Initial Environmental Examination

June 2017

SRI: Second Integrated Road Investment Program

Western Province

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

CURRENCY EQUIVALENTS

(as of 30 May 2017)

Currency unit	–	Sri Lanka Rupee (SLRl}
SLR1.00	=	$ 0.00655
$1.00	=	Rs 152.63

ABBREVIATIONS

ABC	-	Aggregate Base Course
AC	-	Asphalt Concrete
ADB	-	Asian Development Bank
CBO	-	Community Based Organizations
CEA	-	Central Environmental Authority
DoF	-	Department of Forest
DOI	-	Department of Irrigation
DSDs	-	Divisional Secretary Divisions
DOFC	-	Department of Forest Conservation
DWLC	-	Department of Wild Life Conservation
EC	-	Environmental Checklist
EIA	-	Environmental Impact Assessment
EMP	-	Environmental Management Plan
EPL	-	Environmental Protection License
ESDD	-	Environmental and Social Development Division
FBO	-	Farmer Based Organizations
GND	-	Grama Niladhari Divisions
GoSL	-	Government of Sri Lanka
GRC	-	Grievance Redress Committee
GRM	-	Grievance Redress Mechanism
GSMB	-	Geological Survey and Mines Bureau
IEE	-	Initial Environmental Examination
iRoad	-	Integrated Road Investment Program
iRoad 2	-	Second Integrated Road Investment Program
LA	-	Local Authority
LAA	-	Land Acquisition Act
MC	-	Municipal Council
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
PCPIU	-	Project Coordination Project Implementing Unit
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
TEEMP	-	Transport Emissions Evaluation Model for Projects

UNEP	-	United Nations Environment Program

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EXECUTIVE SUMMARY

A. Introduction

1. Sri Lanka is poised to serve as an important economic link between the east and the west, owing to its strategic location and potential as a naval, aviation, energy and information hub.

2. Accelerated development programs in socio-economic and social infrastructure are being undertaken by the Government of Sri Lanka (GOSL). The GOSL is also looking to expand this growth and subsequent socio-economic benefits into rural communities.

3. Efficient road networks connecting developed centers with underdeveloped areas are essential to facilitate the equity of socio-economic opportunities. This includes reduced travel time to essential public and private facilities such as hospitals, schools, markets and financial institutions.

4. The Integrated Investment Program iRoad has been proposed by the Road Development Authority (RDA) under Ministry of Higher Education and Highways, to improve transport connectivity between rural communities and economic centers. The iRoad will be financed by the Asian Development Bank (ADB) under a Multitranche Financing Facility (MFF), with four tranches implemented over a period of ten years. iRoad intends to connect over 1,000 Grama Niladari Divisions (GNDs), rural hubs throughout the country, with a trunk road network suited to all weather standards. This trunk road network will be operated in a sustainable manner at a satisfactory condition.

5. The iRoad program has developed around 700 km of national and rural roads located within Southern Province under the Tranche 1. The succeeding Tranches focus on Sabaragamuwa, Central, North Central, North Western, and Western Provinces.

6. The iRoad 2 Program proposed, which includes the Western Province, will upgrade and maintain selected road sections in Colombo, Gampaha and Kalutara Districts in to all-weather standards. The selected rural roads in Western Province are currently governed by Provincial Road Development Authority (PRDA) and *Pradeshiya Sabhas* (local authorities) of Colombo, Gampaha and Kalutara Districts. As a part of the project, 284.97km of rural roads in Colombo District, and 318.687 km in Gampaha District and 261.084 km Kalutara District have been selected for upgrade. However, no national roads have been selected in these three districts.

7. The proposed road upgrades will include: improvement and maintenance to all weather standards, which are prone to frequent inundations, surfacing the existing pavement with Asphalt Concrete (AC) or concrete in sections, repairing or reconstructing damaged culverts, introducing earth drains for all road sections and building up drains where necessary, and removing any irregularities on the existing vertical profile.

8. The tranche is classified as environmental Category B under the ADB Rapid Environmental Assessment checklist for roads and highways. This Initial Environmental Examination (IEE) report has been prepared consistent with the ADB Safeguard Policy Statement (SPS) 2009 and the Environmental Safeguards Compliance Manual of RDA.

B. Approach and Methodology

9. This IEE was carried out in compliance with the Environment Assessment and Review Framework (EARF) for iRoad 2 Program, RDA manuals on environmental and social safeguards compliance in road development projects. The field assessments were carried out during the months of December, 2016 to March, 2017. Environmental Checklist (EC) was prepared for each candidate rural road. Based on the findings, one Rapid Environment Assessment (REA) checklist was prepared for the province as required by the ADB SPS and accordingly proposed project was categorized as environmental category B. Finally, a consolidated IEER including an Environment Management Plan (EMP) was prepared for all roads in WP.

C. Policy and Legal Framework

10. Key national environmental laws and regulations that guide the environmental impact assessment include: 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.

11. Project roads for Western Province included under the investment program were selected based on the screening criteria on environment safeguards as discussed in the Environment Assessment and review Framework of iRoad 2.

12. 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.

D. Description of the Project

13. The project will rehabilitate and improve the existing pavement surface of selected rural roads in Colombo, Gampaha and Kalutara districts of Western Province. A total of about 870 km of rural roads have been identified for initial screening (economic, environment and social aspects). Civil works related to road rehabilitation and improvements will be carried out for a period of two (2) years and the improved roads will be further maintained for three (3) years.

14. As per the preliminary engineering estimates the approximate qualities of main construction materials required will be as follows; 241,200 m3 of Aggregate; 233,000 m3 of Soil; 21,000 m3 of Sand; and 19,600 Tons of Bitumen. These material will only be secured from authorized sources with relevant approvals and licenses.

E. Description of Existing Environment

15. **Climate:** Colombo, Gampaha and Kalutara districts in Western Province belong to low country – wet, and wet zones while the eastern part of the Kalutara District falls in to the mid country - intermediate zone.

16. Relative humidity varies generally from about 70 percent during the day to about 90 to 95 percent at night. The climate is tropical and rainfall is significant. The annual temperature is 27-32°C.

17. **Rainfall:** The average annual rainfall is around 2348 mm. The rainfall pattern of the Western Province is influenced by southwest monsoon from May to September, the peak rainy season. The rest of the year consists of convective rains.

18. **Hydrology**: Colombo district consists of catchments Kelani River, Attanagalu Oya, Ma oya covers Gampaha District and mainly Kalu Ganga covers Kalutara District. The Kelani River basin contains the majority of the area of the Colombo District.

19. **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. Nonetheless, there are intermittent depreciations in the ambient air quality due to vehicular emissions, fugitive dust from unpaved road travel, and use of wood and for cooking.

20. **Natural Disasters**. Colombo and Gampaha Districts were **not classified as modest level** of landslide hazard areas. But some areas in the Kalutara District have been flagged for potential landslides and cut slope failures during periods of heavy rains by National Building Research organization (NBRO).

21. Western Province is vulnerable to recurrent flooding as a result of an increase in average rainfall coupled with heavier rainfalls, with knock-on impacts to the infrastructure, utility supply and the urban economy of the province. As the most urbanized province in Sri Lanka, these climate events pose a number of problems. Major floods in Sri Lanka are associated with the two monsoons. Typically, during the southwest monsoon season (May-September) the Western Province is most vulnerable to floods. Particularly, rivers along the western slopes of the hilly central areas cause floods in the lower flood plains of Kalu Ganga and Kelani Ganga in this period.

F. Protected Areas and Biodiversity

22. Both manmade and natural habitats are found along the project roads. Manmade habitats include home gardens, paddy fields, and plantations of tea, rubber, coconut and cinnamon. Natural habitats include marshland, streams, scrubland and forests. No officially identified natural reserves, national parks or sanctuaries are located along or near any of the project roads in the province.

G. Socio-Economic Status

1. Population and population density

23. The Western Province's population was 5,821,710 in 2012. The majority of the population are Sinhalese (84.26%), with a minority Sri Lankan Moor (7.74%) and Sri Lankan Tamil (5.77%) population. 73.67% were Buddhist, 12.93% were Christian, 8.61% are Islam, 4.71% are Hindu.

2. Economy

24. The Western Province provides the highest contribution to the Gross Domestic Product contributing 41.2% of the Provincial Gross Domestic Product (PGDP). It has a PGDP growth rate of 5.8% as of 2015. Agriculture only made up 1.7% of the GDP, the lowest among the nine provinces, while industrial sector made up 34.6%, the highest in the country, and service sector represented 56.5%.

25. The province is undergoing rapid development with several of the largest infrastructure development projects in Sri Lanka including Colombo International Financial City (CIFC), which is an International Financial Zone, and the Western Region Megapolis Panning Project (WRMPP). The Western Province is also undergoing a major real estate and construction boom with residential and commercial buildings and skyscrapers appearing on the constantly changing the skylines of cities such as Colombo and Rajagiriya. Several major residential, office and hotel buildings as well as resorts and malls are either proposed or under construction in all the three districts.

3. Education

26. 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.

4. Household income

27. According to the Household Income and Expenditure survey results, the mean monthly household income in Sri Lanka was Rs. 45,878 in 2012/13. When compared with other provinces, the highest reported household income level in the Western Province is more than twice that reported in the Eastern province. Surveying district figures, Colombo district has indicated the highest monthly household income in both mean and median measurements. (Mean Rs. 77,723; median Rs. 50,071). The per capita income of the Western Province was 1.4 times the national per capita income in 2015. However, per capita income ratio in the Western Province declined marginally over the period of 2014 to 2015. The monthly household income in the Gampaha district is mean Rs. 58,248 and median Rs 38,807. In the Kalutara district, the monthly household income amounts to mean Rs. 50,341 and median Rs. 36,512.

5. Poverty

28. The official national poverty line in March 2017 was Rs. 4222. The district poverty line in Colombo was Rs. 4389, in Gampaha was Rs. 4383 and in Kalutara was Rs. 4274. Poverty headcount index, an indicator commonly used to measure poverty, declined from 8.9 percent in 2009-10 to 6.7 percent in 2012-3. By district, the indices were 1.4 percent in Colombo, 2.1 percent in Gampaha and 3.1 percent in Kalutara.

H. Existing Infrastructure Facilities and Mega Development

29. Western Province has become the center for few mega development projects in the country which includes the Colombo South Harbour Project, Colombo Outer Circular Highway, Colombo - Katunayake Expressway, Colombo Port City Project, Improvements to Katunayake Bandaranayake International Air Port Project. Other than these major development projects many medium to small scale water and sanitation projects, road development works, electricity and irrigation water supply projects have also commenced in Western Province.

I. Sites with Religious, Cultural and Archaeological Importance

30. There are many sites with religious, cultural and archeological importance within Western Province. However, no road in Colombo district is located close to any such site. In Gampaha district road I.D 35, 36 and 37 are located about 2 km from Asgiri Raja Maha Viharaya and road I.Ds 125, 126 and 127 are located about 3 km from Bothale Wallawa. In Kalutara district road I.D. 147 provides access to Duwa Raja Maha Viharaya which is a temple as well as a site with archaeological value.

J. Anticipated Environmental Impacts and Proposed Mitigation Measures

1. Pre-construction stage

31. Environmental impacts related to project siting in flood and erosion prone areas and shifting of utilities need to be addressed. Hydrologic studies will be carried out by design engineers of contractors with assistance from design engineers of PIC to design bridges and culverts with adequate capacities based on 100- and 50- year flood return periods. Concurrence of Irrigation Department, Provincial Irrigation Department and Agrarian Development Department will be taken for bridges and culverts over irrigation and drainage canals that are controlled by these agencies. Construction operations during dry weather flow are possible mitigation measures.

32. Road sections located in rolling and hilly terrain should be identified and screened for susceptibility to erosion and counter measures 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 should be 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.

2. Construction phase

33. 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 embedded 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) location of camps at least 100m away from water resources, provision of septic tanks to treat wastewater, and linking with local health programs on prevention and control of communicable diseases; (vi) 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) implementation of 1:3 compensatory plantation to off-set impacts from tree cutting and (xi) provision of personal protective equipment to all workers.

3. Operation Phase

34. Environmental impacts during operation include 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 drainage and proper disposal of collected debris, provision of road safety appurtenances in the road design, and avenue plantation for noise control.

35. The projected variations in temperature and precipitation of the project roads indicated vulnerability to landslides. Key engineering measures to address these risks in the design include:

i. increasing in embankment height,
ii. constructing new side and lead away drains,
iii. constructing new culverts or widening of existing ones and
iv. constructing new bridges

K. Institutional Requirements, EMP and Grievance Redress Mechanism

1. Institutional Arrangement

36. The Ministry of Higher Education & Highways (MOHE&H) is the Executing Agency (EA) and RDA is the Implementing Agency and within RDA head office there will be a Project Coordination Project Implementing Unit (PCPIU). The PCPIU will be responsible for overall program coordination and implementing the project in the Western Province. Managing detailed design and supervision of the construction works and ensuring that all environmental safeguard requirements in accordance with this EARF is a responsibility of Project Implementation Consultants (PIC). A PIC will be recruited for Western province. The PICs will supervise the contractor in construction as well as maintenance works including managing the environment.

37. The PCPIU will be headed by a full time Project Director (PD) who will be supported by a team of engineers from RDA. The PCPIU will have a separate Environment and Social Unit (ESU) which includes a Senior Social Safeguards Officer and Senior Environment Safeguards Officer and assistants to cover the quantum and geographic distribution of works under the investment program. The PIC will support the PIU for supervision of the design and construction works by the civil works of Contractor. The PIC team will include a team of Environment Specialist, Social Gender Resettlement Specialist and Assistants for conduction of regular monitoring of safeguards implementation on site. From Contractor's side, there will be at least an Environment Officer and a Safety Officer.

2. Environmental Management Plan

38. A general Environment Management Plan (EMP) was prepared as part of this IEE report taking in to account the impacts and mitigation measures discussed in chapter on "Impacts and mitigation measures". Once the contracts are finalized the contractors will prepare Site Specific Environmental Management Action Plans (SSEMAP) for each package with road specific details. The SSEMAPs will be based on the impacts and mitigation measures discussed in the general EMP. SSEMAPs should include road specific impacts, mitigation measures supported by site plans as indicated in the EARF.

39. All costs for implementing the mitigation measures will be included in the Bill of Quantities (BOQ) by the Contractor as implementation of the SSEMAP 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. The EMP has been modified accordingly paying more attention on the environmental impacts and mitigation measures during the operational stage together with reconstruction stage.

40. 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 for each road by the contractor under the supervision of 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 shall 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. An Environmental Monitoring Plan (EMoP) has also been developed as part of the IEER. Based on these records and site visits, the PIC shall prepared monitoring reports during the construction and operation stage on an annual basis per Province and submitted through respective PIU to ADB for disclosure on the ADB website. Furthermore the Contractor will also be responsible for updating SSEMAP if there are any significant changes in the project site conditions or engineering design.

41. Implementation of the mitigation actions during the construction stage is a main responsibility of the Contractor. As a project proponent RDA holds the overall responsibility to carry out the mitigation measures throughout the project cycle. The ESU of PIU, ES and SGRS of PIC will conduct regular monitoring visits to all project roads, ESDD of the RDA will periodically monitor the implementation of EMP.

3. Grievance Redress Mechanism

42. 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. The proposed GRM for this project are of three levels. Level one is at the grassroots level where contractor, PIU and PIC involve in handling grievances. Level two will be Grievance Redress Committee (GRC) which will be headed by Grama Niladhari (GN) and level three will be at Divisional Secretariat (DS) level. EARF outlines the system of GRM & GRC.

L. Public Consultation and Disclosure

43. During the environmental examination, consultations were held with stakeholders including local communities and government agencies like the Department of Wildlife Conservation (DWLC), to ensure no encroachment inside or near protected areas. 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 have to be prepared per province and have to be submitted to ADB for disclosure on the ADB website.

M. Conclusion and Recommendations

44. The proposed project has been categorized as Category B on the ADB Rapid Environmental Assessment (REA) checklist for roads and highways as initial environmental examination ascertains that it is unlikely to cause any significant environmental impacts. The few impacts identified are temporary and local in nature and relatively easy to mitigate.

45. In accordance with the ADB checklist, screening was undertaken to avoid roads likely to cause significant adverse impacts. Roads falling under ‘Category A’ were excluded, for example roads falling in part or whole within a protected area.

46. The initial environmental examination conducted for the project conforms to the ADB SPS (2009), pertinent national environmental laws and regulations, and technical and procedural requirements. The few significant impacts are typical to road construction and simple to mitigate. Impacts related to road siting in flood and erosion prone areas are mitigated through proper design. Potential issues during the construction phase can be mitigated through good engineering and housekeeping practices, and implementation of clearance and permit requirements.

47. 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.

48. The consultation with public revealed that the communities require a safe road with proper maintenance.

49. The road side drainage is another aspect that needs to be considered even if the main focus will be on maintenance. The point of improving road side drainage was point out by many during the discussions had with the community. The necessity of proper drainage was also observed by the hydrologist and field team.

50. Establishment of the Grievance Redress Committees before commencement of improvements and maintenance work is also an important aspect with regret to social safeguards compliance. As revealed in the socioeconomic analysis the public welcome this project as a positive factor in economic development.

51. There will be no cases of involuntary resettlement due to the proposed improvements. The temporary disturbances to people living close to the road and for community organizations along the road will be mitigated during the construction period

I. INTRODUCTION

A. Background

52. According to the Department of Census and Statistics of Sri Lanka, the population was 20.35 million in 2012. Rural population of Sri Lanka is about 81.6% of the total population according to the World Bank statistics. In 2014, 6.7% of the country lived below the national poverty line. Poverty is concentrated in areas where connectivity to towns and markets, access to electricity and average educational attainment are relatively low, and agricultural labour is an important source of employment. 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.

53. The Government of Sri Lanka is implementing the Integrated Road Investment Program (iRoad) to improve the connectivity between rural communities and socioeconomic centers by improving the transport efficiency on selected national, provincial and local roads. The Government would like to select about 1000 Grama Niladari Divisions (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 national road network to all weather standards, and

ii. Operating a sustainable trunk road network of at least fair condition.

54. The iRoad program is financed by the Asian Development Bank (ADB) under a Multi tranche Financing Facility (MFF). The present investment program covers Western, Central, Sabaragamuwa, North Central, North Western Provinces and Kalutara District in Western Province. Based on the success of the present program the Government of Sri Lanka (GoSL) has requested ADB to fund the second Integrated Road Investment Program covering the following Provinces.

- Western Province
- Uva Province
- Eastern Province
- Northern Province

55. The second largest share of poor population in Sri Lanka is reported from Western province although it records the lowest Head Count Index (8.2 percent) among all provinces.

56. This document presents the Environmental Survey and Initial Environmental Examination (IEE) Report prepared for Western Province which covers 870.321km of rural roads to be upgraded and maintained to all weather standards.

57. These rural roads are currently governed by Provincial Road Development Authority (PRDA) and Local authorities (MC, UC and PS) of Western Province. The road lengths in each district; Colombo, Gampaha and Kalutara is presented in table below and particular road list is attached in appendix 1.A.

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

District	Number ofRoads	Length of Roads (km)
Colombo	185	284.976
Gampaha	207	318.687
Kalutara	116	266.658
Total	508	870.321

Source: iRoad 2 Program, RDA

B. Objectives of the proposed project

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

59. Specific objectives of this project are;

- To improve the road condition between rural communities and socioeconomic centers of the Western Province,
- To upgrade and maintain 870.321km of rural access roads in Western 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

60. In order to achieve these objectives, the road network in Colombo, Gampaha and Kalutara districts will be upgraded with the following guidelines:

- Improve and maintain the existing roads to all weather standards
- Surfacing the existing pavements with Asphalt if the pavement surface condition is poor.
- 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

As mentioned above, this Environmental survey and IEE Report covers upgrading and maintaining 870.321km of rural roads to all weather standards.

61. 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

62. This IEE was carried out in compliance with the Environment Assessment and Review Framework (EARF) for iRoad 2 Program, 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 December, 2016 to March, 2017.

63. The field assessment was followed by preparation of Environmental Checklist (EC) for each candidate rural road and the IEE was prepared for the while summarizing findings of each EC. Based on the findings, one Rapid Environment Assessment (REA) checklist was prepared for the province as required by the ADB SPS and accordingly proposed project was categorized as environmental category B.

64. As mentioned, EC was prepared for each road to be upgraded under the iRoad 2 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

65. Sample ECs prepared for Western Province are provided appended (Appendix 1.D) to this IEE report for reference.

66. 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, religious places, community centers 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.

67. In addition to field data, 1:50,000 topographic map sheets of Survey Department of Sri Lanka and google satellite imagery 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 project roads. Further satellite imagery available on-line from Google maps were also utilized as a secondary information base.

68. The field assessment and preparation of EC and IEE were carried out by a well-trained multidisciplinary team including Team leader, Hydrologist, Ecologist, and Sociologist. This core team was supported by Field Surveyors, GIS and CAD operators.

69. As per the EARF following criteria on environment safeguards were used to further screen the long list of roads selected for the environment assessment;

i. Roads that will cause significant and irreversible environmental impacts that would trigger classification as environment 'Category A' in accordance with the SPS will NOT BE INCLUDED in this investment program. A road project improvement work will be classified as environment 'Category A' if the road works are located fully or partially inside a legally protected area or critical habitat area[1] or have direct and irreversible impacts on cultural heritage sites of national and international significance.
ii. Roads falling in part or whole inside or within the buffer zone of a SNR, NP or NR will NOT BE SELECTED under the investment program.
iii. Rehabilitation of roads falling adjacent to other protected areas (such as sanctuaries or protected wet lands) or eco-sensitive areas WILL BE INCLUDED only if there is NO WIDENING OF THE ROAD "RIGHT OF WAY" OR ACQUIRING of land from the protected area or eco-sensitive area. For such project roads proper consultations will be held with the Department of Wildlife Conservation, Forest Department, local community and other relevant stakeholders and appropriate clearances or endorsements should be sought if required.
iv. Rehabilitation and improvement work of the any project road must have minimal or no long term impacts on other forms of sensitive ecological habitats such as marshes, natural streams, tanks and related wetland habitats.

[1] Critical habitat according to the SPS is an area with high biodiversity value, including habitat required for the survival of critically endangered or endangered species; areas having special significance for restricted range species; sites that are critical for the survival of migratory species; areas supporting globally significant concentrations or numbers individuals of congregatory species; areas with unique assemblages of species or that area associated with key evolutionary processes or provide ecosystem services; and areas having biodiversity of significant social, economic or cultural importance to local communities.

E. Literature Survey & desk Study

70. To identify the social & economic conditions in the project area, available information was collected from Resource Profiles of the Divisional Secretariat Divisions & Censes Reports published by the Censes Department. Total population, ethnicity, Religion by population, total land area & land use patterns, livelihood patterns & main economic activities etc. analysed by using this information.

71. The details of project affected population / affected land area /affected structures were obtained from Resource Development Consultants. (Results of Survey done by them).

F. Observation Method for community participation

72. To identify the perception, views and ideas of the development activities various interviews, such as focus group discussions & key informant interviews among the beneficiaries, who live either sides of the roads and road users, were conducted.

G. Line Agency meetings

73. To make aware and get the cooperation for the development programs, group discussions and community meetings were conducted in order to get their cooperation.

H. Impacts for Sensitive areas

74. Schools, religious places, sacred places (Buddhist Temples and Bo trees, Churches, Mosques and Hindu Kovils are situated on either sides of the road and are considered as being sensitive localities.

II. POLICY AND LEGAL FRAMEWORK

A. Legal Framework

75. National Environmental Policies and Laws. The national laws relevant to these projects are National Environmental Act (NEA) No 47 of 1980 and Amendment Acts of 1988 and 2000.

- Fauna and Flora protection Ordinance No 22 of 2009
- Sri Lanka Land Reclamation and Development Corporation Act
- The Forest Ordinance no 17 of 1907 and its amendments
- Urban Development Authority and/or Municipal/Urban Council / Pradeshiya Sabha Laws
- Mines and Minerals Act No 33 of 1992.
- Agrarian Services Act No 58 of 1979
- Crown land Ordinance (Chapter 454)
- Soil conservation Act 1951 amended 1996
- Irrigation Act No 1of 1951
- Felling of Trees Control Act No 9 of 1951 as amended through Act No. 30 of 1953
- Flood Protection Ordinance of 1956, amended 1981

1. National Environmental Act No 47 of 1980 and Amendment Acts of 1988 and 2000

76. Sri Lankan national Legislation under the National Environmental Act no 47 requires that Environmental Impact Assessments or Initial Environmental Examinations(IEE) are conducted for new road projects and highways which extend over a distance of 10 km. It provides guidelines for environment management, management of natural resource, fishery, Wild life forestry, soil conservation, environment quality, Environment protection and approval of projects.

