kegalle	86.2	1.6	11.8	0.4	0.0

Department of Census and statistics, 2012.

93. **Drinking water:** As shown in Table IV.16, majority of households in Ratnapura district use pipe-borne water at 48.8% of the total households. In Kegalle District, majority of households use protected well water for drinking purpose at 52.0% rate while 12.3%, and 11.1% of total households get water from river, tank, stream, or spring.

Table IV.16: Source of Drinking water

District	Protected well	Unprotected well	Pipe born water	River/tank/ streams/spring	Other (Tube well, bottled water, etc.)
Ratnapura	30.1	5.9	48.8	12.3	2.9
Kegalle	52.0	8.8	27.0	11.1	1.1

Source: Department of Census and statistics, 2012.

(C) Sanitary Facilities

94. As shown in Table IV.16 majority of households in these two districts use private toilets at 89.4%, 90.2% in Ratnapura district and 90.4% in Kegalle district. There are 13.0% and 8.8% households in these two respective districts sharing the toilets with other families.

Table IV.17: Type of Toilets - 2012

District	Private	Sharing with others	Common/Public toilets
Ratnapura	86.5	13.0	0.5
Kegalle	90.4	8.8	0.8

Source: Department of Census and statistics, 2012.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES

95. 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

96. **Impacts due to Landslides:** As Ratnapura and Kegalle Districts are 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.

97. 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 to 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.

98. **Road construction in flood prone areas:** As described in Chapter IV, most of the roads in Ratnapura 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 to minimize above impacts.

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

99. 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

100. 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

101. 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.

102. 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.

103. 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

104. 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.

105. 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.

106. 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

107. 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.

108. 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.

109. 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

110. 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.

111. 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.

112. 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

113. 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.

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 strict nature reserves, nature reserves, national parks and sanctuaries are located along or near any of the project roads in Sabaragamuwa province.

115. **Impacts on terrestrial flora:** During the construction stage loss of vegetation within the ROW is inevitable. 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 forest lands. Hence there will be no direct impact on such areas. Still there 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. Impacts Due to Extraction and Transportation of Construction Materials

125. 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.

126. 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.

9. Requirement of lands for the road upgrading

127. 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 piling, 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.

10. Safety of Workers and Public

128. 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 Equipments (PPE) to be used at every time involved in when construction activities and high visibility jackets at night
- Ensuring that plant and vehicle operators are properly licensed and trained
- Arranging for the provision of first aid facilities, readily available trained paramedical personnel, and emergency transport to the nearest hospital
- Arranging for regular safety checks of vehicles and material, and allocation of responsibility for this
- Ensuring that quarry operations, particularly blasting is carried out and supervised by trained personnel, that explosives are stored in a secure location and that all due precautions are taken to ensure that blasting does not induce rock falls
- Provision of hazard warning signals around construction sites, and directing vehicle and pedestrian traffic away from work sites
- Provision of traffic management plans during construction including barricading of openings and lighting at night where required.

C. Operational Phase

1. Impacts on water resources

129. 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.

130. 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

131. 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 while comply with the recommendations of NBRO.

3. Disposal of unsuitable material

132. 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

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

5. Pedestrian and commuter safety

134. 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

135. 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

136. 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

137. 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 Sabaragamuwa 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

138. The Transport Emissions Evaluation Model for Projects (TEEMPT) developed by Clear Air Asia³ 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.

139. 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.

1. Key road upgrading features

140. iROAD will upgrade 101 rural roads with a total aggregated length of 472.09 kms distributed across Sabaragamuwa Province. No land acquisition will be allowed and all improvements will be limited to the existing 1-lane configuration with 3.0-3.5 m 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.

³ 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.

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

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

Table V.1: CO2 Emission Factors

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

143. Finally, emission from road construction were estimated using CO2 emissions stemming from the different activities related to the rural road construction in Sri Lanka at 11,000 kg/km as estimated by R. Santhini (2006)⁴.

2. Estimated Carbon Emissions

144. For each kilometer of rural road upgrading in Sabaragamuwa, CO2 emission from construction is estimated at 11 tons. Total annual emission with the project is estimated at 33 tons.

3. Climate Risks and Adaptation needs

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

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

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

⁴ R. Santhini (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>

147. **Landslides triggered by precipitation.** Heavy rains can cause disruption of the road networks, decreased accessibility, erosion of roads and embankments, surface water drainage problems, slope failures, landslides, among others. Increased river flow resulting from precipitation and storminess may result in damages to bridges. Bridge/culvert capacities are reduced or exceeded, causing upstream flooding to occur.

148. 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. The total cost of measures for flood mitigation and cost of measures for slope protection are given in table V.2.

Table V.2: Cost for disaster mitigation

District	Cost (Rs.)	Percentage of the total civil cost
Cost for flood mitigation		
Ratnapura	66,512,508.80	1.09
Kegalle	85,310,299.38	1.6
Sub Total (a)	151,822,808.18	1.34
Cost for slope protection		
Ratnapura	29,716,121.16	0.5
Kegalle	47,592,327.31	0.78
Sub Total (b)	77,308,448.47	0.68
Total (a+b)	229,131,256.65	2.01

Source: Engineering estimations

149. The costs for taking these measures add up to a total of Rs. 229.13 million (about 1.76 million US\$). This is approximately 2% of the total civil works costs. It must be pointed out that these measures would have been considered anyway in the conventional design as the issue of flooding and erosion is a threat to the sustainability of the road. However, these measures also contribute to adaptation of the roads for future increases in precipitation and storm surges. This risk screening and risk identification exercise has helped to ensure that all roads with climate risks have adequate risk mitigation or adaptation measures.

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

A. Environmental Management Plan

150. 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.

151. 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

152. The Grievance Redress Mechanism (GRM) is necessary to support general public to resolve their problems due to project activities through mutual understanding and consensus reaching process with relevant parties. The ADB safeguards policy 2009 also provide guidance to establish GRM to address the affected peoples' concerns, complaints, and grievances about the project's environmental performance.

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

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

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

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

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

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

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

158. Committee meetings will be conveyed by the Secretary, the PIU representative. The chairman of GRC is expected to take appropriate actions with the consultation of other committee members within three weeks' time and to be informed immediately to affected people.

159. The issues that could not be resolved by level one GRC will be forwarded to DS level GRC within seven days (working days) of the final decision of GN level GRC.

160. The flow chart of the GRM is presented in figure VI.1.

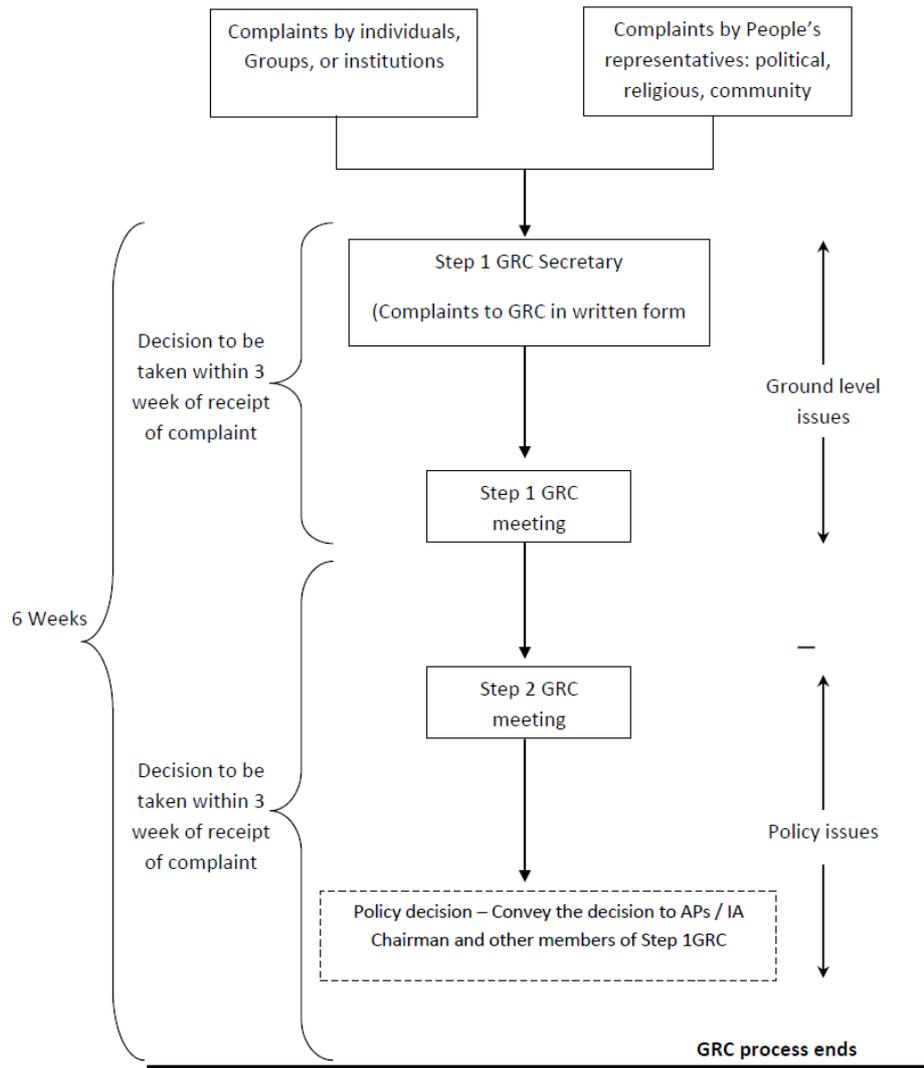


Figure VI.1: GRM process

VII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Public consultation process

161. 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.

162. People in the project area (both males and females) have positive ideas about the road development and their ideas indicate the importance of the road network development in the Sabaragamuwa 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

163. 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 both DOFC and DWLC confirmed that there will not be major impacts to the protected areas since road improvement will be strictly within the existing ROW.

B. Disclosure of information

164. 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.

165. 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

166. 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.

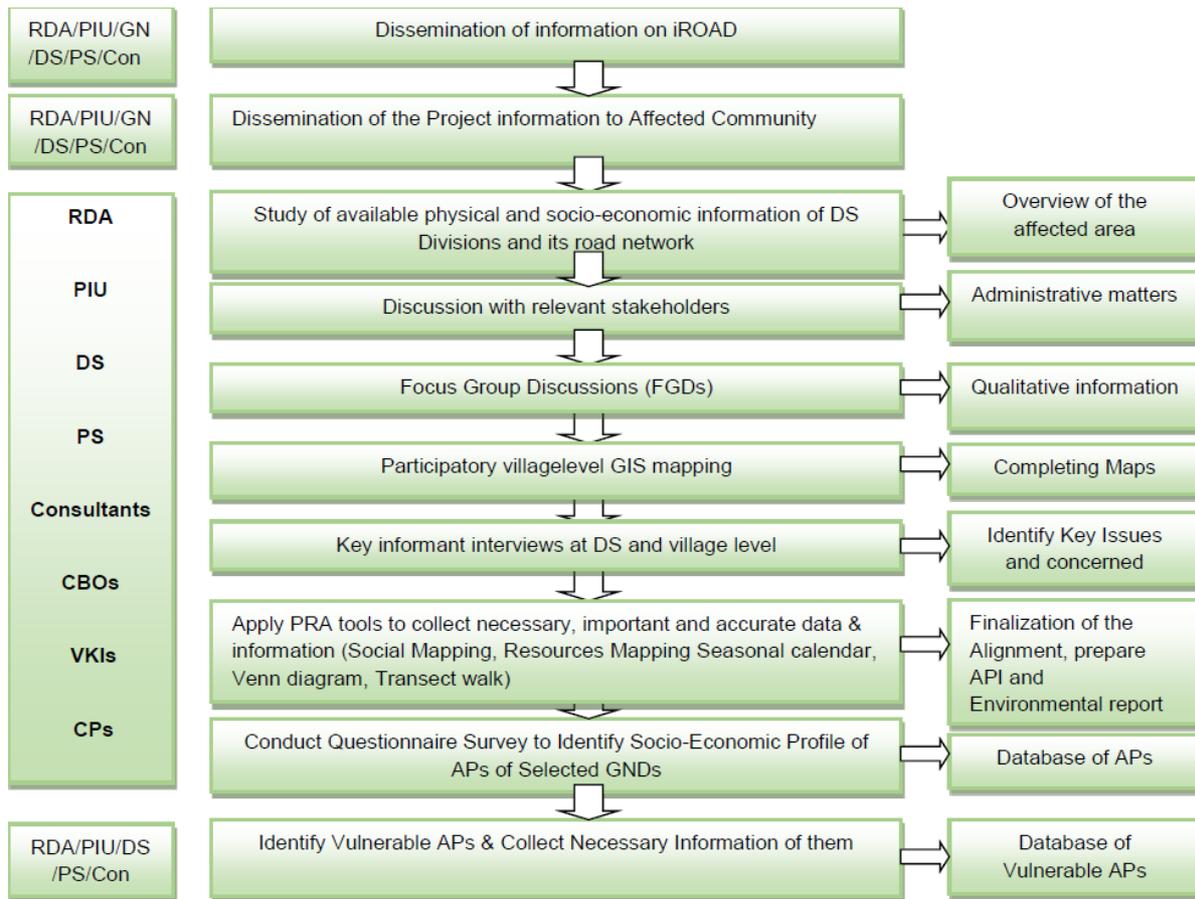


Figure VII.1: Stages of participatory project preparation

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

167. The transect walk for Sabaragamuwa province was carried out by the Social safeguards consultant. The outcome of the transect walk carried out for Rathnapura district was prepared on July 2014 and for Kegalle district on August 2014. The reports are available for reference at PIU. The transect walk conducted for road code 17 of Rathnapura district and road code 10 of Kegalle district are attached in appendix VII.1 as samples.



Figure VII.2: Transect walk in Rathnapura



Figure VII.3: Transect walk in Kegalle

VIII. CONCLUSION AND RECOMMENDATIONS

168. The information on existing social environment suggests that agriculture is a main occupation for most of rural population in the Sabaragamuwa 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.

169. This Initial Environmental Examination has discussed various aspects of the proposed rehabilitation and upgrading of 114 road sections comprising 541.63km length. Contractors are liable to keep the roads in operational status for approximately 3 years after the 2 years of construction period.

170. 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 DWLC.

171. 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.

