



DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF HIGHWAYS, PORTS & SHIPPING

ROAD DEVELOPMENT AUTHORITY

CONSTRUCTION OF
EXTENSION OF SOUTHERN EXPRESSWAY FROM MATARA
TO HAMBANTOTA

SECTION 2 FROM BELIATTA TO WETIYA

CONTRACT AWARDED TO
CHINA STATE CONSTRUCTION ENGINEERING CORPORATION LTD

CIVIL WORK CONTRACT NO: RDA/SEEP/CONT-S2

VOLUME 6

SUPPLEMENTARY INFORMATION

SEPTEMBER 2014

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- (b) The Letter of Acceptance
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SUPPLEMENTARY INFORMATION

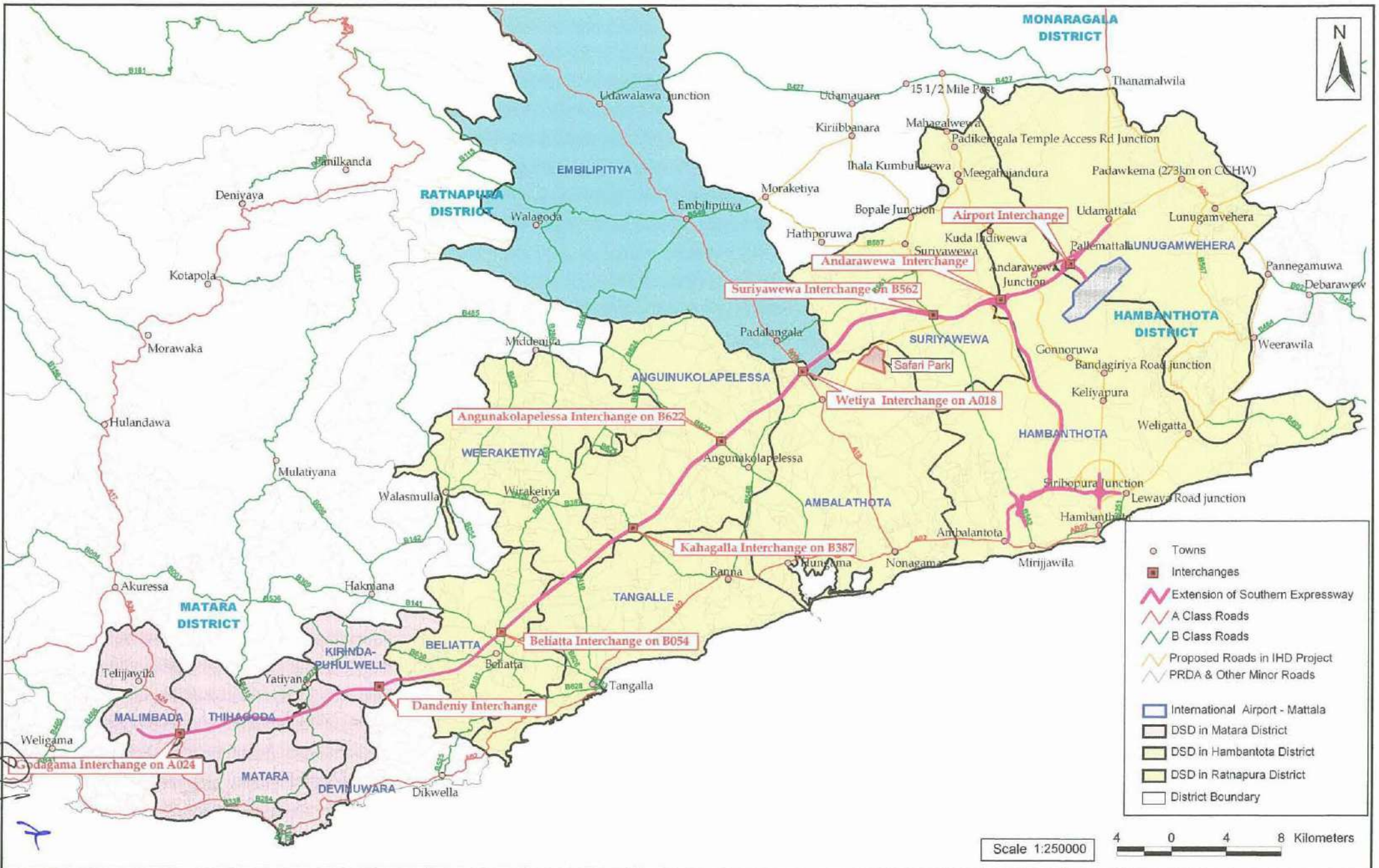
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PROJECT MAP

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DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF PORTS & HIGHWAYS

Extension of Southern Expressway with DS Divisions



PROJECT FORMULATION, MONITORING & GIS SECTION
PLANNING DIVISION,
ROAD DEVELOPMENT AUTHORITY,
"SETHSIRIPAYA",
BATTARAMULLA.

ENVIRONMENTAL MONITORING PLAN

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Environmental Monitoring Plan (EMoP) for the Section II - Beliatta to Wetiya(30+000 to 56+000) section of the proposed southern expressway extension

Environmental component	Project Stage	Parameters to be Monitored	Location	Frequency	Standards	Rate (Rs.)	Amount (Rs.)	Implementation and Supervision
Air Quality	Before construction stage	SPM, PM10, NO ₂ ,CO,SO ₂ , CO ₂	Two locations 1. At the road side, close to the premises of K.A.Chamith, No99/171, Kasagala, Hakuruwela 2. at the roadside, close to premises of K.Wijesinghe, Koragahawela junction, Agunakolapallessa Note: Baseline monitoring of air quality parameters were done at above locations.	Once	NAAQS of Sri Lanka	Per sample 40,000	80,000	Contractor RDA/ PMU through CSCand consultation with ESD Division
	Construction stage	SPM, PM10, NO ₂ ,CO,SO ₂ , CO ₂	Two locations 1. At the road side, close to the premises of K.A.Chamith, No99/171, Kasagala, Hakuruwela 2. at the roadside, close to premises of K.Wijesinghe, Koragahawela junction, Agunakolapallessa	Construction - 4 times/Year for 2.5 Years (however, additional measurements may need to be taken in case there are complaints of deterioration of air quality)	NAAQS of Sri Lanka	Per sample 40,000	800,000	Contractor RDA/ PMU through CSCand consultation with ESD Division
	Operation stage	SPM, PM10, NO ₂ ,CO,SO ₂ , CO ₂	Should be decided on complaint basis	On any complaint basis	NAAQS of Sri Lanka	Per sample 40,000		RDA through ESD Division Central Environmental Authority