77. Rehabilitation or improvement of existing roads under iRoad 2 project do not fall within the list of “Prescribed Projects” listed in Gazette Extra Ordinary No. 772/22 of 24th June 1993 and subsequent amendments, which needs to go through the Environmental Impact Assessment (EIA) process and subsequent conditional approval from the Central Environment Authority. (CEA). The EIA process of the “Prescribed Project” involves conducting of an “Initial Environment Examination” (IEE) based on the ToR prepared by the Project Approving Agency.

78. Though this project is not categorized under Prescribed Projects, further amendments to the NEA that stipulated on material extraction, emissions, noise & vibration levels will have a bearing on this development project. The development of roads under iRoad project are not new road traces but are existing roads which are being rehabilitated.

79. Roads which are located within Wildlife parks, Sanctuaries and designated Forest areas have not been selected for improvements under this program. However if a project road falls adjacent to the boundary of a protected area or a designated area of Forest Department, necessary clearance will need to be sought from the Department of Wildlife Conservation (DWC) and Department of Forest (DoF) even if there will be no widening of the road ROW.

2. Coast Conservation Act (CCA)

80. In year 1963 a Coast Protection Unit was established within the Colombo Port Commission, with the realization that a comprehensive approach to coastal resources management was required. Based on the observations made on coastal development during the 1970's the government established a Coast Conservation Division under the Ministry of Fisheries. In 1981 the parliament enacted the Coast Conservation Act (CCA) No. 57 of 1981. This act decreed the appointment of a Director of Coast Conservation with following responsibilities; (1) Administration and implementation of the provisions of the Act; (2) Formulation and execution of schemes of the work for coast conservation within the Coastal Zone ; and (3) Conduct of research, in collaboration with other Departments, Agencies and Institutions for the purpose of coast conservation. The act is administered by the Coast Conservation & Coastal Resource Management Department (CC & CRMD) which was established by upgrading the Coast Conservation Division.

81. The act was amended in 2011 through Coast Conservation (Amendment) Act, No. 49 of 2011 (Coast Conservation and Coastal Resource Management Act). Through this amendment the scope of CC & CRMD extended from conservation to management of coastal resources.

82. The Coast Conservation and Coastal Resource Management Act is empowered within the "Coastal Zone" as defined in the Act as follows;

83. "The area lying within a limit of three hundred (300) meters landwards of the Mean High Water Line and a limit of two (2) kilometers seaward of the Mean Low Water Line and in the case of rivers, streams, lagoons, or any other body of water connected to the sea, either permanently or periodically, the landward boundary extends to a limit of two (2) kilometers, measured perpendicular to the straight base line drawn between the natural entrance points thereof and shall include the waters of such rivers, streams and lagoons or any other body of water so connected to the sea, and shall also include the area lying within a further extended limit of hundred (100) meters inland from the Zero Mean Sea Level along the periphery." The Coastal Zone is depicted in figure 1.1 below.

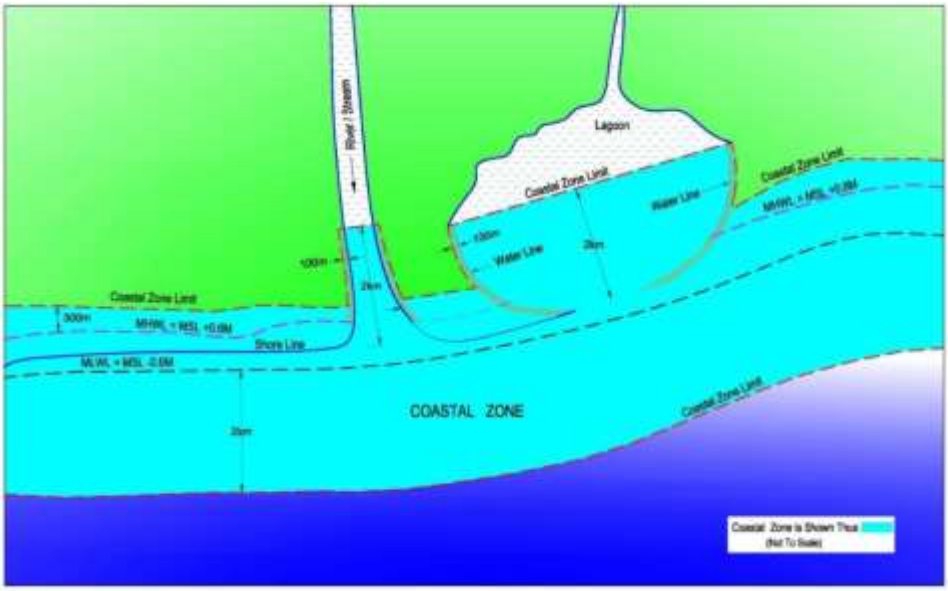

Figure 1.1 The Coastal Zone of Sri Lanka

84. Activities within the Coastal Zone prohibited by the Coast Conservation Department are:

- Removal of coral other than for research purposes;
- Mining of sand except in areas identified by the Coast Conservation Department;
- Development within 200 meters of designated archaeological sites; and
- Any development activity that will significantly degrade the quality of designated natural areas of exceptional value.

85. All the other development activities within the Coastal Zone may require permits. The Director shall issue a permit if:

- The activity is consistent with management policies stated in chapter 3, 4 and 5 of Coastal Zone Management Plan.
- The activity is not prohibited by the Coastal Zone Management Plan
- The activity is outside designated set- back lines.

86. The Act ensures all permitted activities within the Coastal Zone are met with National Standards set by the Sri Lanka Standards Institution (SLSI) for the relevant environmental parameters, and where such standers are not available the interim standers of the Central Environmental Authority.

- The activity allows for continuation of existing fishing activities.
- The activity is consistence with the intent agency zoning schemes and /or guidelines recognized by Coast Conservation Department.

87. Activities within the Coastal Zone prohibited by the Coast Conservation Department are:

- Removal of coral other than for research purposes;
- Mining of sand except in areas identified by the Coast Conservation Department;
- Development within 200 meters of designated archaeological sites; and
- Any development activity that will significantly degrade the quality of designated natural areas of exceptional value.

88. All the other development activities within the Coastal Zone may require permits. The Director shall issue a permit if:

- The activity is consistent with management policies stated in chapter 3, 4 and 5 of Coastal Zone Management Plan.
- The activity is not prohibited by the Coastal Zone Management Plan
- The activity is outside designated set- back lines.

3. Fauna and Flora protection Ordinance No 2 of 1937 and its amendments

89. The Fauna and Flora (protection) Ordinance no 2 of 1937, as amended by the Fauna and Flora (Amended) Act no 49 of 1993 and Act No 22 of 2009 provides regulations for the protection, conservation and preservation of fauna and flora of Sri Lanka, for the prevention of the commercial exploitation of such fauna and flora, and to provide for matters connected therewith or incidental thereto. This Act is administered by the Department of Wildlife Conservation, and has provisions in it for the protection of fauna and flora in National Reserves and Sanctuaries as well as in private lands in certain instances. In addition, this ordinance provides provisions for the protection of certain species of fauna outside reserves and prohibition and control of the export of some wild animals. This law also has provisions for the protection of some identified protected trees the

provisions in this law will apply to this project if the rehabilitation or road expansion has potential impacts on fauna and flora or if the trace falls within or in close proximity to areas declared under the Fauna and Flora Protection Ordinance.

4. Sri Lanka Land Reclamation and Development Corporation Act

90. The Sri Lanka Land Reclamation and Development Corporation (SLLRDC) established under this Act which was amended by law no 27 of 1976, Act no 52 of 1982 and Act no 35 of 2006. The SLLRDC has the power to declare low lying areas as flood protection areas. If the road expansion involves any filling of low lying areas, the approval of the SLLRDC will be required.

5. Urban Development Authority and/or Municipal/Urban Council/ Pradeshiya Sabha Laws

91. Since the road trace runs along many Pradeshiya Sabhas, Municipal Councils and Urban Councils, the provisions in these acts will apply to this project.

6. The Forest Ordinance no 17 of 1907 and its amendments

92. The Forest ordinance was first enacted in the form of the Forest Ordinance no 10 of 1885 which made provisions for the declaration of reserved forests. The Forest Ordinance no 16 of 1907 is the cornerstone of the present law relating to forests and plant protection. Since its enactment, the ordinance has been amended many times and was last amended in 2009. The present Forest Ordinance is an ordinance to consolidate and amend the law relating to conservation, protection and sustainable management of forest resources and has provisions for community involvement in forest management and benefit sharing through forest agreements. The provisions in this Act will apply to this project if the road expansion involves forest areas and during the removal of trees for road rehabilitation and expansion.

7. Mines and Minerals Act no 33 of 1992

93. The Geological Survey and Mines Bureau which functions under the provisions of the Mines and Minerals Act no 33 of 1992, issues three types of licenses for exploration, mining, trading and transport. The GSMB license is required for all types of mining including sand and quarry mining operations. The license issued by the GSMB grants the license holder the exclusive right to mine, process and trade in all minerals specified in the license. As such, all quarry operations and mining operations connected with road project will require a valid license issued by the GSMB.

94. Apart from NEA there are a number of other environmental laws and regulations under GOSL that are applicable to the investment program as given in Table II.1 below.

Table II-1: Applicable national laws and regulations for the investment program

Item	Legislation	Relevance and main content	Authorizing institution
01.	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,	CEA

Item	Legislation	Relevance and main content	Authorizing institution
		treatment plants, sewerage networks, mechanized mining activities etc.	
02.	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
03.	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 atmosphere during proposed project activities.	CEA
04.	National Environmental (Noise Control) Regulations No.1 of 1996 and its amendments	Regulates maximum allowable noise levels for construction activities at the boundary of such construction site/ area during proposed project activities	CEA
05.	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
06.	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
07.	Forest Act No. 34 of 1951	This act is to consolidate and amend the Ordinance relating to the conservation, protection and management of forest and forest resources. For control of felling and transport of timber and for matters connected therewith or incidental thereto.	Forest Department
08.	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 tree species (mainly intended to stop indiscriminate felling of specified trees) in the country.	Forest Department
09.	Water Resources Board Act No.29 of 1964 and (Amendment) Act, No. 42 of 1999	The act controls and regulates developments (including conservation and utilization) of water resources; prevention of pollution of rivers, streams and other water resources; formulation of national policies relating to control and use of water resources.	Water Resources Board
10.	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

Item	Legislation	Relevance and main content	Authorizing institution
11.	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 (MOD)
12.	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
13.	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
14.	Crown (State) Land Ordinance No. 8 of 1947 and Act No. 13 of 1949	An ordinance/ Act to make provision for the grant and disposition of crown (State) 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 Commissioner General's Department
15.	Agrarian Development Act No. 46 of 2000 (Section 32)	This act regulates using paddy land for any other purpose other than agricultural cultivation without the written permission of the Commissioner General.	Department of Agrarian Development
16.	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 (State) Land Ordinance No. 08 of 1947 (chapter 454) and the land development ordinance No.19 of 1935 chapter 464 as amended by land development (amendment) acts, No. 16 of 1969, No. 27 of 1981, No. 22 of 1998, No. 22 of 1995. State Land (Recovery of Possession) Act No. 07 of 1979.	Governor – Western Province Provincial Council and Land Commissioner General's Department
17.	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

Item	Legislation	Relevance and main content	Authorizing institution
18.	National Thoroughfares Act, No. 40 of 2008	This act is also known as the RDA Act provide directive for planning, design construction, development, maintenance and administration of an integrated public road network in Sri Lanka.	Road Development Authority
19.	Urban Development Authority (UDA) Law No. 41 of 1978 and Urban Development Projects (Special Provisions) Act No. 2 of 1980	This law provides for the establishment of the UDA to promote integrated planning and implementation of economic, social and physical development of certain areas as may be declared by the minister to be urban development areas and for matters connected with the relevant project activities. Urban Development Projects (Special Provisions) Act No. 2 of 1980 is an act to provide for the declaration of lands urgently required for carrying out urban development projects and to provide for matters connected there with relevant project activities.	Urban Development Authority (UDA)
20.	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)
21.	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
22.	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
23.	Antiquities Ordinance No. 9 of 1940 and amendments	The Act regulate activities of projects located in close proximity of any archeological reserves.	Department of Archeology
24.	Unexploded Ordinance	To ensure safety of work force during constriction period in roads located in areas were the armed conflict existed (i.e. in Northern and Eastern Provinces)	Ministry of Defense

95. Other than the above requirements, specific approvals/ clearances, permits and licenses that need to be obtained for the proposed program are out lined under table II-1. These approvals/ clearances, permits and licenses are based on the laws and regulations under the NEA, CCA, FaFPA and other Acts and regulations listed in table II-2.

Table II-2: Approvals/ clearances, permits and licenses applicable for the investment program

Project stage	Approvals	Project related activity	Relevant agency	Responsible party/ies
Pre-construction stage (Before mobilization or contractor/s)	Environment clearance	Implementation of the project within Provinces of North, East, Uva and Western.	CEA	RDA, Project coordinating PIU assisted by ESDD[2]
	Permit or clearance from CC & CRMD	Implement road rehabilitation and upgrading activities within the Coastal Zone	CC & CRMD	RDA, Project coordinating PIU assisted by ESDD
	Certificate of Unexploded Ordinance (UXO certificate)	Implementation of the project within Provinces of North and East	MOD	RDA, Project coordinating PIU and Provincial PIUs of Northern and Eastern Provinces
Pre-construction stage (With mobilization of contractor/s but before commencement of civil works)	Recommendation from National Building Research Organization (NBRO)	Clearing of vegetation and cutting of slopes in hilly terrains especially in Uva Province and Kalutara District in Western Province	NBRO	RDA, Project coordinating PIU and Provincial PIUs Uva and Western Provinces assisted by ESDD
	Environmental Protection License (EPL)[3]	Opening and operation of material extraction sites (borrow pits and quarry sites); Siting and operation of asphalt plants, crusher plants, concrete batch mixing plants etc.	CEA	Contractor/s under direct guidance of PIC[4]

[2] Project coordinating PIU: The Project Implementing Unit under the Director General's Office, RDA which is functioning as the project coordinating unit for the investment program. ESDD: Environment and Social Development Division of RDA.

[3] EPL, IML, Explosive permits and Trade Licenses should be renewed as per the conditions stipulated in these documents.

[4] PIC: Project Implementing Consultant who will be appointed on a province basis for this investment program (iRoad 2).

B. Policy Framework

1. ADB's Safeguard Policy Framework, June 2009

96. 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.

97. 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.

98. 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.

99. 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.

100. 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.

101. **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.

102. 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.

103. 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.

104. 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.

105. 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.

106. 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.

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

108. 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.

109. 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.

110. 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.

111. 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.

112. Sri Lanka is a signatory for some international conventions which includes; 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.

III. DESCRIPTION OF THE PROJECT

A. Location of the project

113. Most of the road sections selected for the project connect rural areas with the trunk road network in Colombo, Gampaha and Kalutara Districts in Western Province. Accordingly a road lengths of 284.976km, 318.687km and 266.658km in each Colombo, Gampaha and Kalutara districts respectively 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 location maps. The respective GNDs crossed by each road are presented in the specific ECs. Sample ECs are presented in appendix I.D.

114. Location maps attached in appendix III.A presents the general location of rural roads in Colombo, Gampaha and Kalutara Districts respectively. And specific location maps for each road is attached in each ECs.

B. Need of the Project

115. 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.

116. The Western Province, consisting of Colombo, Gampaha and Kalutara Districts, is the most socio-economically developed part in Sri Lanka. It contributes more than fifty percent to the Gross Domestic Product. Western Province is the most densely populated province of Sri Lanka, which is 3,593 km2 in extent is home to the country's legislative capital Sri Jayewardenepura. It is also home to the country's commercial hub, Colombo.

117. It is also 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 especially under the Western Region Megapolis Planning Project. Proposed Light Rail Transit project, Outer Circular Expressway, Elevated roads along baseline road and port access road, and construction of flyovers in order to increase transport efficiency are some of such major development projects offered to the Western Province.

118. 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 17.0% of the labor force in Kalutara district is 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, 2015). In order to obtain a reasonable price for their products it is necessary to transport them to better markets which are mostly found in town areas. 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. 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 address the connectivity issues for these rural communities.

119. The proposed iRoad 2 Program of RDA will improve the transport connectivity between rural communities and socio-economic centers. And under the project, 870.321km of roads of the Western Province will be upgraded and maintained to all-weather standards. 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 the area which will be a positive drive to development of the country.

C. Analysis of Alternatives

1. No Project Alternative

120. The GOSL will be initiating key infrastructure project in the province especially under the Western Region Megapolis Planning Project. 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 2, these flagship projects will not realize the expected benefits and the province will continue to stagnate. The Poverty Head Count Index of Colombo, Gampaha and Kalutara Districts as of 2013 are 1.4%, 2.1% and 3.1%, respectively.

121. 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 culverts and side- drains, and increase erosion due to lack of slope protection. Also Poor road surface will result to increase in fuel consumption and increase in noise and dust levels which will result to poorer air quality particularly immediately along the project road.

122. The lack of culverts 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

123. With the iRoad 2 program, 870.321km length of rural roads in Western 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 pavement surface condition, drainage, and strengthening against erosion will have their corresponding environmental benefits. However, the projected increase in traffic and operating speeds may increase the noise, emissions, and road accidents.

124. On the other hand, once the accessibility is increased, the travel time to centers such as hospitals, schools, markets and other infrastructure facilities available in town centers will be reduced. Therefore, the iRoad 2 program is a timely required project to facilitate the socioeconomic development of the Western Province and ultimately for the development of the country.

D. Magnitude of Operations

1. Project Activities

125. The iRoad 2 Program will upgrade and maintain selected road sections in Western Province to all-weather standards. The selected rural roads are currently governed by the local Authorities (MC, UC and PS) of Colombo, Gampaha and Kalutara Districts and Western Provincial Road Development Authority (WPRDA). Under the project, rural roads of 284.976km, 318.687km and 266.658km in each Colombo, Gampaha and Kalutara districts respectively have been selected to be upgraded.

126. Selected roads are narrow with varying widths and poor surface and drainage conditions. Details of these roads i.e. length, widths, and surface type are provided in each ECs.

127. As mentioned above, it is proposed to upgrade and maintain selected roads in Colombo, Gampaha and Kalutara Districts to all weather standards under iRoad 2 Program. For selected roads, different typical cross sections have been developed to suit existing road condition; gravel, Metal and tar, concrete, and concrete 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 which is comparatively a long lasting, durable 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 it will be overlaid with the Asphalt Concrete or concrete in sections where there is frequent inundation.
- 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 built up drains has been provided for town areas or other necessary locations. Otherwise earths drain will be provided.
- The earth work will be carried out in required areas.
- Finally, road marking will be carried out. (Source: PIU, iRoad 2 Program, RDA)

128. Improvements on cross and side-drainage of the particular roads will be considered in locations where drainage structures have been 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 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

129. 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 aggregates and sand. Offshore sand which is extracted, cleaned and stored by Sri Lanka Land Reclamation Development Corporation could also be purchased and 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. Possible material extraction locations of Western province are shown in Appendix III.D

130. Based on engineering estimates prepared for each road for Western Province, approximate quantities of material required for each district are given in Table III-1.

Table III-1: Material Requirement for Western Province

District	Aggregate (m^3)	Soil (m^3)	Sand (m^3)	Bitumen (t)
Colombo	88,200	27,200	2,800	7,900
Gampaha	98,800	135,200	12,900	6,700
Kalutara	54,200	70,600	5,300	5,000
Total	241,200	233,000	21,000	19,600

IV. DESCRIPTION OF EXISTING ENVIRONMENT

131. The IEER provides a comprehensive description of the existing environment of the areas, which may get potentially affected by the project activities under the proposed iRoad 2 project in Western Province. The study extends into the assessment of existing physical, biological, socio-economic, archaeological and cultural aspects and expected changes to such aspects in surrounding areas during the construction of the roads.

132. The available published literature, documents and maps (e.g. topographic, geological maps, forest, satellite imagery, Google image maps etc.,) related to study area of this project were reviewed.

133. The information taken by the project team on status of land use patterns, topography and soil erosion tendency, slope stability, landslides tendency, etc., within the influence area were reviewed through site observations and on-site delineation in maps.

134. Site visits & investigations were carried out to identify environmental sensitive locations, conflict points etc.

135. Baseline data on socio-cultural environment were also compiled, including present population, land use and ownership, community structure, cultural properties, significant natural, cultural or historic sites, land and water based activities such as agriculture, fisheries within the project influence area.

136. Environmentally sensitive areas as well as all protected areas under the Forest Ordinance and Fauna and Flora Protection Act, such as conservation forests, sanctuaries and National Parks situated along the road traces will be identified and marked. In addition, other environmentally sensitive areas such as wetlands and Environmental Protection Areas declared under the National Environmental Act were identified. Mitigation measures have been suggested for potential impacts from project activities to these areas.

A. Physical Environment

1. Climate (Rainfall/temperature), Land Use, terrain and soil

137. The three candidate districts, Gampaha, Colombo and Kaluthara where the iRoad are situated belongs to Low country wet zone Sri Lanka. Rainfall in these three districts have a bi-model pattern where high rainfall peaks takes place in the Month of May in the South West Monsoon. Average annual rainfall in this region ranges from 2000mm to 5000mm. And the annual temperature is 27-32 0C (Source Arjuna's Atlas of Sri Lanka).

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

Table IV-1: Agro Ecological Zones related to candidate road sections

District	Agro-ecological zone	Roads(ID) falls in to agro-ecological zone	75% expectancy value of rainfall (mm)	Description (Land use, Terrain, Soil groups)
Colombo	WL_1a	64_i,64_ii,64_iii,64_iv,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,151,188,189,190,191,192,193,194,195,196_i,196_ii,197,198,199,201,202,203,204,205,206,207,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232233,234,235,253,254,255,256,257,258,259,260,289	>3300	Tea, Rubber, Paddy, Mixed home garden, Export agriculture crops(cinnamon), Flat, RYP with wet mountain regosols
	WL_1b	8,51,55,56,58,59,60,61,62,83,84,85,86,87_i,87_ii,93,100,101,110,120,124,126,129,133,136,139,141,147,149,151,152,153,154,155_i,155_ii,156,157,158,159_i,159_ii,160,161,162,163,164_i,164_ii,164_iii,164_iv,164_v,165,166,167,168,169,170,171,172,174,175,176,177,178,179,181,182,183,184,185,186,187_i,187_ii,208,261,263,264,265,266,267,268,269,270,271,272,	>2800	Paddy, Coconut, Vegetables, Mixed home garden, Flat, RYP with wet mountain regosols, Alluvial soils
	WL_2a	273,274,275,276,277,278,279,280,281,	>2400	Coconut, Paddy, Mixed home garden, Flat, RYP with well-developed laterite, Alluvial soils
	WL_3	22_i,23,24_i,24_ii,26,29,31,35,38_i,38_ii,39,40,47,48,49,50,53,91,92,95,96,97,102,103,104,106,107,108,111,113,114,115,116,117_i,117_ii,118,119,131,145,146,240,241	>1700	Coconut, Paddy, Mixed home garden, Flat, Flat, RYP with well-developed laterite, Sandy Regosols , bog and half-bog soils
Gampaha	WL_1a	118,318_i,347	>3300	Paddy, Tea, Rubber, Coconut, Vegetables, Mixed home garden, Flat, RYP with wet mountain regosols, RYP with well-developed laterite

District	Agro-ecological zone	Roads(ID) falls in to agro-ecological zone	75% expectancy value of rainfall (mm)	Description (Land use, Terrain, Soil groups)
	WL_1b	2,40,41,43,44,4752,53,55,61,63,65,299,333,334,336,337,338,339,340,345,346,348,355,357,358,361,362,363,371,372,375,410_i,410_ii,411	>2800	Paddy, Coconut, Export agriculture crops(cinnamon), Vegetables, Mixed home garden, Flat, RYP with well-developed laterite
	WL_2b	135	>2200	Paddy, Coconut, Export agriculture crops(cinnamon), Vegetables, Mixed home garden, Flat, RYP with well-developed laterite, Erosional remnants
	WL_3	1,3,4,5,6_i,6_ii,7,8_i,8_ii,10,11,12,14,17,20,31,32,33,34,35,36,37,38,39,50,51,54,56,57,62,66,67,68,69,70,71_i,71_ii,73,78,79,80,81,82,83,84_i,84_ii,85,86,87,88_i,88_ii,89,91,92,93,94,95,96,98,101,102,107,108,109,110,111_i,111_ii,113,114,116,117,120,122,123,124,125,126,127,128,134_i,134_ii,136,137,141_i,141_ii,141_iii,142,144_i,144_ii,145,146,147,148,152,153,154,155,156,157,158,159,160,164,165,166,167,168,172,176,177,179,180,181,184,185,186,187_i,187_ii,188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,229,230,231_i,231_ii,,232,233,234,235,236,237,238,239,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,260,261,262,264,265,266_i,266_ii,267,268,274,276,277,279,280,281,282,283,284,286,287,290,29	>1700	Paddy, Coconut, Mixed home garden, Flat, RYP with well-developed laterite, Sandy Regosols , bog and half-bog soils

District	Agro-ecological zone	Roads(ID) falls in to agro-ecological zone	75% expectancy value of rainfall (mm)	Description (Land use, Terrain, Soil groups)
		1,292,293,295,296,298,300,301,313,315_i,315_ii,315_iii,316,318_ii,320,322,325,330,331,332,335,341,342_i,342_ii,343,344,349,350,351,352,353_i,353_ii,354,370,377,378,385,387,390,395,396_i,396_ii,398,400,401,402,403,407,408,409,412,413,414,415_i,415_ii,416,417		
Kalutara	WL_1a	26,27,29,30,31,36_i,36_ii,62,64,66,67,68,69,72,73,74,75,81,82,83,84,85,86,87,89,260,263,	>3300	Natural Forest, Tea, Rubber, Palm oil ,Export agriculture crops(cinnamon), Mixed home garden, Undulating and Hilly, RYP with wet mountain regosols, RYP with prominent A1 horizon
	WL_1b	49,59,60,61,63,65,78,71,76,174,182,185,186,187,188,208,255,258	>2800	Rubber, Coconut, paddy, Export agriculture crops (cinnamon), Flat, RYP with wet mountain regosols
	WL_2a	40,47,48,54,133,136,139,141,142,145_i,145_ii,145_iii,147,159,160,163,150,153,168,170,172,180,189,191,213,214, 215,216,217,218,223,224,227,254	>2400	Coconut, Paddy, Export agriculture crops(cinnamon), Flat, RYP with well-developed laterite, Regosols on old sands, bog and half-bog soils

RYP-Red Yellow Podsolic; RBL- Reddish Brown Latosolic; LHG-Low Humic Clay.