172. The road network improvement in Sabaragamuwa 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.

KEGALLE DISTRICT - SABARAGAMUWA PROVINCE
RURAL ROAD LIST

Serial No	D.S.D	Road ID	Road Name	Road Category	Length (km)	Total
1	Yatiantota	1	Theligama - Ganepalle	PRDA	1.80	17.10
2		3	Nawata - Parussella	PRDA	2.00	
3		4	Parussella - Ranpaumgama	PS	3.10	
4		5	Batakitta - Mahabge	PRDA	7.20	
5		6	Seepoth - Nagastenna	PRDA	3.00	
6	Bulathkohupitiya	10	Thannimale - Maharangalla	PRDA, PS	3.50	11.50
7		11	Bulathkohupitiya Dedugala Road 8 th Bend - Kalupahana watta Neluwakkana -Narangalla	PS	3.00	
8		12	Panapitiya Junction - Poonahela Panapitiya - Ambamalla	PRDA	5.00	
9	Deraniyagala	7	Maliboda - Magala Ingiriyawatta	PS	3.00	11.70
10		9	Deraniyagala Hospital - Dikella/Dehiovita	PRDA, PS	8.70	
11	Dehiovita	14	Warakatenna - Meegastenna	PRDA	4.20	34.45
12		15	Ambalanpitiya Bridge - Godagampala Junction	PRDA	3.00	
13		16	Atulugama Junction to Kanangama Udukumbura Road Tenkiyawaththa Road	PRDA	3.50	
14		17	Boralankada Udabage Junction to Iyalawatta Kelani River	PRDA, PS	10.50	
15		18	Katulanda Road	PRDA	5.50	
16		19	Debegama - Kelegama - Napawala	PS	3.25	
17		70	Mniyamgama to Welangalla kadamandiya	PRDA	4.50	
18	Ruwanwella	20	Atalawaththa Wangedimole Ela Hedungama Puhulwala Salgala Welhella	PS	9.65	37.30
19		21	Kithalangamuwa Batuwana Road	PS	5.60	
20		22	Kadigamuwa - (Kiriwana Junction) Narangastenna Teample	PS	1.20	
21		23	Mahalla - Troywatta - Eke kanuwa Road	PS	4.00	
22		24	Indurana - Amithirigala Road	PRDA	6.80	
23		26	Pamankade - Mahadeniya Road	PRDA	4.80	
24		27	Imbulana - Weddawala - Gonagaldeniya Road	PRDA	5.25	
25	Galigamuwa	33	Arandara Dewalaya - Boyagoda - Holombuwa Road	PRDA, PS	3.90	27.20
26		34	Hapudeniya - Malwana	PS	1.80	
27		35	Pindeniy Bridge Weliwanguwa	PS	1.90	
28		36	Etikeeriyagolla - Naberiyawa - Atugoda Road	PRDA	5.00	
29		37	Makuddala Ayurvedic Center - Kahatagolla Junction	PS	3.00	
30		38	Imbulgala to Ambanpitiya - Kumarage Mawatha	PS	3.60	
31		39	Alawattenna - Dedigama	PS	5.00	
32		40	Palapoluwa - Kumbalgama	PS	3.00	

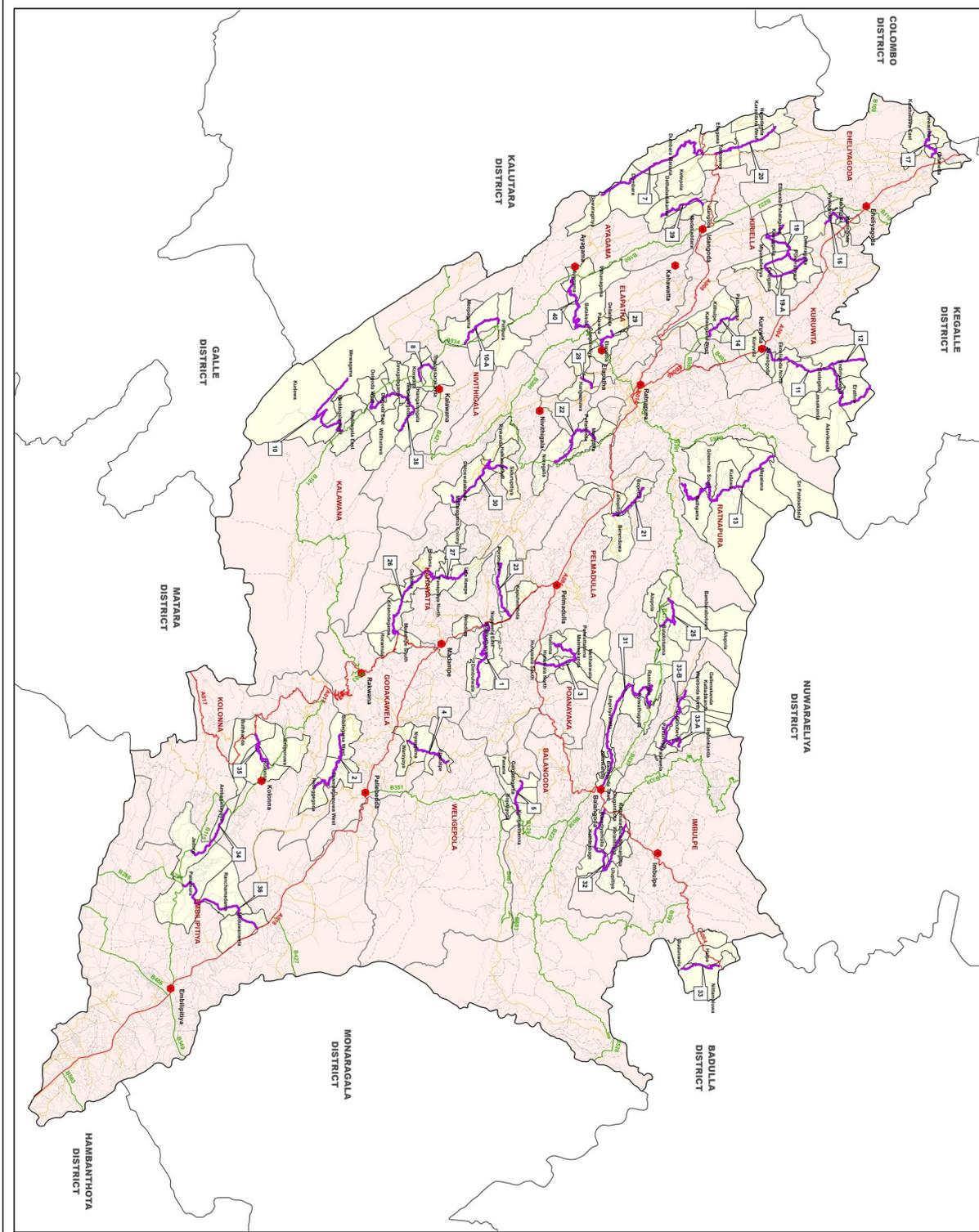
Serial No	D.S.D	Road ID	Road Name	Road Category	Length (km)	Total
33	Warakapola	57	Tholangamuwa - Ihalagama Gasnawa Road	PS	0.98	13.75
34		58	Algama - Dikdeniya Road (Algama Kanista Vidyalaya,Ihalagama Road	PS	4.00	
35		59	Dedigama - Veneriwaththa - Koongahamula Pitadeniya Road	PS	3.30	
36		60	Dedigama - Herathgoda - Othnapitiya Road	PS	1.81	
37		61	Dummaladeniya - Meneripitiya - Meerigama Road	PS	1.25	
38		63	Ambepussa Dadli Senanayaka Mawatha	PS	2.41	
39	Rabukkana	28	Molagoda (Shed) - Alulena Teample	PRDA	2.60	13.80
40		29	Kempitiya Muslim Palileya - Kempitiya Teample	PRDA	2.50	
41		30	Korahetta Meeduma Vidyalaya - Dambulla Clinic Center (Rabukkana - Dobemada Road)	PS	2.60	
42		31	Daluggala (Junction) - Bathaburaya Playground	PRDA/PS	3.84	
43		32	Deldeniya (Junction) - Randeniya	PS	2.26	
44	Mawanella	42	Wanduragoda Teample Junction (Mawanella - Hemmathagama Road) - Aluthnuwara	PS	1.20	20.59
45		43	(Mawanella - Hemmathagama Road) Eraminigammana Temple - Thambavita - Gampola Road Junction	PS	3.40	
46		44	Alpitiya - Dompitiya Magama - Ambadeniya	PS	1.15	
47		45	Heendeniya - Danagama Road (Anwarama Shed) Heendeniya - Danagama Junction	PS	3.11	
48		46	Road to Weganthale Saradeyal Village	PS	2.02	
49		47	Keppitipola - Mahakehelwala Ihalagama - Galpotta Pasal junction - Kiriyateuna - Beddewela	PS	5.30	
50		48	Gangoda Teample - Eke Kanuwa Mediliya Road (From Dippitiya - Hemmathagama Road,Sarath's Kade)	PS	1.79	
51	71	Wdiyathenna dumabuluwawa via Walekade	PS	2.62		
52	Aranayaka	50	Dippitiya - Demalagiriya - Dooldeniya - Thalgaspitiya Road	PS	4.26	20.16
53		51	Thuththiripitiya Junction - Wattegadara Road	PRDA /PS	4.20	
54		52	Thalgamuwa - Attapitiya Road	PRDA /PS	3.00	
55		53	Wakirigala Dispensary - Polkubura Namalgama Road	PS	2.40	
56		54	Aranayaka Town - Sapumal Ambe Welanthalawa Road	PS	2.00	
57		55	Yalapala - Galatara - Erawwala Road	PS	1.80	
58	56	Hathgampola Vidyalaya - Elangapitiya Road	PS	2.50		
59	Kegalle	64	Elbert Senavirathne Mawatha - Kegalle	UC	0.87	9.57
60		65	Ranwala - Kahagalla - Nawagamuwa Road	PRDA /PS	3.60	
61		66	Randeniya Graselin Janapadaya - Dimbulgamuwa Road	PS	2.10	
62		68	Paragammana - Dikkella - Babaradeniya Beragala Road	PS	1.20	
63		69	Karadupana - Malwatta Kanda - Dewela Road	PS	1.80	
Total					217.12	217.12

RATHNAPURA DISTRICT - SABARAGAMUWA PROVINCE**RURAL ROAD LIST**

Serial no	D.S Division	Road ID	Road Name	Road Catogary	Length/(Km)	Sub Total
1	Ratnapura	13	Galabada - Ratganga Temple - Kudawa - Mapalana Via Palabaddala Road	PRDA/PS	16.9	21.15
2		14	Near Saman Dewalaya Kataliyanpall – New Town Up to Muttetu pita via Price College (Section A)	PS	4.25	
3	Kuruwita	11	Kuruwita Via Erathna to Kendalanda Road (Kuruwita to Dearwood Tea Factory 3.2 Km, Boraluwa to Kendalanda Road 3.1 km)	PRDA	6.3	10.3
4		12	Batatota Junction via Divaguhawa to Kalanchiwatta Road	PRDA	4	
5	Eheliyagoda	16	Mahingoda Viyalagoda via Puwakgahadeniya Road	PS	3	9
6		17	Muruthangala Dewrumpitiya Estate via Kaluandura & Muruthangala Temple Via Dewrumpitiya Road	PS	6	
7	Kiriella	19	Ihalakanda Kanugalla Rukhena Hatharaanda Hena Pahalawaththa Paranagama	PRDA/PS	7.9	20.5
8		19A	Bodimaluwa Pohorabawa School via Paranagama	PRDA	6.4	
9		20	Madala Gettuwa Viathanakanda Via Keenagahavila Road	PRDA/PS	6.2	
10	Kalawana	8	Tapaswara Kanda – Wiskamgoda Road via Karapotha Bridge	PS	2.9	26
11		10	Weddagala – Kudawa – Wewagama Road	PRDA/PS	12	
12		38	Delgoda Balipola up Waturawa Road	PS	5.2	
13		10A	Nikagoda – Batamandiya – Polwatta – Sisira Kade, Pibura	PS	5.9	
14	Ayagama	7	Dumbara Manana Wathukaragama to Dumbara Kovila Main Road	PRDA	7	12
15		39	Nammuniyawaththa Namunutenna Gangodakanda Road	PRDA	5	
16	Elapatha	40	Palawela – Ayagama Road	PRDA	10	10
17	Pelmadulla	21	Bopeththa Junction to Mawella Road	PRDA/PS	5.5	21.7
18		22	Marapana Mada Handiya to Dela Road	PRDA	5	
19		23	Near Dakunu Panawenna Rubber Factory to Poronuwa Road	PRDA	6.2	
20		25	Wewelwatta – Alupola Road	PRDA	5	

Serial no	D.S Division	Road ID	Road Name	Road Catogary	Length/(Km)	Sub Total
21	Godakawela	1	Ellagewaththa Junction to Gorakawela via Opatha, Makandura	PRDA	7	17.54
22		2	Palamkotta Junction to Ambalama via Nawinna Henaggegoda	PRDA	10.54	
23	Weligepola	4	Badullegama to Elamalpe – Godakawela Road	PRDA	2	6
24		5	Kongastenna Junction to Ilukkumbura Road	PRDA	4	
25	Opanayaka	3	Hallinna Junction to Polwattahena Matihakwela Hunuwela Road	PRDA	10.1	10.1
26	Balangoda	31	Rassagala – Heramitigala – Samanalawaththa – Massenna Road	PRDA/PS	16	16
27	Ibulpe	32	Rathmalavinna – Hatharabage – Udagama – Olugantota road	PRDA	11.5	25.1
28		33	Halpe –Weheragoda Road	PRDA	4	
29		33A	Gurubawila Kanawinna Road	PS	3	
30		33B	Gurubavila Helapadeniya Gallenakanda Road	PS	6.6	
31	Kahawattha	26	Rilladola Bogaha Asala to Amunukara Junction	PRDA	5.3	13.1
32		27	Amunukara Junction to Gabbela Digandala Demuwatha Road	PRDA	7.8	
33	Elapatha	28	Labuwatta Junction to Pinnagolla via Hapugahawela junction Road	PRDA	1.8	4.8
34		29	Elapatha Damme Junction to Damme Prajashalawa Road	PRDA	3	
35	Niwithigala	30	Sidurupitiya Junction Waththahena Pitakalaya Road	PRDA	10	10
36	Kolonna	34	Ambagahayaya Junction To 8 Mile Post Via Mahayaya Road	PS	5.86	11.56
37		35	From Nawaneliya Temple To Eththakanda Via Nedola Road	PRDA	5.7	
38	Ebilipitiya	36	96 Junction To Panamura Road Via Ranchamadama Ethgala	PRDA	10.12	10.12
Total					254.97	254.97

Ratnapura District Key Map



Legend

- Social Economic Centres
- Proposed Roads (ROAD)
- Proposed Roads (ROAD)
- Proposed Roads (ROAD)

Road Network

- A Class Roads
- B Class Roads
- Secondary/Minor Roads
- Jeep/Car/Taxis
- Railways

Administrative Boundary

- District Boundary
- ON/Division Boundary
- Selected GNDs
- OS Division Boundary

Scale
1:150,000
0 3 6 12 Kilometers

Data Source(s):
1:50,000 Digital Data of Survey Department

Produced on:
30-08-2014

Projection/Spheroid:
Transverse Mercator
SHP - Transverse

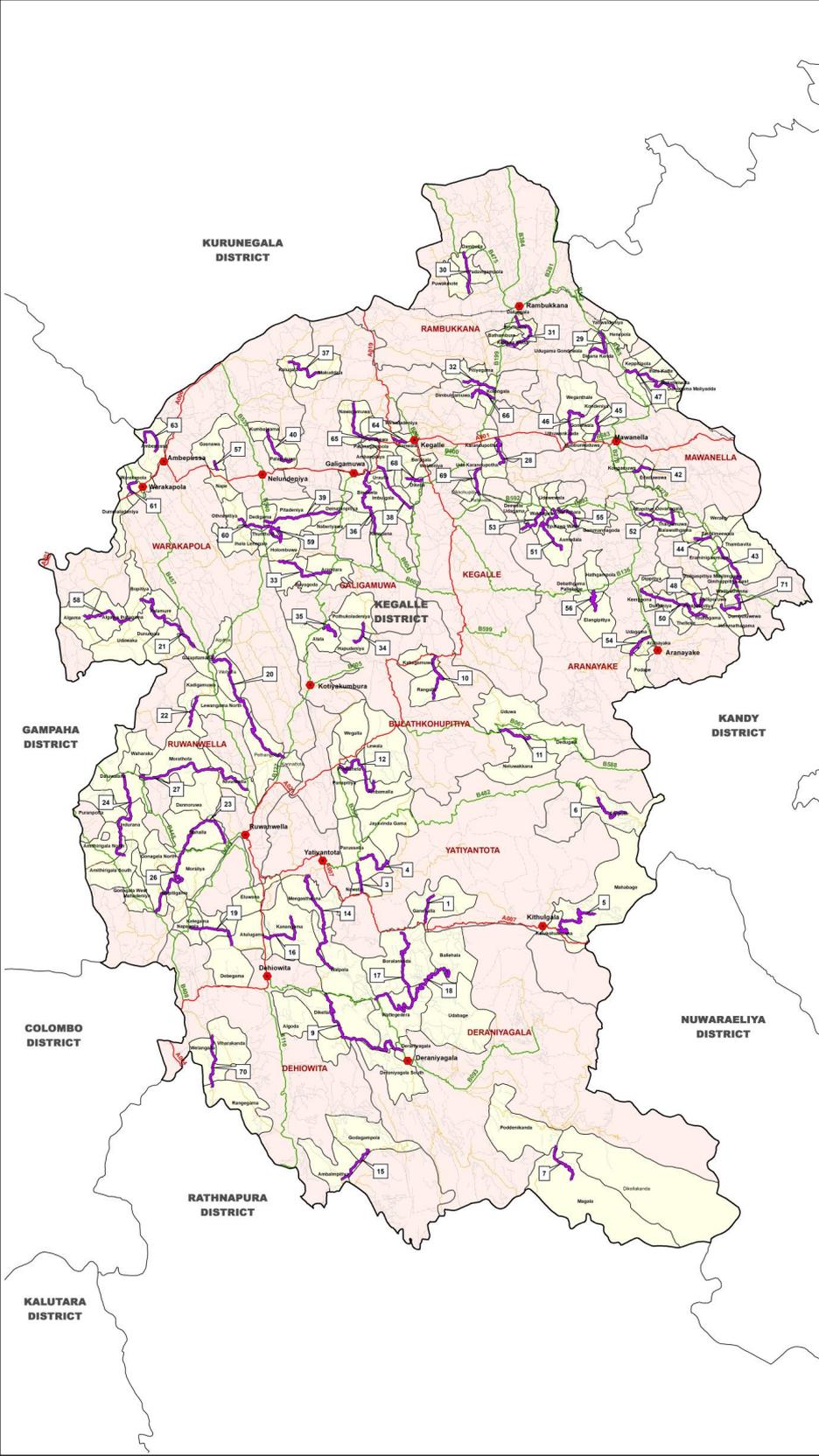
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**Ministry of Highways,
Ports and Shipping,
Sri Lanka**