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Environmental component	Project Stage	Parameters to be Monitored	Location	Frequency	Standards	Rate (Rs.)	Amount (Rs.)	Implementation and Supervision
Water Quality	Before construction stage	Temperature, pH, Electrical Conductivity, Turbidity, Salinity, Total Coliform count, DO, BOD	Four locations 1. 6° 4.234'N, 80° 44.534'E 2. 6° 10.256'N, 80° 51.494'E 3. 6° 12.181'N, 80° 53.706'E 4. 6° 13.384'N, 80° 55.584'E	Once	CEA Water Quality Regulation	Per sample 10,000	40,000	Contractor RDA/ PMU through CSC and consultation with ESD Division
	Construction stage	Temperature, pH, Electrical Conductivity, Turbidity, Salinity, Total Coliform count, DO, BOD	Four locations 1. 6° 4.234'N, 80° 44.534'E 2. 6° 10.256'N, 80° 51.494'E 3. 6° 12.181'N, 80° 53.706'E 4. 6° 13.384'N, 80° 55.584'E	Construction – 4 times/Year for 2.5 Years	CEA Water Quality Regulations	Per sample 10,000	400,000	Contractor RDA/ PMU through CSC and consultation with ESD Division
	Operation stage	Temperature, pH, Electrical Conductivity, Turbidity, Salinity, Total Coliform count, DO, BOD	Four locations 1. 6° 4.234'N, 80° 44.534'E 2. 6° 10.256'N, 80° 51.494'E 3. 6° 12.181'N, 80° 53.706'E 4. 6° 13.384'N, 80° 55.584'E	On any complaint basis	CEA Water Quality Regulations	Per sample 10,000		RDA through ESD Division Central Environmental Authority

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Environmental component	Project Stage	Parameters to be Monitored	Location	Frequency	Standards	Rate (Rs.)	Amount (Rs.)	Implementation and Supervision
Noise and Vibration	Before construction stage	Leq10 and Leq 50 values	Five Locations 1. At the road side, close to the premises of K.A.Chamith, No99/171, Kasagala, Hakuruwela 2. at the roadside, close to premises of K.Wijesinghe, Koragahawela junction, Agunakolapallessa Note: Baseline monitoring of noise levels and vibration were done at above locations.	Once	CEA Regulations on ambient noise levels and permissible ground vibration levels	Per sample 10,000	20,000	Contractor RDA/ PMU through CSCand consultation with ESD Division
Noise and vibration	Construction	Leq10 and Leq 50 values	Five Locations 1. At the road side, close to the premises of K.A.Chamith, No99/171, Kasagala, Hakuruwela 2. at the roadside, close to premises of K.Wijesinghe, Koragahawela junction, Agunakolapallessa	Construction - 4 times/Year for 2.5 Years (however, additional measurements may need to be taken in case there are complaints of high noise and vibration levels).	CEA Regulations on ambient noise levels and permissible ground vibration levels	Per sample 10,000	200,000	Contractor RDA/ PMU through CSCand consultation with ESD Division
	Operation stage	Leq10 and Leq 50 values	Should be decided on complaint basis	On any complaint basis	CEA Regulations on ambient noise levels and permissible ground vibration levels	Per sample 10,000		RDA through ESD Division Central Environmental Authority

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Environmental component	Project Stage	Parameters to be Monitored	Location	Frequency	Standards	Rate (Rs.)	Amount (Rs.)	Implementation and Supervision
Flora	Before construction stage	No. of trees to be removed	Land available within the proposed ROW	Once	-	Per sample 30,000	30,000	Contractor RDA/ PMU through CSC and consultation with ESD
	Construction stage	Replanting of trees	Land available within the ROW	2 visits/ year for 2.5 years	No. and Diversity of species replanted	Per sample 30,000	150,000	Contractor RDA/ESD Division
	Operation stage	Survival of trees	Land available within the ROW	2 visits/ year for 2 years	Percentage of survival	Per sample 30,000	120,000	RDA designated division RDA/ESD Division, (DOF if required)
Fauna (including aquatic fauna)	Before construction stage	Diversity of species and presence of animal corridors/pathway, locations/number of animal crossing structures to be placed during construction stage	Area within the proposed ROW	Once		Per sample 30,000	30,000	Contractor RDA/ PMU through CSC and consultation with ESD Division

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Environmental component	Project Stage	Parameters to be Monitored	Location	Frequency	Standards	Rate (Rs.)	Amount (Rs.)	Implementation and Supervision
	Construction stage	Adequacy of animal crossing structures	Locations of animal crossing structures within the proposed ROW	2 visits/year for 2.5 years		Per sample 30,000	150,000	Contractor RDA/ PMU through CSC and consultation with ESD Division
	Operation stage	No. of animal death due to the expressway	Land available within the ROW	2 visits/ year for 2 years		Per sample 30,000	120,000	RDA designated division RDA/ESD Division
Total Cost for monitoring of before construction and construction stage¹							1,900,000	

Note:

BOD = Biological Oxygen Demand, CO=Carbon monoxide, CO2= Carbon Dioxide, CSC = Construction Supervision Consultant, DO = Dissolved Oxygen, DOF = Forest Department, ESD Division = Environmental and Social Development Division, NAAQS= National Air Quality Standards, NO2= Nitrogen Dioxide, PM10= Reparable particulate matter<10micrometers diameter, RDA=Road Development Authority, SO2=Sulphur dioxide, SPM= Suspended particulate matter, TSS = Total Suspended Solids

1. Contractor should secure the cost of monitoring for "before construction" and "construction" stages of above monitoring plan.

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ENVIRONMENTAL MANAGEMENT PLAN

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Environmental Management Plan (EMP) for Section II: Beliatta to Wetiya (chainage 30+000 to 56+000) of Southern Expressway Extension Project

This Environmental Management Plan (EMP) is the summarized matrix of all possible impacts that may occur during construction of Beliatta to Wetiya section of Southern Expressway Extension Project from Matara to Mattala (Hambanthota).