2. Hydrology

139. The candidate roads in the three districts Gampaha, Colombo are within the river basins Maha Oya, Attanagalu Oya, Kelani Ganga, Colombo Catchment, Bolgoda Ganga, Kalu Ganga and Benthara Ganga. Out of these Colombo catchment is considered as a drainage basin as there is no large river within it. The candidate roads stream system and river basins for the three districts are shown in Figure IV-1 to Figure. IV-6.

3. Streams Crosses by Candidate Roads

140. **Colombo District:** Colombo District consists of catchments of Kelani River, Weras Ganga and Bolgoda River. The Kelani River basin covers the majority of the area of the Colombo District and candidate roads cross numerous streams. Table IV-2 below presents the streams (major and

minor) crossed by the candidate roads or streams running parallel to the candidate roads that are located within the project area.

Table IV-2 Roads that Cross Rivers and Streams, Colombo District

Road ID	Chainage at river crossing or stream crossing
WCO026	Road crosses tributary of Kelani river within 0.4 - 0.5km
WCO038	Road crosses tributaries of Kelani river between 0.2 - 0.3km and 0.4-0.5km
WCO056	Stream (tributary of Kelani River) were observed within 0.8 - 0.9km
WCO065	Tributaries of Kelani River were observed at, 0.3 – 0.4km and 1.2-1.3km crossing the road.
WCO067	The road crosses a Stream (tributary of Kalu River) between 1.5 and 1.6km.
WCO072	The road crosses a tributary of Kelani River between 1.5 and 1.6km.
WCO083	Road crosses Kelani River at 0.7-0.8 km
WCO085	Stream (tributary of Kelani River) were observed within 1.5 – 1.6km
WCO091	Road crosses a tributary of Kelani River at 0.5km.
WCO107	Road crosses tributary of Kelani river between 0.3 and 0.4km.
WCO108	Tributaries of Kelani River were observed at, 0.6-0.7km and 2.2-2.3km.
WCO111	Road crosses streams (tributaries of Kelani River) at 0.8-0.9km and 1.1-1.2km.
WCO114	Road crosses Kelani River at 1.4-1.5 km
WCO149	Road crosses tributary of Kelani river between 0.8 and 0.9km.
WCO157	Road crosses tributary of Kelani river between 0.8 and 0.9km.
WCO162	Stream(tributary of Kalu River) was observed within 1.5-1.6km
WCO174	Road crosses minor streams at 0.6-0.7km
WCO184	Tributary of Kalu River is crossed at 2.7-2.8km.
WCO185	Tributary of Kalu River is crossed at 0.8-0.9km.
WCO188	Stream is crossed at 0.3-0.4km
WCO189	Tributary of Kelani River is crossed at 0.7-0.8km.
WCO193	Road crosses streams (tributaries of Kelani River) at 0.2-0.3km and 0.9-1.0km.
WCO195	Road crosses a tributary of Kelani River at 2.5-2.6km.
WCO208	Tributaries of Kalu River were observed at, 1.5-1.6km and 2.2-2.3km.
WCO230	Tributary of Kelani River is crossed at 0.6-0.7km.
WCO235	Road crosses streams (tributaries of Kelani River) at 1.8-1.9km and 2.3-2.4km.
WCO253	Road crosses streams (tributaries of Kelani River) at 0.8-0.9km and 1.3-1.4km.
WCO256	Stream(tributaries of Kelani River) were observed within 1.5-1.6km
WCO259	Tributary of Kelani River is crossed by the road between 3.4-3.5km.
WCO267	Tributary of Kelani River is crossed at 2.5-2.6km.
WCO269	Road crosses minor stream between 1.5 and 1.6km
WCO271	Stream is crossed at 0.8-0.9km
WCO278	Road crosses minor stream at 0.4-0.5km.
WCO279	Road crosses a tributary of Kelani River at 0.6-0.8km.

141. **Gampaha District:** Gampaha District consists of catchments of Kelani River, Attanagalu Oya and Maha Oya. The Kelani River, Attanagalu Oya and Maha Oya basins cover the lower, middle and upper parts of the Gampaha district and candidate roads cross numerous streams. Table IV-3 below presents the roads in Gampaha district that crossed rivers or streams.

Table IV-3: Roads that Cross Rivers and Streams, Gampaha District

Road ID	Chainage at river crossing or stream crossing
WGA031	Stream(Tributary of Attanagalu Oya) of is crossed at 2.5-2.6km
WGA032	Road crosses stream (tributary of Attanagalu Oya) at 1.6-1.7km
WGA040	Road crosses a tributary of Kelani River at 2.4-2.5km.
WGA050	Tributary of Kelani River was observed at 1.3-1.4km.
WGA051	Tributary of Kelani River is crossed at 1.8-1.9km.

Road ID	Chainage at river crossing or stream crossing
WGA081	Road crosses streams (tributaries of Attanagalu Oya) at 0.4-0.5km and 0.8-0.9km.
WGA089	Road crosses a stream (tributary of Attanagalu Oya) at 0.3-0.4km.
WGA124	A Stream (tributary of Maha Oya) was observed within 0.6-0.7km.
WGA137	Road crosses tributaries of Attanagalu Oya at 1.3-1.4Km and 1.6-1.7Km
WGA160	Road crosses Attanagalu Oya at 0.4-0.5km.
WGA177	Road crosses minor tributaries of Attanagalu Oya at 0.1-0.2Km and 0.3-0.4Km
WGA186	Road crosses minor tributaries of Maha Oya within 1.8-1.9km
WGA187	Road crosses streams (tributaries of Maha Oya) at 0.6-0.7km and 1.3-1.4km
WGA191	Road crosses a tributary of Maha Oya at 2.1-2.2km.
WGA197	Road crosses tributary of Maha Oya between 1.9 and 2.0 km.
WGA198	Road crosses tributary of Maha Oya between 0.8 and 0.9km.
WGA199	Stream (tributary of Attanagalu Oya) was observed within 0.4-0.5km
WGA203	Road crosses minor stream at 0.4-0.5km
WGA235	Tributary of Maha Oya is crossed at 1.3-1.4km.
WGA239	Tributary of Maha Oya is crossed at 0.4-0.5km.
WGA251	Stream is crossed at 0.6-0.7km
WGA254	Tributary of Attanagalu Oya is crossed at 1.2-1.3km.
WGA257	Stream (tributary of Attanagalu Oya) was observed within 0.2-0.3km.
WGA262	Stream (tributary of Attanagalu Oya) was observed within 1.5 – 1.6km
WGA286	Road crosses minor stream at 1.6-1.7km
WGA289	Stream (tributary of Kelani River) were observed within 1.2-1.3km
WGA291	Road crosses tributary of Attanagalu Oya between 1.6 and 1.7 km.
WGA320	Stream (Tributary of Attanagalu Oya) of is crossed at 0.9km
WGA333	Road crosses Attanagalu Oya at following locations:0.8km,1.1-1.2km,2.5-2.6km
WGA334	Road crosses a tributary of Attanagalu Oya at 1.2-1.3km.
WGA347	Tributary of Attanagalu Oya was observed at 1.2-1.3km.
WGA349	Road crosses streams (tributaries of Attanagalu Oya) at 1.4-1.5km and 2.0-2.1km.
WGA358	Road crosses streams (tributaries of Attanagalu Oya) at 0.8-0.9km and 1.3-1.4km.
WGA370	Road crosses a stream (tributary of Kelani River) at 1.6-1.7km.
WGA377	A Stream (tributary of Attanagalu Oya) was observed within 0.6-0.7km.
WGA385	Road crosses tributaries of Attanagalu Oya at 0.5-0.6km
WGA400	Stream (Tributary of Attanagalu Oya) is crossed at 0.8-0.9km
WGA401	Road crosses stream (tributary of Attanagalu Oya) at 1.3-1.4km
WGA402	Road crosses a tributary of Attanagalu Oya at 0.9-1.0km.
WGA406	Road crosses streams (tributaries of Attanagalu Oya) at 0.5-0.6km and 0.8-0.9km.
WGA415	A Stream (tributary of Maha Oya) was observed within 1.9-2.0km.

142. **Kalutara District:** The major catchments located in Kalutara District are of Kalu Ganga, Kuda Ganga (Branch of Kalu Ganga) and Bolgoda River. The Kalu Ganga catchment and the Kuda Ganga, branch of Kalu Ganga are the largest covering almost the entire district. Table IV-4 below presents the roads in Kalutara district that crossed rivers or streams.

Table IV-4: Roads that Cross Rivers and Streams, Kalutara District

Road ID	Chainage at river crossing or stream crossing
WKA003	Stream is crossed at 1.2-1.3km
WKA014	Magura Ganga is crossed at 2.5-2.6km.
WKA029	Road crosses a stream (tributary of Kalu Ganga) at 1.5-1.6km.
WKA059	Road crosses a tributary of Kalu Ganga at 1.5-1.6km.
WKA067	Kalu Ganga is crossed at 1.6-1.7km.
WKA068	Road crosses streams (tributaries of Kalu Ganga) at 1.5-1.6km and 2.2-2.3km.
WKA069	Kalu Ganga is crossed at 0.8-0.9km.
WKA093	Road crosses Benthara Ganga at 0.7-0.8 km

Road ID	Chainage at river crossing or stream crossing
WKA095	Road crosses Benthara Ganga at 0.8-0.9 km
WKA097	Benthara Ganga is crossed at 1.6-1.7km.
WKA113	Benthara Ganga is crossed at 2.5-2.6km.
WKA131	Road crosses tributaries of Kalu Ganga at following locations: 0.4-0.5km, 0.6-0.7km, 1.7-1.8km
WKA139	Road crosses streams (tributaries of Kalu Ganga) at 0.8-0.9km and 1.5-1.6km.
WKA150	Road crosses tributary of Kalu Ganga between 0.8 and 0.9km.
WKA189	Road crosses Bolgoda River between 1.4 and 1.5km.
WKA215	Stream (tributary of Kalu River) was observed within 0.7-0.8km
WKA217	Road crosses minor streams at 0.8-0.9km
WKA223	Bolgooda River is crossed at 4.2-4.3km.
WKA258	Road crosses tributaries of Kalu Ganga at following locations: 1.0-1.1 km, 1.8-1.9 km, 3.1-3.2km, 4.5-4.6km

143. Detailed Maps of stream crossings are presented in Appendix IV.A

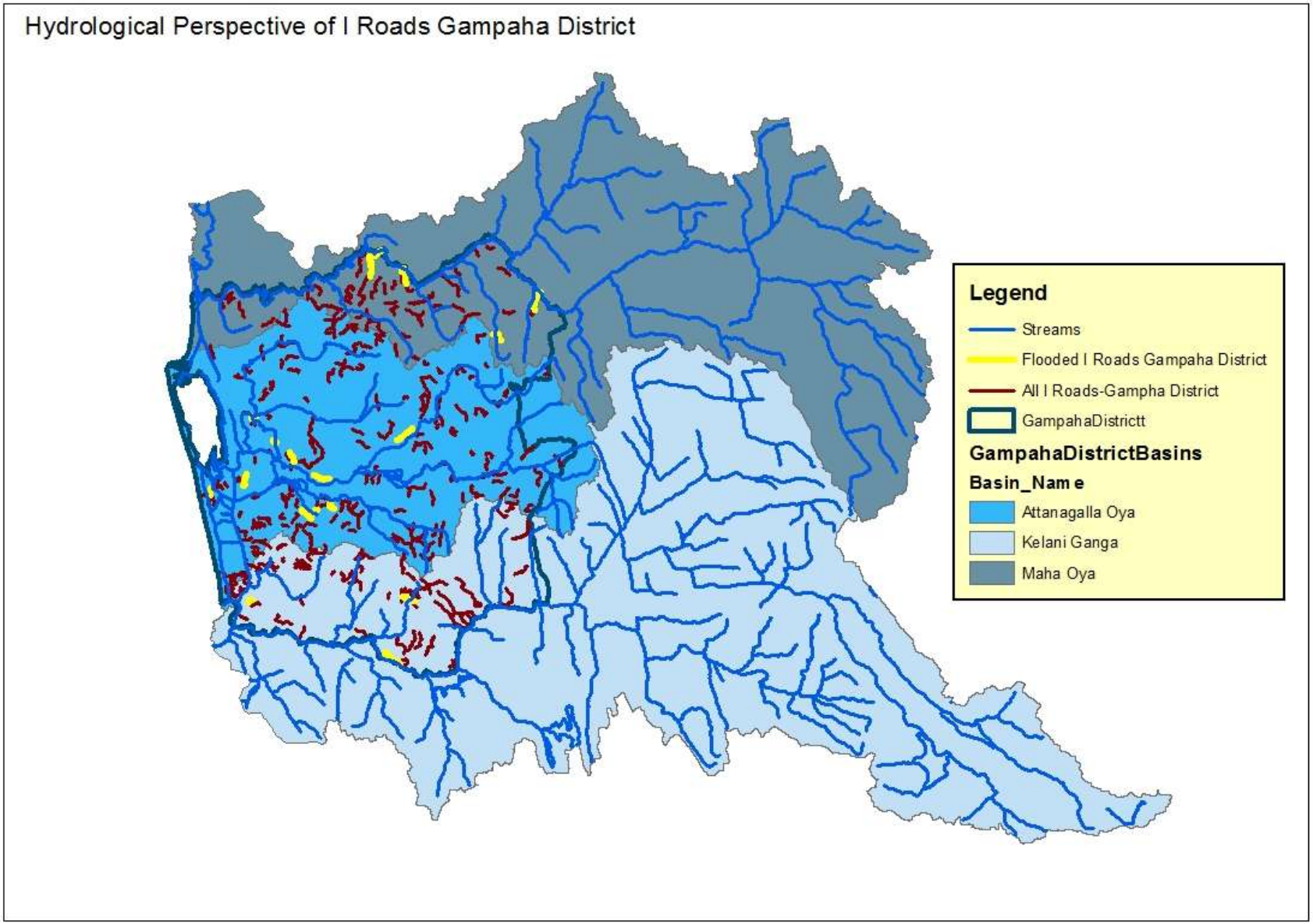

Figure IV-1: Hydrological Perspective of iRoad 2 in Gampaha District

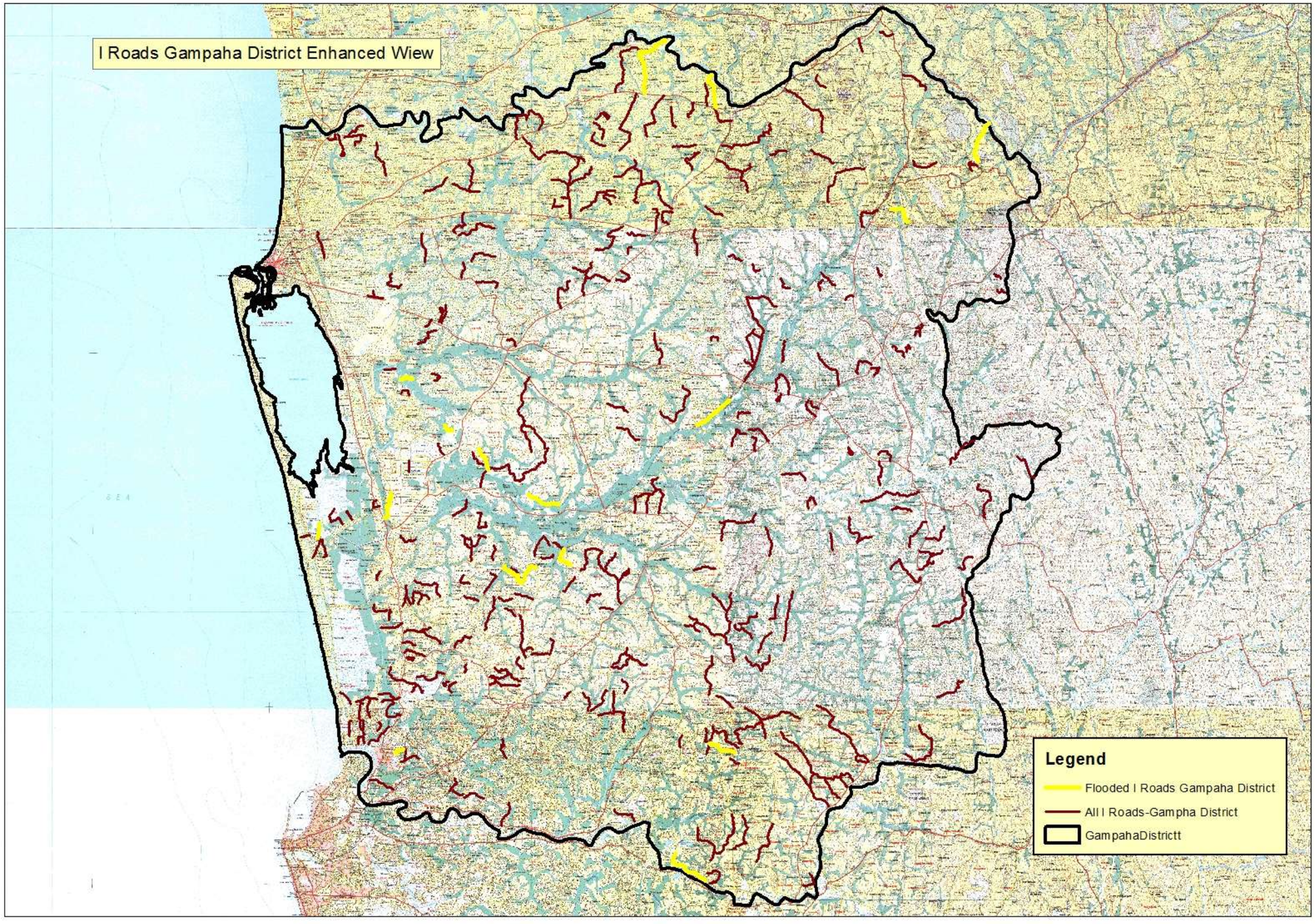

Figure IV-2: Hydrological Perspective of iRoad 2 in Gampaha District (Enhanced View)

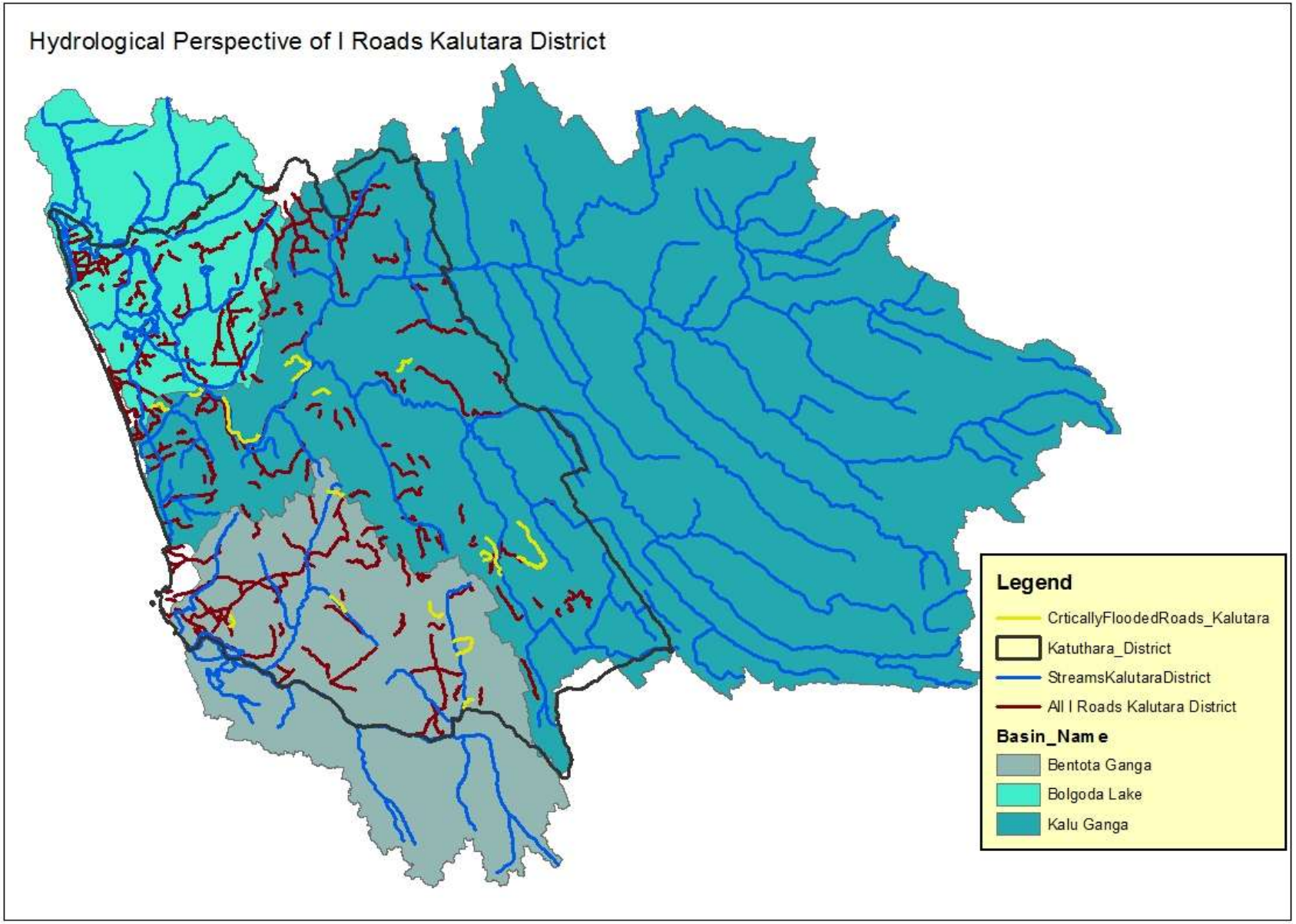

Figure IV-3: Hydrological Perspective of iRoad 2 in Kaluthara District

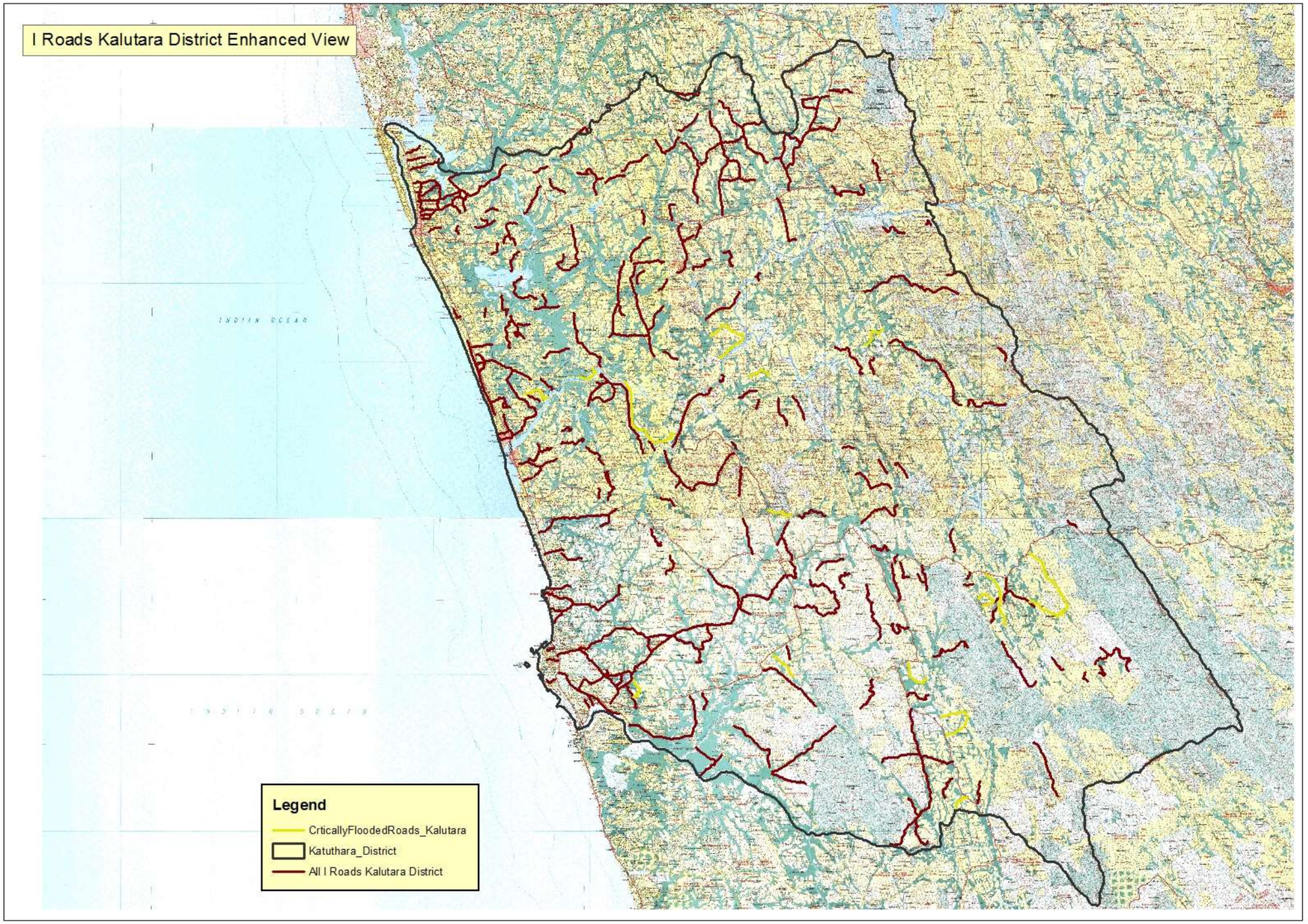

Figure IV-4: Hydrological Perspective of iRoad 2 in Kaluthara District (Enhanced View)