**Road Development
Authority**

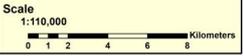
Map Produced through the support of GIS section,
Road Development Planning Division,
RDA

Kegalle District Key Map



Legend

- Social Economic Centres
- Proposed Roads (ROAD)
 - Proposed Roads (i ROAD)
- Road Network
 - A Class Roads
 - B Class Roads
 - Secondary/Minor Roads
 - Jeep/Carl Tracks
 - Railways
- Administrative Boundary
 - Selected GNDs
 - GN Division Boundary
 - DS Division Boundary
 - District Boundary



Data Source(s): 1:50,000 Digital Data of Survey Department	
Produced on :	30-08-2014
Projection/Spheroid :	Transverse Mercator SLD - Kandawala

The Map is Designed for A1 size

	Ministry of Highways, Ports and Shipping
	Road Development Authority

Map Produced through the support of:

Asian Development Bank	GIS Section, Planning Division, RDA
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1983
24/6/2014

**SURVEY AND PRELIMINARY ENGINEERING OF INTERGRATED
ROAD INVESTMENT PROGRAMME (iROAD)**

SABARAGAMUWA PROVINCE

Standard Drawings

JUNE 2014



KATARINA &
ENGINEERS
INTERNATIONAL

TABLE OF CONTENTS

HIGHWAY DRAWINGS		
No	Name	Drawing No
1	PRDA Road	TS-PRDA-01
2	PRDA Road	TS-PRDA-02
3	PS Road	TS-PS-01
4	PS Road	TS-PS-02
5	PS Road	TS-PS-03
6	PS Road	TS-PS-04
7	PS Road	TS-PS-05
8	PS Road	TS-PS-06
STRUCTURAL DRAWINGS		
No	Name	Drawing No
1	Pipe culvert - Single pipe	S - 01
2	Pipe culvert - Double pipe	S - 02
3	Slab Culvert	S - 03
4	Retaining wall - R/F concrete	S - 04 - A
5	Retaining wall - R/F concrete	S - 04 - B
6	Retaining wall - R/F concrete	S - 04 - C
7	Retaining wall - RRM & Mass Concrete	S - 05
8	Retaining wall - Random Gabion wall	S - 06
9	Causeway	S - 07
10	Typical Drains	DS - 01

ADB
 ADB FUNDED
 ROAD PROJECT
 SABARAGAMUWA PROVINCE

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

No	REVISION	DATE

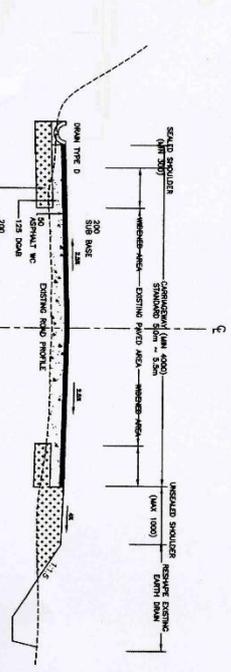
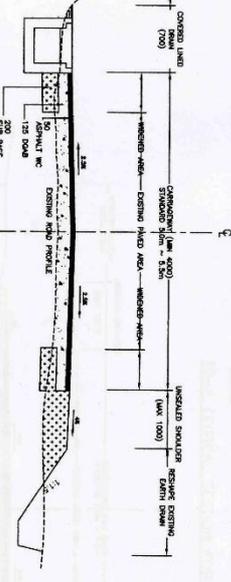
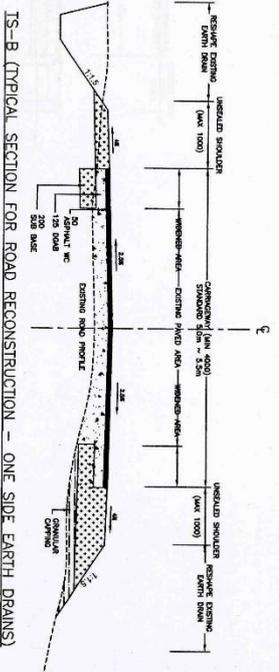
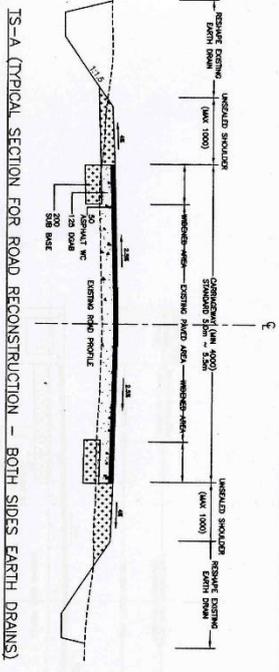
CONSULTANT

 KATHIRAI & ENGINEERS
 INTERNATIONAL

DRAWING TITLE
 DWG No

DES	DATE

POSED TYPICAL SECTIONS (TS) FOR PRDA ROAD



LEGEND: IS-E (TYPICAL SECTION FOR ROAD RECONSTRUCTION - ONE SIDE CHANNEL DRAIN)

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

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-05
5. IF THE SPECIFIED MINIMUM DIMENSIONS SHOWN IN THE DRAWING CAN NOT BE MAINTAINED DUE TO ROAD 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 DAAB SHOULD BE 100mm TOP OF THE EXISTING PAVEMENT.
8. MINIMUM THICKNESS OF THE GRANULAR CAPPING LAYER SHOULD BE 100mm. IF THE THICKNESSES < 100mm USE GRANULAR SUB BASE.
9. ISOLATED BASE FAILURE SECTION SHOULD BE RECTIFIED PRIOR TO EXISTING PAVEMENT STRENGTHENING.

ADB
ADB FUNDED
ROAD PROJECT
SABARAGAMUWA PROVINCE

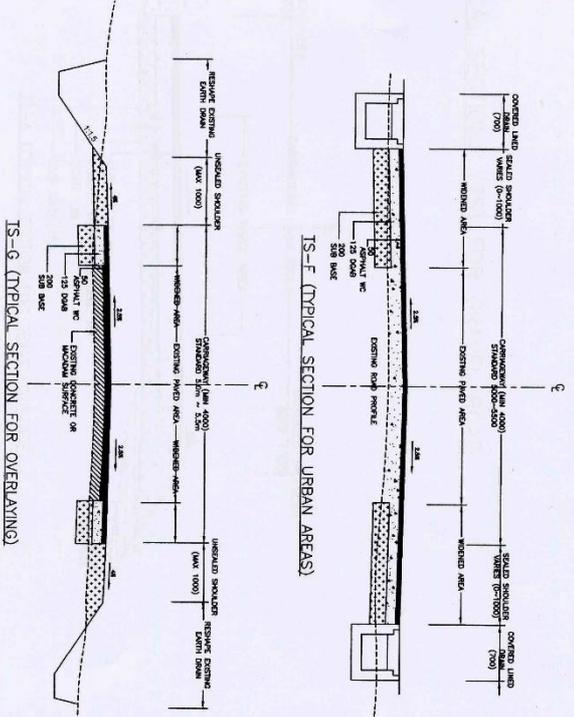
CLIENT
DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority

NO.	REVISION	DATE	CONTRACT NO.	DRAWING TITLE	DES.	CHEK.	DATE
				TYPICAL CROSS SECTION FOR PRDA ROAD			11-10-2015



KATHIRKA & ENGINEERS
CONSULTANTS

TYPICAL SECTIONS (TS) FOR PRDA ROAD



LEGEND:

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

ADB
ADB FUNDED
I ROAD PROJECT
SABARAGAMUWA PROVINCE

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

NO.	REVISION	DATE

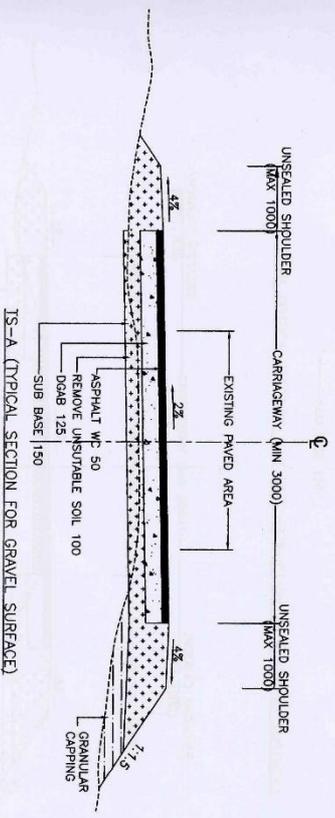
CONTRACT NO. W-10/2011
 NATIONAL ENGINEERS INTERNATIONAL

DRAWING TITLE: TYPICAL CROSS SECTION FOR PRDA ROAD
 DRAWN NO. IS-PRDA-02

DESIGNER	DATE
CHECKER	DATE

- 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-05
 5. IF THE SPECIFIED MINIMUM DIMENSIONS SHOWN IN THE DRAWING CAN NOT BE MAINTAINED DUE TO ROW RESTRICTIONS THE DIMENSIONS CAN BE REDUCED SUBJECT TO THE APPROVAL OF THE ENGINEER.
 6. INTERPACKING DETAILS WITH ADJACENT BUILDINGS/LANDS SHOULD BE DECIDED ACCORDING TO THE SITE CONDITIONS.
 7. MINIMUM THICKNESS OF DAAB SHOULD BE 100mm TOP OF THE EXISTING PAVEMENT.
 8. MINIMUM THICKNESS OF THE GRANULAR CAPPING LAYER SHOULD BE 100mm, IF THE THICKNESSES < 100mm USE GRANULAR SUB BASE.
 9. ISOLATED BASE FAILURE SECTION SHOULD BE RECTIFIED PRIOR TO EXISTING PAVEMENT STRENGTHENING.

PROPOSED TYPICAL SECTIONS (TS) FOR GRAVEL ROAD



LEGEND:

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

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
2. THIS DRAWING PROVIDES A GUIDANCE ONLY. EXACT DETAILS TO SURF 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-05
5. IF THE SPECIFIED MINIMUM DIMENSIONS SHOWN IN THE DRAWING CAN NOT BE MAINTAINED DUE TO ROW RESTRICTIONS THE DIMENSIONS CAN BE REDUCED SUBJECT TO THE APPROVAL OF THE ENGINEER.
6. INTERPACKING 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.

ADB
ADB FUNDED
ROAD PROJECT
SABARAGAMUWA PROVINCE

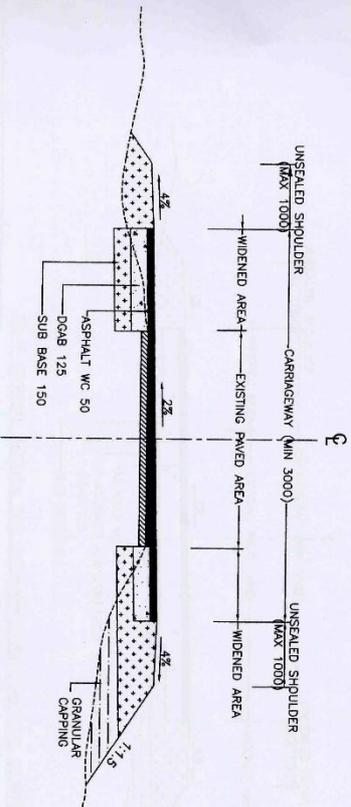
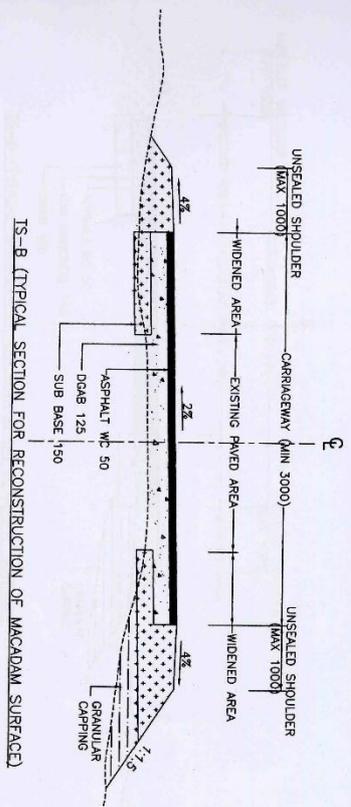
CLIENT
DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority

NO.	REGION	DATE

CONSULTANT
VR
KATAPANA & ENGINEERS
INTERNATIONAL

DRAWING TITLE		DES
TYPICAL GROSS SECTION FOR P5 ROAD		DRW
OVER NO.	15-SS-01	CHK
DATE	11-06-2014	DATE

PROPOSED TYPICAL SECTIONS (TS) FOR MACADAM ROAD



LEGEND:

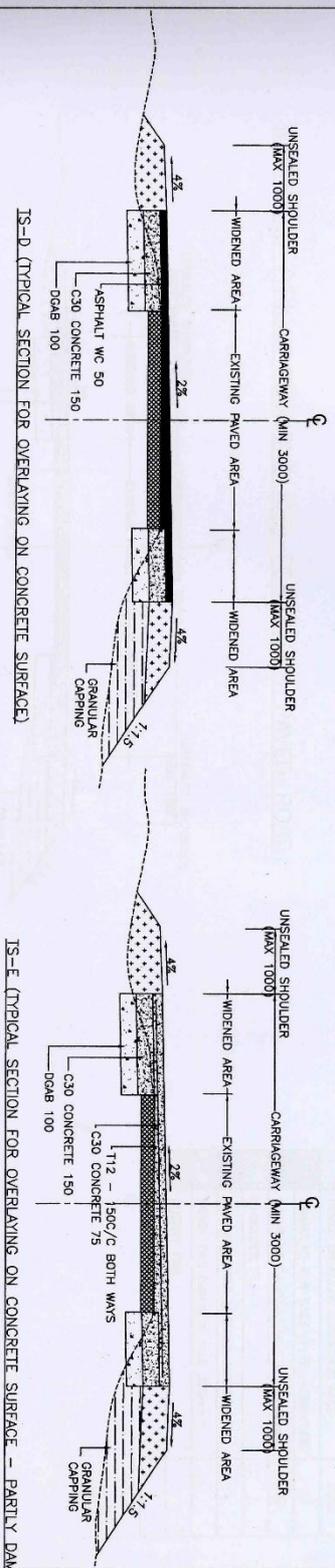
	ASPHALT WEARING COURSE	WC
	DENSE GRANULAR AGGREGATE BASE	DGAB
	GRANULAR SUB BASE (TYPE I-CBR>30%)	GS
	GRANULAR CAPPING (TYPE II-CBR>10%)	GC
	SHOULDER FILL	
	BLINDING LAYER (GRADED AGGREGATE)	
	ROCK FILL (MAXIMUM SIZE 250mm)	
	QUARRY FINE	
	C30 CONCRETE	

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

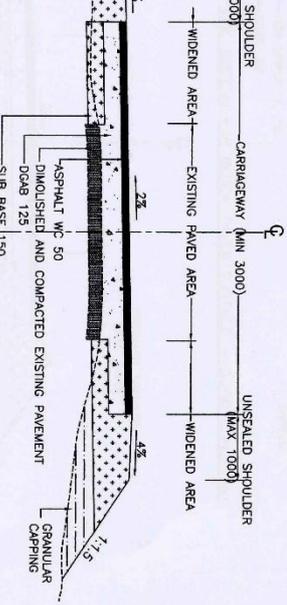
<p>ADB FUNDED ROAD PROJECT SABARAGAMUWA PROVINCE</p>	<p>CLIENT DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF PORTS & HIGHWAYS Road Development Authority</p>	NO.	REGION	DATE	<p>CONSULTANT KAVANARA & ENGINEERS INTERNATIONAL</p>	DRAWING TITLE	DES.	DATE
						<p>TYPICAL CROSS SECTION FOR P5 ROAD</p>	<p>DRW./ CHK</p>	<p>11-06-2014</p>