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

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

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

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

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Environment Management Plan

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
1.0 Advance Works					
1.1 Land Acquisition					
1.1.1 Removal of structures within the proposed project area					
(a)	For the title holders, compensation for lost housing structures will be paid based on the Land Acquisition Act (LAA) and its 2008 regulations. Entitlements of affected persons will be based on the project specific entitlement matrix prepared based on the National Involuntary Resettlement Policy (NIRP).	Locations of affected buildings in the project area	Based on the Land Acquisition Act and its regulations	CV/RDA/PMU	RDA/ESDD
1.1.2 Acquisition of private/ state land for the proposed project area					
(a)	Compensation for private lands will be paid based on the Land Acquisition Act (LAA) and its 2008 regulations guided by the project specific entitlement matrix based on the NIRP.	Throughout the project area where private lands are to be acquired	Based on the Land Acquisition Act and its regulations	CV/DS/RDA/PMU	RDA/ESDD
1.2 Design for cross drainage					
(a)	Design of cross drainage structures should be based on RDA bridge design manual. Any recommendations given by department of irrigation and Mahaweli Authority of Sri Lanka (MASL) should be considered when designing via ducts, road side drains, culverts and bridges.	Throughout the project area	Design Cost	RDA	RDA/ES Division
1.3 Identification of utility supply lines that may need to be shifted					
(a)	Prior consultation and consent should be taken from relevant service providers (CEB, NWS & DB, SLT) if sections of utility lines need to be shifted due to design requirements or shift in alignment.	Throughout the road section	Design cost	RDA	Service provider
1.4 Road sections near archaeological sites					
(a)	Prior consultation and consent should be taken from Department of Archaeology to clarify presence of any archaeological sites within the proposed ROW.	Throughout the road section	Design cost	RDA	Department of Archeology
2.0 Construction Phase					
2.1 Earthwork and Soil Conservation					

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

Environment Management Plan

Environmen tal Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
2.1.1	Disposal of debris and spoil				
(a)	All debris and residual spoil material including any left earth shall be disposed only at locations approved by the engineer for such purpose and subjected to the clauses 2.1.1.b and 2.1.1.c below. Temporary dumps of construction material should not be placed within marsh, paddy land or near to any canal, drain or drainage path. Waste soils and other denuded materials should not be left in places where it may be carried by rain water/flood to downstream flood plains. Waste soils and other denuded materials should not be left in places where it may be carried by rain water/flood to downstream flood plains.	Throughout the project area and disposal sites identified	Engineering Cost	Contractor	CSC, RDA/ PMU, LA
(b)	Waste soil disposal sites should be selected carefully avoiding water bodies and wetlands as much as possible and they should be approved by the relevant Local Authority (LA). The contractor should submit the approval along with a soil disposal management plan to the "Engineer" before commencement of such disposal operations.	-Do-	-Do-	-Do-	-Do-
(c)	The debris and spoil shall be disposed in such a manner that; (i) waterways, marshes and drainage paths are not blocked (ii) the disposed material should not be washed away by runoff and (iii) should not be a nuisance to the public	All water ways including all irrigation canals, drainage canals, irrigation tanks and streams (Kirima Oya ~30+200, Urubokka oya 43+400, Irrigation canal 43+900, 46+850, 50+000, stream 51+500, Irrigation canal 52+250, stream 53+500, Irrigation canal 54+000, stream 54+200)	-Do-	-Do-	CSC, RDA/ PMU, LA
(d)	If directed by the Engineer the debris and residual spoil material including any left earth shall be used, to refill the borrow areas subjected to laying of topsoil as per EMP clause 2.1.2 below.	At all borrow sites identified by contractor and approved by engineer	-Do-	-Do-	-Do-
(e)	If approved by the engineer, contractor can dispose the debris and spoil as a filling material provided that the contractor can ensure that such material is used for legally acceptable purposes with disposed in an environmentally acceptable manner.	Throughout the project area	-Do-	-Do-	-Do-
(f)	Bentonite slurry resulted from piling activities should be disposed only	Within sites where piling	Engineering	Contractor	CSC, RDA/

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Environment Management Plan

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	<p>in locations which are approved by CEA, LA and under the supervision of CSC.</p> <p>Any preconditions listed by CEA and/ or LA should be strictly followed.</p> <p>Bentonite should not be allowed to drain off when temporarily stored within the site.</p> <p>Bentonite slurry should always be disposed mixed with soil.</p> <p>If abandoned quarries are used as disposal sites, the contractor should first remove any stagnated water within such site.</p> <p>Adequate silt traps should be constructed at such sites to avoid Bentonite mixed soil run off to surrounding areas.</p> <p>All vehicles should be sufficiently covered when transporting Bentonite mixed soil from the construction site to disposal area.</p> <p>No leakages should occur when transporting of Bentonite mixed soil.</p>	work will be carried out and at locations where Bentonite slurry will be disposed and roads through which Bentonite slurry will be transported	Cost		PMU, CEA, LA
	(h) Dump trucks should not be overfilled with debris or excavated soil. The site supervisor should make sure that no material is hanging over the tipper bed before releasing the truck to the disposal site.	Throughout the project area and disposal sites identified	Engineering Cost	Contractor	CSC, RDA/ PMU
	2.1.2 Conservation and reuse of top soil				
	(a) If the contractor is in any doubt on whether to conserve the topsoil or not for any given area he shall obtain the direction from the Engineer in writing. If directed by the engineer, top soil of the agricultural lands and any other productive areas where it has to be removed for the purpose of this project shall be stripped to a specified depth of 150mm and stored in stockpiles of height not exceeding 2m.	Within the project area where topsoil from productive land to be removed	Engineering Cost	Contractor	CSC, RDA/PMU
	(b) Removed top soil could be used as a productive soil when replanting/establishing road side vegetation	Throughout the project area	-Do-	-Do-	-Do-
	(c) Such stockpiled topsoil could also be used to cover the areas including cut slopes where the topsoil has been removed due to project activities. Residual topsoil could be distributed on adjoining/proximate barren areas as identified by the contractor with approval from Divisional Secretary (DS) and LA under the supervision of CSC. The layer of thickness of such spread soil should be within 75mm – 150mm.	-Do-	-Do-	-Do-	CSC, RDA/PMU, DS, LA