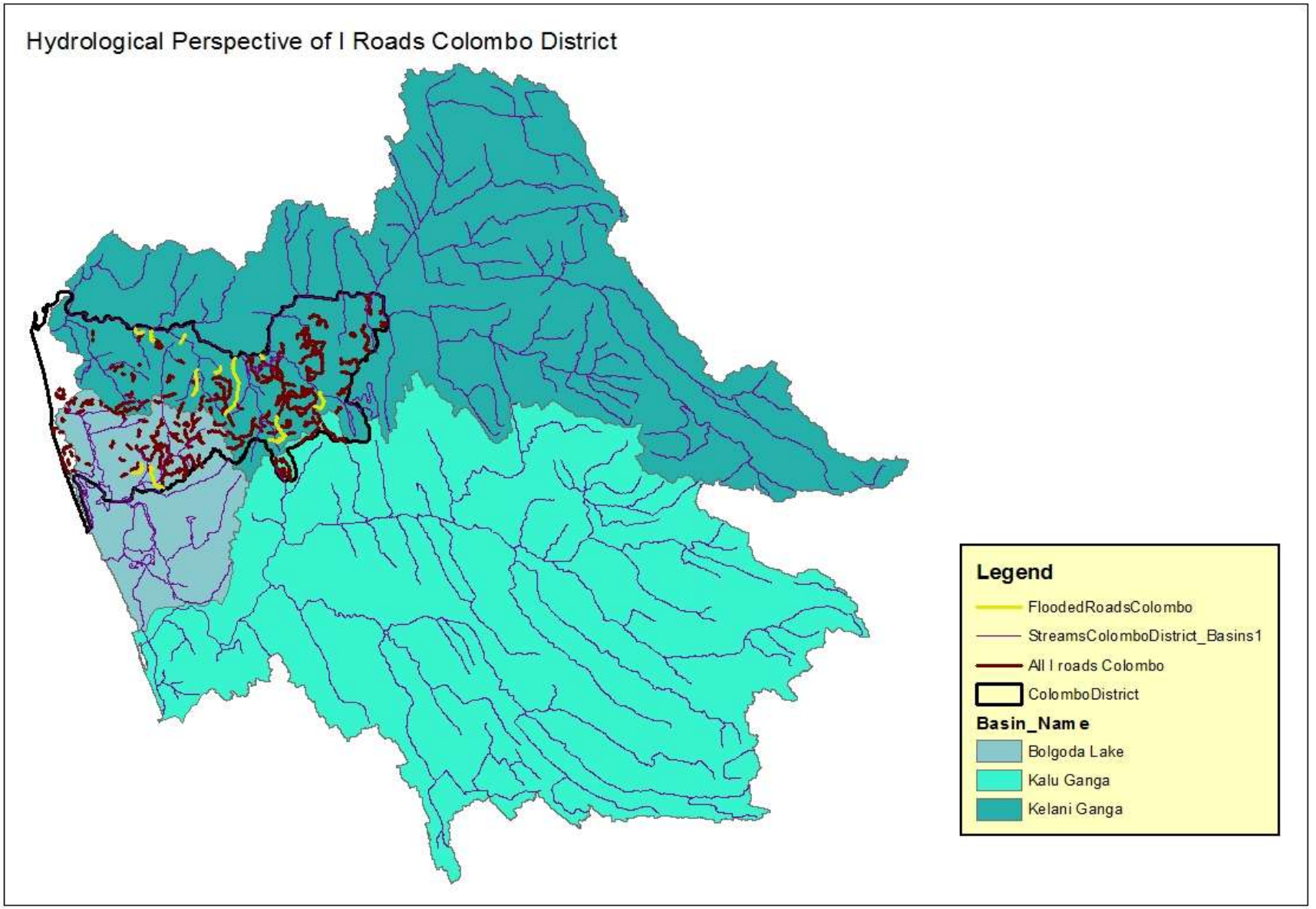

Figure IV-5: Hydrological Perspective of iRoad 2 in Colombo District

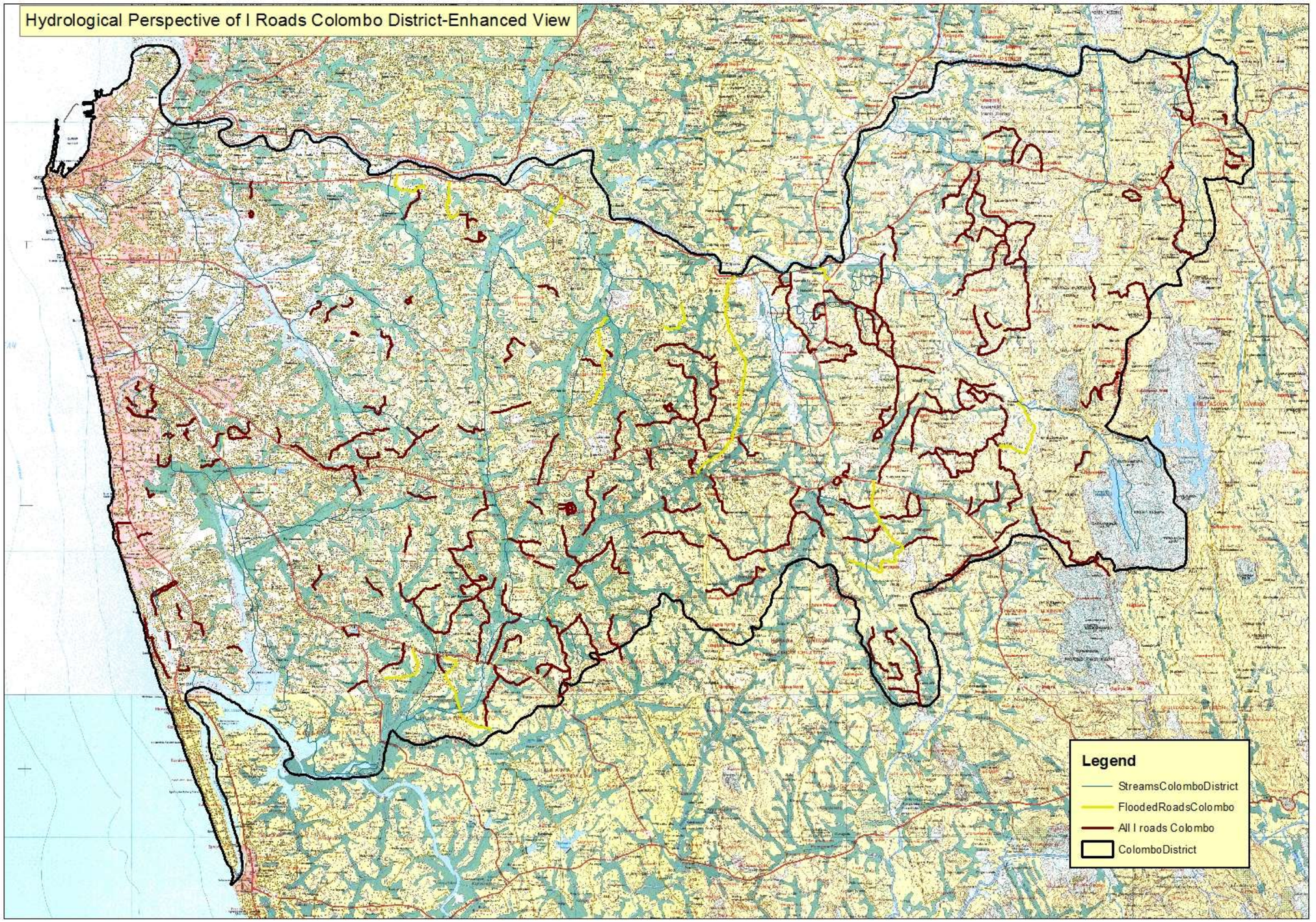

Figure IV-6: Hydrological Perspective of iRoad 2 in Colombo District (Enhanced View)

2. Air Quality and Noise

144. Except few roads in Colombo district and road sections in Gampaha and Kalutara districts 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 gravel roads, near roadside factories and major intersections where temporary deterioration occurs. An extract from the National Environmental Regulations on Ambient Air Quality, declared in 1994 is presented in Table IV-5.

Table IV-5: National Ambient Air Quality Standards

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

Source: Gazette of the Democratic Socialist Republic of Sri Lanka, 850/4 (20 December, 1994).
Note: PM 10 – particulate matter < 10 µm
NAAQS – National Ambient Air Quality Standards (NAAQS)

145. Since July 2008, Vehicle Emission Test (VET) certificate became mandatory for obtaining the vehicle revenue license for all vehicles including construction vehicles. This is a good move 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 and to improve the air quality in the country.

146. The area mostly includes rural areas with a good vegetation cover excluding some roads in the Colombo district and therefore the noise levels are relatively low. The study area belongs to Low and Medium noise areas, according to Schedules I and II of National environmental (Noise Control) regulations No.1 1996 (924/12). Therefore, the ambient noise level of the area can be considered as 63 dB (A) during day time (06.00 hrs-18.00 hrs) and 50 dB (A) night time (18.00 hrs - 06.00 hrs). Rich vegetation in the along the project roads in Kalutara and Gampaha districts acts as an efficient noise absorbent.

147. table IV-6 presents the 2005 "World Health Organization Air Quality Guidelines" which offers a global guideline on thresholds and limits for key air pollutants that pose health risks5.

Table IV-6: WHO Ambient Air Quality Guidelines, 2005

Parameter	Averaging Period	Guideline value in mg/m^3
Sulphur Dioxide (SO_2)	24 hour	125 (Interim target 1) 50 (Interim target 2) 20 (Guideline)
	10 minute	500 (Guideline)
Nitrogen Dioxide (NO_2)	1 year	40 (Guideline)
	1hour	200 (Guideline)
Particulate Matter (PM_{10})	1 year	70 (Interim target 1)

[5] These guidelines are adopted by the Word Bank under their General EHS Guidelines.

Parameter	Averaging Period	Guideline value in mg/m^3
	24 hour	50 (Interim target 2) 30 (interim target 3) 20 (Guideline) 150 (Interim target 1) 100 (Interim target 2) 75 (Interim target 3) 50 (Guideline)
Particulate Matter ($PM_{2.5}$)	1 year 24 hour	35 (Interim target 1) 25(Interim target 2) 15 (Interim target 3) 10 (Guideline) 75 (Interim target 1) 50 (Interim target 2) 37.5 (Interim target 3) 25 (Guideline)
Ozone	8 hour, daily maximum	160 (Interim target 1) 100 (Guideline)

3. Natural Disasters

Flooding. Floods are the main and most significant natural disaster that occur in all the three districts. Manmade causes such as blockage of drainage, unauthorized filling of flood detention areas have contributed to increase the significance of this disaster. Large scale flooding generally occurs in the Maha Oya, Attanagaly Oya, Kalu Ganga and Kelani Ganga. There is medium scale flooding in the Colombo catchment and Bolgoda Basin. Flooding is comparably minor in Bentota Basin. Critically flooded IRoad 2 2 in the three districts were screened and extra site visits were undertaken to particularly study the prevailing flood issues.

148. A detailed map of detected floods in Colombo and Gampaha along Kelani River included in appendix IV.B. Below table summarizes the roads that are prone to floods in each district.

Table IV-6 (a). Roads prone to flood in each district of WP

Road ID.	Chainage at flood range
Colombo District	
WCO83	0+800-0+900
WCO84	0+600-0+900
WCO136	0+400-0+500,0+600-0+800
WCO235	1+400-1+600
WCO259	2+200-2+400, 3+600-3+800
WCO267	2+400-2+600,2+800-2+900
WCO271	2+400-2+600, 2+800-2+900
Gampaha District	
WGA031	2+400-2+600
WGA034	0+200-0400
WGA050	0+800-0+900
WGA069	0+600-0+800
WGA118	0+300-0+400,0+600-0+800
WGA124	0+600-0+900
WGA166	0+100-0+600

Road ID.	Chainage at flood range
WGA203	0+700-1+200
WGA210	1+400-1+600
WGA257	0+100-0+572
WGA264	0+200-0+500, 0+600-0+800, 0+800-0+900
WGA268	0+700-0+900
WGA351	0+300-0+900
WGA352	0+300-0+600
WGA363	0+200-0+400, 0+500-0+700, 0+700-0+900,1+200-1+600
WGA385	0+400-0+600
Kalutara District	
WKL09	1+200-1+400, 1+600-1+800
WKL14	0+400-2+400, 3+100-3+936
WKL30	0+200-0+300, 0+800-1+200, 1+800-1+900
WKL82	1+200-1+400, 1+600-1+700, 3+400-3+600, 4+100-4+300
WKL83	0+200-0+300
WKL95	0+900-1+100
WKL97	0+200-0+400
WKL113	0+800-1+200
WKL117	0+700-0+900
WKL159	1+400-1+600, 1+800-1+900
WKL168	1+400-1+600
WKL191	1+100-1+400
WKL238	0+200-0+800, 1+400-1+600
WKL253	2+400-2+600, 3+600-3+900, 4+900-5+100
WKL258	2+200-2+400, 2+600-2+800, 4+600-40+900

149. **Landslides.** Colombo and Gampaha Districts are not classified as modest level of landslide hazard areas. But some areas in Kalutara District were warned by the National Building Research organization (NBRO) especially in heavy rainy periods the possibility of landslide and cut slope failures in Kalutara district. Figure IV-7 shows the project roads laid in landslide hazard prone.

150. Other than these main natural disasters the coastal belt located in Colombo, Gampaha and Kalurata were affected by the tsunami which the country in year 2004. However, occurrences of drought was also not significant until last year (year 2016) where the island wide drought had impacts on these three districts also.

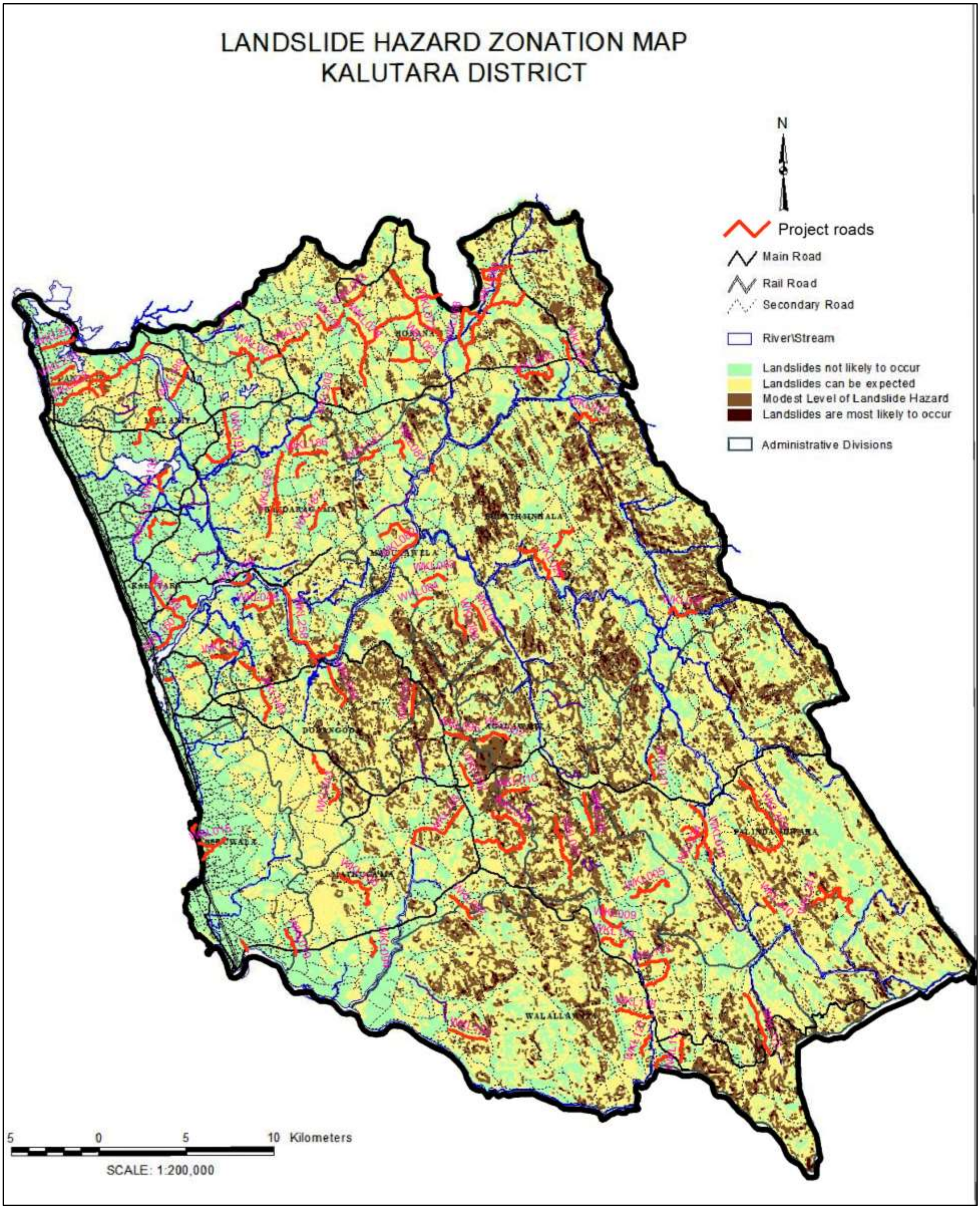

Figure IV-7: Landslide Hazard zonation and project roads

B. Ecological Environment

151. **Colombo District.** Colombo receives a 2404 mm (94.6 in) average annual rainfall or 200.3 mm (7.9 in) per month. Rainfall receives during the South - west monsoon period (May to September). The driest weather is in January, when an average of 62 mm (2.4 in) of rainfall and wettest weather is in May, when an average of 382 mm (15 in). Mean annual temperature is 280 C. Relative humidity is between 750 % to 800%. Main soil type is red yellow podzolic.

Table IV-7: Land Use in Estate Sector in Colombo District (Extent in Acres)

District	Extent	Paddy	Temporary Crops Other than Paddy	Permanent Crops	Wood and Forest Lands, Meadows, Pastures	Waste Land Under Rocky and Marshy	Lands under Buildings, Roads etc	Other Lands not Specified Elsewhere
Colombo	13,195	24	39	11,161	327	242	434	968

District	Total Extent	Tea	Rubber	Coconut
Colombo	13,195	149	9,462	1,047

Census of Agriculture 2002

152. Kelani river which is 145 km long, flows through the Colombo District. Kelani Ganga is one of the main river basin in Sri Lanka which is currently experiencing large scale flooding and subsequent damage to property and livelihoods. Kelani basin received 350 mm of total rainfall within three days (15 to 17 May 2016).

153. Forest type in both Colombo and Kalutara Districts are same. It is Tropical wet evergreen forests (at elevations between 0-1000 m). Mangroves can be identified along the coastal region of the District.

154. The forest reserve in Colombo District "Indikada Mukalana" releases water to Wak Oya, Hal Dola, Panwila Ela and several other streams. The area is now planted with "Hora" trees after removing non indigenous pine trees. Sri Lanka government expects to protect the forest coverage of the country through this measure. Human activities are thoroughly restricted under law in the forest reserves

155. The Urban Wetlands of Colombo are as follows.

- **Bellanwila–Attidiya Marshes. (Threat Status: High)**

156. Primarily a freshwater marsh ecosystem, consisting of shallow freshwater ponds, marshes, and seasonally flooded grasslands with scattered shrubs and small trees, this area is considered an important stopover for migratory birds and a pivotal roosting site for herons and egrets.

- **Talangama wetland (Threat Status: Moderate)**

157. It is home to about 100 species of wetland birds and common garden birds such as Herons, Bulbuls, Swamp hens, Water hens, Kingfishers, Teals, Gulls, Swallows, Egrets and Storks amongst many others. Also, seen here are numerous species of Butterflies and Dragonflies. There are also plenty of Purple faced leaf monkey and other reptiles to be seen here.

- **Thalangama Tank**

158. This habitat includes a seasonally flooded grassland/paddy fields, a freshwater swamp forest and scrublands. With over 100 species of birds recorded, the tank is an important habitat for water birds.

- **Colombo Flood Detention Areas. (Threat Status: High)**

159. Comprising of the Kolonnawa marsh, the Kotte marsh, and the Nawala (Heen Ela) marsh, these three habitats connect to a large system of marshlands that include the Bellanwila-Attidiya marsh system.

160. There are two main forest reserves and sanctuary also located in Colombo District, as follows

- **Bellanwila – Attidiya Bird Sanctuary (372 hectares)**

161. Main attractions forested wetlands include mangrove swamps and freshwater swamps Migratory and local water birds. There are some 166 species of birds sighted in the area of which most are residential and around 40 migratory. The area also has a recorded 71 species of butterflies and 44 species of fish.

- **Labugama Kalatuwawa forest reserve**

162. Udagama Kanda, a mountain in Sri Lanka, situated in Padukka Division, Colombo District. The Labugama and Kalatuwawa reservoirs are situated in the same mountain range. The mountain is mainly covered by Labugama - Kalatuwawa Forest Strict Reserve which is roughly the catchment area of the said reservoirs and is home to wild cats, foxes, deer, sambhur, wild boar, wild hare and porcupines. The village of Udagama is also on the slopes of the mountain.

163. **Gampaha District** . The Gampaha district possesses the topographical features of the coastal plain. The general elevation of the district is below 100 m. In general, Gampaha is a district with a rainfall of over 2500mm. With its eastern highlands placed windward to the south west monsoon. It receives comparatively heavy rain. Of the total land area of the district, about 22 square kilometers comprise water bodies. The major river traversing the district is the Attanagallu Oya about 60 km in length and its mean annual run-off is 1569cm. This river, rising from the eastern highlands flows westward sand joins the sea via the Negombo lagoon. The Kelani Ganga 145 meters long, is fed by a catchments area of 2292 km^2.

164. Forest Resources. The extent of the natural forest cover of the Gampaha district is shown below. Gampaha district is in the low country region of Sri Lanka. Due to that, most of the forests in the district belong to tropical wet evergreen forest. There are several biodiversity hot spots in Gampaha district and they are Muthurajawela marsh, Pilikutthuwa forest, Danavikanda, Maligatenna Temple area, Kotakanda and along the Ma Oya.

Table IV-8: Distribution of forests in the Gamapha district.

Types of Forest Extent	(Ha.)
Low land rain forests	273
Moist monsoon forests	14
Mangroves	122
Sparse forests	20
Total	**429**

165. There is one national park named Horagolla national park and two wildlife sanctuary named Muthurajawela wetland sanctuary (extent 1777ha) and Maimbilkanda- Nitambuwa

sanctuary that have been declared under Fauna and Flora Protection Ordinance which is administered by Wildlife Conservation Department. Horagolla National park is situated in Attanagalle divisional secretariat division while Muthrajawla Sanctuary is situated in Wattala and Ja- Ela DS division. Muthurajwela wetland sanctuary is the largest saline peat bog of Sri Lanka located between Negombo Lagoon and Kalani River.