PROPOSED TYPICAL SECTIONS (TS) FOR CONCRETE ROAD



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	



TS-F (TYPICAL SECTION FOR OVERLAYING ON CONCRETE SURFACE - DAMAGED)

NOTES:

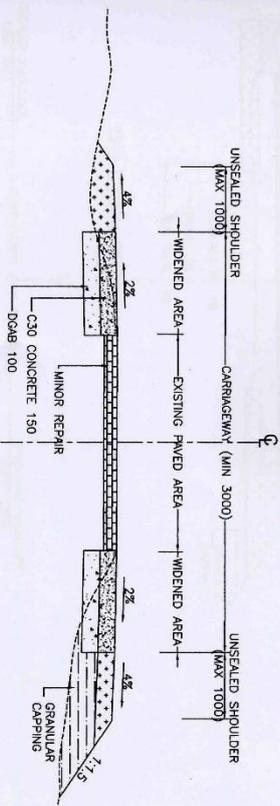
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE MENTIONED.
2. THIS DRAWING PROVIDES A GUIDANCE ONLY. EXACT DETAILS TO SUIT SITE CONDITIONS SHALL BE DECIDED BY THE ENGINEER AT CONSTRUCTION STAGE.
3. SELECT DRAINS AS PER SITE CONDITION FOR DRAIN DETAILS REFER DRAWING NO. DS-01
4. FOR TOE WALL DETAILS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

<p>ADB FUNDED ROAD PROJECT SABARAGAMUWA PROVINCE</p>	<p>CLIENT DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF PORTS & HIGHWAYS Road Development Authority</p>	<p>CONTRACT NO.</p>	<p>DRAWING TITLE</p>	<p>CBS</p>
		<p>RESUBMISSION</p>	<p>TYPICAL CROSS SECTION FOR PS ROAD</p>	<p>DATE</p>
<p>DATE</p>	<p>DATE</p>	<p>DATE</p>	<p>DATE</p>	<p>DATE</p>

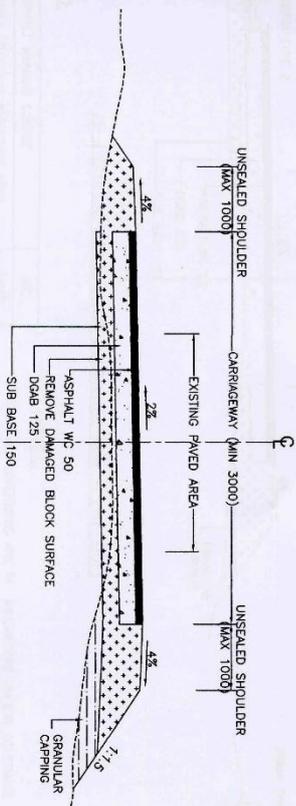
PROPOSED TYPICAL SECTIONS (TS) FOR BLOCK PAVED ROAD

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	
	BINDING LAYER (GRADED AGGREGATE)	
	ROAD FILL (MAXIMUM SIZE 250mm)	
	QUARRY FINE	
	C30 CONCRETE	



TS-G (TYPICAL SECTION FOR BLOCK PAVED SURFACE - GOOD CONDITION)



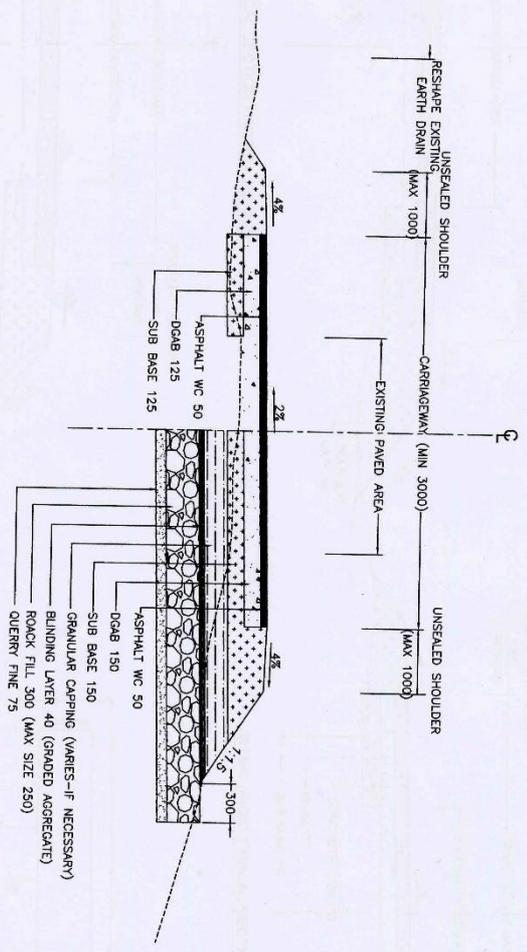
TS-H (TYPICAL SECTION FOR BLOCK PAVED SURFACE - DAMAGED)

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-05
5. IF THE SPECIFIED MINIMUM DIMENSIONS SHOWN IN THE DRAWING CAN NOT BE MAINTAINED DUE TO ROW RESTRICTIONS THE DIMENSIONS CAN BE REDUCED SUBJECT TO THE APPROVAL OF THE ENGINEER.
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.
8. ISOLATED BASE FAILURE SECTION SHOULD BE RECTIFIED PRIOR TO EXISTING PAVEMENT STRENGTHENING.

<p>ADB FUNDED ROAD PROJECT SABARAGAMUWA PROVINCE</p>	<p>DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF PORTS & HIGHWAYS Road Development Authority</p>	CLIENT:	NO.	REGION	DATE	CONTRACTOR:	DRAWING TITLE:	DATE
		<p>KATIRAMA & ENGINEERS INTERNATIONAL</p>					<p>TYPICAL GROSS SECTION FOR P5 ROAD</p>	<p>DRW CHK</p>

PROPOSED TYPICAL SECTIONS (TS) FOR WEEK SOIL AREA



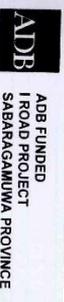
TS-M (TYPICAL SECTION FOR MARSHY & WEAK SOIL AREA)

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)	
ROACK FILL (MAXIMUM SIZE 250mm)	
QUERRY FINE	
C30 CONCRETE	

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 JOE WALL DETAILS REFER DRAWING NO. S-05
5. IF THE SPECIFIED MINIMUM DIMENSIONS SHOWN IN THE DRAWING CAN NOT BE MAINTAINED DUE TO ROW RESTRICTIONS THE DIMENSIONS CAN BE REDUCED SUBJECT TO THE APPROVAL OF THE ENGINEER.
6. INTERFACING DETAILS WITH ADJACENT BUILDINGS/LANDS SHOULD BE DECIDED ACCORDING TO THE SITE CONDITIONS.
7. MINIMUM THICKNESS OF DGAB SHOULD BE 100mm TOP OF THE EXISTING PAVEMENT.
8. MINIMUM THICKNESS OF THE GRANULAR CAPPING LAYER SHOULD BE 100mm, IF THE THICKNESSES < 100mm USE GRANULAR SUB BASE.
9. ISOLATED BASE FAILURE SECTION SHOULD BE RECIFIED PRIOR TO EXISTING PAVEMENT STRENGTHENING.



ADB FUNDED
ROAD PROJECT
SABARAGAMUWA PROVINCE

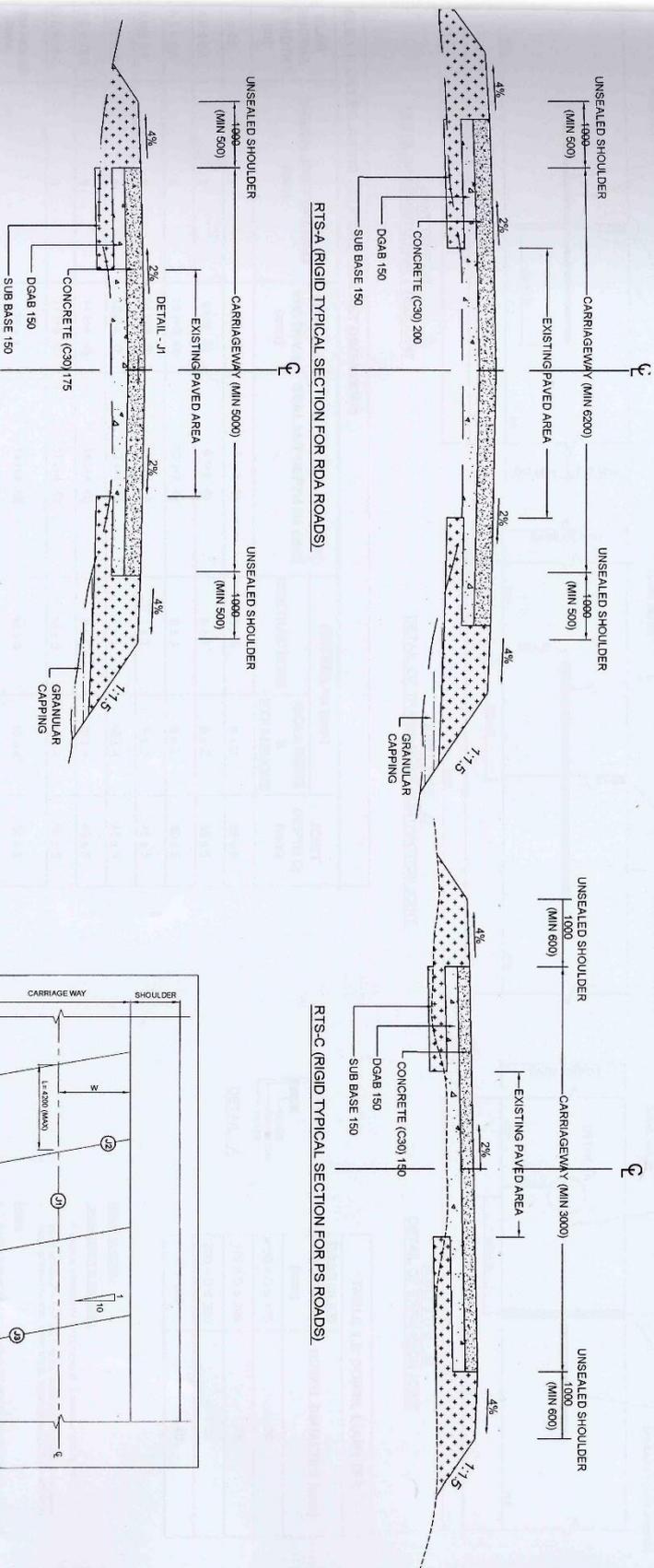
CLIENT
DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority

No	REVISION	DATE

CONSULTANT
KATIRIWA & ENGINEERS
INTERNATIONAL

DRAWING TITLE		DATE
TYPICAL CROSS SECTION FOR FS ROAD	11-08-2014	
DWG. No.	TS-08	
DATE	11-08-2014	

PROPOSED RIGID PAVEMENT TYPICAL SECTIONS FOR INUNDATING AREA

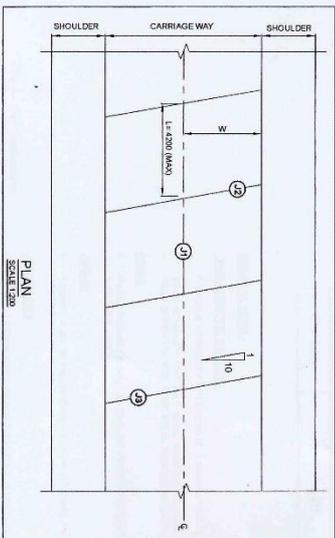


CONCRETE C30	
DENSE GRANULAR AGGREGATE BASE	DGAB
GRANULAR SUB BASE (TYPE I-CBR<30%)	GS
GRANULAR CAPPING (TYPE II-CBR<10%)	GC
SHOULDER FILL	
BLINDING LAYER (GRADED AGGREGATE)	
ROCK FILL (MAXIMUM SIZE 250mm)	
QUERRY FINE	

RTS-B (RIGID TYPICAL SECTION FOR PRDA ROADS)

RTS-A (RIGID TYPICAL SECTION FOR RDA ROADS)

RTS-C (RIGID TYPICAL SECTION FOR PS ROADS)



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-05

NDB
ADB FUNDED
I ROAD PROJECT
SABARAGAMUWA PROVINCE

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

No.	REVISION	DATE

CONSULTANT:
KATTAHURA & ENGINEERS
INTERNATIONAL

DRAWING TITLE		DES
RIGID PAVEMENT TYPICAL SECTIONS		
DWG No.	RTS-01	
DATE	16.08.2014	

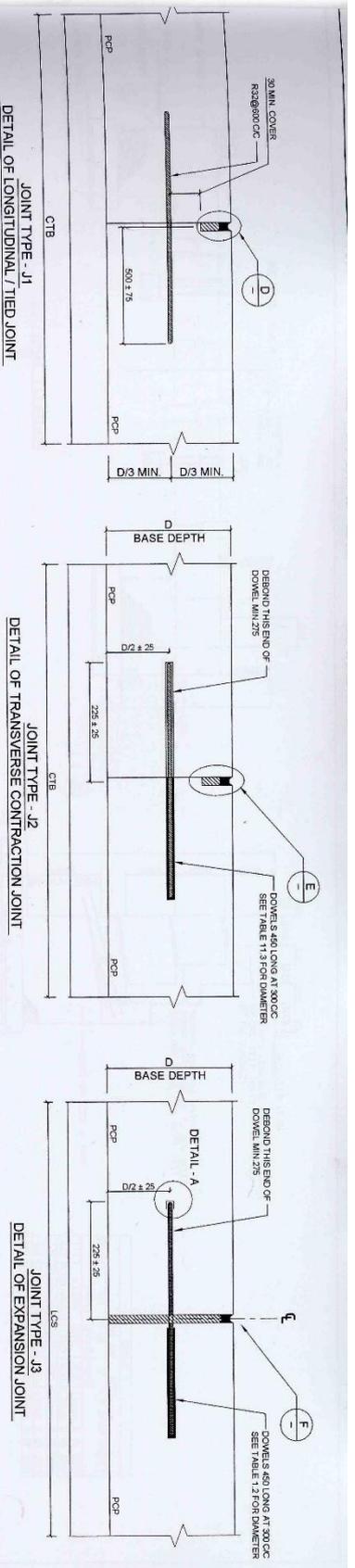


TABLE 1.1: UNITED JOINTS - SILICONE SEALANT DIMENSIONS

SLAB LENGTH L (m)	DESIGN JOINT OPENING WIDTH Ws (mm)	SEALANT WIDTH Ws (mm)	SEALANT DEPTH Ds (mm)	RECESS RS (mm)		JOINT DEPTH Df (mm)
				CONTRACTIONS	ISOLATIONS & EXPANSIONS	
≤ 4.6	2	7 (+3, -0)	7 (+3, -0)	5 ± 3	8 ± 2	35 ± 5
4.6 ≤ 6.5	3	9 (+3, -0)	9 (+3, -0)	5 ± 3	8 ± 2	35 ± 5
6.5 ≤ 8.0	4	10 (+3, -0)	10 (+3, -0)	6 ± 3	8 ± 2	40 ± 5
8.0 ≤ 9.5	4	11 (+3, -0)	11 (+3, -0)	6 ± 3	8 ± 2	45 ± 5
9.5 ≤ 11.5	5	12 (+4, -0)	12 (+4, -0)	7 ± 3	10 ± 4	45 ± 5
11.5 ≤ 13.0	5	14 (+4, -0)	14 (+4, -0)	8 ± 3	10 ± 4	45 ± 5
13.0 ≤ 15.0	6	17 (+5, -0)	17 (+4, -0)	10 ± 3	12 ± 4	50 ± 5
Edge Approach Slabs		25 ± 4	14 (+4, -0)	10 ± 4	12 ± 4	50 ± 5

NOTE: * SLAB LENGTH (IN THE CASE OF TRANSVERSE JOINTS) OR WIDTH (IN THE CASE OF LONGITUDINAL JOINTS) ARE CALCULATED AS THE AVERAGE OF SLABS ABUTTING THE JOINT UNDER DESIGN.