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Environment Management Plan

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

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Environment Management Plan

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	surfaces/embankment slopes and cut areas should be covered with suitable material until permanent measures are carried out.				
(b)	Work that lead to heavy erosion shall be avoided during the raining season. If contractor intends to carry out such activities during rainy season prior approval must be obtained from the Engineer by submitting a proposal on actions that will be undertaken by the contractor to prevent erosion.	Throughout the project area with special attention to Kirima Oya ~30+200, Urubokka oya 43+400, Irrigation canal 43+900, 46+850, 50+000, stream 51+500, Irrigation canal 52+250, stream 53+500, Irrigation canal 54+000, stream 54+200	-Do-	-Do-	-Do-
(c)	The work, permanent or temporary shall consist of measures as per design or as directed by the engineer to control soil erosion, sedimentation and water pollution to the satisfaction of the engineer. Typical measures include the use of dikes, sediment basins, fiber mats, mulches, grasses, slope drains and other devices. All sedimentation and pollution control works and maintenance thereof are deemed, as incidental to the earthwork or other items of work.	-Do-	-Do-	-Do-	-Do-
2.1.5	Contamination of soil (fuel, lubricants and salts from sea sand)				
(a)	Vehicle/machinery and equipment servicing and maintenance work shall be carried out only in designated locations/ service stations approved by the engineer.	Servicing yards to be used for vehicle servicing	Engineering Cost	Contractor	CSC, RDA/ PMU, LA, CEA
(b)	Approval from CEA in the form of an Environmental Protection Licenses (EPL) should be secured by the contractor if he intends to operate his own vehicle servicing yards.	-Do-	-Do-	-Do-	CSC, RDA/ PMU, CEA, LA
(c)	Waste oil, other petroleum products and untreated wastewater shall not be discharged directly out of the service yards. Adequate measures shall be taken against pollution of soil by spillage of petroleum/oil products from storage tanks and containers. All waste petroleum products shall be disposed of in accordance with the guidelines issued by the CEA or the engineer.	Servicing yards to be used for vehicle servicing and locations along the road section where vehicles will be temporarily stationed	-Do-	-Do-	-Do-
(d)	Sites used for vehicle and plant service and maintenance shall be	New servicing yards	-Do-	-Do-	-Do-

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Environment Management Plan

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

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Environment Management Plan

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
(a)	Storage locations of sand, metal, soil should be located away from settlements and other sensitive receptors and covered (with artificial barriers or natural vegetation). Measures given under clause 2.5.1 should be considered within material storage site to minimize dust during handling of material. All access roads within the storage site should be sprinkled with water for dust suspension.	At all material storage locations (stock piles of soil, sand and aggregate)	Engineering Cost	Contractor	CSC, RDA/PMU
2.2.2	Storage of fuel, oil and chemicals (avoid fumes and offensive odour)				
(a)	All cement, bitumen (barrels), oil and other chemicals should be stored and handled on an impervious surface (concrete slab) above ground level. Storage facility of cement, bitumen (barrels), oil and other chemicals should be an enclosed structure ensuring that no storm water flows in to the structure. Material storage sites should not be located within flood prone areas. A ridge should be placed around the storage facility to avoid runoff getting in to the material storage structure. Adequate ventilation should be kept to avoid accumulation of fumes and offensive odour that could be harmful to material handlers. Measures given under clause 2.10 should be considered to avoid any accidents and risks to worker population and public.	At all material storage locations (cement, bitumen, fuel, oil and other chemicals used for construction activities)	Engineering Cost	-Do-	-Do-
2.2.3	Transportation of material				
(a)	The contractor should avoid over loaded trucks to transport material to construction sites.	Throughout the project area	Engineering Cost	Contractor	CSC, RDA/PMU
(b)	All material transported to site shall be adequately covered to avoid any spillage. When transporting material such as soil it is best to dampen the surface of soil to minimize dust emission.	Throughout the project area	-Do-	-Do-	-Do-
2.3.	Water – Protection of Water Sources and Quality				
2.3.1.	Loss of minor water sources and disruption to water users				
(a)	Contractor should make employees aware on water conservation and waste minimization in the construction process.	Throughout the project area and at worker camps	Engineering Cost	Contractor	CSC, RDA/PMU

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Environment Management Plan

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
(b)	Contractor shall protect sources of water (potable or otherwise) such as water sources used by the community so that continued use of these water sources will not be disrupted by the work. In case the closure of such sources is required on temporary basis contractor shall provide alternative arrangements for supply. Alternative sources such as wells thus provided should be within acceptable distance to the original sources and accessible to the affected community.	Wells and other public water sources locations close to the project area	-Do-	-Do-	CSC, RDA/PMU, LA
(c)	Contractor shall not divert, close or block existing canals and water paths in a manner that adversely affect downstream intakes. If diversion or closure or blocking of canals and water paths is required for the execution of work, contractor must obtain the engineers approval in writing. Closure of such canals should not be done during periods when they are highly used such as cultivation periods of agricultural lands. Contractor shall also obtain the approval from line agency that is responsible to maintain the canal, intake/water supply (such as DOI, MASL, Department of Agrarian Services (DoAS), NWS & DB or local authority of Divisional Secretary). Contractor shall restore the drainage path back to its original status once the need for such diversion or closure or blockage ceased to exist. During the affected period contractor shall supply water to the affected community.	Existing canals and water paths which need to be diverted or temporarily closed for construction work	-Do-	-Do-	CSC, RDA/PMU, DoAS, DOI, NWS & DB, LA, DS
(d)	Contractor should ensure smooth drainage of water to avoid any upstream inundation and water logging condition of paddy lands by proper maintenance of every canal/stream by de-silting, clearing of any blockage.	-Do-	-Do-	-Do-	-Do-
(e)	In case the contractor's activities going to adversely affect the quantity or quality of water, the contractor shall serve notice to the relevant authorities and downstream users in advance.	Throughout the project area	-Do-	-Do-	-Do-
2.3.2	Siltation into water bodies				
(a)	Contractor shall take measures to prevent siltation of waterways as a result of his work including construction of temporary/ permanent devices to prevent water pollution due to siltation and increase of	Near to all existing streams, irrigation canals, drains and irrigation tanks	Engineering Cost	Contractor	CSC, RDA/PMU, LA, DOI, DoAS

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Environment Management Plan

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	turbidity. These shall include the measures against erosion as per EMP 2.1.4.	within and close to the project area			
(b)	Construction materials containing small/ fine particles shall be stored in places not subjected to flooding and in such a manner that these materials will not be washed away by runoff.	Kirima Oya ~30+200, Urubokka oya 43+400, Irrigation canal 43+900, 46+850, 50+000, stream 51+500, Irrigation canal 52+250, stream 53+500, Irrigation canal 54+000, stream 54+200	-Do-	-Do-	-Do-
(c)	Temporary soil dumps should be placed sufficiently away from all water ways.	-Do-	-Do-	-Do-	-Do-
(d)	Temporary soil dumps should be kept avoiding drainage canals and wetlands. If such dumps are left at the site for a long time those dumps should be covered with thick polythene sheets and should not be exposed to direct rainfall.	Throughout the project area	-Do-	-Do-	-Do-
(e)	Embankment slopes should be compacted to the required degree of compaction and covered with proper mulch.	-Do-	-Do-	-Do-	-Do-
2.3.3	Alteration of drainage paths, impacts to retention capacities, damage to flood protection structures				
(a)	Temporary cross drainage openings should be provided along the pilot road in line with all locations where permanent cross drainage structures will be located on the trace. It is suggested to use a set of 300mm, 600mm or 900mm pipes which will yield the same opening size equivalent to the opening of the structure on the expressway. The contractor should keep provisions to break open the pilot road and allow dissipate/ avoid any water logging condition upstream during intense rainfall events (if instructed by engineer).	At all existing streams, irrigation canals, drains and other waterways within and close to the project area (Irrigation canal 43+900, 46+850, 50+000, stream 51+500, Irrigation canal 52+250, stream 53+500, Irrigation canal 54+000, stream 54+200)	Engineering Cost	Contractor	CSC, RDA/PMU
(b)	Contractor shall not close or block existing canals, drains and other water paths permanently. If diversion or closure or blocking of canals and streams is required for the execution of work, contractor must first	-Do-	-Do-	-Do-	CSC, RDA/PMU, DOI, DoAS, LA/