166. The largest agro-ecological region of the district is comprising 121,171 hectares. The agro-ecological features of this region are an annual rainfall exceeding 1525mm or 75%. The potential of rain, knolly and rolling plain and red-yellow podsolic soil with soft and hard laterite. About 85% of the region belongs to this agro-ecological zone. The agro ecological is characterized by bog and semi bog soil and red and yellow podsolic.

167. According to information available in Department of Wildlife Conservation any of candidate roads of Gampaha District are not falling within or adjacent to protected areas such as national parks, nature reserve and strict nature reserves other than the Nilsirigama Main road (road no. 166) runs close to the Muturajawela Sanctuaty. According to information available in Central Environmental Authority, any of candidate roads of Gampaha District are not falling within or adjacent to Environmental Protection areas (EPA's declared under the National Environmental Act) are located or near any of the project roads in the Gampaha district.

168. **Kalutara District.** Kalutara District has an area of 1,598 square kilometers. Kalutara District is situated in Low land wet zone. Land use in Kalutara can be categorized as below.

Table IV-9: Land Use in Estate Sector in Kaluthara District (Extent in Acres)

District	Extent	Paddy	Temporary Crops Other than Paddy	Permanent Crops	Wood and Forest Lands, Meadows, Pastures	Waste Land Under Rocky and Marshy	Lands under Buildings, Roads etc	Other Lands not Specified Elsewhere
Kalutara	67,728	792	172	52,982	2,766	2,348	2,675	5,993

District	Total Extent	Tea	Rubber	Coconut
Kalutara	67,728	2,603	40,993	1,466

Source: Censes of agriculture 2012.

169. Forest type in Kalutara District is Tropical wet evergreen forests (at elevations between 0-1000 m). Mangroves can be identified along the coastal regions of the District.

170. Kalu Ganga is also located in Kalutara District. Kalu Ganga basin is the second largest river basin in Sri Lanka covering 2766 km2 and much of the catchment is located in the highest rainfall area of the country. The basin has steep gradients in upper part and mild gradients in lower part. Due to these hydrological and topographical characteristics of the river basin, its lower flood plain suffers from frequent floods during the Southwest monsoon season.

171. The world heritage site, Sinharaja Forest Reserve has located at the border of the Kalutara district.

172. Main forest reserves, estuary and wetland situated in Kalutara District are as follows,

- **Bolgoda Wetland**

173. This wetland is located in 30 km south of Colombo in the Kalutara District, of the western Provinces. The area is Kalu and Kelani river basins including the Bobola River cover an area of 1245 ha.

174. Bodhinagala is a relatively small tract of secondary lowland rainforest, with a Buddhist hermitage located centrally. It is surprisingly rich floristically and holds a number of endemic fauna within relatively easy reach of the commercial capital of Colombo.

175. Some of the ecologically important forest reserves can be identified as follows:

- Nachchimale Forest Reserve (Monastery) - Ingiriya- Horana, 400 Hectares
- Mithirigala Forest Reserve (Monastery) - Hanwella, 368 Hectares
- Bambaragala Mookalana – Kiriella – Horana, 350 Hectares
- Hora Forest Reserve (HoraKele) - Ingiriya- Horana, 13 Hectares

176. The list of roads that are in close proximity to these sensitive reserves are presented below.

Table IV-9 (a): A summary of roads in close proximity to sensitive reserves

Road ID.	Sensitive reserve	Proximity
Colombo district		
WCO203	Labugama Katuwewa Forest	Nearby
WCO258	Koskanda Forest / Kananpella Forest	Nearby
WCO220	Indikada Mukalana Reserve	Nearby
Gampaha district		
WGA347	Alawalala Proposed Forest Reserve	Nearby
WGA355	Muthrajawela Sanctuary	Nearby
WGA166	Degraded tropical forest patch	Nearby
Kalutara district		
WKL29	Ingiriya Forest Reserve	Nearby
WKL250	Sinharaja Forest Reserve	Nearby

C. Socio - Economic Environment

177. Western Province is located in the South West of Sri Lanka. It has an area of 3,684 square kilometers (1,422 sq mi). The province is surrounded by the Laccadive Sea to the west, North Western Province to the north, Sabaragamuwa Province to the east and the Southern Province to the south.

1. Administrative Segregations

178. The Western Province, which consists in three Districts namely Colombo, Gampaha and Kalutara, is the most socio-economically developed part in Sri Lanka. There are 40 Divisional Secretariat Divisions and 2,496 Grama Niladhari Divisions spread in Western province, as following table.

Table IV-10: Number of Sub National Administrative Divisions by District (as at 08th August 2012)

Province /District	Land Area (Km^2)	DSDs	Pradesheeya Saba	Municipal Councils	Urban Councils	Electorates	GNDs	Villages
Colombo	699	13	3	5	5	15	557	357
Gampaha	1387	13	12	2	5	13	1177	1565
Kalutara	1598	14	12	-	4	8	762	235
Sri Lanka	***65,610***	***2331***	***271***	***23***	***41***	***160***	***14,021***	***36,822***

Source: MRCB (Master Registry of Census Blocks).

2. Population

179. According to the Department of Census and Statistics 2012, the total population in Western Province is 5,851,130. Compared to the total population in the country (20,359,439), 28% of the total population (5,851,130) live in the Western Province. Out of the total population of Western Province, (2,848,649) are males and 3,002,481 are females. Ratio of the female population is more than that of the male population in all three Districts.

Table IV-11: Demographic Characteristics of population

District	Total Population		
	Male	Female	Total
Colombo	1,140,472	1,183,877	2,324,349
Gampaha	1,116,893	1,187,940	2,304,833
Kalutara	593,284	630,664	1,221,948
Total (W. P.)	2,848,649	3,002,481	5,851,130

180. Out of the total population of the Western province, 39.7% belongs to Colombo District and the percentages of Gampaha District and Kalutara District are 39.4% and 20.9% respectively. Population density value in the province is 1,588 per sq. km. Colombo District population density value is 3,325 per sq.km and is almost twice than that of Gampaha District (1662) and the Kalutara District has the lowest, which is 765.

Table IV-12: Distribution of population by sector

District	Total Population	Population by sector (%)			Population Density
		Urban	Rural	Estate	
Colombo	2,324,349	77.6	22.1	0.3	3325
Gampaha	2,304,833	15.6	84.3	0.1	1662
Kalutara	1,221,948	8.9	88.0	3.1	765

181. Majority of Population in Colombo District are living in urban and sub-urban areas. Compared to the Kalutara District, most of the people in Gampaha District are living in sub-urban areas. Municipal councils and urban council areas are defined as urban areas in Sri Lanka. There are five municipal councils in Colombo District, namely Colombo, Dehiwela-Mount Lavenia, Moratuwa, Sri Jayawardanapura Kotte, and Kaduwela. Population within the municipal council area in Colombo District is 1,274,028 and out of this, 44% and 20% of the population live in Colombo and Kaduwela Municipal areas respectively. The Population of 05 urban council areas of Colombo District is 532,007. Population of the two Municipal Council areas of Negambo and Gampaha in Gampaha District are 142,449 and 63,335 respectively. There are 155,437 population living in 05 urban council areas In Gampaha District. Population of Municipal Council area in Kalutara and 4 urban council areas population is 109,829. In Kalutara District most of the people are living in rural areas.

Table IV-13: Distribution of population by Ethnicity and religion

District	Ethnic Group (%)				Religious Group (%)				
	Sinhalese	Tamil	Moors	Others	Buddhist	Hindu	Islam	Catholic	Others
Colombo	76.5	11.2	10.7	1.6	70.2	8.0	11.8	7.0	3.0
Gampaha	90.5	3.9	4.2	1.3	71.3	2.3	4.9	19.5	2.0
Kalutara	86.8	3.8	9.3	0.2	83.4	3.2	9.4	3.3	0.8

182. Majority of population in Western Province is Sinhalese (84.2) and second highest ethnic group is Sri Lankan Moors (7.9%) followed by Tamils (6.8%). Others are Burgher, Malay and Sri Lankan Chetty and Baratha which form 1.2%. Also, majority of population in these three districts are Buddhists and second highest religion is Roman Catholics. Following table presents the distribution of three Districts of Western Province.

Table IV-14: Distribution of population by Education

District	No schooling	Passed primary	Passed secondary	Passed GCE O/L or Equivalent	Passed GCE A/L or Equivalent	Degree or above
Colombo	2.4	16.3	34.5	22.2	18.9	5.7
Gampaha	1.8	16.8	40.8	21.8	15.7	3.1
Kalutara	2.7	21.0	40.3	19.4	14.0	2.6

183. Almost all the premier educational institutions in the island are located in the Western Province. Government and private sector Universities, and private higher educational Institutions are situated mainly in Colombo district and secondly in Gampaha District. Having the highest population in the all the provinces, Western Province has the largest amount of schools in the country, which includes national, provincial, private and international schools.

184. In Western province percentages of people passed primary, passed secondary, passed GCE O/L or equivalent, passed GCE A/L or equivalent and degree or above are 17.5, 38.2, 21.5, 16.6 and 4.0 percent respectively. These figures show that within the Western province, the majority of the population completed education up to secondary level. Those who have completed the highest education level which is degree and above (4.0%) is significantly high in Western Province. The percentage of population whose highest educational level is degree or above is high in Colombo district (5.7%), when compared to Gampaha (3.1%) and Kalutara (2.6%).

Table IV-15: Distribution of population by Economic Status (age 15 years and above)

District	Active			Inactive		
	Male	Female	Total	Male	Female	Total
Colombo	650,257	298,436	948,693	234,967	636,785	871,752
Gampaha	639,430	280,387	919,817	211,800	647,645	859,445
Kalutara	325,843	145,465	471,308	114,915	338,199	453,114

185. Economic activities that people engaged for their livelihood are very important characteristic of a population.

186. Economically active population or the labour force comprised of employed and unemployed persons. According to the data, 51.7 percent of aged 15 years and above population is economically active in western province. Kalutara district (51.0%) reported a lower economically active percentage than that of Colombo (52.1%) and Gampaha (51.7%) districts.

187. The following table presents the percentages of economically active population by sector and sex. In all three districts over 94 percent of the economically active population is employed.

Table IV-16: Employed population (age 15 years and above) by sector of employment

District	Govern. employee	Semi Gov. employee	Private sec. employee	Employer	Own account worker	Un paid family worker	Total
Colombo	127,927	29,753	494,114	32,455	197,145	22,634	904,028
Gampaha	113,836	30,061	465,256	26,031	209,325	22,652	867,161
Kalutara	65,071	14,900	22,457	10,555	116,553	13,440	442,976
							2,214,165

188. Total employed and unemployed population in Western province is 2,214,165 and 125,653 respectively. The total employed population in Colombo district is reported as 904,028 while the corresponding figures for Gampaha and Kalutara districts are 867,161 and 442,976 respectively. Among the employed population in western province, 13.9 percent is employed in the government sector.

189. The Western province provides the highest contribution to the gross domestic product of the country contributing 41.2% of the Provincial Gross Domestic Product (PGDP) and has a nominal PGDP growth rate of 5.8% as of 2015. Agriculture only made up 1.7% of the GDP the lowest among the nine provinces while Industrial sector made up 34.6% the highest in the country and the service sector represented 56.5 %. (Provincial Gross Domestic Product – 2015).

Table IV-17: Households in occupied housing units in districts by principal source of drinking water-2012

District	No of Households	Principles source of drinking water									
		Well		Pipe born water				Others			
		Protected well	Unprotected well	Tap within the unit	Tap within the premises	Tap out of the premises	Rural water supply	Tube well	Bowzers	Bottled water	Tank, stream, river etc
Colombo	558755	133,159	7,026	350,327	26,942	18,202	17,600	1754	58	682	3,005
Gampaha	593,317	360,453	14,668	121,816	23,817	15,664	19,018	32,604	712	543	4,052
Kalutara	300,402	178,299	13,942	61,311	8,517	4,955	20,349	6,534	594	60	5,841

190. According to above figures, the main source of drinking water of about 80% of the population within Colombo District is pipe borne water, while this figure is less for Kalutara and Gampaha Districts.

Table IV-18: Households in Occupied housing units in districts by Principal type of Lighting, 2012

District	No of Households	Principal type of lighting					
		Electricity		Others			
		National Grid	Rural hydro power projects	Kerosene	Sola power	Bio Gas	others
Colombo	558,755	545,784	904	11,370	150	44	503
Gampaha	593,317	573,100	0	19,505	232	34	446
Kalutara	300,402	281,075	1,416	16,853	657	36	365

191. Above Table indicates the position of household lighting in 2012, which indicates a certain very small percentage of people using other than electricity. However, the percentage of electricity usage is extremely high for the entire Western province.

Table IV-19: Households in occupied housing units in districts by toilet facilities

District	No of Households	Within the unit		Without unit		Others		
		exclusively for HHs	Sharing with another HHs	exclusively for HHs	sharing with another HHs	No toilet, but sharing with another HHs	Common/Public toilet	Not using toilet
Colombo	558,755	387,843	14,529	110,189	22,715	44,661	18,244	574
Gampaha	593,317	288,017	18,012	231,090	45,227	8.790	1,406	775
Kalutara	300,402	127,743	6,535	145,422	14,681	4,741	534	746

192. Related to housing units using toilet facilities, Colombo District is having a higher percentage of people without toilet facilities of their own. This is mainly due to the fact that

appreciable number of people are living in slums and shanties. In this respect, other two districts are in a better position.

Table IV-20: Road Kilometer age by Province and District 2011

Province / District	Class A	Class B	Class C	Class D	Class E	Class E1	Total
Colombo	166	258	211	188	-	9	832
Gampaha	128	610	370	506	-	-	1,614
Kalutara	80	341	417	230	-	44	1,112
Western Province	*374*	*1209*	*998*	*924*	*-*	*53*	*3,559*

Table IV-21: Road Network of the Western Province

Type of Road	Class A	Class B	Class C	Class D	Class E
Km	374	1,209	998	924	11,044
% of Total Roads	3	8	7	6	76

A,B - National Roads; C,D Provincial Roads; E- Local Authorities Roads.

193. As Sri Lanka's road network is fairly good, the percentage of roads of the Western province is not high as compared to economic indicators. Out of the total roads, Western province has less than 10% of the total road network, which is a commendable factor, from the point of view of the national infra-structure aspect.

3. Infrastructure Facilities and the Mega Development

194. The massive infrastructure development implemented over the past few years in Western province especially in Colombo District, had a significant positive impact on expanding the productive capacity of the economy and would facilitate a high and sustainable growth momentum in the medium term. The government accelerated development projects for infrastructure development, facilitate to enhanced economic activities and help to deliver a transformative impact on the lives of the people. The development initiatives taken in the areas of roads, railroads, irrigation, energy and water supply, communication and recreation bares testimony to the government's continuous commitment to improve the economic infrastructure base of the Western province.

195. Colombo South Harbour Project, Colombo Outer Circular Highway, Colombo - Katunayake Expressway, Colombo Port City Project, Improvements to Katunayake Bandaranayake International Air Port Project are some of the mega infrastructure development projects that have been implemented since 2012 in WP. Meanwhile, many small scale infrastructure development projects such as the 'Maga Neguma' rural road development programme, rural electrification projects, minor irrigation projects and community based water supply projects were continued to facilitate regional development in the area.

196. The private sector also plays a significant role in strengthening the economic infrastructure mainly centered Colombo and Western province particularly in relation to the telecommunication and transportation sectors while contributing to enhance social infrastructure such as education, health and housing. Such forms of Public-Private Partnerships (PPPs) helps to catalyze economic development and to create an investor friendly environment.

197. The government has given high priority to rehabilitate the existing road network and build new roads to support efficient mobility. The transportation sector also in Western Province has achieved significant progress during past few years with the expansion of the existing road network and transport services, strengthening connectivity and contributing to inclusive growth in the whole country. This has connected underprivileged remote areas in the whole western province with the main economic stream and ensure the efficiency and the growth of productivity. The development in the transportation sector continued to be seen in the road

development sector, while expansion of bus services particularly covering the rural areas and additions to the rail road network continued. Over the past few years, considerable improvements have been made to the road network, facilitating both passenger and goods transportation. The construction of highways, expressways, bridges and rehabilitation of existing roads in the entire province recorded significant growth in the past 4-5 years.

4. Places of cultural, archaeological and religious significance

198. Colombo District: Places with archaeological value in the Colombo district are listed below. None of these sites are affected by roads included in iRoad 2 program in Colombo district. Moreover, the survey team did not discover any archaeologically valuable places along the roads listed under iRoad 2 program in Colombo district.

Table IV-22: Sites with cultural, archeological and religious importance – Colombo district

Name of Site	DS Division
Akaravita Raja Maha Viharaya	Hanwella
Balapokuna Viharaya	Thimbirigasyaya
Cargills building Fort	Colombo
Central Kovil, Rest hall	Colombo
Colombo Chartered Bank Building	Colombo
Darly Building	Thimbirigasyaya
Gafoor building	Colombo
Giraimbula wooden bridge	Thimbirigasyaya
Maligawaththa Muslim Cemetery	
Maligawaththa railway premises	Colombo
Kayman's Gate Dematagoda	Colombo
Nawangamuwa Rajamaha Viharaya	Kaduwela
Old Colombo Dutch Hospital	Colombo
Old Parliament building	Colombo
Pitakotte Raja Maha Viharaya	Kotte
St. James building Colombo	Colombo
Subodharama Purana Viharaya Karagampitiya	Dehiwala
Sunethradevi Raja Maha Viharaya Pepiliyana	Dehiwala
Vidyodaya Pirivena Maligakanda	Colombo
Ratmalana Dewala Waththa	Rathmalana

199. Gampaha District: Places with archaeological value in the Gampaha district are listed below. None of these sites are located along any of the roads covering under the iRoad 2 program in Gampaha district. Asgiri Raja Maha Viharaya which was located within 2 km from road I.D 35, 36 and 37, while Bothale Wallawa is located within 3km from road I.D 125, 126 and 127. Moreover, the survey team did not discover any archaeologically valuable places during the environment survey to prepare road specific Environment Checklist.

Table IV-23: Sites with cultural, archeological and religious importance – Gampaha district

Name of Site	DS Division
Asgiri Raja Maha Viharaya	Gampaha
Aththanagalla Raja Maha Viharaya	Aththanagalla
Bogahawaththa Ambalama	Divulpitiya.
Bothale Paththini Dewalaya	Mirigama
Bothale Walawwa	Mirigama.
Dadagamuwa Rajamahaviharaya	Divulapitiya
Kelaniya Raja Maha Viharaya	Kelaniya.
Kossinna Raja Maha Viharaya	Kadawtha
Malwana Fort	Dompe

Name of Site	DS Division
Negambo Fort	Negambo
Pilikuththuwa Raja Maha Viharaya	Aththanagalla,
Saint Stephen's Church	Negambo
Yaka Bendi Ella	Divulapitiya
Yayagala Purana Viharaya	Veyangoda
Warana Raja Maha Viharaya	Mirigama
Aluthapola Viharaya Aluthapola	Divulapitiya
Ancient Gal- Edananda	Negambo
Horagolla Wallawa	Aththanagalla
Balagalla Sarasvathi Pirivena	Mirigama
Ambagahahena Cave	Divulapitiya

200. Kaluthara District: Archeologically, culturally and religiously important places in Kalutara district are summarized below. The road ID 147 provides access to Duwa Raja Maha Viharaya which is Archaeological valuable religion place. Places with archaeological value in the Kaluthara District are listed above. During the field visits it was observed that Horana Raja Maha Viharaya is located around 5 km from the Road ID 208. Ganewaththa Purana Raja Maha Viharaya is located about 2 km away from road ID. 131 and 136.

Table IV-24: Sites with cultural, archeological and religious importance – Kalutara district

Name of Site	DS Division
Beruwala Light House	Baruwala
Dewamithrarama Purana Viharaya	Bulathsinhala
Gallen Raja Maha viharaya	Madurawala
Horana Raja Maha Viharaya	Horana
Gangatilake Dewalaya	Kaluthara
Kande Viharaya	Panadura
Kechchimalei Mosque	Beruwala
Payagala Moola Maha Viharaya	Kaluthara
Richmend Carsle	Kaluthara
Purana Kande Viharaya	Panadura
Rankoth Viharaya	Panadura
Kaluthara Bodiya	Kaluthara
Payagala Police station	Kaluthara
Sri Damma Rakkhithaarama Purana Viharaya	Millaniya
S.t Mary’s Church	Beruwala
S.t Francis Church	Baeruwla
Duwa Temple	Kaluthara
Sumanaranma Maha Viharaya	Kaluthara
Vivekarama Viharaya	Kaluthara

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES

201. It is anticipated that environmental and social impacts would be minimal for this road rehabilitation project as all the civil works will mainly be limited to existing ROW. Impacts of permanent physical or economical displacement of public will also not occur as there will be no land acquisition. However there will be some temporary impacts especially during the construction period which can be avoided, minimized or mitigated. This section discuss such impacts and suggested mitigation measures.

A. Pre-Construction Stage

1. Project induced natural hazards

202. Impacts due to Landslides: As Colombo and Gampaha Districts are identified as non-landslide prone areas, hence, there is no risk of landslide if natural slopes are disturbed, but the Kaluthara district has identified as landslide prone and there is a risk of landslide if natural slopes as disturbs and land use is altered by the construction activities during extreme rainfall events.

203. 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.

204. Road construction in flood prone areas: As described in Chapter IV, some of the roads in Gampaha and Colombo 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.

205. RDA requires a 50 year flood return period in culvert designs and a 100 year flood return period for designing bridges.

2. Shifting of Public Utilities

206. Before the rehabilitation works, Public utilities closer to the CW of proposed roads/sections includes electric posts, power supply lines, water supply mains, telephone posts 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.

207. Shifting operations will affect the communities as there will be disruptions to the supply (especially electricity and water). Even if this is a temporary impact it could be significant since disruptions will affect day to day activities of people.

208. Prior to projected improvement work, correct coordination and consent shall be taken from service suppliers if utility lines are to be shifted. Before shifting of such utility lines, an

advance notice shall be given to the general public regarding the time and period of utility disruption. This will help the public to prepare for such short time interruptions. Use of expertise and well-trained machinery operates can scale back accidental harm and guarantee reestablishment of utilities with minimum period.

209. Any accidental damages to utility lines shall be immediately attended by contractor after informing the PIC and PIU. Also the contractor shall obtain assistance from the relevant service providing agency when reinstating such damaged supply lines.

3. Requirement of Lands for the Project

210. Most of the iRoad 2 roads is having adequate existing ROW for the proposed rehabilitation. Thus, acquisition of lands will not be carried out for this project. However if lands are required for activities such as realignment of bends or construction of cross drainages in some road sections, that has to be undertaken by negotiation with property owners and involvement of a third party. Although people in the project area are willing to give their lands for such special cases, specified process for land donation in Resettlement Framework of iRoad program will be followed for taking lands. Further the necessary actions to secure lead-away canals beside the road will be done with the assistant from PS, divisional secretary and PRDA.

211. Lands that needs to use for temporary labour camps, yards, stores will also be secured as stated in the Resettlement Framework for this program.

B. Construction stage

1. Hydrological Impacts and Mitigation Measures

212. Baseline Impacts. Following general hydrological baseline impacts were observed in the candidate roads.

(a) Road profile is low and at some places water overflows the road. This is local flooding.
(b) Culverts have not been provided for some valleys where the road profile is low
(c) Long road stretches flood frequently because of regional river floods
(d) Long stretches of the road is subject to rare infrequent regional floods
(e) Culverts are dilapidated and non-functional
(f) Culverts are silted and less functional with poor leader way connections
(g) Capacity of existing culverts are not sufficient. This causes culvert overflows, aggravated backwater which sometimes inundates nearby houses.
(h) There is no proper side drain system connecting culverts

213. Mitigation Measures for Baseline Impacts.

(a) Provision of culverts for overflowing valleys
(b) Raising the road profile within practical limits above the frequent floods and if the profile cannot be raised provide concrete road surface.
(c) Replace non-functional culverts with new culverts
(d) Desilt culvert openings and connect the leader-way drains
(e) Provide culverts with larger openings. Box or pipe culverts will be used as appropriate.
(f) Provide side drains connecting culverts and leader way drains.

214. Baseline Drainage Impacts in the selected iRoad 2 and Proposed Mitigation Measures. Roads with significant drainage issues such as road inundation, were screened and detailed

site reconnaissance were undertaken by the Hydrologist to identify the existing hydrological impacts and propose mitigation action which could be started at the design stage. Details are given in table V-1 below. The suggest mitigation measures are the most suitable mitigation measures in the opinion of the hydrologist and such mitigation measures (e.g. concreting road surfaces) could be implemented after further studies by Highway engineers.