TABLE 1.2: DOWEL DIAMETER

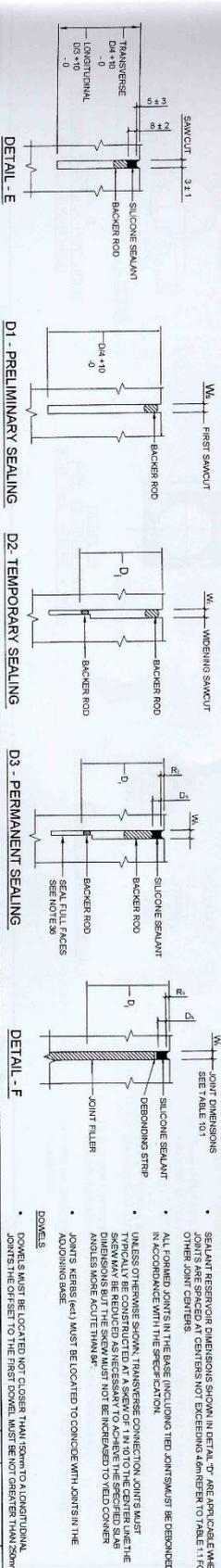
BASE SLAB THICKNESS (mm)	DOWEL DIAMETER (mm)
150 < D ≤ 175	20
175 < D ≤ 200	25
200 < D ≤ 280	32
D > 280	40

GENERAL NOTE:

- CHARACTERISTIC STRENGTH
 - FLEXURAL STRENGTH OF CONCRETE: 4.30 N/mm² (AT 28 DAYS)
 - FLEXURAL STRENGTH FOR MILD STEEL REINFORCED DOWELS: 250 N/mm²
 - YIELD STRENGTH FOR TONE STEEL REINFORCED DOWELS: 400 N/mm²
- PAVING
- PAVING WITHIN TRAVEL LANES MUST PRECEDE PAVING WITHIN ADJACENT SHOULDER LANES
- TERRACE
- TERRACE MUST BE PROVIDED IN TIED LONGITUDINAL JOINTS AT THE SPECIFIED SPACING

JOINT DETAILS

- SEALANT RESERVOR DIMENSIONS SHOWN IN DETAIL 'C' ARE APPLICABLE WHEN JOINTS ARE SPACED AT CENTERS NOT EXCEEDING DIMENSION TO TABLE 1.1 FOR OTHER THAN 200mm
- ALL FORMED JOINTS IN THE BASE (INCLUDING TIED JOINTS) MUST BE DEMOLISHED IN ACCORDANCE WITH THE SPECIFICATION
- UNLESS OTHERWISE SHOWN, TRANSVERSE CONNECTION JOINTS MUST BE DEMOLISHED WITH THE SPECIFICATION
- UNLESS OTHERWISE SHOWN, TRANSVERSE CONNECTION JOINTS MUST BE DEMOLISHED WITH THE SPECIFICATION
- DIMENSIONS BUT THE SKEW MUST NOT BE INCREASED TO YIELD CORNER ANGLES MORE ACUTE THAN 90°
- JOINTS KEYS (if any) MUST BE LOCATED TO COINCIDE WITH JOINTS IN THE ADJOINING BASE



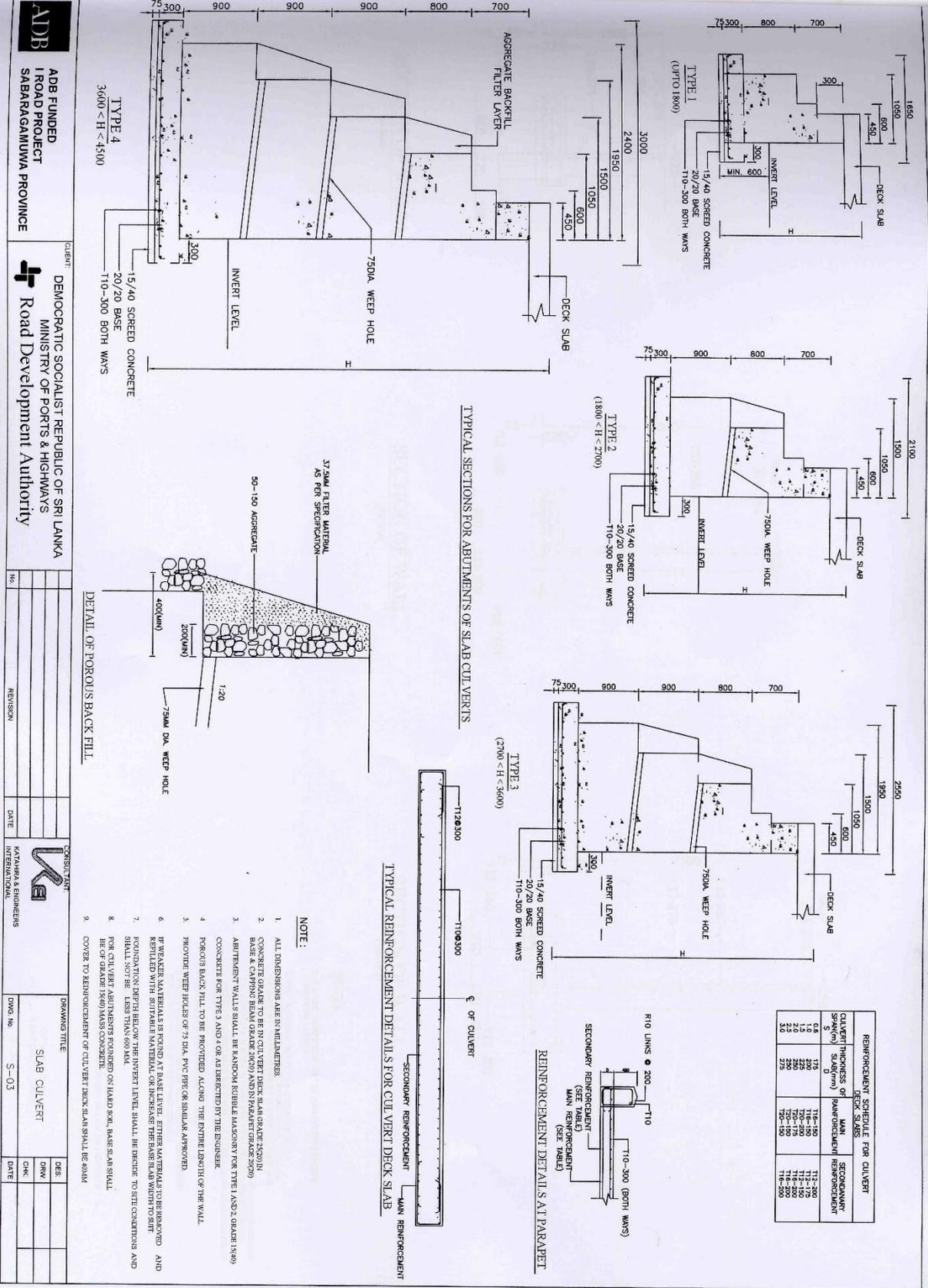
ADB FUNDED ROAD PROJECT SABARAGAMUWA PROVINCE

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

NO.	REVISION	DATE

CONSULTANT: VEKA ENGINEERS INTERNATIONAL

DWG No.	DES.	DATE

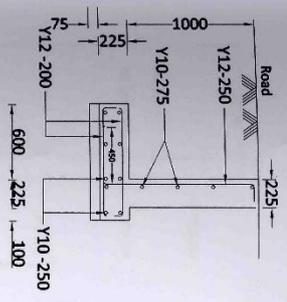


ADB
ADB FUNDED
ROAD PROJECT
SABARAGAMUWA PROVINCE

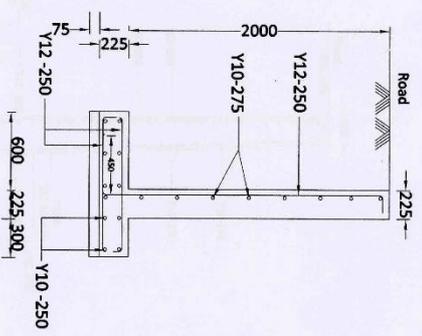
CLIENT
DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority

NO.	REVISION	DATE	CONSULTANT	DRAWING TITLE	DES.
			KATANKA & ENGINEERS INTERVENTIONAL	SLAB CULVERT	DRW
					CHK
					DATE

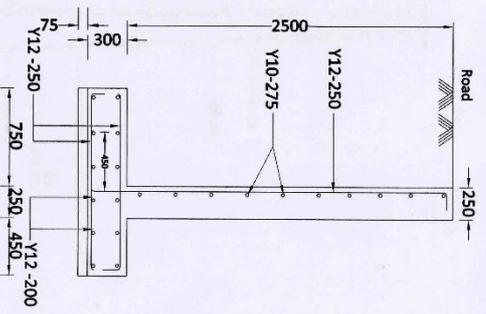
DWG. NO. S-03



SECTION OF WALL
1st Wall



SECTION OF WALL
2nd Wall



SECTION OF WALL
2.5m Wall

NOTES:

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2. THIS DRAWING 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 SCURED IN GRADE C15 CONCRETE. SCURED 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. 20(20)
6. REINFORCEMENT SHALL BE HOT ROLLED HIGH YIELD STEEL TO BS 4469 WITH MIN f_y -460 N/SQMM.
7. CLEAR COVER TO REINFORCEMENT SHALL BE 50 MM.
8. RAFTER DRA WING S-603 FOR THE DETAIL OF POROUS BACKFILL.
9. 75 DIA PVC WEEP HOLES SHALL BE PROVIDED AT 2000 SPACING (STAGGERED) AND BE LAID TO A SLOPE OF 1:10.



ADB FUNDED
I ROAD PROJECT
SABARAGAMUWA PROVINCE

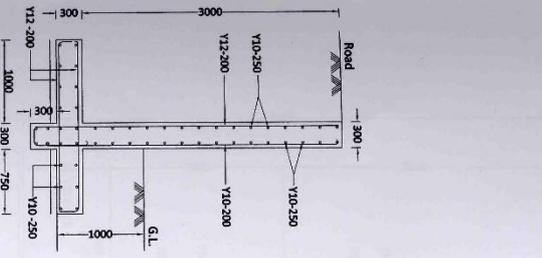
CLIENT
DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority

NO.	REVISION

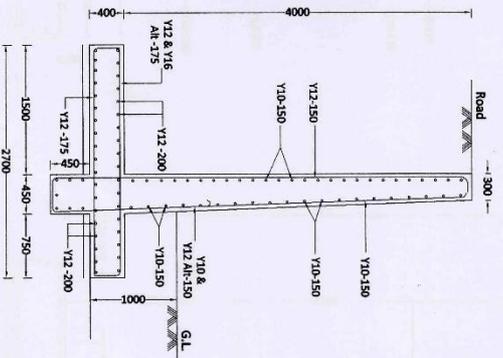
DATE
CONSULTANT
KATIPANA ENGINEERS
INTERNATIONAL

DRAWING TITLE
RETAINING WALL
REINFORCED CONCRETE

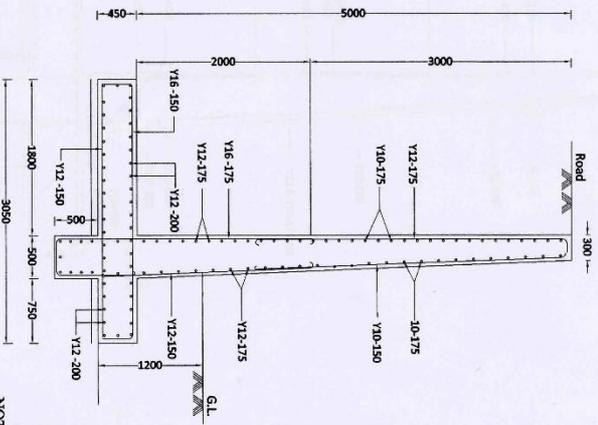
DES.	CHK.	DATE
		11-06-2014



SECTION OF WALL
3m Wall



SECTION OF WALL
4m Wall

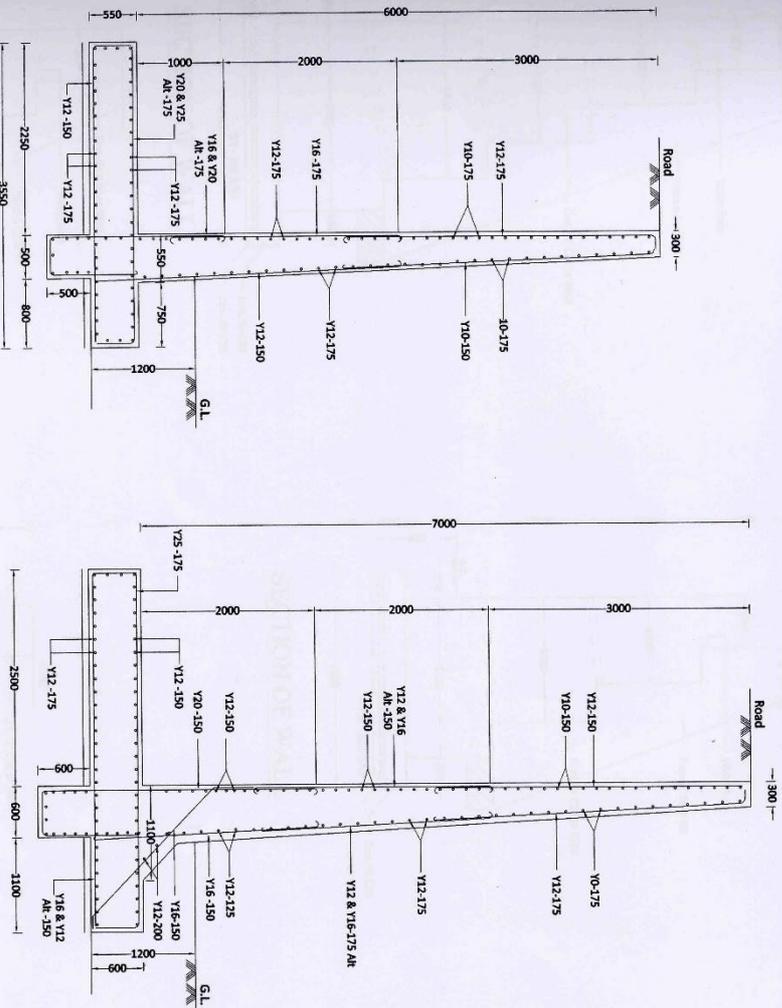


SECTION OF WALL
5m Wall

NOTES:

1. ALL THE DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED
2. THIS DRAWING PROVIDES A GUIDANCE ONLY. THE DIMENSIONS SHALL BE DECIDED BY THE ENGINEER AT CONSTRUCTION STAGE.
3. ALL FOUNDATION PILES SHOULD BE IN GRADE C-20 AND SCREEN IN GRADE C10 CONCRETE. SOILED 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. 30(0)
6. REINFORCEMENT SHALL BE HOT ROLLED HIGH TENSILE STEEL (S) 8@440 WITH MAX 9 @60 NSR/DIA.
7. CLEAR COVER TO REINFORCEMENT SHALL BE 50 MM.
8. REFER DRAWING S-03 FOR THE DETAIL OF POROUS BACKFILL.
9. 75 DIA. PVC WEEP HOLES SHALL BE PROVIDED AT 2000 SPACING (STAGGERED) AND BE LAD TO A SLOPE OF 1:10.