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Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	<p>obtain the Engineers approval in writing and diversion or closure should not be carried out during water is highly demanded such as cultivation seasons.</p> <p>Contractor shall carry out an investigation and report to the Engineer, if an investigation is requested by the Engineer.</p> <p>Contractor shall also obtain the approval from the relevant agency such as DOI, MASL, DoAS and Divisional Secretary (DS) if instructed by the engineer.</p> <p>Contractor shall restore the drainage path back to its original status once the need for such diversion or closure or blockage is no longer required.</p>				DS
	(c) The debris and spoil shall be disposed in such a manner that waterways and drainage paths are not blocked. And contractor should clear the waterway if blocked due to such activities.		-Do-	-Do-	-Do-
	(d) Avoid/ minimize construction works near/ at such drainage locations during heavy rain seasons which create flood conditions.		-Do-	-Do-	-Do-
	(e) Removal of all temporary structures built especially in the Kirima Oya and Urubokka Oya immediately after the construction of the expressway will avoid the impact of such temporary strictures on flood retention areas both during construction and operational stage of the project. Further contractor should not undertake any filling without approval from the engineer.		-Do-	-Do-	-Do-
2.3.4. Contamination of water from construction wastes					
	(a) The work shall be carried out in such a manner that pollution of natural watercourses and irrigation canals is avoided. Measures as given in 2.1.4, 2.1.5, 2.1.6, 2.3.2, 2.3.5 and 2.3.6 clauses shall be taken to prevent the wastewater produced in construction from entering directly into streams, water bodies or the irrigation systems.	Near to existing streams, canals, drains and marshy areas within and close to the project area	Engineering Cost	Contractor	CSC, RDA/ PMU
	(b) Avoid/ minimize construction works near/ at such drainage locations during heavy rain seasons.	-Do-	-Do-	-Do-	-Do-
	(c) The discharge standards promulgated under NEA shall be strictly adhered to. All waste arising from the project is to be disposed in a manner that is acceptable to the engineer and as per the	-Do-	-Do-	-Do-	-Do-

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Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	guidelines/instructions issued by the CEA.				
	2.3.5. Contamination from fuel and lubricants				
(a)	All vehicle and plant maintenance and servicing stations shall be located and operated as per the conditions and /or guidelines stipulated under the EPL issued by CEA. In general these should be located at least 200m away from water bodies and wastewater shall not be disposed without meeting the disposal standards of the CEA. Wastewater from vehicle and plant maintenance and servicing stations shall be cleared of oil and grease and other contaminants to meet the relevant standards before discharging to the environment.	Vehicle and plant maintenance and servicing centers	Engineering Cost	Contractor	CSC, RDA/ PMU, LA, CEA
	2.3.6. Locating, sanitation and waste disposal in construction camps				
(a)	Locations selected for labour camps should be approved by engineer and comply with guidelines/ recommendations issued by the CEA, LA. Construction labour camps shall not be located within 200m from waterways, near to a site or premises of religious, cultural importance and school.	Locations where labour camps will be setup	Engineering Cost	Contractor	CSC, RDA/ PMU, LA, CEA
(b)	Labour camps shall be provided with adequate and appropriate facilities for disposal of sewerage and solid waste. The sewage systems shall be properly designed, built and operated so that no pollutant leakage to ground or adjacent water bodies/watercourses takes place. Garbage bins shall be provided the camps and regularly emptied. Garbage should be disposed off in a hygienic manner, to the satisfaction of the relevant norms. Compliance with the relevant regulations and guidelines issued by the CEA/LA shall be strictly adhered to.	At all labour camps	-Do-	-Do-	-Do-
(c)	Contractor shall ensure that all camps are kept clean and hygienic. Necessary measures shall be taken to prevent breeding of vectors	-Do-	-Do-	-Do-	-Do-
(d)	Contractor shall report any outbreak of infectious disease of importance in a labour camp to the engineer and the Medical Officer of Health (MOH) or to the Public Health Inspector (PHI) of the area immediately. Contractor shall carry out all instructions issued by the authorities, if any.	Within and close to the project area with special attention near to labour camps	-Do-	-Do-	CSC, RDA/ PMU, LA, CEA, MOH/ PHI
(e)	Contractor shall adhere to the CEA recommendations on disposal of wastewater. Wastewater shall not be discharged to ground or	At all labour camps	-Do-	-Do-	-Do-

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Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	waterways in a manner that will cause unacceptable surface or ground water pollution.				
(f)	All relevant provisions of the Factories Act and any other relevant regulations aimed at safety and health of workers shall be adhered to.	-Do-	-Do-	-Do-	-Do-
(g)	Contractor should remove all labour camps fully after its need is over, empty septic tanks, remove all garbage, debris and clean and restore the area back to its former condition.	-Do-	-Do-	-Do-	-Do-
2.3.7.	Wastage of water and waste minimization				
(a)	The contractor will minimize wastage of water in the construction process/operations by reusing water as much as possible, utilizing only the required amount of water for the construction works etc...	Within and close to the project area and labour camps	Engineering Cost	Contractor	CSC, RDA/PMU, LA, CEA
(b)	The contractor shall educate and made employees aware on water conservation, waste minimization and safe disposal of waste following guidelines given by CEA and LA.	-Do-	-Do-	-Do-	-Do-
2.3.8.	Extraction of water				
(a)	The contractor is responsible for arranging adequate supply of water for the project purpose throughout the construction period. Contractor shall not obtain water for his purposes including for labour camps from public or community water supplies without approval from the relevant authority. Such extraction (if approved) should be under direct supervision of the engineer.	Within and close to the project area and labour camps	Engineering Cost	Contractor	CSC, RDA/PMU, LA
(b)	Extraction of water by the contractor for the project purposes shall comply with the guidelines and instructions issued by relevant authority. The Contractor shall not extract water from groundwater or from surface water-bodies without permission from the Engineer.	-Do-	-Do-	-Do-	-Do-
(c)	Construction over the irrigation canals will be undertaken under necessary permission from the Department of Agrarian Services and Department of Irrigation.	Near to all existing streams, irrigation canals, drains and irrigation tanks within and close to the project area	-Do-	-Do-	CSC, RDA/PMU DoAS, DOI
(d)	The Contractor may use natural sources of water subject to the provision that any claim arising out of conflicts with other users of the said natural sources of water shall be made good entirely by the	At all natural water sources used for construction works	-Do-	-Do-	CSC, RDA/PMU, LA