Table V-1: Baseline Drainage Impacts in the Selected IRoad 2 and Proposed Mitigation Measures

Road Designation	Road Name	Approximate Chainage Prevailing Drainage Impacts	Proposed Mitigation Action
GAMPAHA DISTRICT			
WGA034	Yagoda Thonduwa Road	• Water overflow in a valley. The existing culvert at [111549E,207977] silted and non-functional • At [111547E,208086N] road low and close to the rail road. There have been no historical floods	• Replace the culvert by 1/900mm pipe culvert. • Nominally raise and improve the road profile
WGA 031	Ganemulla Bulugahagoda Road	• Average 0.6m occasional inundation 250m from [108571E,207276N] and quick flood recession	• Road surface already concreted and further rehabilitation in the concrete stretch may not be necessary.
WGA050	From Pelahela 1 Pole to Demalagama	• Culvert at [119796E,197872N] not sufficient • Frequent flooding	• inundation Replace the culvert 1/600mm by 2mx1.5m box • Raise the road by 1m
WGA069	Kudahakapola Temple Road	• Frequent inundation by 0.6m 200m from [102276E,209906N] • Local inundation owing to poor side drainage	• Raise by 0.7m • Provide side drains
WGA166	Nilsirigama Main Road	• 0.225m inundation around [98877E,209114N] • Culvert a [98879E,209086N] broken(1/900mm pipe)	• Raise the road by 0.45m. More raising will be necessary at dents depending on the profile. • Provide 3mx1.5m box culvert
WGA257	Wimala Viharaya Mawatha- Opata Rddolugama Road	• The flood height of the entire road is very high • New culvert needed at [105588E,214516N]	• Entire road length needs concreting. Road raising above the flood level is not practical. • 1/900mm diameter culvert recommended
WGA264	Siyambalapitiya Lokingamuwa	• Road inundation by 0.6m, occasional but persist for about 5 days. Flood area 350m from [107738E,212451N]	• Raise the road by 0.75m before carpeting. If the road is raised above frequent flood level concreting may not be needed. • 1/900mm diameter culvert recommended

Road Designation	Road Name	Approximate Chainage Prevailing Drainage Impacts	Proposed Mitigation Action
		• Culvert at [107679E,212591N] not visible	
WGA363	Pahala Mapithigama Keregala Mawatha (Ganga Mitiyawatha Road)	• Culvert at [117389E, 191928N] 1/600mm diameter pipe inadequate • Flood inundation heavy and infrequent	• Provide 1/900mm diameter pipe culvert • Concreting may not be necessary
WGA268	Thammita Katugastota	• 0.3m occasional flooding • Silted box culvert at [110762E, 210619N] 2mx0.3 m – Low height	• Raise the road profile by 0.3m • Desilt the culvert to gain height. If height is not sufficient increase the height upto 0.9m
WGA385	Madawala Aramba Road	• Flood inundation is very high and occasional	• Road raising to avoid occasional inundation is not practical. Concreting recommended for the whole road stretch.
WGA351	Magalegoda Road	• There is no corresponding culvert in the road opposite of the rail culvert. Since the road is low culvert will not be possible to construct. • Flooding in paddy area 0.3m – 100m from [119209E,215089N]	• Needs a concrete causeway at [119163E,215049N] • Raise the road in paddy area by 0.45m
WGA352	Heendeniya Pattiyagoda Provincial Road	• The road is inundated by heavy floods. • Culverts are newly built and good	• Concreting recommended for the whole road
WGA210	Road from Katukenda upto Maningamuwa Alugolla Junction	• Inundation very rare and the floods recedes quickly	• No concreting needed
WGA203	Polwatta Road from Waradala Negambo Road	• Frequent flooding • Culvert at [119200E, 232605N] broken	• Concreting recommended • Replace the culvert by a 1/900mm pipe
WGA124	Lindara Nalingamuwa Road	• Frequent flooding • The bridge capacity not sufficient and augmentation of the capacity of the nearby bridge is needed	• Raise the road by 0.6m-150m from [129055E,255995N] • New culvert 3x1.2 needed at [129151E, 226001N]
WGA118	Public Road near Ambepussa Army camp	• Inundation occasional by Maha Oya Floods	• No concreting needed
KALUTHARA DISTRICT			
WKL9	Polgampola Katugoda Road	• Road low and there is frequent inundation	• New culvert [135380E, 140414N]

Road Designation	Road Name	Approximate Chainage Prevailing Drainage Impacts	Proposed Mitigation Action
WKL19.1	Danawathugoda Maddegoda Kalawila Road	• 0.15m inundation 300m from [117929E, 137954N]	• Raise the road by 0.3m
WKL14	Baduraliya Magura Penigala Road	• Heavy inundation of entire road	• Concreting recommended as the road surface has broken
WKL30	From Galhena Junction to Mirishena Factory	• High inundation but infrequent	• Concreting recommended for inundated
WKL82	Ampitigoda Road to Anguruwathota	• High inundation close to Kalu Ganga	• Concerting recommended for the inundated stretches
WKL83	Warakagoda Mathru Sayana to Ihalakarannagoda	• Rare inundation. Road already concreted	• Present concreting may be sufficient
WKL95	Iddagoda Pallewatte Road	• 0.15m inundation at [126737E,150415N] • Culvert at [126811E,150396N] insufficient as nearby houses go under water	• Raise the road by 0.3m. However interlocking blocks already in place. • Provide 2/900 mm diameter pipe culvert
WKL97	Welipenna Uragoda Road	• Entire road flooded with a high flood depth	• Concreting recommended for the entire road as the road surface is broken
WKL113	Bambarella Botalawa Road	• Inundation high and not frequent • Existing culvert at [138065E,136291N] dilapidated • Causeway at [138264E,136271N] • Culvert [138326E,136296N] LHS smaller • Need a new culvert at [139101E,137259N] as the existing culvert invert is high • Inundation before the above culvert	• Concrete 200m from [137712E,136107N], and 400m from [138309E,136253N] • Provide 1/900mm diameter pipe culvert • Provide 2/600mm pipe culvert on causeway • Provide 1/900mm diameter pipe on LHS • Provide 2/900mm pipe culvert • Concreting recommended
WKL117	Uthuru Pitigalgoda Road	• Frequent high inundation	• Concreting recommended for the whole road
WKL159	Diyagama Gangabada Road	• High and infrequent inundation	• Concreting may not be needed
WKL168	Uggalaboda Kudauduwegama Road	• Flooding near Kalu Ganga only	• No concreting may be necessary

Road Designation	Road Name	Approximate Chainage Prevailing Drainage Impacts	Proposed Mitigation Action
WKL238	Magura Gurugoda Road	• The entire road floods to about 1.2m height	• Concreting recommended
WKL241	Bollunna Batahena Road	• At [148058E,141330N] there is a causeway with 3/900mm diameter pipes, which inundates and the road becomes impassable.	• Provide a minor bridge or install another row of 3/900mm diameter pipes
WKL253	Seenadola Thawana Road	• Slight inundation 600m from [143099E,144671N] • Culvert at [143752E,147335N] dilapidated • Culvert at [143790N,147314E] not sufficient 1/450mm pipe	• Raise the road by 0.3m • Provide 2mx1.2m box culvert • Provide 1/900mm diameter pipe culvert.
WKL258	Panagoda Uduwara Road	• Flooding at locations near Kalu Ganga. Part of the road has already been carpeted.	• Concreting may be necessary.
WCO235	Waga to Halpe Estate Road	• The bridge at [1311009N, 185182E0 overflows infrequently when Labugama Reservoir spills. Flood height is high.	• Repair the concrete surface of the bridge and road for 200m laying concrete
WCO259	Arukwatte Angamuwa Road	• Road already carpeted • Culvert at [126080E,181241N] 1/600mm diameter pipe inadequate	• Road raising by 1m is not practical after carpeting recently • Provide 2/900mm pipe culvert
WCO136	Jalthara Aramaya Road	• The culvert opening at [119324E,188045N] not visible • 0.45m inundation near the culvert above • There is no visible opening to the culvert at [118939E,187801N] • 0.3m inundation near the above culvert	• Provide 2/900mm diameter pipe culvert • Raise the road by 0.5m • Provide 2mx1.6m box culvert • Raise the road by 0.45m
WCO267	Habarakada Ranala Road	• 2’ inundation in the paddy area around [116529E, 188144N] • Need a culvert at [116607E,188159N] • Need further determination of hydrological conditions.	• Raise the road by 0.75m • Provide 2/3.0mx1.5m box. • Carry out further hydrological studies
WCO83	Medhananda Mawatha Kaduwela	• The bridge at [114869N,192004E] is narrow	• Replace with an enlarged bridge

Road Designation	Road Name	Approximate Chainage Prevailing Drainage Impacts	Proposed Mitigation Action
WCO84	Shantha Mariya Mawatha Weliwita	• Flood inundation is high	• Provide concrete for road surface
WCO271	Wethara Weedagama Road	• 0.3m inundation near [111317E,174975N] • Need a new culvert at [111323E,174905N] • Need a new culvert at [111323E,174946N] • Need a new culvert at [111463E,174457N] • The culvert at [111261E,175187N] has no height in barrel • Need side drains	• Raise the road by 0.45m • Put 3mx1.m new box culvert • Put 3mx1.m new box culvert • Put 3mx1.m new box culvert • Provide 1mx1m box culvert • Provide side drains and connect to culverts • Further hydrological studies recommended
WCO59	Halpita Pasal Mawatha	• Slight inundation near [109823E,175695N]	• Raise the road by 0.3m

3. Landslide during construction stage

215. 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. Based on the experience of iRoad program any location which is prone to landslides will not be touched by the contractor. Warning sign boards will be placed at such locations with road narrow sign boards if required.

4. Biological Impacts

216. Existing Habitats with respect to flora and fauna, in and around the proposed roads selected for rehabilitation, mainly consist of the manmade habitats like home gardens, paddy fields, plantations of rubber, coconut, cassava, and pineapple. But some areas of the road runs, that consist semi natural habitats like, marshland (mainly abandoned paddy fields), streams and scrubland in privately own lands.

217. According to information available in Department of Wildlife Conservation any of candidate roads are not falling within or adjacent to protected areas such as national parks, nature reserve and strict nature reserves other than the Nilsirigama Main road runs close to the Muturajawela Sanctuary. According to information available in Central Environmental Authority, any of candidate roads of Gampaha District are not falling within or adjacent to Environmental Protection areas (EPA's declared under the National Environmental Act) are located or near any of the project roads in the Gampaha district.

218. According to information available in Forest Department, last part of the Alawala-Mahakanda Road runs close to the Alawala Proposed Forest Reserve and Last part of Bopagama Ella Road also run close the degraded tropical forest patch.

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

220. 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.

221. 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.

222. 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.

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

224. The free movement and natural behaviour of animals near forest areas (as indicated in table IV-9 (a) on roads close to sensitive reserves) could be disturbed during the construction stage due to workers, construction noise and frequent movement of construction vehicles. 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.

225. Construction activities around forest areas, elephant habitats or around their migration paths should be carried out under the instruction of DOF and DWLC. Construction activities should be limited to daytime around above locations and should be completed within short period of time. Material extraction sites, processing plants and waste disposal sites should not be located around above locations too.

226. 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.

227. 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.

228. No solid waste will be dumped into water bodies, 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.

5. Increase of local air pollution, noise and vibration

229. 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.

230. 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.

231. 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.

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

233. As a result of 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.

234. 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.

235. 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.

6. Impact on Water Resources

236. Seasonal tanks, streams, rivers, irrigation canals, waterfalls and community water supply facilities are located adjacent/across the proposed project roads. Therefore, excessive use of water for construction activities may impact on aquatic ecology and water resources especially during the dry season. Construction of cross drainages may temporarily block or divert streams, disturbance to the natural drainage pattern and create flooding and will affect the water sources use by the local community. Surface water runoff and ground water close to construction sites can be polluted with various materials such as cement, bitumen and chemicals etc.

237. In such circumstance the method statement with mitigation action for anticipated impacts should be submitted by the contractor and approval should be obtained prior to construction activities. Since water related issues are significant during the construction activities of roads, priority should be given for the community requirements. Construction work affecting surrounding water bodies by erosion, silting and sedimentation should be prevented using silt traps, sedimentation basins and work should be scheduled during the dry season. Necessary steps should be taken to avoid entering waste water directly in to water bodies. Contractor will organize awareness program for employees regarding water conservation, pollution and minimization of water usage.

238. Contractor shall not divert, close or block existing canals and streams in a manner that adversely affect downstream intakes without approval from the Engineer and relevant government agencies. Contractor shall restore the water sources to its original status once such diversion or closer or blockage occur during the site.

239. Temporary storage of material should be done in approved sites by the Engineer where natural drainage is not disturbed. All toxic and hazardous materials required for construction should be as much as possible sited away from water bodies with the instruction of engineer and should prevent their entering into such places. Water that contaminate with fuel, oil and grease shall not be directly released to storm water or natural water drainage system. Cement, bitumen, grease, lubricant and chemicals should be stored on an impervious surface above the ground level and should be handled without contamination of soil and water.

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

240. 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.

241. 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.

242. 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.

8. Disruption to Traffic/Transportation

243. 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.

244. 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.

9. Impacts Due to Extraction and Transportation of Construction Materials

245. 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.

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

10. Safety of Workers and Public

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

- Provision to workers of Personnel Protective Equipment's (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
- Proper briefing and training of workers on safety precautions, and their responsibilities for the safety of themselves and others
- 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.

248. Ensure that worker housing complies with necessary laws and regulations (such as ILO, factory ordinance etc,).

249. Anticipated problems related to solid waste disposal and mitigation measures. Solid wastes such as plastics, polythene, excess sand, boulders, coarse and fine aggregate, cement bags, cut pieces of materials, various chemicals paints etc. will bring adverse effects through visual pollution and by settling on different aquatic and terrestrial habitats, if not properly managed. In addition, if solid waste is disposed haphazardly, it will lead to an increase in the populations of nuisance animals such as stray dogs, cats and crows in the area. This will be a health hazard to the people living in the area.

250. Solid waste generated during construction work such as plastics, polythene, excess sand, boulders, coarse and fine aggregate, cement bags, cut pieces of materials, various chemicals paints etc. should be removed from work sites in a very effective manner.

251. Anticipated problems related to labour camps and mitigation measures. The labour camps can be an environmental hazard and a nuisance if they are not strategically sited and hygienically maintained.

252. Adverse impacts of labour camps shall be mitigated through following measures;

- Any labour camps to be established should be sited away from protected areas such as Conservation Forests, Sanctuaries, National Parks or Environmental Protection Areas as declared by the CEA. A minimum distance of 250m should be maintained from schools, hospitals, places of worship as well as culturally and archaeologically significant areas.
- The surrounding area of labour camps should be maintained in a sanitary manner in order to prevent the breeding of mosquitoes and other disease carrying vectors.
- Wastewater from labour camps should not be disposed of into nearby water ways or into the ground in order to prevent soil and water pollution.
- All labour camps should be provided with the required sanitary facilities including sewage disposal. Properly designed sewerage system should be installed and properly maintained in order to ensure no sewage pollution or contamination of nearby water bodies occurs.
- The sewerage system has to be designed, built and maintained in such a manner that no contamination of soil or nearby water bodies will take place.
- Solid waste from the labour camps should be properly managed by separating the biodegradable component from the non-biodegradable components such as polythene, glass and metal. A suitable arrangement should be made with the relevant Local Authority to periodically remove the accumulated waste for recycling or final disposal.
- Solid waste should not be allowed to accumulate for long periods of time within the labour camps under any circumstances.
- All labour camps should be provided with first-aid facilities and all precautions should be adopted in order to ensure workers' health and safety at all times.

- The contractor should ensure proper disposal of sludge from septic tanks through a suitable arrangement with the relevant Local Authority. Sludge disposal should not be done in a haphazard manner, and should be done only at specific locations approved by the LA.
- Labour camps should have adequate bathing and toilet facilities for workers according to the number of workers in residence. Toilets should be properly maintained and cleaned in regular intervals.
- Adequate water should be provided in all labour camps for toilet and bathing purposes as well as for drinking purposes.

253. Anticipated problems related to surface water resources and mitigation measures. Some of the rehabilitation roads crosses streams listed in table IV-2, IV-3 and IV-4. These streams are perennial and shall be subject to adverse impacts especially during the construction period as there are chances of improper drainage of wastewater from the construction sites and thereby the formation of stagnant pool. The stagnant pool will promote breeding of mosquitoes and create generally insanitary conditions. If this waste water gets channelized in to the stream, it will contaminate the streams. During construction of culverts, in addition to disposal of the spoils in to the riverbed, the increased sediment load due to the constricted waterway and consequent increased sediment load will cause increased turbidity downstream of the bridge location. Discharge of culvert construction wastewater with high concentration of suspended solid load will disturb the aquatic ecosystem of the receiving water body. Impact on the river system can be minimized if the culvert construction is taken up in the lean flow season

254. Liquid and solid waste discharges from petroleum; oil and lubricant storage areas, work force camps and all other operational areas may impact the water quality of the receiving water body if disposed directly.

255. Construction workers' camps pose another major problem unless located in a planned manner. Sewage generated from these camps, unless disposed in a safe manner, can lead to problems of contamination of surface water sources.

256. Effluents from the hot-mix plants in the form of oil, grease, etc., if not contained and disposed properly, could lead to pollution of land and water in the adjacent areas.

257. These adverse impacts shall be mitigated through implementing the following;

- Adequate measures should be adopted in order to prevent wastewater arising from construction sites from entering into rivers, streams, wetlands or other water bodies.
- All wastewater from construction sites should comply with the relevant standards as prescribed by the CEA, and should be disposed of at locations with adequate dilution factor as stipulated in the CEA standards.
- Wastewater from vehicle/plant maintenance and service stations and all construction sites should comply with the relevant standards prescribed by the CEA prior to disposal into the environment. Action should be taken to ensure that excess oil and grease is removed from the wastewater through installation of efficient oil filtering mechanisms. The wastewater from vehicle and machinery service and maintenance stations should be periodically tested through a recognized laboratory, in order to ensure that it is in conformity with the standards prescribed by the CEA.
- Construction work close to streams and water bodies must be avoided during the rainy period
- Silt fencing consisting of geotextile supported by wire mesh mounted on a panel made up of angle frame to be installed at edges of stockpiles near waterbodies.

- Locations of fuel storage and vehicles cleaning areas should be at least 300m from the nearest waterbody /drain
- Oil & grease inceptors should be provided in fuel storage and vehicles cleaning areas.
- Slopes of embankments meals leading to water bodies should be modified and re-channelled to prevent pollution of water- bodies.

258. Impact and mitigation measures for cultural, archaeological and religious sites. Only Duwa Raja Maha Viharaya located within the Kaluthara District, which is of archaeological valuable and religion place will be affected during the construction period of Duwa Temple Road (road ID. 147). This is a popular Buddhist temple, which draws large number of devotees daily, especially on weekends and particularly during Poya days, which falls on once a month. However, due to the popularity of the temple, it is observed that the reconstruction of this road is very important (i.e. construction of the road will be a beneficial impact). Therefore, as a mitigation measure, it is recommended to avoid construction activities after 6.00 p.m. daily on weekdays, and avoid all activities during weekends and particularly on Poya days. If activities have to be done on the month of May, avoid Poya day and the following day, as the Wesak full moon day, which is the holiest day of Buddhists, falls on this Poya.

259. In addition to above site, which is a popular premises that attract large number of devotees, there are other religious places such as Buddhist temples and churches. In the construction process, these sites have to be especially noted and any construction activities should be avoided during the holy days of the particular religion. Especially related to Buddhist sites, Poya days, which are also government and mercantile holidays, have to be voided and related to Catholic/ Christian sites (especially Sundays), Muslim and Hindu sites, holly days of the particular religion have to be avoided in the process of construction activities.

C. Operation Stage

1. Occurrence of landslides

260. 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 in the first three years and thereafter the PRDA/ or Local authority 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.

2. Air quality and noise

261. 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.

3. Disposal of unsuitable material

262. 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. Safety of the Road Users

263. Improvement of road surface, widening and slightly adjustments of bends will increase the speed of vehicles and incidents of the accidents. Enforcement of speed limits, traffic rules and regulations, installation of warning signs, pedestrian crossings, sign boards for animal crossings, guard railings for essential locations are need to avoid road accidents. On the other hand convenient passages of these roads with safety measures will reduce number of accidents and risk to the pedestrians and drivers.

5. Encroachment of Right Of Way

264. Encroachment can be taken place any time after completion of construction works and this practice is common around public and environment sensitive locations. This will cause impact to the pavements, road side drains, pedestrians and rooting maintenance of roads. Regular checking and removal of unauthorized structures from ROW by the Client as well as enforcement of rules and regulations is essential to avoid encroachment of road reservations.

6. Impacts on water resources

265. 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.

266. 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.

7. Pedestrian and commuter safety

267. 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

268. 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.

D. Positive Impacts of the Project

269. Following socio-economic benefits are expected to transfer to the affected population of roads selected under the iRoad 2 Program.

- 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.
- Improvements in road connectivity reduce regional disparity, open up new markets, generate employment opportunities and thereby reduce poverty in lagging areas.

- The road network improvement 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

270. Growth in vehicular traffic and energy use are considered as main contributors of increased Green House Gas (GHG) emissions which directly affect global warming. According to "International Energy Outlook 2016" (IEO2016) prepared by U.S. Energy Information Administration, the energy use in the transportation sector includes energy consumed in moving people and goods by road, rail, air, water, and pipeline. Transportation sector has accounted for 25% of total world delivered energy consumption in 2012. And it is forecasted that transportation energy use to increase by 1.4% per year from 2012 to 2040 in the IEO2016 Reference case.

271. The evaluation study by ADB's Independent Evaluation Department (IED) in year 2010 (Evaluation Knowledge Brief, July 2010 – EKB) on reducing Carbon emission for transport projects has indicated the need of a shift in ADB's investments on transport sector in to low Carbon growth across Asia and the Pacific regions.

272. Improving the surfaces (pavements) of existing rural roads in Western Province may increase the traffic volume in these roads. However, changes in vehicle operation speeds with respect to present conditions will have an impact on emission levels of the gases emitted by such vehicles. Most common types of vehicles that would move on these roads are bicycles, bullock carts, motor cycles, three wheelers, cars, vans, buses and light commercial vehicles. Thus emission of Carbon Dioxide (CO2) from motorized vehicles which is a GHG needs to be analysed to evaluate the overall contribution of this investment program in terms of the change in CO2 emissions.

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

274. The TEEMP model for rural roads was used for the analysis with using default parameters for base fuel consumption, emission factor and upstream emission percentage. Occupancy-loading, average trip lengths of each type of vehicle, vehicle type growth and roughness factors (before and after improvements) were fed to the model based on the details of traffic and economic analysis for roads in Western Province. A summary of these input parameters are presented below.

Table V-2: Input parameters for TEEMP model for roads in Western Province

Parameter	Input value
Occupancy/loading	
Two wheeler	1.8
Three wheeler	2.0
Passenger car	3.0
Light Commercial Vehicle	3.0 Ton
Bus	35.0
Heavy Commercial Vehicle	8.0 Ton
Bullock cart	0
Bicycle	1.0
Roughness	
Before improvement	6.0 m/km
After improvement	3.0 m/km
Lane configuration	
Before	Single lane @ 2.5 m pavement
After	Single lane @ 3.0 m pavement

275. Model predicted CO_2 emission levels. Three case scenarios were analysed using the model based on the traffic analysis in NP which categorized the traffic levels as rural, urban and provincial. Model output includes CO_2 emissions at Business as Usual (BAU) or without project; with project (i.e. with improvements) and with induced traffic; and with project and without induced traffic.

Table V-3: CO_2 emission at PAU, Project & induced traffic and Project without induced traffic

	Emission of CO_2 in Ton/km/year (net change in emission)		
	Rural	**Urban**	**Provincial**
BAU	10.4	49.0	46.1
Project with induced traffic	8.2 (2.2)	33.9 (15.1)	31.2 (14.9)
Project without induced traffic	9.5 (0.9)	39.6 (9.4)	36.4 (9.7)

276. As indicated in the model output and summarized in above table the proposed improvement to existing road pavements will bring a reduction in CO_2 emission even with a growth of traffic. However, this analysis is based on the assumption that the roughness of improved road surface will be maintained during the project life. Therefore, it is important that the road maintenance program is maintained throughout the project span (i.e. during operational stage). Based on the total length of roads to be improved in WP and based on the minimum (0.9 T/km/year) and maximum (15.1 T/km/year) net change in CO_2 emissions or CO_2 savings of the proposed investment program in WP will be between 1,260 and 21,140 Tons/year.

277. Mitigation measures for floods. Climate change in a global perspective has brought about a change in rainfall pattern and especially the intensities of rainfall. Therefore, special attention shall be paid to road side drainage and cross drainage in designing of the improvements for these roads. Structures such as culverts, causeways and bridges with small spans will be constructed along with road side drains (either earth or concrete based on the requirement) to facilitate the existing flow regime as well as future discharge volumes as predicted by drainage analysis during level one designs. All hydraulic structures constructed on these roads will be of reinforced concrete. Based on the Preliminary Survey and Engineering works an approximate amount of LKR 1,280 million has been allocated in the Bills of Quantities (BOQs) to construct new structures and rehabilitate existing structures in selected roads. This allocation is about 6% of the total construction cost estimated for WP. Considering the percentage of allocation (which is generally 5% - 10% of construction cost) for Environment Management plan which includes mitigation of flood impacts this allocation will be sufficient to mitigate impacts due to floods in selected roads in WP.