<p>ADB FUNDED ROAD PROJECT SABARAGAMUWA PROVINCE</p>	<p>DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF PORTS & HIGHWAYS Road Development Authority</p>	<p>CONSULTANT</p> <p>KATAYHIRA & ENGINEERS INTERNATIONAL</p>	<p>DRAWING TITLE</p> <p>RETAINING WALL REINFORCED CONCRETE</p>	<p>DES.</p> <p>CHK.</p>
		<p>NO.</p> <p>REVISION</p> <p>DATE</p>	<p>DWG. NO. S-01-B</p>	<p>DATE</p> <p>11-06-2014</p>

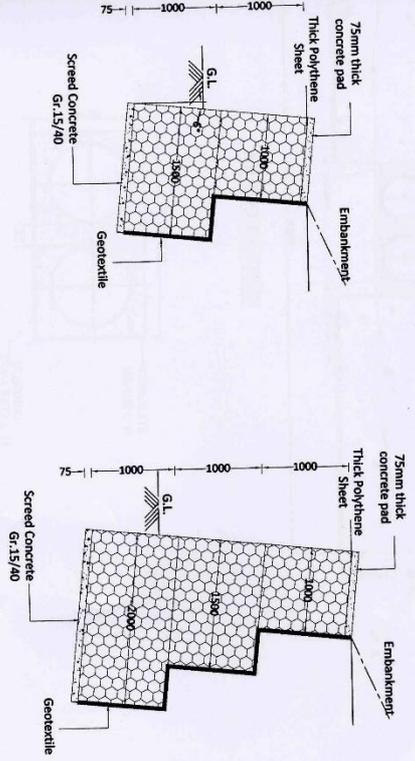
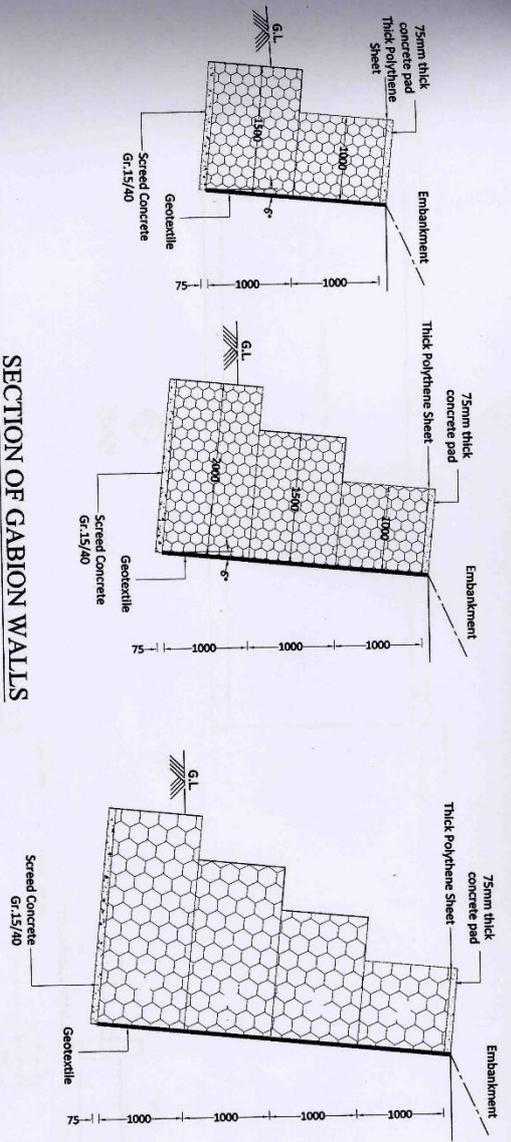


SECTION OF WALL
6m Wall

SECTION OF WALL
7m Wall

- NOTES:**
1. ALL THE DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED
 2. THIS DRAWING 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 C20 AND SCAFFED IN GRAD C15 CONCRETE, SCAFFED IS 50MM THICK UNLESS OTHERWISE SHOWN.
 4. FOUNDATION DEPTH IN EACH WALL TYPE SHOULD BE AS SHOWN OR AS DIRECTED AT SITE TO SUIT SITE CONDITIONS.
 5. CONCRETE GRADE SHALL BE GR. 20/20
 6. REINFORCEMENT SHALL BE HOT ROLLED HIGH YIELD STEEL, TO BS 4469 WITH MIN. f_y 460 N/SQMM.
 7. CLEAR COVER TO REINFORCEMENT SHALL BE 50 MM.
 8. REFER DRAWING S-03 FOR THE DETAIL OF POROUS BACKFILL.
 9. 75 DIA PVC WEIR HOLES SHALL BE PROVIDED AT 2000 SPACING (STAGGERED) AND BE LAID TO A SLOPE OF 1:10.

		ADB FUNDED I ROAD PROJECT SABARAGAMUWA PROVINCE	
		CLIENT: DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF PORTS & HIGHWAYS Road Development Authority	
NO.	REVISION	DATE	CONTRIBUTOR
			KATAPANA & ENGINEERS INTERNATIONAL
DRAWING TITLE		DESIGNER	DATE
RETAINING WALL REINFORCED CONCRETE		DNV	14.06.2014
DRAWING No. S - 04 - C		CHK.	

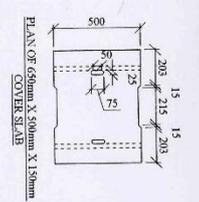
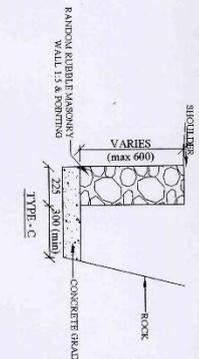
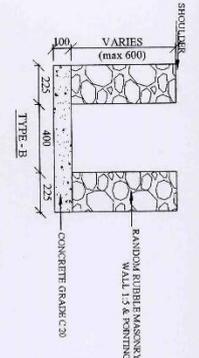
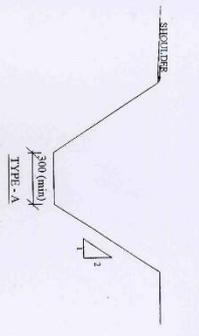


SECTION OF GABION WALLS

SECTION OF GABION WALLS

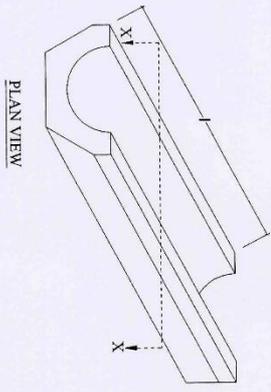
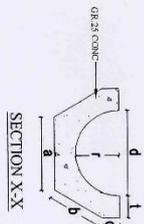
- NOTES:**
1. ALL THE DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED
 2. THIS DRAWING PROVIDES A GUIDANCE ONLY. EXACT DETAILS TO SUIT SITE CONDITIONS SHALL BE DECIDED BY THE ENGINEER AT CONSTRUCTION STAGE.
 3. ALL SCREED IN GRADE C13 CONCRETE AND IT IS 50MM THICK UNLESS OTHERWISE SHOWN.
 4. FOUNDATION DEPTHS IN EACH WALL TYPE SHOULD BE AS SHOWN OR AS DIRECTED AT SITE TO SUIT SITE CONDITIONS.
 5. USE DOUBLE TWISTED HEXAGONAL MESH AS INSTRUCTED IN STANDARD SPECIFICATION FOR THE BOXES.
 6. BROKEN ROCK SHALL BE VARYING IN SIZE (USE MINIMUM 100MM AND MAXIMUM 300MM)
 7. USE GEOTEXTILE AS DIRECTED BY THE ENGINEER ACCORDING TO THE SITE CONDITION.

<p>ADB FUNDED ROAD PROJECT SABARAGAMUWA PROVINCE</p>		<p>CUSTOMER DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA MINISTRY OF PORTS & HIGHWAYS Road Development Authority</p>		<p>CONSULTANT KATANGALA ENGINEERS INTERNATIONAL</p>		<p>DRAWING TITLE RETAINING WALL GABION WALL</p>		<p>DATE 11-06-2014</p>
NO.	REVISION	DATE	DWG No.	5-06	DRS	CHK		



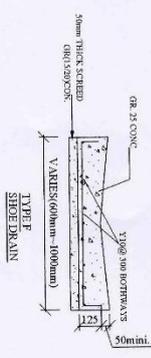
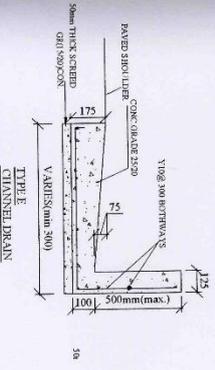
EARTH DRAIN
SCALE: 1:25

MASONRY RUBBLE LINED DRAIN
SCALE: 1:25



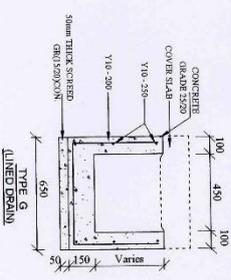
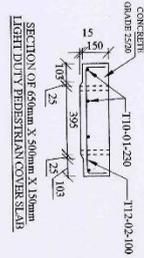
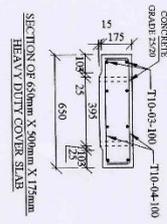
TYPE	DIAMETER	THICKNESS (t)	LENGTH (l)	a	b	c	d/2	R/F
9"	225	50	600	216	140	40	112	R6
12"	300	50	600	250	160	75	150	R6

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



REINFORCEMENT CONCRETE DRAINS
SCALE: 1:25

DETAIL OF COVER SLAB
(SCALE: 1:25)



TYPICAL DRAIN SECTIONS

ADB
ADB FUNDED
ROAD PROJECT
SABARAGAMUWA PROVINCE

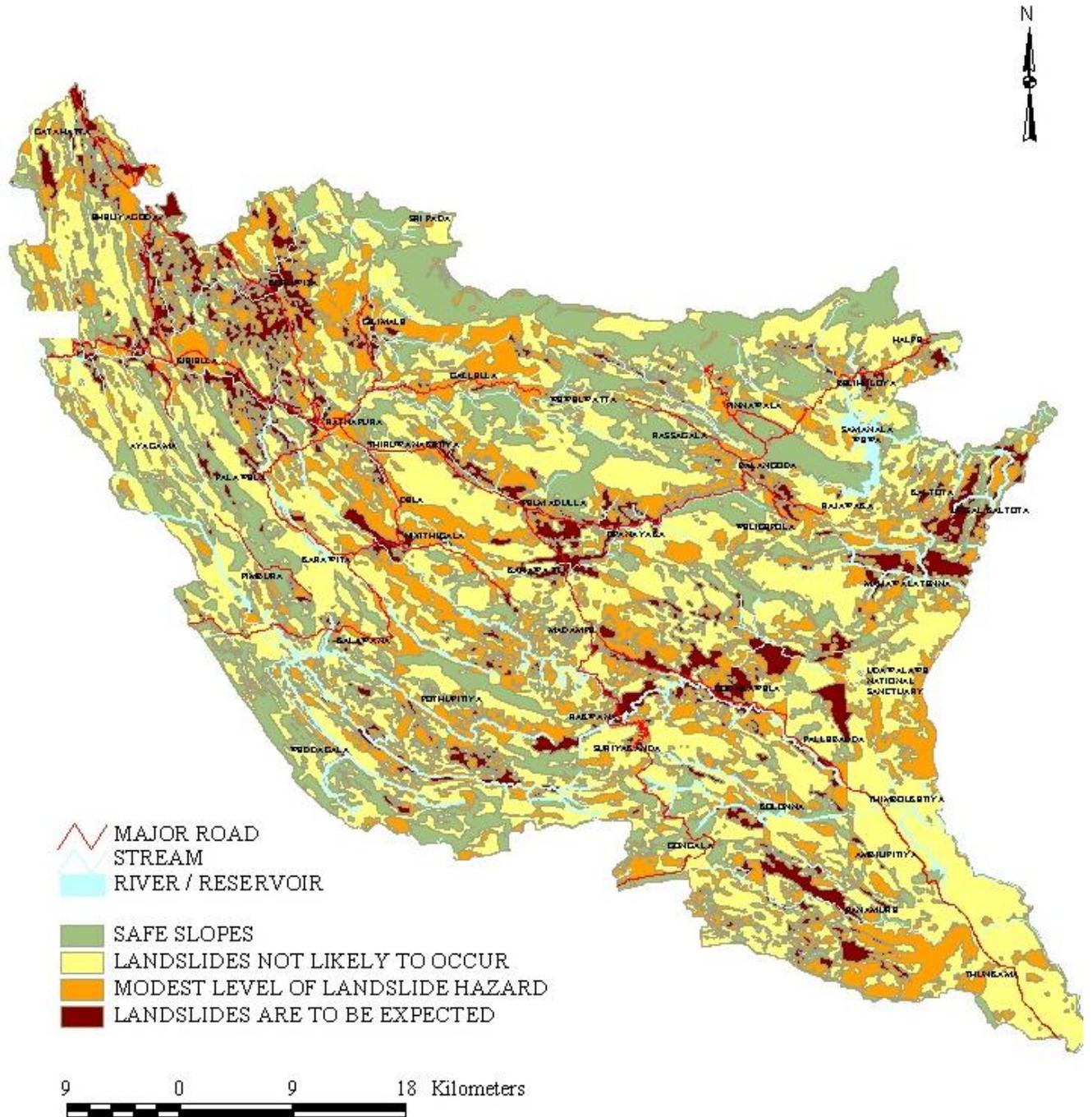
DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS
Road Development Authority

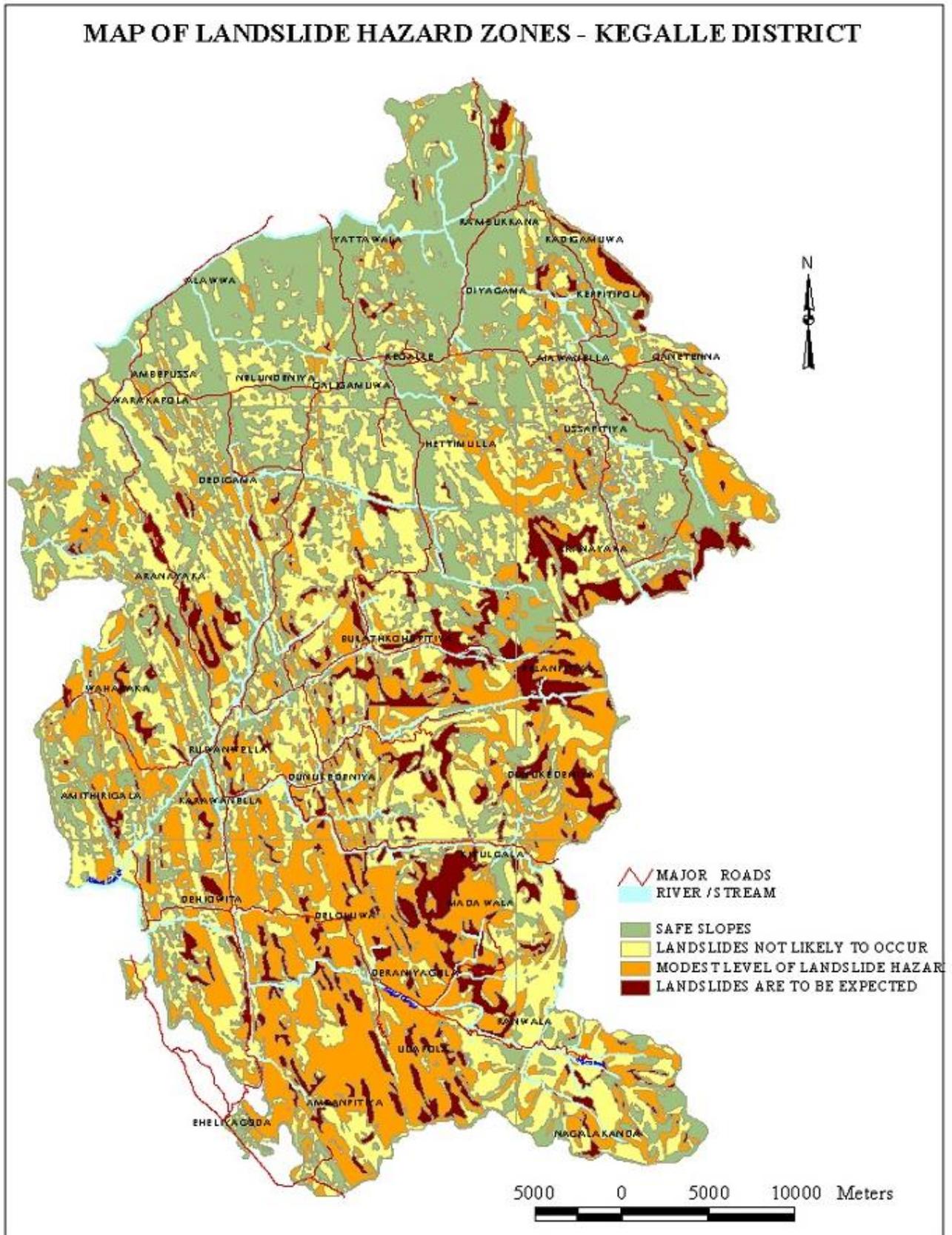
NO	REVISION	DATE

ICA
CONSULTANT
KATHIRIA ENGINEERS
INTERNATIONAL

DWG No	DS-01	DES	DATE

MAP OF LANDSLIDE HAZARD ZONES - RATNAPURA DISTRICT





Source: http://www.nbro.gov.lk/web/index.php?option=com_content&view=article&id=168&Itemid=192&lang=en



වන සංරක්ෂණ දෙපාර්තමේන්තුව

வன பரிபாலனத் திணைக்களம்

FOREST DEPARTMENT

ප්‍රධාන කාර්යාලය, සම්පත්පාය, කූ. පෙ. 3, බත්තරමුල්ල, ශ්‍රී ලංකාව.
தலைமை அலுவலகம், "சம்பத்தபாய", த. பெ. இல. 3, பத்தரமுல்லை, இலங்கை.
Head Office, Sampathpaya, P. O. Box 3, Battaramulla, Sri Lanka

දුරකථන } 2866631
தொலைபேசி } 2866632
Telephones } 2875540

ෆැක්ස් }
பெக்ஸ் } (94-1) 2866633
Fax }
E-mail: Forest@slt.lk.