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Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	contractor.				
2.4.	Flood Prevention				
	2.4.1. Blockage of drainage paths and drains				
(a)	Contractor's activities shall not lead to flooding conditions as a result of blocked drainage paths and drains. The contractor shall take all measures necessary or as directed by the Engineer to keep all drainage paths and drains clear of blockage at all times.	Kirima Oya ~30+200, Urubokka oya 43+400, Irrigation canal 43+900, 46+850, 50+000, stream 51+500, Irrigation canal 52+250, stream 53+500, Irrigation canal 54+000, stream 54+200	Engineering Cost	Contractor	CSC, RDA/PMU
(b)	If flooding or stagnation of storm water is caused by contractor's activities, contractors shall provide suitable means to (a) prevent loss of access to any land or property and (b) prevent damage to land and property. Contractor shall compensate for any loss of income or damage as a result of such flooding.	-Do-	-Do-	-Do-	-Do-
(c)	When working in flood prone areas during rainy season the contractor shall avoid storing materials, chemicals and other items of work in areas where those can be washed away by the floods.	-Do-	-Do-	-Do-	-Do-
	2.4.2 Construction of pilot road				
(a)	The pilot should at least contain the same number of openings as of the main trace. It is recommended that the pilot road have at least one Nos. of openings for every 100 m of pilot road. The contractor should maintain all road side drains given special attention during rainy seasons. The contractor should avoid any blockage in side drains and culverts that are put across the pilot road	Throughout the pilot road	Engineering cost	Contractor	CSC, RDA/PMU
(b)	Contractor should properly restore the land over which the pilot/ service road was constructed after completion of project to the satisfaction of Engineer, LA.	Throughout the entire trace	Engineering cost	Contractor	CSC, RDA/PMU, LA
2.5	Air Pollution				
	2.5.1. Generation of dust				

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Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
(a)	The contractor shall effectively manage the dust generating activities such as topsoil removal, handling and transporting sand, rubble, bitumen, and cement during periods of high winds or during more stable conditions with winds directed towards adjacent residences and other facilities.	Within and close to the project area where earth work will take place, storage locations of sand, rubble, bitumen, cement and all sub roads used for material transportation, paying special attention to sensitive locations such as; schools and places of religious importance	Engineering Cost	Contractor	CSC, RDA/PMU
(b)	All stockpiles shall be located sufficiently away from sensitive receptors.		-Do-	-Do-	-Do-
(c)	All vehicles delivering materials shall be covered to avoid spillage and dust emission.		-Do-	-Do-	-Do-
(d)	The Contractor should avoid, where possible and take suitable action to prevent dirt and mud being carried to the roads (particularly following wet weather).		-Do-	-Do-	-Do-
(e)	The contractor should enforce vehicle speed limits to minimize dust generation.		-Do-	-Do-	-Do-
(f)	The Contractor shall employ adequate number of water trucks/ bowsers (at all times) to sprinkle water to suppress dust at all exposed areas as required (note: the use of waste water / waste oil for dust suppression is prohibited). The frequency of spraying water will depend on the weather condition and as instructed by the Engineer.		-Do-	-Do-	-Do-
(g)	All cleared areas shall be rehabilitated progressively.		-Do-	-Do-	-Do-
(h)	All earthwork shall be protected in a manner acceptable to the minimize generation of dust.		-Do-	-Do-	-Do-
(i)	All existing highways and roads used by vehicles of the contractor, or any of his sub-contractor or supplies of materials or plant and similarly roads which are part of the works shall be kept clean and clear of all dust/mud or other extraneous materials dropped by such vehicles or their tyres.		-Do-	-Do-	-Do-
(j)	Clearance shall be affected immediately by manual sweeping and removal of debris, or, if so directed by the Engineer, by mechanical sweeping and clearing equipment. Additionally, if so directed by the Engineer, the road surface will be hosed or sprinkled water using		-Do-	-Do-	-Do-

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Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	appropriate equipments.				
(k)	Plants, machinery and equipment shall be handled (including dismantling) so as to minimize generation of dust.		-Do-	-Do-	-Do-
(l)	The contractor shall take every precaution to reduce the level of dust emission from the Asphalt Concrete Plants and Concrete Batch Mixing Plants up to the satisfaction of the Engineer in accordance with the relevant emission norms.		-Do-	-Do-	-Do-
(m)	Asphalt Concrete Plants and Concrete Batch Mixing Plants shall be sited in accordance with CEA guidelines and operated with EPL. The plants shall be fitted with the requirements of the relevant current emission control legislation.		-Do-	-Do-	CSC, RDA/PMU, CEA
2.5.2	Emission from Asphalt Concrete (AC) Plants and Concrete Batch Mixing Plants				
(a)	The AC plants and batching plants shall be sited in accordance with CEA guidelines. It is recommended that plants to be located sufficiently away from sensitive receptors such as settlement areas, places of religious importance and schools.	Locations at which hot mix plant/s and concrete batching plant/s to be located. No hot mix plant or concrete batching plant will be established close or at near vicinity of sensitive locations such as; settlement areas & schools and places of religious importance	Engineering Cost	Contractor	CSC, RDA/PMU, CEA
(b)	The exhaust gases shall comply with the requirements of the relevant current emission control legislation. All operations at plants shall be undertaken in accordance with all current rules and regulations protecting the environment as well as the conditions given in the EPL.	-Do-	-Do-	-Do-	-Do-
(c)	Regular checks shall be carried out on the plants to verify the effectiveness of the dust control systems. The contractor shall take immediate action to rectify any problems found in the systems.	AC plant and Concrete Batch Mixing plant	Engineering Cost	Contractor	CSC, RDA/PMU, CEA
2.5.3.	Odour and offensive smells				
(a)	Contractor shall take all precautions such as storing all chemicals used for construction works in properly closed containers with good	Within and close to the project area including all	Engineering Cost	Contractor	CSC, RDA/PMU