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

A. Institutional Arrangement

278. Ministry of Higher Education and Highways (MoHEH) will be the Executing Agency (EA) of this investment program. Secretary to the ministry will be responsible for decisions on overall approvals and operational policies of the project. RDA will be the Implementing Agency (IA) of the program. A project coordinating PIU (PCPIU) with a full time Project Director (PD) will be established under DG/ RDA for coordinating overall program work starting from SAPE works. Provincial level PIUs will be established in the four provinces considered under iRoad 2 program.

279. The PCPIU will be responsible not only for overall program coordination but also to implement the program for the Western Province. The PCPIU will be headed by a full time Project Director (PD) and supported by a team of engineers from RDA. The PCPIU will have an Environment and Social Unit with a Safeguards Team including a Senior Social Safeguards Officer and Senior Environment Safeguards Officer and Social/ Environment Officers assistants (as required) to cover the quantum and geographic distribution of works under the investment program. Project Implementation Consultants (PIC) will support the PCPIU for supervision of the design and construction works by the civil works of Contractor. The PIC team will include a team of Environment Safeguards Consultant, Social Gender Resettlement Specialist and Assistants (stationed at each district) for conduction of regular monitoring of safeguards implementation on site. From Contractor's side, there will be an Environment Officer and a Safety Officer. As per the preliminary arrangements there will be two to four contract packages for each district. Other than these key environment and social staff the Project Engineers, Site Engineers and Technical Officers will also be trained on environment and social safeguards compliance requirements. Possible themes for training and awareness are listed below;

- The application of Context Sensitive Design (CSD)[6] in rural road development;
- Effective consultation and handling of public grievances;
- Land donation process;
- Developing of environment management plans based on a site or cluster specific requirement;
- Preparation of environment monitoring checklists;
- Monitoring and reporting of environment safeguards compliance.

B. Environmental Management and Monitoring Plans

280. A standard EMP was prepared as part of the IEE report is shown in appendix VI.A. However, specific EMP's for each contract package will be prepared by the contractor with reference to the standard EMP. Since its contractor's responsibility to implement the EMP, all costs for implementing the mitigation measures will be included in the Bill of Quantities (BOQ) by the contractor. Contractors who implement rural road components will have a construction period of approximately two years and routine maintenance for three years.

281. Monitoring of EMP implementation will be carried out during the preconstruction, construction, and operation and maintenance stages of the project. Environmental Monitoring Checklists (EMC) will be prepared by the Contractor/s based on the EMP for each of these stages (Sample EMC is attached in appendix VI.B). ES of PIC will review and approve the EMCs. The EMC monitors the degree of compliance of the mitigation measures proposed in the

[6] CSD refers to roadway standards and development practices that are flexible and **Sensitive to Community Values.** CSD allows roadway design decisions to better balance economic, social and environmental objectives. - Minnesota Department of Transport

EMP in all three stages. Every road must have one EMC completed during pre-construction, one to three during construction depending on the length of the road and one 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. The contractor/s shall prepare package or road cluster specific EMPs and submitted to PIC for approval. These EMPs will have road/ site specific information with mitigation measures.

282. Apart from the EMP common Environment Monitoring Plan (EMoP) has been prepared and attached as appendix VI.C. It is expected that the bidders will keep a provision of 5-10% of total construction cost as cost to carry out mitigation measures as listed in the EMP. The cost of implementing mitigation measures during construction and maintenance period (3 years) will be a responsibility of the contractor while RDA will bear the cost of implementing mitigation measures during pre-construction period. Once the roads are handed over to the relevant local authorities it will be their responsibility to implement any mitigation measure.

C. Grievance Redress Mechanism

283. Grievances from the affected people on social and environmental issues during project implementation will be addressed mainly through the existing local administrative system. Depending on the nature and significance of the grievances or complaints, grievances will be addressed at three (3) levels. The first will be at the grass roots level where complaints will be directly received and addressed by the contractor, PIC and PIU representatives on site. Grievances which are simple but still cannot be addressed at the grass roots level will be addressed at the Grama Niladhari (GN) level or level two. More complex grievances which cannot be addressed at the GN level will be addressed at the Divisional Secretariat (DS) level which is considered as level three. There will be a Grievance Redress Committee (GRC) at the GN and DS levels. Minimum composition of GRCs at GN and DS levels are discussed below.

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

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

285. At the DS Level GRC members will be:

i)	Divisional Secretary of the area	Chairman
ii)	Representative of PIU	Secretary
iii)	Grama Niladhari	Member
iv)	Representative of PIC	Member
v)	Representative of Contractor	Member
vi)	Representative of a social organization (Non-Governmental Organization/ Community-Based Organization) of the area	Member
vii)	A community member/religious leader	Member
viii)	Woman representative from the local community	Member

286. To make the Grievance Redress Mechanism (GRM) process gender responsive the GRC will include one woman member to represent the local community women. Further when grievances or complaints are submitted to the GRC, both women and men complainants

will be treated equally and necessary measures will be taken to address the grievance in the best way possible.

287. Recommended steps with timeline on the operation of the GRM is provided in figure V-1. Adjustments may be made to the GRC composition (i.e. inclusion of more members) during the implementation of the program in each Province.

288. Public notices will be put up at each road before commencing of civil works providing information on GRM, contact persons in case of such grievance. Suggestions, requests and complain boxes will be installed at suitable locations within each project road. The online method developed under iRoad will also be implemented as a means of collecting public grievances in iRoad 2. A request, suggestion and complain register will be maintained at contractor's office by the Environment Officer (EO) the respective contractor. All suggestions, requests and complains shall be recorded in this register with actions taken.

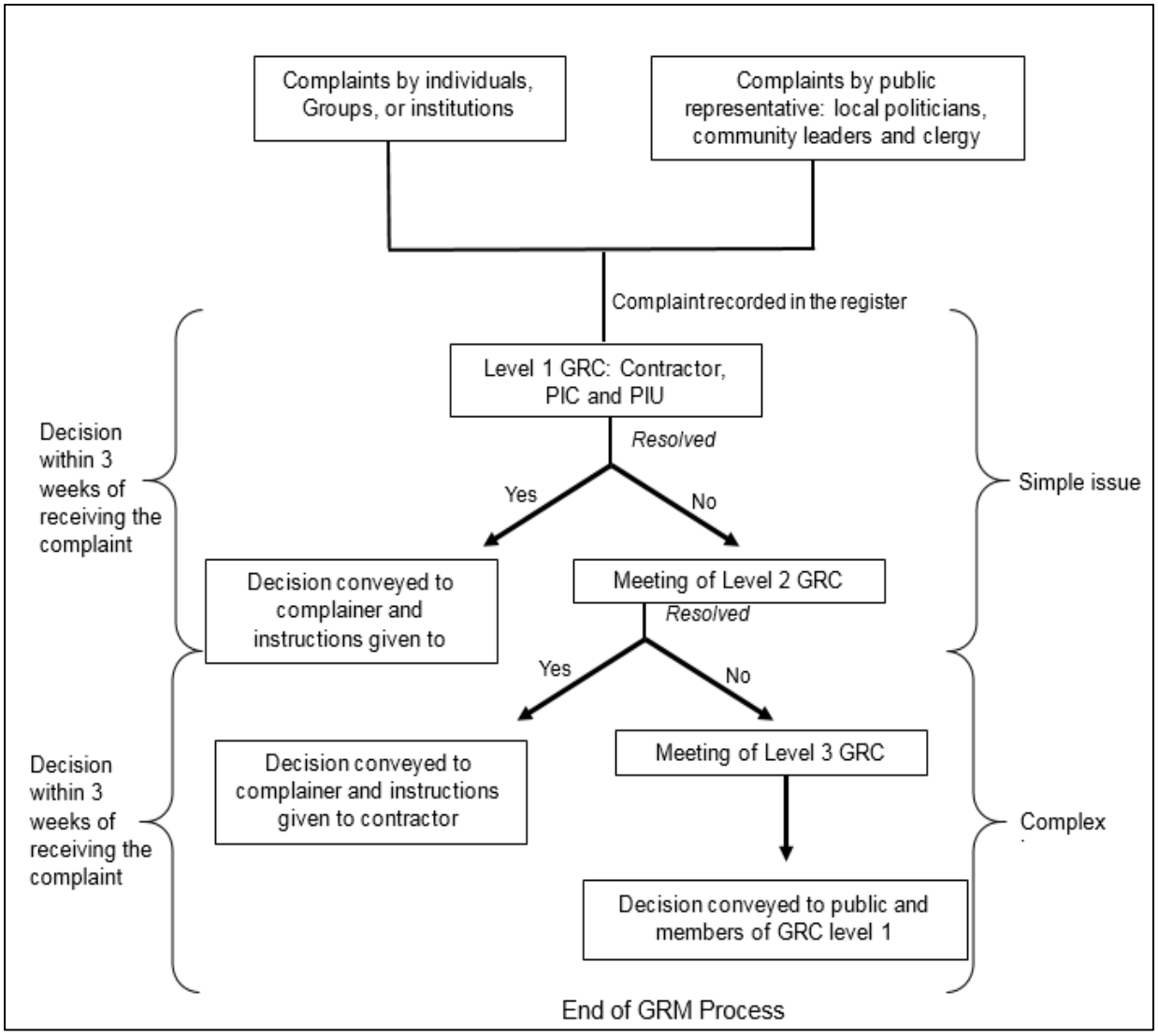

Figure VI-1 Summary of GRM process

VII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Public Consultation Process

289. The consultant carried out public consultation for each road along with the field assessment for preparation of the ECs. The main objective was to understand the public viewpoint regarding the environmental issues along the road. It will also be useful to respond to public concerns and suggestions during the early stages of the project there by reducing any objections towards the project.

290. Important suggestions by the public can also be incorporated in to the design of roads to reduce any adverse impacts to the environment. Special consideration was paid to road sections which are susceptible to floods and landslides during the public consultations. The views obtained from public consultation are given in the particular ECs which are attached in appendix I-D of this report.

291. Most of the People along the project roads have positive ideas about the road improvement and their ideas indicate the importance of the infrastructure development in the rural areas within the Western Province. The main benefits perceived by the public are listed below.

- Improvement in living standard of people
- Easy transportation for people and their products
- Easy access to Hospitals, Schools, markets, etc.
- Potential development to industries including tourism
- Ability use roads in all weather conditions
- Increased connectivity among villages
- Less travel time for school children
- Increased road safety, reduction of road accidents
- Town development and increase in land value
- Security for women, children and elders

Figure VII-1: Public consultation during the field visits

B. Disclosure of information

292. 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.

293. Disclosure of information can be done mainly through the Divisional Secretariat and the Grama Niladhari of the area. Community Based Organizations (CBO), Farmer Based Organizations (FBOs), Trade Organizations and any other village societies can also be used as possible sources of disseminating project related information. Religious leaders such as the head priest of the temple can also be used as resource persons for such activities.

294. Media can be used to advertise the availability of the report could help information disclosure to any interested groups outside the project area. 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 phase.

VIII. CONCLUSION AND RECOMMENDATIONS

295. The proposed project has been categorized as Category B on the ADB Rapid Environmental Assessment (REA) checklist for roads and highways as initial environmental examination ascertains that it is unlikely to cause any significant environmental impacts. The few impacts identified are temporary and local in nature and relatively easy to mitigate.

296. In accordance with the EARF, screening was undertaken to avoid roads likely to cause significant adverse impacts. Roads falling under 'Category A' were excluded, for example roads falling in part or whole within a protected area.

297. The initial environmental examination conducted for the project conforms to the ADB SPS (2009), pertinent national environmental laws and regulations, and technical and procedural requirements. The few significant impacts are typical to road construction and can be mitigated. Impacts related to road siting in flood and erosion prone areas are mitigated through proper design. Potential issues during the construction phase can be mitigated through good engineering and housekeeping practices, and implementation of clearance and permit requirements.

298. Significant impacts are not considered adverse and typical to road constructions that are can be mitigated. 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.

299. The consultation with public revealed that the communities require a safe road with proper maintenance.

300. The road side drainage is another aspect that needs to be considered even if the main focus will be on maintenance. The point of improving road side drainage was point out by many during the discussions had with the community. The necessity of proper drainage was also observed by the hydrologist and field team.

301. Establishment of the Grievance Redress Committees before commencement of improvements and maintenance work is also an important aspect with regret to social safeguards compliance. As revealed in the socioeconomic analysis the public welcome this project as a positive factor in economic development.

302. There will be no cases of involuntary resettlement due to the proposed improvements. The temporary disturbances to people living close to the road and for community organizations along the road will be mitigated during the construction period.

APPENDIX I.A RURAL ROAD LIST OF COLOMBO DISTRICT – WESTERN PROVINCE

Rural Road List of Colombo District – Western Province

iRoad_ID	GID	Road_Name	Km
WCO008	8	Homagama Ramahera Road	1.813
WCO026	26	Develop the Hath Bodiya Road	0.610
WCO031	31	Develop the Bodiyawatta Rd	0.543
WCO035	35	Develop the Kalubowila Temple rd	0.770
WCO038	38	Develop the Gensonwaththa Rd Sec.i	0.408
WCO038	38.1	Develop the Gensonwaththa Rd Sec.ii	0.222
WCO039	39	Develop the Field Mw	0.509
WCO040	40	Develop the Rohini Road	0.584
WCO047	47	Keels housing road Papiliyana	0.644
WCO048	48	Wickramarathna Mw Papiliyana	0.771
WCO049	49	Suriyamal Mawatha Diulapitiya	0.699
WCO050	50	Bodhisiha Mw Dulapitiya	0.875
WCO051	51	Mampe Koskanatha Mawatha	1.025
WCO053	53	Develop the Garden Rd (Rathmalana)	0.520
WCO055	55	Palanwatta Mavithara Road	0.956
WCO056	56	Mahalwarava Banglawatta jayapura Road	1.058
WCO058	58	Hermanminer Mawatha	1.589
WCO059	59	Halpita pasal mawatha(2 Step)	2.112
WCO060	60	Makandana Sudarshama Mawatha	0.786
WCO061	61	Kesbewa Thanayama Road	0.776
WCO062	62	Nampamunuwa jayanthi Mawath	0.910
WCO064	64	Padukka ring road Sec.i	0.126
WCO064	64.1	Padukka ring road Sec.ii	0.185
WCO064	64.2	Padukka ring road Sec.iii	0.234
WCO064	64.3	Padukka ring road Sec.iv	0.207
WCO065	65	Padukka Nimalsiri Mawatha	1.473
WCO066	66	Malagala Cemetery road	0.970
WCO067	67	Kahawala Nakandala road	2.014
WCO068	68	Malagala Yatawathura Rathmalgoda road	2.661
WCO069	69	Yatawathura Kahawala road	1.056
WCO070	70	Kahawala Piburagala road	1.402
WCO071	71	Padukka Jayanthi Mawatha 1	1.346
WCO072	72	Udumulla Angamuwa road	1.769
WCO073	73	Meeriyagalla Weragala road	1.308
WCO074	74	Weragala Kudagala road	1.074
WCO075	75	Angamuwa Weragala road	1.088
WCO076	76	Weheragala Mawatha (Weheragala)	0.841
WCO077	77	Pahala Bope Rathugama Mawatha	0.623
WCO078	78	Bope Siyambalawa road	1.933
WCO079	79	Padukka Pusweli mawatha	0.772
WCO080	80	Arukwaththa Angampitiya Ganegoda road	1.380

iRoad_ID	GID	Road_Name	Km
WCO081	81	Angampitiya Fausy road	2.123
WCO082	82	Pitumpe Pabbatharama road	0.585
WCO083	83	Medadanda Mawatha front of Seelalankara Mawatha	1.314
WCO084	84	Shantha Mariya Mawatha (Weliwita)	1.602
WCO085	85	Weliwita Wewa Road	1.409
WCO086	86	Kothalawala Gamunupura Main Road to IDL	1.485
WCO087	87	Kakirideniya Road (from 177 main road to Vihara Mawatha) Sec.i	0.784
WCO087	87.1	Kakirideniya Road (from 177 main road to Vihara Mawatha) Sec.ii	0.345
WCO091	91	Kanadawatta Road	0.798
WCO092	92	Shanthiyogashrama Road	0.658
WCO095	95	Laka Road near lake basin to Hokandara Thalawathugoda Road	1.274
WCO096	96	Palawatta Perera Mawatha	0.775
WCO100	100	Galpoththe Road(190 Main road) to front of Ceylon steel PVT Ltd.	1.610
WCO101	101	Korathota Alwiswatta Madha Para	0.929
WCO102	102	Developing Maharagama Ananda Maithree Mawatha	1.018
WCO103	103	Developing Pannipitiya Cemetery Road	0.821
WCO104	104	Developing Depanama Dewala Road	0.605
WCO106	106	Developing weeramawatha Munamale plase	0.558
WCO107	107	Developing Pannipitiya Bogahawaththa Road	1.119
WCO108	108	Developing Malabe road Liyanagoda to Katukurunda	1.467
WCO110	110	Developing Rukmale Nugeamulla junction to the Nugeamulla Road	1.109
WCO111	111	Developing Balance Part of Maharagama Kalalgoda Meemanagoda road	1.417
WCO113	113	Developing Pannipitya Pragathi Mawatha	0.598
WCO114	114	From Araliya Uyana Depanama Pannipitiya to Dambahena Road,Temple Road	2.057
WCO115	115	Developing Maharagama Pamunuwa railway avenue to Pannipitiya Bridge	1.304
WCO120	120	Sri Nandarama Road	1.448
WCO124	124	Walauwa road	0.730
WCO126	126	Nagaraseema Mawatha .	1.236
WCO129	129	Habarakada Mullegama J.A.Karunasena Mawatha	0.841
WCO131	131	Develop the Bdowita 2nd Step, From Abesekara Mw	0.555
WCO133	133	Habarakada Kamath godalla road	0.521
WCO136	136	Jalthara Aramaya road to jaya Mw junction falls through the city of west auctioning land	1.637
WCO139	139	Welipillewa Walpita road	1.136
WCO141	141	welipillawa towards to batawala road.	1.354
WCO147	147	Meegodadeniya Main road	2.898
WCO149	149	Wataraka North " Somarathana Mawatha Gammana Road.	1.111
WCO151	151	Poregedara Liyanwala road	1.538
WCO152	152	Udagewatta,Gurugewatte,road	1.642

iRoad_ID	GID	Road_Name	Km
WCO153	153	Dampe Baige watta road	2.377
WCO154	154	Dampe Kajugahawatta deniya -Dehigahawita road	1.989
WCO155	155	Godagama Palpolawatta road Sec.i	0.207
WCO155	155.1	Godagama Palpolawatta road Sec.ii	0.745
WCO156	156	Panagoda-Romiyel mawatha	2.049
WCO157	157	Panagoda-Kompayahena road	1.219
WCO158	158	Layanel Jayasinghe Mawatha (Karuwalapitiya) towards to Nawalamulla road.	0.969
WCO159	159	Layanel Jayasinghe Mawatha towards to Ranaviru Gammana Village. Sec.i	0.863
WCO159	159.1	Layanel Jayasinghe Mawatha towards to Ranaviru Gammana Village. Sec.ii	0.603
WCO160	160	Kiriberiyakale Prithika Mawatha	0.737
WCO161	161	Dolahena Govijanapadaya road	1.902
WCO162	162	Dolahena Moonamale road	1.721
WCO163	163	Uduwana Delgaha watta road	1.701
WCO164	164	Internal Roads in Katuwana industrial Zone. Sec.i	1.463
WCO164	164.1	Internal Roads in Katuwana industrial Zone. Sec.ii	0.468
WCO164	164.2	Internal Roads in Katuwana industrial Zone. Sec.iii	0.258
WCO164	164.3	Internal Roads in Katuwana industrial Zone. Sec.iv	0.138
WCO164	164.4	Internal Roads in Katuwana industrial Zone. Sec.v	0.213
WCO165	165	Katuwana Daham Mawatha	0.728
WCO166	166	Somalankara Mawatha- from Magammana junction to Niyadagala Junction.	1.164
WCO167	167	Magammana Kothalawala road.	0.806
WCO168	168	Magammana Batahena road.	0.782
WCO169	169	Kahathuduwa Pragathi Mawatha	1.396
WCO170	170	Mihimanwila road Kahathuduwa up to 120 Main Road	1.480
WCO172	172	First Stage of Sumana Mw old Kahathuduwa-Ukkotuwa Main Road	1.176
WCO174	174	Ruban Amarathunga By road of jambugasmulla Kahathuduwa	0.841
WCO175	175	Kiriwaththuduwa Galkanda road	1.947
WCO176	176	Kiriwaththuduwa Kithulawila road	1.833
WCO177	177	Mattegoda - Kirigampamunuwa Main Road	1.970
WCO178	178	Asiri Uyana Main Road in mattegoad	0.819
WCO179	179	Cemetry Road in Sandun pura in mattegoda	0.947
WCO181	181	D.C Attanayaka Mawata	1.589
WCO182	182	Jayaliyagama Udagammana road	2.184
WCO183	183	welakumbura Mawatha	0.751
WCO184	184	Main road From Ambagashandiya junction up to koraleima	3.848
WCO185	185	From Munamale Main Road, Hakurudeniya to Subodarama Temple to Thoramulla	1.292
WCO186	186	Papiliwala road from salgas mw in mattegoda up to brahamanagama junction	1.493
WCO187	187	Kandawatta Road Sec.i	0.615

iRoad_ID	GID	Road_Name	Km
WCO187	187.1	Kandawatta Road Sec.ii	0.664
WCO188	188	Hanwella central college road	0.757
WCO189	189	Diddeniya Kehelhenakanda road	1.917
WCO190	190	Diddeniya pinnawala road	1.380
WCO191	191	Diddeniya Bandarawaththa road	1.526
WCO192	192	Diddeniya kammalwaththa road	1.028
WCO193	193	E/ Hanwella Eriyagolla Road	1.375
WCO194	194	Tuntana Mahakanda Road	2.974
WCO195	195	Hanwella Jayaweeragoda Road	3.543
WCO196	196	Pahala Hanwella Walauwaththa road Sec.i	0.530
WCO196	196.1	Pahala Hanwella Walauwaththa road Sec.ii	0.824
WCO197	197	Bope Wewalketiya Mahingala road	2.240
WCO198	198	Bopewaththa road	1.142
WCO199	199	Waga Bope Halpewaththa road	5.223
WCO201	201	Pallewasala Kelimadala road	1.124
WCO202	202	Waga Mawaragodalla road	1.468
WCO203	203	Dabora Dangana Kubura road	0.951
WCO204	204	Waga Mawaragodella shramadana road	0.985
WCO205	205	Waga Thiruwana main road	0.727
WCO206	206	Kelimadala mahayaaya road	0.846
WCO207	207	Angampitiya Uggalla Galkaduwa Kelimadala road	3.610
WCO208	208	Road From tha thekotuwa junction to steel work shop in kahathuduwa	3.946
WCO209	209	Kosgama Balika road, from High level road to Mawalgama road	2.051
WCO210	210	Kadugoda railway station road	0.921
WCO211	211	Mawalgama Kadugoda road	1.410
WCO212	212	Uruwela Malwaththa road	2.472
WCO213	213	Arapangama Mawalgama road	1.910
WCO214	214	Ihala Kosgama Aluboodala road	2.712
WCO215	215	Ihala Kosgama Prima Farm road	1.974
WCO216	216	Weragollawatha Main road	1.514
WCO217	217	Dunkalahena road	3.052
WCO218	218	Ilukowita Koswaththa road	1.095
WCO219	219	Thummodara pagngnagula road	3.221
WCO220	220	Ilkowita Digana Road	0.898
WCO221	221	Welikanna Milladanda Elamalawala road	2.066
WCO222	222	Welikanna Elamalawala road	1.232
WCO223	223	Welikanda Weliowita road	1.004
WCO224	224	Kadugoda Kahahena road	3.178
WCO225	225	Brandigampala suduwella road	1.375
WCO226	226	Halpe Pussagala road	1.749
WCO227	227	Main road and By roads from The Police station on Aradanakanda Awissawella Mw to Aradandanakanda Watta	0.890
WCO229	229	Halpewaththa road	4.487

iRoad_ID	GID	Road_Name	Km
WCO230	230	Development of Honigama road from the Kudagama road to JAK Bangalow	0.914
WCO231	231	Developmant of Kudagama Menguswatta road	1.001
WCO232	232	Pinnawala Ganelanda road	1.071
WCO233	233	By roads at Pragathipura	0.946
WCO234	234	Pitumpe Annasigalahena road	1.001
WCO235	235	Carpat laying & Development Road From waga iridapola to hlpe estate through boraluwatenna	3.488
WCO253	253	Avissawella - Kudagama	2.539
WCO254	254	Puwakkpitiya - Kaluadura	4.124
WCO255	255	Kosgama- Welikanna	8.611
WCO256	256	Shantha Mariya Mawatha	2.139
WCO258	258	Karadana-Wewita-Udugama-Bope kade	4.754
WCO259	259	Arukwatta-Angamuwa-Meeriyagalla	5.663
WCO260	260	Liyanwala - Kurugala	3.351
WCO261	261	Meegoda -Gehenuwala-Atigala	7.944
WCO263	263	Naduhena-Nawalamulla-Welipillewa	4.059
WCO264	264	Horagala - Dampe	2.888
WCO265	265	Dampe - Pitipana	2.521
WCO267	267	Habarakada Ranala	3.674
WCO269	269	Maththegoda - Kudamaduwa- Sangarama	2.124
WCO271	271	Wetara - Weedagama	3.814
WCO272	272	Kahatuduwa - Diyakade	2.398
WCO275	275	From Angulana Statin Rd (to Uyana Rd)	1.373
WCO276	276	Lunawa Uyana Road	1.025
WCO278	278	kaldemulla Eabert Lane	1.026
WCO279	279	kaldemulla Road	1.702
WCO289	289	Vidyala Road - 2nd Lane	0.505
		Total	284.976