මගේ අංකය } EMD/EIA/RD/rural roads/2014/අංකය }
எனது இல. } E.M.D இல. }
My Ref. } Your Ref. }

දිනය } 2014.08.27
திகதி }
Date }

අධ්‍යක්ෂ, (පරිසරික 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 ඇතුළත් වන සංරක්ෂණ දෙපාර්තමේන්තුව පාලනය යටතේ පවත්නා වනාන්තර තුළින් වැටී ඇති මාර්ග සම්බන්ධව වෙන වෙනම පරීක්ෂා කර නිර්දේශ ඉදිරිපත් කිරීමට කලක් ගතවන බව දන්වමි.
03. මෙහි හදිසි අවශ්‍යතාවය සලකා වනාන්තර තුළින් 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

Em EMD/EIA/RD/rural

වන සංරක්ෂක ජනරාල් }
வன பாதுகாவலர் நாயகம் } 2866616
Conservator-General of Forests }

වන සංරක්ෂක }
வன பாதுகாவலர் }
Conservator of Forests }

මෙහෙයුම් / நடவடிக்கை / Operations } 2866624
පර්යේෂණ / ஆய்வு / Research } 2866628
පාලන / பரிபாலனம் / Administration } 2866625

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
Upgrading of Rural Roads to all Weather Standards – Sabaragamuwa Province**

This standard Environmental Management Plan (EMP) is the summarized matrix of all possible impacts that may occur during upgrading and maintenance of roads in Sabaragamuwa Province to all weather standards under the 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
1.	Climate Change Consideration and Vulnerability screening	<ul style="list-style-type: none"> ○ 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	<ul style="list-style-type: none"> ○ 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 	Throughout the project area	Costs for tree removal. Costs for compensatory tree replanting.	Contractor	PIU, Project Implementation Consultant (PIC), DS

		<ul style="list-style-type: none"> o 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	<ul style="list-style-type: none"> 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 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	<ul style="list-style-type: none"> 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 	Throughout the road with special attention to any common property to be shifted	Costs of removing and repairing common properties	Contractor	PIU, PIC

		<ul style="list-style-type: none"> ○ 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 				
5.	Hydrology and Drainage	<ul style="list-style-type: none"> ○ 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 waterbody 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.	Included in project costs.	PIU, Design consultants	PIU, SRRDA

6.	Landslide impacts	<ul style="list-style-type: none"> ○ 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.	Landslide impact	<ul style="list-style-type: none"> ○ 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 	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

				Contractor	PIU, PIC
2.	Flood impacts	<p>and prevent damage to land and property</p> <ul style="list-style-type: none"> ○ 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 flood prone areas in Ratnapura District. ○ 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 	<p>Throughout the project area with special attention to roads which are prone to floods especially in Ratnapura District</p>	<p>To be included under contractors costs</p>	

	loss of crop and produce especially in the upstream side of the drainage path	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	
3. Sourcing and transportation of construction material	<p>loss of crop and produce especially in the upstream side of the drainage path</p> <ul style="list-style-type: none"> <input type="checkbox"/> Borrow Earth : <ul style="list-style-type: none"> ○ 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. ○ 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. <input type="checkbox"/> Aggregate : <ul style="list-style-type: none"> ○ 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. <input type="checkbox"/> Transportation of Construction Material <ul style="list-style-type: none"> ○ 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 				PIU, PIC

		avoid or minimize the spillage of the material during transportation.					
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<p>5.</p> <p>Loss of Productive Soil, erosion and land use change</p>	<ul style="list-style-type: none"> ○ 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. 	<p>Throughout the project area and camps sites, storage areas and temporary offices</p>	<p>To be included under contractors costs</p>	<p>Contractor</p>	<p>PIU, PIC</p>
<p>6.</p> <p>Slope protection and stabilization</p>	<ul style="list-style-type: none"> ○ 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 	<p>In project areas falling inside landslide prone</p>	<p>To be included under contractors costs</p>	<p>Contractor</p>	<p>PIU, PIC</p>

7.	Compaction and Contamination of Soil	<ul style="list-style-type: none"> ○ To prevent soil compaction in the adjoining productive lands beyond the ROW, the movement of construction vehicles, machinery and equipment shall be restricted to the designated haulage route. ○ The productive land shall be reclaimed after construction activity. ○ Fuel and lubricants shall be stored at the predefined storage location. ○ The storage area shall be paved with gentle slope to a corner and connected with a chamber to collect any spills of the oils. ○ All efforts shall be made to minimise the waste generation. Unavoidable waste shall be stored at the designated place prior to disposal. ○ To avoid soil contamination at the wash-down and re-fuelling areas, "oil interceptors" shall be provided. Oil and grease spill and oil soaked materials are to be collected and stored in labelled containers (Labelled: WASTE OIL; and hazardous sign be displayed) and sold off to relevant parties. ○ Any land degraded due to construction activities should be restored to the satisfactory level of the owner 	Throughout the project area with special attention to paddy and other agricultural lands	To be included under contractors costs	Contractor	PIU, PIC
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8.	Establishment of Construction Camp, temporary office and storage area	<ul style="list-style-type: none"> ○ 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 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 	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
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		<ul style="list-style-type: none">○ 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.				
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9.	Construction Debris and waste	<ul style="list-style-type: none"> 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 LADS. 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	To be included under contractors costs	Contractor	PIU, PIC
10.	Air and Noise Quality and vibration	<ul style="list-style-type: none"> 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 	Throughout the project road with special attention to schools, hospitals and religious places located along candidate roads	To be included under contractors costs	Contractor	PIU, PIC

		<ul style="list-style-type: none"> ○ away and in downwind direction of the human settlements and should not disturb normal life of residents. ○ Material storage areas shall also be located downwind of the habitation area. ○ Hot mix plant shall be fitted with stack of adequate height (30m) or as may be prescribed in the EPL to ensure enough dispersion of exit gases. ○ Diesel Generators (DG) shall also be sound proof or fitted with stack of adequate height. ○ Construction vehicles and machineries shall be periodically maintained. ○ All heavy equipment and machinery shall be fitted in full compliance with the national regulation, Noise Control Regulations - Extra Ordinary Gazette No. 924/12 May 1996 amended by Extra Ordinary Gazette 937/7 April 1997. ○ No construction along community areas will be permitted during night time ○ Contractor shall take appropriate action to ensure that construction works do not result in damage to adjacent properties due to vibration. If any damages occur, contractor will be responsible for rectifying the damage. 				
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11.	Tree plantation	<ul style="list-style-type: none"> ○ Compensatory afforestation shall be made on 1:3:ratio basis. ○ Only native species should be selected with the consent of DoF for replanting ○ Additional trees shall be planted wherever feasible. ○ Follow up maintenance of planted saplings will be carried out for a minimum of 3 years 	Throughout the all project roads.	To be included under contractors costs	Contractor	PIU, PIC
12.	Ground Water and Surface Water Quality and Availability	<ul style="list-style-type: none"> ○ 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

13.	Occupational Health and Safety	<ul style="list-style-type: none"> ○ 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 project roads	Costs to be borne by Contractor	Contractor	PIU, PIC
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<p>14</p> <p>Traffic Management and Road Safety</p>	<ul style="list-style-type: none"> ○ Adequate signboards shall be placed much ahead of diversion site to caution the road users. The road signs should comply with the Road Safety Manual of RDA. ○ It is proposed to discuss with the Department of Railways for providing adequate safety measures at unmanned railway crossing where applicable. Adequate clearly visible sign shall be provided on both sides of the railway crossing. ○ Road furniture including footpaths, railings, storm water drains, crash barrier, traffic signs, speed zone signs, pavement markers and any other such items will be provided to enhance the road safety where necessary at the completion of the project ○ Monitor and record road crashes during construction and maintenance stages and take appropriate remedial actions 	<p>Throughout the subproject area</p>	<p>To be included in contractor's cost</p>	<p>Contractor</p>	<p>PIU, PIC</p>
<p>15.</p> <p>Impacts on Biodiversity</p>	<ul style="list-style-type: none"> ○ No solid waste or spoil dumping sites, hot mix plants and worker camps should be located within or close to the forest areas. ○ Strict worker force supervision should be carried out by the contractor when conducting construction work within the area and the construction works should be completed within a minimum specified time period. ○ Restrictions on the daily working hours between daylight and sunset must be enforced in sites near forest areas 	<p>Near forest areas</p>	<p>To be included in contractor's cost</p>	<p>Contractor</p>	<p>PIU, PIC</p>

	<ul style="list-style-type: none"> ○ Conditions which may be required by the DOFC for roads located adjacent or close to forest areas must be met ○ Ensure that the timing of tree removal does not coincide with breeding season of birds or other fauna if the trees are being used by birds and other fauna 				
III	Post Construction and Operational Stage				
1.	<p>Occurrence of landslides</p> <ul style="list-style-type: none"> ○ 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.	<p>Hydrology and Drainage</p> <ul style="list-style-type: none"> ○ 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	<ul style="list-style-type: none"> o 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 o Strategically locating compensatory plantation along sensitive noise receptors to provide additional attenuation o 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	<ul style="list-style-type: none"> o All construction camp/temporary office/material storage areas are to be restored to its original conditions or as agreed with the land owner. o 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	<ul style="list-style-type: none"> o Contractor to undertake survivability assessment and report to PIU the status of compensatory tree plantation. o Additional plants should be planted for dead plants if any 	All tree replanted areas	To be borne by the contractor	Contractor (during maintenance period) and RDA	PIU/RDA

6.	Occupational Health and Safety	<ul style="list-style-type: none"> ○ 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
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**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
1.	Climate Change Consideration and Vulnerability screening	<ul style="list-style-type: none"> ○ 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	<ul style="list-style-type: none"> ○ 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. 	Throughout the project area		
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3.	Shifting of utilities	<ul style="list-style-type: none"> ○ 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. <ul style="list-style-type: none"> ○ 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	<ul style="list-style-type: none"> ○ 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		

5.	Hydrology and Drainage	<ul style="list-style-type: none"> ○ 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		
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6.	Landslide impacts	<ul style="list-style-type: none"> ○ 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		
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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.	Landslide impact	<ul style="list-style-type: none"> ○ 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		

2.	Flood impacts	<ul style="list-style-type: none"> ○ 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 flood prone areas in Ratnapura District. ○ 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 upstream side of the drainage path 	Throughout the project area with special attention to roads which are prone to floods especially in Ratnapura		
3.	Sourcing and transportation of construction material	<input type="checkbox"/> Borrow Earth:	Throughout the project area with special		

	<ul style="list-style-type: none"> ○ 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. ○ 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. 	<p>attention to borrow pits and quarries</p>		
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<p>5.</p> <p>Loss of Productive Soil, erosion and land use change</p>	<ul style="list-style-type: none"> ○ 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. 	<p>Throughout the project area and camps sites, storage areas and temporary offices</p>		
<p>6.</p> <p>Slope protection and stabilization</p>	<ul style="list-style-type: none"> ○ 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 	<p>In project areas falling inside landslide prone</p>		

<p>7.</p>	<p>Compaction and Contamination of Soil</p>	<ul style="list-style-type: none"> ○ To prevent soil compaction in the adjoining productive lands beyond the ROW, the movement of construction vehicles, machinery and equipment shall be restricted to the designated haulage route. ○ The productive land shall be reclaimed after construction activity. ○ Fuel and lubricants shall be stored at the predefined storage location. ○ The storage area shall be paved with gentle slope to a corner and connected with a chamber to collect any spills of the oils. ○ All efforts shall be made to minimise the waste generation. Unavoidable waste shall be stored at the designated place prior to disposal. ○ To avoid soil contamination at the wash-down and re-fuelling areas, "oil interceptors" shall be provided. Oil and grease spill and oil soaked materials are to be collected and stored in labelled containers (Labelled: WASTE OIL; and hazardous sign be displayed) and sold off to relevant parties. ○ Any land degraded due to construction activities should be restored to the satisfactory level of the owner 	<p>Throughout the project area with special attention to paddy and other agricultural lands</p>		
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8.	<p>Establishment of Construction Camp, temporary office and storage area</p>	<ul style="list-style-type: none"> ○ 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. <p>The construction camps, office and storage areas shall have provision of health care facilities for adults, pregnant women and children.</p> <p>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.</p> <ul style="list-style-type: none"> ○ 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 	<p>Throughout the project area with special attention to labour camps, storage areas and office premises</p>	
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		<ul style="list-style-type: none">○ 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.			
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9.	Establishment of Construction Camp, temporary office and storage area	<ul style="list-style-type: none"> ○ 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		
10.	Air and Noise Quality and vibration	<ul style="list-style-type: none"> ○ Vehicles delivering loose and fine materials like sand and aggregates shall be covered. ○ Dust suppression measures such as water sprinkling, shall be applied in all dust prone locations such as unpaved haulage roads, earthworks, stockpiles and asphalt mixing areas. ○ Batching plants and asphalt (hot mix) should be operated with necessary licenses (Environmental Protection License (EPL) and trade license) and plants shall be located at least 0.2 km away and in downwind direction of the human 	Throughout the project road with special attention to schools, hospitals and religious places		

	<p>settlements and should not disturb normal life of residents. o Material storage areas shall also be located downwind of the habitation area.</p> <ul style="list-style-type: none"> 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. 			
<p>11.</p>	<p>Tree plantation</p>	<p>Throughout the road.</p>		

<p>12. Ground Water and Surface Water Quality and Availability</p>	<ul style="list-style-type: none"> ○ 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. 	<p>Throughout road with special attention to streams, tanks and marshes</p>		
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13.	Occupational Health and Safety	<ul style="list-style-type: none"> ○ 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		
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	<ul style="list-style-type: none"> ○ Adequate signboards shall be placed much ahead of diversion site to caution the road users. The road signs should comply with the Road Safety Manual of RDA. ○ It is proposed to discuss with the Department of Railways for providing adequate safety measures at unmanned railway crossing where applicable. Adequate clearly visible sign shall be provided on both sides of the railway crossing. ○ Road furniture including footpaths, railings, storm water drains, crash barrier, traffic signs, speed zone signs, pavement markers and any other such items will be provided to enhance the road safety where necessary at the completion of the project ○ Monitor and record road crashes during construction and maintenance stages and take appropriate remedial actions 			
14.	<p>Impacts on Biodiversity</p> <ul style="list-style-type: none"> ○ No solid waste or spoil dumping sites, hot mix plants and worker camps should be located within or close to the protected areas. ○ Prior approval should be taken from the relevant department for entrance or temporary alteration of properties belongs to such areas. <p>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.</p>	Near forest reserves, national parks, sanctuaries if any	To be included in contractor's cost	PIU, PIC