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

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Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	barriers such as tarpaulin, corrugated sheets to cover the crusher plant area. Such cover should be at least 5 ~ 10 m above ground level.				
2.6. Noise Pollution and Vibration					
	2.6.1 Noise from vehicles, plants and equipment.				
(a)	All machinery and equipment should be well maintained and fitted with noise reduction devices in accordance with manufacturer's instructions.	All machinery and vehicles used for the construction of the highway	Engineering Cost	Contractor	CSC, RDA/PMU, CEA, LA
(b)	All heavy equipment and machinery shall be fitted in full compliance with the national regulation, Noise Control Regulations - Extra Ordinary Gazette No. 924/12 May 1996 amended by Extra Ordinary Gazette 937/7 April 1997.	-Do-	-Do-	-Do-	-Do-
(c)	All vehicles and equipment used in construction shall be fitted with exhaust silences. During routine servicing operations, the effectiveness of exhaust silencers shall be checked and if found to be defective shall be replaced. Notwithstanding any other conditions of contract, noise level from any item of plant(s) must comply with the relevant legislation for levels of sound emission. Non-compliance machinery shall be removed from site.	All machinery and vehicles used for the construction of the highway	-Do-	-Do-	-Do-
(d)	Maintenance of vehicles, equipment and machinery shall be regular and proper, to the satisfaction of the Engineer, to keep noise from these minimal.	-Do-	-Do-	-Do-	-Do-
(e)	Workers in vicinity of strong noise, and workers working with or in crushing, compaction, batching or concrete mixing operations shall be provided with protective gear.	Within and close to the project area, quarry, crusher plants	-Do-	-Do-	-Do-
(f)	Limiting operations to times when they have least impact in settlement areas, especially near schools and places of worship. Such time schedules should be prepared in consultation with relevant institutions & places that will be affected.	Near to sensitive areas: schools and places of religious importance	-Do-	-Do-	-Do-
(g)	Contractor should avoid any construction activity during public holidays with religious importance.	Throughout the project	-Do-	-Do-	-Do-
(h)	Contractor should avoid any construction activity which generates heavy noise during noise sensitive hours at day time and night hours.	Throughout the project	-do-	-do-	-do-

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Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	If work is to be carried out during night time, the contractor will need to obtain prior approval from the "Engineer" and relevant agency/ ies. The contractor shall adhere to any given guidelines by "Engineer" and/ or relevant agency/ ies.				
2.6.2	Vibration				
(a)	The contractor should carry out a property condition survey of all structures within a corridor from both edges of the proposed ROW and record any existing failures of the structures. The width of the corridor will be defined by "Engineer" with the concurrence of Employer.	Along the entire trace and near the quarry sites operated for the project	Engineering Cost	Contractor	CSC, RDA/PMU
(b)	Contractor shall take appropriate action to ensure that construction works do not result in damage to adjacent properties due to vibration.	Along the entire trace and near the quarry sites operated for the project	Engineering Cost	Contractor	CSC, RDA/PMU
(c)	Contractor shall carry out monitoring at the nearest vibration sensitive receptor during blasting or when other equipments causing vibration are used.	Within and close to the project area and quarry sites where blasting is carried out	-Do-	-Do-	-Do-
(d)	The contractor shall modify the method of construction until compliance with the criteria, if vibration levels exceed the relevant vibration criteria.	Within and close to the project area where construction works will commence	-Do-	-Do-	-Do-
(e)	Contractor shall pay due consideration on vibration impacts of blasting on adjoining structures. Explosive loads shall be determined so that excessive vibration can be avoided and blasts shall be controlled blasting in nature. Notwithstanding to these provisions contractor is liable for any damage caused by blasting work.	Within and close to the project area where construction works will commence and at all blasting sites	-Do-	-Do-	-Do-
2.6.3	Noise from blasting or pre splitting operations				
(a)	Blasting shall be carried out only with permission of the Engineer and approval from GSMB for road side blasting all the statutory laws, regulators, rules, etc., pertaining to acquisition, transport, storage, handling and use of explosives shall be strictly followed.	Throughout the road where blasting will be possible specially within cut areas	Engineering cost	Contractor	CSC, RDA/PMU, GSMB
(b)	Blasting shall be carried out during fixed hours (preferably during mid-day), as permitted by the Engineer. The timing should be made known	-Do-	-Do-	-Do-	-Do-

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Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	to all the people within 500 m (200 m for pre-splitting) from the blasting site in all directions. People, except those who actually light the fuse shall be excluded from the area of 200 m (50 m for pre-splitting) from the blasting site in all directions at least 10m minutes before the blasting.				
2.7.	Impacts to Flora				
	2.7.1 Loss or damage to trees and vegetation				
(a)	All works shall be carried out in a manner that the destruction to the flora and their habitats is minimised. Trees and vegetation shall be felled / removed only if that impinges directly on the permanent works or necessary temporary works. In all such cases contractor shall take prior approval from the engineer.	Applicable throughout/adjacent the project area	Engineering/ Environmental Cost	Contractor	CSC, RDA/PMU, DOF
(b)	Contractor should provide necessary instructions to drivers, operators and other construction workers not to destroy ground vegetation cover unnecessarily. Construction vehicle, machinery and equipment shall be used and stationed only in the areas of work and in any other area designated/ approved by the engineer. Entry and exit of construction vehicles and machinery should be restricted to particular points as directed by the engineer.	-Do-	Engineering Cost	Contractor	CSC, RDA/PMU
(c)	A compensatory tree planting program should be developed in consultation with DoF/ local authorities/ communities in order to replenish the loss of trees. At least 2 good specimens native tree species should be planted for each tree removed. Compensatory tree planting should be attended for about two years to promote survival of the replanted specimens	Throughout/adjacent the project area	Engineering/ Environmental Cost	-Do-	CSC, RDA/PMU, DOF
(d)	In order to prevent further invasion of existing invasive species, the waste plant materials generated during the site clearing and dredging activities (if any) should be securely disposed. Also, it is recommend to use native floral species when replanting to be carried out in order to prevent the risk of new invasion to the project area.	Throughout/adjacent the project area	Engineering/ Environmental Cost	-Do-	CSC, RDA/PMU, DOF
	2.7.2 Chance found important flora				