Rural Road List of Gampaha District – Western Province

iRoad_ID	GID	Road_Name	Km
WGA004	4	Ganawala Kohalwila	1.276
WGA005	5	Parakum Mawatha	1.107
WGA006	6	Belummahara Jayasumanarama Road Sec.i	1.048
WGA006	6.1	Belummahara Jayasumanarama Road Sec.ii	0.411
WGA007	7	A.K.C. Amarasinghe Mawatha	1.085
WGA008	8	Nedungamuwa Wanatha Road Sec.i	0.976
WGA008	8.1	Nedungamuwa Wanatha Road Sec.ii	0.274
WGA011	11	Imbulgoda Saliya Bathik Road	0.746
WGA014	14	Neduna Road	0.765
WGA017	17	Siyabalagaha Kanatta Road	0.629
WGA020	20	Pathahawatta Road	0.884
WGA031	31	Ganemulla Bulugahagoda	2.848
WGA032	32	Horagolla Makilangamuwa	1.842
WGA033	33	Imbulgoda Ihalayagoda Moragoda	3.499
WGA034	34	Yagoda Thonduwa	1.330
WGA039	39	Kajuwattawila Indolamulla Road	0.577
WGA040	40	Udugama Dangalla Road	3.584
WGA043	43	Owitigama North Koshena Road	0.871
WGA044	44	Kimbulwilawatta Morahena Road	1.983
WGA047	47	Udamapitigama Dewala road	1.718
WGA049	49	Keragala Danawkanda road Via Estate	1.119
WGA050	50	From Pelahela 1 Pole to Demalagama	1.574
WGA051	51	Putupala Rambutanwatta Road	2.659
WGA052	52	Pugoda Deththemulla Road	1.222
WGA053	53	Werahera Hiswella Road	1.986
WGA054	54	Alikehena Lansiyawatta Road	0.941
WGA055	55	Palugama Pelangashena Gebrial Appuhami Mw	2.436
WGA057	57	Dekatana Demalagama	1.575
WGA061	61.1	Gampolagedara Pepolgahadeniya Sec.ii	3.007
WGA062	62	Henegama Wanaluwawa	2.087
WGA065	65	Pugoda Mandawala	4.666
WGA066	66	Waharaka Putupagala	2.320
WGA069	69	Kudahakapola Temple Road	1.655
WGA072	72	Ragama Ketagewatta Road	1.329
WGA074	74	Kapuwagara Road	2.021
WGA075	75	De Mezanad College Road	0.572
WGA078	78	Narangodapaluwa Gemunu Mawatha	2.033
WGA080	80	Polpitimukalana Jaya Mawatha	0.999
WGA081	81	Yakkaduwa Vila Road	1.317
WGA083	83	Nivandama Galhidahena Road	1.753
WGA084	84	Nivandama Hambana Road Sec.i	1.037

iRoad_ID	GID	Road_Name	Km
WGA084	84.1	Nivandama Hambana Road Sec.ii	0.180
WGA087	87	Batuwatta Kendaliyaddapaluwa Road	0.955
WGA088	88	Batuwatta Gamini Mawatha Sec.i	1.102
WGA088	88.1	Batuwatta Gamini Mawatha Sec.ii	0.378
WGA089	89	Nivandama Devala Road	0.599
WGA095	95	Sudarma Road	1.127
WGA096	96	Sewalee Kelanitissa Road (Welikeliya)	0.631
WGA107	107	Deverlopment of public Road at Loluwagoda harankahawa	1.694
WGA110	110	Development of public Road at kalukanda	0.639
WGA113	113	Deverlopment of public Road at Mottunna Puhulowita ist &2nd lane	1.211
WGA114	114	Deverlopment of public Road at Kappitiwalana hirikuluwa	0.962
WGA116	116	Development of public road at Beligaswathta Highwaycity	0.738
WGA117	117	Deverlopment of public Road at Giriullagama	0.869
WGA118	118	Development of the public Road Ambepussa near by Army camp	2.338
WGA122	122	Nalla Road	0.947
WGA123	123	Development of the public Road Radawadunna near by temple	0.720
WGA124	124	Development of public Road at to naligama from Lindara	1.397
WGA125	125	Development of the public Road Danowita Weragoda near by temple	0.664
WGA126	126	Development of public Road at Waththe Gedara Mangedara	0.695
WGA127	127	Development of the public Road at Ambalanwththa near by police station	0.745
WGA128	128	Development of the public Road at Mirigama Ambalanwththa near by Plat	1.796
WGA135	135	Development of public Road at Tawalampitiya (Galge kanda-school)	1.479
WGA136	136	Weyangoda Diulgashandiya	6.804
WGA137	137	Nawammahara Main Road	1.868
WGA146	146	Thuduwe Gedara Jude Mawatha	0.798
WGA153	153	Maradana Road	0.946
WGA166	166	Nilsirigama Main Road	0.761
WGA177	177	Bant Road	0.738
WGA180	180	Weliamuna Road	1.271
WGA184	184	Prakrama Road from Negombo Road to Guludupita	1.278
WGA186	186	The Road from east Dagonna up to Halgahawela	2.458
WGA187	187	Road from Godigamuwa junction across temple junction upto Dehigahapallama Sec.i	2.043
WGA187	187	Road from Godigamuwa junction across temple junction upto Dehigahapallama Sec.ii	1.833
WGA188	188	Road the across Kahabiliyawa Janapadhya up to Allugolla	1.108
WGA189	189	Akaragama Mamit Janapadha Road	1.670
WGA191	191	Road From Karabotuwewa up to Heralugedara	2.922
WGA192	192	Road From Aswennawatta up to Delgahamula junction	1.716

iRoad_ID	GID	Road_Name	Km
WGA193	193	Asswennawatta Ranaviru Mawatha from Nalapha junction up to Kurunegala Road	2.591
WGA194	194	Weragodamulla Arama Road from Asswennawtta Nawaloka junction up to Thambili Uyana Sudugolla junction	2.172
WGA195	195	Road from Ballapana Austin Glouse junction up to Ballapana through Madiththagama village	1.456
WGA196	196	Weeheana watta Road from Ulukade junction up to 12th mile post of kurunegala road near the Sanasa Bank	0.526
WGA197	197	Road from Uorapana junction up to Hapugahagama School	2.237
WGA198	198	Road frome Hapugahagama Coparetive junction up to Thammita Bomaluwa temple	1.200
WGA199	199	Road from Dissagewaththa up to Dagonna "Wela mada"	1.814
WGA202	202	Palliya Para Road from Waradala Minuwangoda Road statue Up to Welihinda	1.479
WGA203	203	Polwaththa road from Waradala Negombo Road Junction upto	1.959
WGA204	204	Waradala Nagahalanda Road from Mr Lionals Dispensary Junction upto Nagahalanda	1.277
WGA205	205	Road from Ambalangoda trancformer up to Kelegedara junction Mr Ananada Boqtiue	0.785
WGA206	206	Road from Walpita minor export Processing farm from upto Udugodagedara	1.748
WGA207	207	Pitipanawatta Road from Kurunegala Road via C.T.B Depot Up to Ghanawasa Mawatha	1.478
WGA208	208	Ghanawasa Mawatha from Mirigama Road up to Pinnakele watta	1.500
WGA209	209	Road from Manikwaththa Jayabima Boutique Up to Kasiwaththa	2.827
WGA210	210	Road from Katukenda upto Maningamuwa Alugolla junction to Mallawagedara Road	3.987
WGA211	211	St: Anthony's road from Katana Miriswatta road up to Katana Disagewatta Road	1.577
WGA212	212	Road from Hunumulla via Palliyapitiya up to Nelligahamula coconut factory	2.420
WGA213	213	Wewapara from Aluthapola road up to Katuwellegama temple	1.594
WGA214	214	Kandekale road from Madithiyawala Kopiwatta upto Medikale	2.010
WGA215	215	Kurundu waththa road from Kurunduwaththa up to Medikale	1.030
WGA216	216	Lunumidella Watta road from Walpita upto Kopiwatta	1.684
WGA217	217	Madagama Halpe main road from Meerigama Main road upto Kosatadeniya Hakurukumbura road	1.533
WGA218	218	Road from Divlapitiya main road opposite Dunagaha Deavalaya upto Palliyapitiya	1.169
WGA220	220	Road from Negambo main road upto Walpola via Dagonna Wimalananda School	0.935
WGA221	221	Road from Nalapana up to Diyagampola	3.489
WGA222	222	Welikatiya Rajagahapura road from Godigamuwa main road up to Palliyapitiya	1.929
WGA223	223	Road from Katukenda upto Kasiwatta	3.881

iRoad_ID	GID	Road_Name	Km
WGA224	224	Pothu Kepilla road from Dunagaha Thambilikatuwa up to south Kehelella	1.914
WGA225	225	Road from Kehelella colony up to Badalgama main road	1.224
WGA229	229	Road from Pitiyegedara Pillawa junction up to Halpe Batapotha	1.489
WGA230	230	Road from Mirigama road vea Balagalla Privena up to Hanchapola	1.383
WGA231	231	Doonagaha Sevana Road from Induraga temple Road up to Godigamuwa Doonagaha Road Sec.i	0.513
WGA231	231.1	Doonagaha Sevana Road from Induraga temple Road up to Godigamuwa Doonagaha Road Sec.ii	0.512
WGA232	232	The road to the West palliyapi?iya started near the baseball Institute Godigamuwa road	0.979
WGA233	233	The road from the school will start palliyapi?iya Hunumalla High School	1.327
WGA234	234	Sirigapathawatta Road up to Pethiyagoda School	2.552
WGA235	235	Halpe Kosatadeniya	1.520
WGA236	236	Akarawita Galwala	1.941
WGA238	238	Kaluwarippuwa Kangodamulla	1.577
WGA239	239	Thammita Delwagura	1.706
WGA241	241	Thoppuwa D.J. Fernandopulle Mw	1.978
WGA244	244	Udagangawa New Lanka Road	1.425
WGA245	245	Bambukuliya St.Micle Mw	1.194
WGA246	246	Udagangawa Welakkanny Road	0.638
WGA248	248	Road near to Dewamottawa Sub Post office	0.504
WGA249	249	Dewamottawa Banduwatta Road	1.112
WGA251	251	Gothamiland Road - Kasagahawatta	0.830
WGA254	254	Galmankada Molawaatta Road	1.667
WGA255	255	Kussala Katana Meda Para	0.767
WGA257	257	Wimala Viharaya Mw, Opatha to Raddolugama Road	0.572
WGA258	258	Madurawila Gammeda Rd	1.218
WGA259	259	Pethiyagoda Bandaranayaka Rd	1.368
WGA260	260	Marapola Gamameda Rd	1.727
WGA261	261	Vigoda - Marapola Main rd	1.783
WGA262	262	Metikotamulla - Walpitamulla Main rd	1.849
WGA264	264	Siyabalapitiya Lokingamuwa	1.235
WGA265	265	Uggalboda Dewala Mawatha	1.692
WGA268	268	Thammita Katugasthota	1.808
WGA276	276	Suriyapaluwa Batahena - Main Road	1.026
WGA277	277	Suriyapaluwa Alhenawatha - Road	0.829
WGA280	280	Mahara Nugegoda Devala Raod	1.499
WGA281	281	Ihala Karagahamuna Mangala Mawatha	1.383
WGA282	282	Polhena Raod - Kandaliyaddapaluwa	1.008
WGA284	284	Ihala Karagahamuna School Road	1.785
WGA286	286	Balivila Road	2.698
WGA289	289	Kanatha Road Gonahena	1.529

iRoad_ID	GID	Road_Name	Km
WGA291	291	Buthpitiya Ginigesma	2.635
WGA292	292	Gonahena Weboda	1.580
WGA293	293	Kirikitta Onauwkanda	1.380
WGA294	294	Nedungahahena Embaraluwa	1.594
WGA295	295	Pasgammana Ambagaspitiya	1.616
WGA296	296	Rathupaswala Henegama	3.955
WGA297	297	Weboda Embaraluwa	1.274
WGA298	298	Kongasdeniya Panawala	2.264
WGA299	299	Nikahatikanda Karasnagala	2.647
WGA300	300	Halgampitiya Thiriwanagala	1.670
WGA301	301	292 Village Winibula North Pinthaliya Road	1.359
WGA318	318	Pahala Mottawa waththa Near the Mr Upasena's Home-Common Road Sec.i	0.973
WGA318	318.1	Pahala Mottawa waththa Near the Mr Upasena's Home-Common Road Sec.ii	0.253
WGA320	320	Main Road of ambanawaththa Flat to Common Road	1.074
WGA331	331	Podu Jana Mawatha, Nittambuwa	1.082
WGA332	332	St. Anthony road, Nittambuwa	0.645
WGA333	333	Nagoda, Gama meda road	3.430
WGA334	334	Bonegala Gama meda Road	1.160
WGA335	335	Kuruduwattha road	0.937
WGA336	336	Sudu Nelum Mawatha, Pannila	1.474
WGA337	337	Opathella, Galboda Road	0.935
WGA338	338	Welagedara Jaya Mawatha	1.172
WGA339	339	Meewitagammana Yatawaka road	1.655
WGA340	340	Aliwalapalla Rukmale road	2.689
WGA341	341	Dadagamuwa meda road	0.914
WGA344	344	All Closed Road of the Wetex Ground	0.593
WGA345	345	Kammalwattha Road	0.915
WGA347	347	Alawala Mahakanda road	1.653
WGA348	348	Welikadamulla road	2.510
WGA349	349	Udammita Ambalama Road	2.298
WGA350	350	Katuwasgoda Road	1.393
WGA351	351	Mahalegoda Road	1.210
WGA352	352	Heendeniya Pattiyagoda Province Road	0.902
WGA355	355	Bopagama Ella Road	1.331
WGA357	357	Bopaththa piriewna Road	1.305
WGA358	358	Kalotuwawa Thapowana Road	1.442
WGA361	361	Gampalagedara-Pepolgahadeniya road	4.429
WGA363	363	Pahala Mapitigama, Keragala Mawatha (Ganga Mitiyawatha Road	2.653
WGA370	370	Demalagama-madurawa road	2.128
WGA375	375	Pingamuwa-Kendagolla road	3.323
WGA377	377	Kibulapitiya Paththayamwaththha Road	1.599

iRoad_ID	GID	Road_Name	Km
WGA378	378	Madawala Main Road	0.983
WGA385	385	Madawala Aramba road	0.720
WGA400	400	Neelamahara Doranadiwela Road	1.505
WGA401	401	Amunukumbura Jambu Gahamula Main Road	1.546
WGA402	402	Henagama Gadumana Rajapaksha mawatha	2.419
WGA403	403	Keenigama Dambuwawaththa Main Road	1.159
WGA404	404	Neelamahara to Aramangoda North Main Road	1.567
WGA405	405	Henagama Imbula Junction to kerikiththa Halwaththa Main Road	1.027
WGA406	406	Uruwala Boogahawatta road	1.310
WGA407	407	Kandaliyaddapaluwa keselwaththa road	0.740
WGA408	408	Gonahena eksath samagi mawatha	1.121
WGA409	409	Gonahena nagahakumbura road	1.128
WGA410	410	Rathabale mudumbikanda kamhalwatta road Sec.i	1.001
WGA410	410.1	Rathabale mudumbikanda kamhalwatta road Sec.ii	1.244
WGA411	411	Meegalla gammada Road	1.800
WGA412	412	Mahara ihala karagamulla gamini mawatha	0.965
WGA413	413	Kadawatha Ganemulla Road- Main Road of 100 Athkam niwasa	0.641
WGA415	415	Negombo- meerigama 242 bus route 12 Mile Post to Till Hapuwalana Temple Sec.i	2.357
WGA415	415.1	Negombo- meerigama 242 bus route 12 Mile Post to Till Hapuwalana Temple Sec.ii	0.468
WGA416	416	Negombo- meerigama 242 bus route - 12 Mile Post to Ulukade Junction Near 164/IA,Sewana Home Junction to Ganewaththa Temple	1.174
WGA417	417	Meegamuwa- meerigama 251 Bus Route Katana - Near Halpe icon to koongodamulla Church Junction - mawatha	1.872
		Total	**318.687**

Rural Road List of Kaluthara District – Western Province

iRoad_ID	GID	Road_Name	Km
WKL002	2	Udawela Wilegoda Road	2.303
WKL005	5	Harnkahapatha Road	3.441
WKL007	7	KudaKalupahana Road	4.548
WKL009	9	Polgampala Kapugoda Road	2.285
WKL010	10	Nivithigala Navitigala Road	2.038
WKL011	11	Lathpadura - Etigiriya	1.660
WKL014	14	Baduraliya - Magura - Panigala	3.936
WKL015	15	Rockland Road	1.868
WKL017	17	Ambalppala Road	1.132
WKL019	19	Danwaththagoda - Maddegoda - Kalawila Road Sec.i	1.882
WKL021	21	Sahira College Road	0.738
WKL023	23	Maggona Kudawa Road	0.671
WKL026	26	From Kalawellawa via Mirishena to Govinna Dambalanawatta road	3.287
WKL027	27	Paragoda Gamage watta Road	2.587
WKL029	29	Eta Kanda road	2.071
WKL030	30	From Galahena Junction to Mirishena Factory	2.092
WKL031	31	Thalgas Kanda via Kadanwadiya	1.457
WKL036	36	App. Road Naragala Road Sec.i	0.629
	36.1	App. Road Naragala Road Sec.ii	0.106
WKL040	40	Bombuwela Alhenkanda Ruwanmaga Road	2.247
WKL043	43	Malaboda Mithurugama Road	1.626
WKL044	44	Dikhena Pahanwaththa Main Road	1.639
WKL047	47	Bombuwela Thotagewatta Road	1.790
WKL048	48	Serupita Pitawila Road	2.706
WKL049	49	Kethhena water Pump house Road	0.698
WKL051	51	Naboda Deegalla Road	1.990
WKL053	53	Tebuwana - Aguruwatota	4.954
WKL059	59	Dodangoda - Tebuwana	2.811
WKL061	61	Kumbuka Narangahahena Road	2.135
WKL062	62	Meewana Palana SiriltonWaththa Diganwela Road.	1.337
WKL063	63	Millawa Miriswaththa Road.	1.797
WKL064	64	Horaketiya Meewanapalana Road	2.850
WKL065	65	Kanaththagoda Road	2.320
WKL066	66	Ingiriya Manana Dombagaskanda Road	3.700
WKL067	67	Handapangoda Gatakossawa Road	2.565
WKL068	68	Palpitigoda Maputugala Road	2.930
WKL069	69	Elabadapara maha Ingiriya	1.501
WKL071	71	From Moragahahena Main rd,Welekade to Batuwita Jinction across the Kahatapititya	2.536
WKL072	72	Dambara Millewa	5.625

iRoad_ID	GID	Road_Name	Km
WKL073	73	Handupelpola Kahawala	1.599
WKL074	74	Kindelpitiya Kahawala	1.784
WKL075	75	Kudauduwa Haandupelpola	2.138
WKL076	76	Kumbuka Pansala Road	1.380
WKL078	78	Perangiyawala Munagama	4.640
WKL081	81	Ballaptiya Temple Road to Mahena	1.539
WKL082	82	Ampitigala Road to Angoruwathota	5.047
WKL083	83	Warakagoda Maththru Sayana Road to Ihala Karannagoda	1.712
WKL084	84	Warakagoda Gamagoda Road to Kottayahena	1.354
WKL085	85	Batawala Road	1.811
WKL086	86	Dewananda Road	1.981
WKL087	87	Welipatha Road to Dikhenapura	1.676
WKL090	90	Sirikandura juntion to Sandasirigama Via valikatiya Road	7.405
WKL092	92	Horakandamulla Road	1.597
WKL093	93	pallegodawatta Road	1.422
WKL094	94	Manannawatta Road	1.294
WKL095	95	Iddagoda Pallewatta Road	1.743
WKL097	97	Welipenna Uragoda Road	2.017
WKL105	105	Matugama - Manana - Bopitiya	4.560
WKL106	106	Keerantidiya - Palligoda	2.223
WKL112	112	Miriswattha School Rd	1.674
WKL113	113	Bothalawa Rd	4.088
WKL115	115	Gulanawattha Nawala Mandagala Rd	4.108
WKL117	117	Uthuru Pitigalagoda Rd	1.305
WKL118	118	Horanaperuwa Rd	2.276
WKL119	119	Barodelwattha Rd	2.023
WKL121	121	Gallena Mulla Pansala Rd	1.647
WKL123	123	Neluwa - Karapagala	2.316
WKL131	131	Gonaduwa Kawatayagoda Dilwella Road	1.801
WKL133	133	Mawala Weniwelgala Road	1.389
WKL136	136	Mawala Kuruduwatta Road	0.993
WKL139	139	Uggalboda Edirikele Road	2.267
WKL141	141	Palathota Samagi Road	0.998
WKL142	142	Lagoswatta / Sayamwatta Road	2.100
WKL145	145	Mihikathawatta Road Sec.i	0.539
	145.1	Mihikathawatta Road Sec.ii	0.342
	145.2	Mihikathawatta Road Sec.iii	0.161
WKL147	147	Duwa Temple Road	0.574
WKL150	150	Ethanamadala - Jawatta	1.239
WKL153	153	Malwatta - Jawatta	2.511
WKL159	159	Diyagama - Gangabada	1.554
WKL168	168	Uggalboda - Kudaduwegama	2.050
WKL170	170	Tissa Mawatha	1.001

iRoad_ID	GID	Road_Name	Km
WKL172	172	Retiyalagoda Road Magederawatta	1.768
WKL174	174	Rerukana Samaranayaka Road	1.216
WKL180	180	Alubomulla I R Perera Mawatha	0.730
WKL182	182	Millaniya Deldorawatta Road	0.970
WKL185	185	Kelesgamuwa Road	2.177
WKL186	186	Lenawara Tibbatugoda Road	2.072
WKL187	187	Weniwelpitiya Road	1.959
WKL188	188	Lenawara Koskandawatta Road	1.122
WKL189	189	Aluthgama-Alubomulla	2.198
WKL191	191	Galtude - Weedagama	4.290
WKL208	208	Koskolawatta Road	1.374
WKL213	213	Development of Walana Gamunu Mw	1.57
WKL214	214	Thanthirimulla Dharmarama Mw	0.84
WKL218	218	Thanthirimulla Galgoda Rd	0.83
WKL223	223	Panadura - Kindelpitiya	7.500
WKL224	224	Piliyandala - Henamulla	2.08
WKL227	227	Walana - Bekkegama - Hirana	3.50
WKL234	234	Kalugala puwak gaha Hena Road (Near the school)	1.259
WKL235	235	Bellana Egoda wathta Road	2.706
WKL238	238	Magura Gurgoda Road	2.083
WKL240	240	Tennahena Kovulgama west Road	1.189
WKL241	241	Bollunna batahena Road	1.902
WKL243	243	To Kanaththagoda Magura Temple Road	0.523
WKL250	250	Samagipura Polgahahena Weerasinghe Kanda Road	3.367
WKL253	253	Seeladola - Thawana	8.416
WKL255	255	Haltota - Manana	5.090
WKL258	258	Panagoda - Uduwara	6.698
WKL260	260	Kekulandola Batugampola Kirigala	2.576
WKL263	263	Rathmalgoda Hadapangoda	7.499
WKL264	264	Delgashandiya-Rathmalgoda(Kajuwetiya Rd)	1.366
WKL265	265	Ranaviru Samantha Mawatha	1.86
WKL266	266	Puwakwatta - Kappettiyagahalanda Road	0.58
WKL267	267	Kobawaka - Ihala Opalla Road	4.650
WKL268	268	Pethigamuwa kanda Main Road	2.240
		Total	266.558