	<ul style="list-style-type: none"> ○ Restrictions on the daily working hours between daylight and sunset must be enforced in sites near protected areas or wildlife zones ○ Conditions which may be required by the DWLC for roads located adjacent or close to protected areas must be met ○ For roads falling near protected areas appropriate measures such as posting of information sign boards on the presence of wildlife, speed controls such as speed bumps etc. must be installed as appropriate ○ Other measures to facilitate wildlife movement across the road such as exclusion fences may be installed with advise of DWLC ○ Ensure that construction timing of cross drains and bridges will not affect the migration or breeding of aquatic species. The contractor will seek guidance from pertinent agencies to identify rivers and creeks harbouring sensitive aquatic life. ○ Ensure that the timing of tree removal does not coincide with breeding season of birds or other fauna if the trees are being used by birds and other fauna 			
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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	<ul style="list-style-type: none"> ○ 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	<ul style="list-style-type: none"> ○ 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	<ul style="list-style-type: none"> o 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 o Strategically locating compensatory plantation along sensitive noise receptors to provide additional attenuation o Installation of noise and dust barriers if levels are found to exceed required standards. 	Throughout the road		
4.	Site restoration	<ul style="list-style-type: none"> o All construction camp/temporary office/material storage areas are to be restored to its original conditions or as agreed with the land owner. o 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	<ul style="list-style-type: none"> o Contractor to undertake survivability assessment and report to PLU the status of compensatory tree plantation. o Additional plants should be planted for dead plants if any 	Tree replanted areas		

6.	Occupational Health and Safety	<ul style="list-style-type: none"> ○ 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		
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FORMAT FOR RECORDING TRANSECT WALK &CONSULTATIONS WITH THE AFFECTED PERSONS

1) Name of Road:	<i>Thannimale Junction to Maharangalle Road (10)</i>
2) Villages:	<i>Thannimale , Yatideriya Kotasa, Walakada, Rangalle, Pilawala, no35 Janapadaya, Lakpana, Kahapitiya Janapadaya</i>
3) GND:	<i>Rangalle, Pushpane, Kabagamuwa</i>
4) District:	<i>Kegalle</i>
5) Date; Time:	<i>28/7/2014 9.30 a.m</i>
6) Total Number of Participants in the Transect walk:	<i>Twenty seven beneficiaries with five officials</i>
7) Numbers of Participants falling in the following categories (out of total participants of the meeting):	
Indigenous Persons:	<i>None</i>
Disabled:	<i>None</i>
Households losing structure:	<i>None (No family is losing structures)</i>
Women:	<i>Seven</i>
8) Name & Designation of the Key Participants: From RDA/PIU From PS/DSD/GND	<i>Please refer attached attendance list</i>
9) Issues and suggestions raised by the Participants	
i) Road alignment and design in general	<i>The horizontal alignment need not be changed. Suggest maintaining existing alignment.</i>
ii) Road width and land availability:	<i>This is a Provincial council road. Existing ROW is sufficient for road improvements.</i>
iii) Land owned/used by vulnerable groups of people:	<i>None</i>
iv) Sensitive locations (forests, cultural properties, etc.):	<i>There is a Pinus plantation along 1 km length to both side of the road</i>
v) Water-related issues (drainage lines, river sand water crossings, irrigation water courses, other water bodies, etc.):	<i>There is a water line running parallel to the road at a safe distance. There are sections which get inundated.</i>
vi) Suggestion on location of Contractor's camp site:	<i>There is a land near Samupakaraya at Rangalle that could be used for contractor's camp and yard</i>
vii) Suggestions on alternate routes during construction:	<i>There is an alternative route from Rangalle via Pahala newsmier to the Bulathkohupitiya town.</i>
viii) Road safety-related issues (major junctions, curves, bends, hospitals, schools etc.):	<i>Place signboards at appropriate locations which are identified in the transect</i>
ix) Other suggestions (such as regarding cattle crossing, borrow pits,	<i>None</i>

etc.):	
10) Major Outcomes of the Transect Walk (Summary):	
i) Changes/inputs to be incorporated in the design (alignment, road safety, drains, irrigation water crossing etc.)	<i>Road vertical alignment may need to be improved at sections where the road gets inundated. It is also suggested to have toe walls at locations identified in the transect</i>
ii) Extent of land take and willingness/unwillingness of land owner/users for donation:	<i>Six beneficiaries told that they willing to donate land.</i>
iii) Environmental issues to be resolved (Ponds, water logging etc.):	<i>Referring a transect GPS data system, Water logging areas and inundation sections can be identified</i>
iv) Other issues:	<i>None</i>
11) Brief Summary of consultation held during transect walk:	
Major Issues discussed during the Consultation:	<i>Need to have a good quality road and prevail at least one and half decade without major problems. At present the road gets inundated at few locations, there locations may need to be improved.</i> <i>Two buses are operating along the road and with the road improved there is an opportunity for an additional bus.</i>
Recommendations of the Social Safeguard Specialist:	<i>No specific recommendations</i>



IROAD project

Name of the Road :- Maha Rangalle Road from Thannimale Junction

Attendance list

Name (නම)	Signature (අත්සන)	Name (නම)	Signature (අත්සන)
1 O.V. එල්මන්			
2 K. Ananthakumar			
3 M.G.S.M. Jayawardana			
4 M.W.D.R. කුමාර			
5 A.M.N.B. අක්කරත්න			
6 M.R. ජයවර්ධන			
7 M.R. ජයවර්ධන			
8 R.A.D.K. කුමාර			
9 D. සිල්වා			
10 ජයරත්න දිසානායක			
11 R. ජයවර්ධන			
12 G. ජයවර්ධන			
13 H. ජයවර්ධන			
14 H. ජයවර්ධන වර්මාන			
15 R.A. අමර සේනාරත්න			
16 S.P. ආචාර්ය			
17 ආචාර්ය ආචාර්ය			
18 ආචාර්ය ආචාර්ය			
19 ආචාර්ය ආචාර්ය			
20 S. ආචාර්ය			
21 R. ආචාර්ය			
22 A. ආචාර්ය			
23 T. ආචාර්ය			
24 A. ආචාර්ය			
25 K. ආචාර්ය			
26 J. ආචාර්ය			
27 A. ආචාර්ය			

FORMAT FOR RECORDING TRANSECT WALK & CONSULTATIONS WITH THE AFFECTED PERSONS

1) Name of Road:	<i>Kaluandura Diwrumpitiya watta, Muruthangala Temple Getahetta Rd and up to Diwrupitiya Garment Factory Rd (P1-10)</i>
2) Villages:	<i>Getahetta, Diwrumpitiya, Muruthagala, Kaluandura</i>
3) GND:	<i>Getahetta, Diwrumpitiya, Kaluandura</i>
4) District:	<i>Rathnapura</i>
5) Date; Time:	<i>19 June, 2014 at 09.30 hours</i>
6) Total Number of Participants in the Transect walk:	<i>Six from the public and all officials</i>
7) Numbers of Participants falling in the following categories (out of total participants of the meeting):	
Indigenous Persons:	<i>None</i>
Disabled:	<i>None</i>
Households losing structure:	<i>None (No family is losing structures)</i>
Women:	<i>None</i>
8) Name & Designation of the Key Participants: From RDA/PIU From PS/DSD/GND	<i>Please refer attached attendance list</i>
9) Issues and suggestions raised by the Participants	
i) Road alignment and design in general	<i>The present road alignment could be maintained but there are few locations where the bends could be improved within the available land. There are also few locations where the road needs to be raised.</i>
ii) Road width and land availability:	<i>The road has a ROW of about 5.0 m with few locations where the ROW narrows to about 4.5 m.</i>
iii) Land owned/used by vulnerable groups of people:	<i>No groups of vulnerable people are living in this area</i>
iv) Sensitive locations (forests, cultural properties, etc.):	<i>There is a shrine and a Bo tree and a Hindu Kovil along the road.</i>
v) Water-related issues (drainage lines, rivers and water crossings, irrigation water courses, other water bodies, etc.):	<i>There are few locations where new culverts may need to be constructed.</i>
vi) Suggestion on location of Contractor's camp site:	<i>There are many locations where the contractor can get established.</i>
vii) Suggestions on alternate routes during construction:	<i>Not required as the ROW is sufficient for any temporary diversion.</i>

viii) Road safety-related issues (major junctions, curves, bends, hospitals, schools etc.):	<i>Road safety measures need to be placed close to the schools.</i>
ix) Other suggestions (such as regarding cattle crossing, borrow pits, etc.):	<i>None</i>
10) Major Outcomes of the Transect Walk (Summary):	
i) Changes/inputs to be incorporated in the design (alignment, road safety, drains, irrigation water crossing etc.)	<i>Although the current alignment is adequate there is one location (point 1464) where the road horizontal alignment could be improved without taking of additional land</i>
ii) Extent of land take and willingness/unwillingness of land owner/users for donation:	<i>No additional land is required.</i>
iii) Environmental issues to be resolved (Ponds, water logging etc.):	<i>No such sensitive locations were identified</i>
iv) Other issues:	<i>None</i>
11) Brief Summary of consultation held during transect walk:	
Major Issues discussed during the Consultation:	<i>People in this area travel to Awissawella for their day to day work, but for administrative work they have to travel to Eheliyagoda. This road provides access to Eheliyagoda. Once to road is improved a bus could be operated along this road which will be a great benefit especially to the school children, village elders and women.</i>
Recommendations of the Social Safeguard Specialist:	<i>Possibility of extending the road about 1.0 km towards the line rooms should also be considered as there are villages in that area.</i>



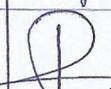
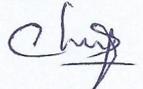
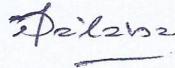
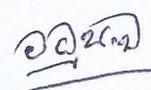
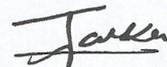
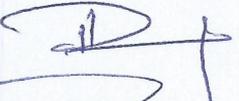
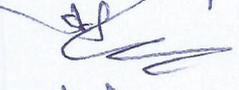
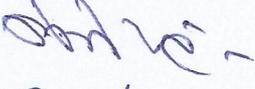
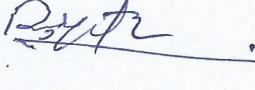
കൂടെ മുക്തൻ പ്രയത്നം

The road alignment will be finalized with the best efforts to address the above issues.

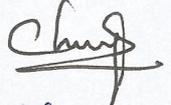
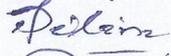
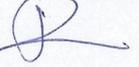
Countersigned

From PS/DSD/GND
(Signature & name)

From AE/JE of RDA
(Signature & name)

ക്രമ നമ്പർ	അ	അടയാൾ	മുൻപിൽ
1	P. P. K. ധാരാ	ഗ്രാ. ക. താലൂക്ക് മേഖല	
2	B. C. J. തൃപ്രയാർ	ജനറൽ ക്ലർക്ക് (താലൂക്ക്) മേഖല	
3	P. D. P. C. കടപ്പേർ	ജനറൽ ക്ലർക്ക് (താലൂക്ക്) മേഖല	
4	H. T. H. M. ജി. കെ. മണല	ജനറൽ ക്ലർക്ക് (ജില്ലാ മേഖല) മേഖല	
5	P. J. മുൻപിൽ	ജനറൽ ക്ലർക്ക് (ജില്ലാ മേഖല) -യ, മുൻപിൽ	
6	H. M. മുൻപിൽ	ജനറൽ ക്ലർക്ക് (ജില്ലാ മേഖല) മേഖല	
7	J. N. K. മേഖല	ജനറൽ ക്ലർക്ക് (ജില്ലാ മേഖല) മേഖല	
8	G. S. G. S. മേഖല	ജനറൽ ക്ലർക്ക് (ജില്ലാ മേഖല) മേഖല	
9	കുറുപ്പൻ മേഖല	ജനറൽ ക്ലർക്ക് - മേഖല	
10	M. S. M. S. മേഖല	ജനറൽ ക്ലർക്ക് - മേഖല	

കിരണ ചിത്രങ്ങൾ

ക്രമം	നാമം	താഴെ	ചിത്രം
01	B.C.T. ജോലി	അടയാളം കിരണ (അടയാളം)	
02	P.D.D.C. ചിത്രങ്ങൾ	അടയാളം കിരണ (അടയാളം)	
3	P-P 10 ഡി	അടയാളം കിരണ	

ಅಧ್ಯಕ್ಷರು ದೃಢೀಕರಿಸಿದ ಲೇಖನ ಪ್ರಾಧಿಕಾರದ ಅಡಿಯಲ್ಲಿ ನಡೆಯುತ್ತಿರುವ ಕಾರ್ಯದ ದೃಢೀಕರಣ.

Attendance

(To be recorded on a separate sheet in the following format)

Community		PIU/PRI	
Name of the Participants	Signature	Name and designation of the official	Signature
ಶೇಷ್ ಬಿ ಸೋಮ	ಶೇಷ್ ಬಿ		
ಪಂಚಾಂಗ ಪ್ರತಿಷ್ಠಾಪಕರು	ಪಂಚಾಂಗ		ಶೇಷ್ ಬಿ
ಪಿ.ಆ. ಡಿ.ಎ.ಕೆ.ಎ	ಪಿ.ಆ. ಡಿ.ಎ.ಕೆ.ಎ		ಪಂಚಾಂಗ
ಒಬ್ಬ ಪುಸ್ತಕ			ಪಂಚಾಂಗ
IT-IT ಪ್ರತಿಷ್ಠಾಪಕರು			ಪಂಚಾಂಗ
ಅಧ್ಯಕ್ಷರು			ಪಂಚಾಂಗ
ಶೇಷ್ ಬಿ	ಶೇಷ್ ಬಿ		ಪಂಚಾಂಗ
S.H. ಅಧಿಕಾರಿ ಕುಟುಂಬ			ಪಂಚಾಂಗ
H. ಅ. ಅಧಿಕಾರಿ ಕುಟುಂಬ			ಪಂಚಾಂಗ
C. ಅಧಿಕಾರಿ ಕುಟುಂಬ			ಪಂಚಾಂಗ
W.A. ಅಧಿಕಾರಿ ಕುಟುಂಬ			ಪಂಚಾಂಗ
W.A. ಅಧಿಕಾರಿ ಕುಟುಂಬ			ಪಂಚಾಂಗ
M. Saravaramuthy			ಪಂಚಾಂಗ
ಪಂಚಾಂಗ ಪ್ರತಿಷ್ಠಾಪಕರು	ಪಂಚಾಂಗ		ಪಂಚಾಂಗ
L.P.A. ಅಧಿಕಾರಿ ಕುಟುಂಬ			ಪಂಚಾಂಗ
ಪಂಚಾಂಗ ಪ್ರತಿಷ್ಠಾಪಕರು	ಪಂಚಾಂಗ		ಪಂಚಾಂಗ
B.L. ಅಧಿಕಾರಿ ಕುಟುಂಬ			ಪಂಚಾಂಗ
ಪಂಚಾಂಗ ಪ್ರತಿಷ್ಠಾಪಕರು	ಪಂಚಾಂಗ		ಪಂಚಾಂಗ
B. ಅಧಿಕಾರಿ ಕುಟುಂಬ			ಪಂಚಾಂಗ
A.G. ಅಧಿಕಾರಿ ಕುಟುಂಬ			ಪಂಚಾಂಗ
ಪಂಚಾಂಗ ಪ್ರತಿಷ್ಠಾಪಕರು	ಪಂಚಾಂಗ		ಪಂಚಾಂಗ
ಪಂಚಾಂಗ ಪ್ರತಿಷ್ಠಾಪಕರು	ಪಂಚಾಂಗ		ಪಂಚಾಂಗ

කළු පසුව, මුරුමානගම, දිවුරුම්පිටිවි නර්මා ගොනානන දිනවා
 නිවස

ස්ථානය :- මුරුමානගම විහාරස්ථානය
Attendance

(To be recorded on a separate sheet in the following format)

Community		PIU/PRI	
Name of the Participants	Signature	Name and designation of the official	Signature
B. Sivakumar	B. Su		
M. JOHNSON	M. J.		
M. N. P. රත්නපාය	M. N. P.		
රත්න පාය නාමය @	R		
මහේස්වරියා	M.		
කුඩි ලිපිපි රොසා	K.		
H. P. විමලසිරිසේන	H. P.		
මාමනි නොරොසා	M.		
K. K. රොසා	K. K.		
දැවැණි රොසා	D.		
පදිංචි කොටුවකින්	P.		
රත්න සේනා	R.		
I. M. A. S. මුරුමානගම	I. M. A. S.		
M. මමන රත්නපාය	M.		
M. D. රත්නපාය	M. D.		
I. P. රත්න	I. P.		
M. මුරුමාන ගුණරත්න	M.		
M. D. මමන	M. D.		
P. P. ලේකා පානච්චි	P. P.		
A. D. විජය	A. D.		
W. M. මහලිංග	W. M.		
W. P. මුරුමාන විජය	W. P.		
S. T. මමන විජය	S. T.		
M. D. මුරුමාන	M. D.		
කුමාරි. මමන	K.		