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Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
(a)	During construction, if a rare/threatened/endangered flora species is found, it shall be immediately informed to the PMU by the contractor. All activities that could destroy such flora and/or its habitat shall be stopped with immediate effect. Such activities shall be started only after obtaining the Engineer's approval. Contractor shall carry out all activities and plans that the Engineer instructed him to undertake to conserve such flora and/or its habitat.	Applicable throughout/adjacent the project area	Engineering/ Environment al Cost	Contractor	CSC, RDA/PMU, DOF
2.8.	Impact on Fauna				
	2.8.1. Loss, damage or disruption to fauna				
(a)	All works shall be carried out in such a manner that the destruction or disruption to the fauna and their habitats is minimum.	Applicable throughout/adjacent the project area	Engineering Cost	Contractor	CSC, RDA/PMU
(b)	Construction workers shall be instructed to protect fauna including wild animals and aquatic life as well as their habitats. Hunting, pouching and unauthorized fishing by project workers is not allowed.	-Do-	-Do-	-Do-	-Do-
	2.8.2 Chance found important fauna				
(a)	During construction, if a rare/threatened/endangered fauna species is found, it shall be immediately informed to the PMU by the contractor. All activities that could destroy such fauna and/or its habitat shall be stopped with immediate effect. Such activities shall be started only after obtaining the Engineer's approval. Contractor shall carry out all activities and plans that the Engineer instructed him to undertake to conserve such fauna and/or its habitat.	Applicable throughout/adjacent the project	Engineering/ Environmen tal Cost	Contractor	CSC, RDA/PMU
2.9.	Disruption to Users				
	2.9.1 Loss of access				
(a)	At all times, the Contractor shall provide safe and convenient passage for vehicles, pedestrians and livestock to and from side roads and property accesses connecting the project road. Work that affects the use of side roads and existing accesses shall not be undertaken without providing adequate provisions to the prior satisfaction of the Engineer.	Within and close to the project area	Engineering Cost	Contractor	CSC, RDA/PMU
(b)	The works shall not interfere unnecessarily or improperly with the convenience of public or the access to, use and occupation of public or private roads, railways and any other access footpaths to or of	-Do-	-Do-	-Do-	-Do-

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Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	properties whether public or private.				
(c)	On completion of the works, all temporary obstructions to access shall be cleared away, all rubbish and piles of debris that obstruct access be cleared to the satisfaction of the Engineer.	-Do-	-Do-	-Do-	-Do-
(d)	Providing advance information to the public about the planned construction works and activities causing disruption to access roads, and the temporary arrangements made to give relief to public in order to avoid any inconveniences due to the construction activities.	-Do-	-Do-	-Do-	-Do-
(e)	Use of flagmen and/or temporary traffic lights to control traffic flows at constricted sites, including safe crossing for pedestrians especially at town areas and near schools.	-Do-	-Do-	-Do-	-Do-
2.10	Accidents and Risks				
2.10.1	Public and worker safety				
(a)	All reasonable precautions will be taken to prevent danger of the workers and the public from accidents such as fire, explosions, blasts, falling rocks, falling to excavated pits, chemical sprays, unsafe power supply lines etc. Workers should be aware about possible risks of accidents during the work at the railway crossing	Within and close to the project area, material storage and worker camps with especial attention to existing settlements	Engineering Cost	Contractor	CSC, RDA/PMU
(b)	The Contractor shall comply with requirements for the safety of the workmen as per the international labour organisation (ILO) convention No. 62 and Safety and Health regulations of the Factory Ordinance of Sri Lanka to the extent that those are applicable to this contract. The contractor shall supply all necessary safety appliances such as safety goggles, helmets, masks, boots, etc., to the workers and staff. The contractor has to comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, excavations, trenches and safe means of entry and egress.	-Do-	-Do-	-Do-	-Do-
2.10.2	Prevention of risks of electrocution				
(a)	All electrical wiring and supply related work should conform to British Standards (BS) or relevant Sri Lankan Standards. Adequate precautions will be taken to prevent danger of electrocuting from electrical equipment and power supply lines including distribution boards, transformers, etc. Measures such as danger signboards, danger/red	Within and close to the project area, material storage and worker camps	Engineering Cost	Contractor	CSC, RDA/PMU

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Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	lights, fencing and lights will be provided to protect the public and workers. All electric power driven machines to be used in the construction shall be free from defect, be properly maintained and kept in good working order, be regularly inspected and as per BS provisions and to the satisfaction of the Engineer.				
2.10.3	Risk at hazardous activity				
(a)	All workers employed in hazardous activities shall be provided with necessary protective gear. These activities include mixing asphalt material, cement, lime mortars, concrete etc., welding work, work at crushing plants, blasting work, operators of machinery and equipment such as power saws, etc.	Within and close to the project area, quarry site and burrow pits	Engineering Cost	Contractor	CSC, RDA/PMU
(b)	The use of any toxic chemical shall be strictly in accordance with the manufacturer's instructions. The Engineer shall be notified of toxic chemicals that are planned to be used in all contract related activities. A register of all toxic chemicals delivered to the site shall be kept and maintained up to date by the Contractor. The register shall include the trade name, physical properties and characteristics, chemical ingredients, health and safety hazard information, safe handling and storage procedures, and emergency and first aid procedures for the product.	Within and close to the project area	-Do-	-Do-	-Do-
2.10.4	Lead pollution				
(a)	No paint containing lead or lead products will be used except in the form of paste or readymade paint. Facemasks shall be supplied to workers who are working in spray painting or scraping lead paints.	Workshops, yards where spray painting is done	Engineering Cost	Contractor	CSC, RDA/PMU
2.10.5	Handling of explosives				
(a)	Except as provided in the contract or ordered or authorized by the Engineer, the Contractor shall not use explosives. Where the use of explosives is so provided or ordered or authorized, the Contractor shall comply with the requirements of the following Sub-Clauses of this Clause besides the law of the land as applicable.	All locations where blasting activities will commence	Engineering Cost	Contractor	CSC, RDA/PMU
(b)	The Contractor shall at all times take every possible precaution and shall comply with relevant laws and regulations relating to the importation, handling, transportation, storage and use of explosives. Contractor shall	-Do-	-Do-	-Do-	CSC, RDA/PMU,

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Environment Management Plan

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	obtain Ministry of Defense (MoD) approval for importing and handling explosives and keep the Local Police informed of the same.				MoD
(c)	Contractor shall take precaution to prevent injury to people and damage the structures/houses and vehicles in the vicinity at the locations of blasting work. Blasting should be controlled to prevent vibration damage to structures and injury to people. The vehicles and road users should be stopped at a reasonable distance from the site and people in the vicinity should be informed when the blasting is carried out. Any debris on the road should be removed promptly before clearing the road for users. Blasting work should be carried out in off peak hours but not during the hours of darkness or at other times, which may cause unacceptable disturbance to religious or other ceremonies.	-Do-	-Do-	-Do-	CSC, RDA/PMU, (GS&MB if required)
(d)	Sufficient and adequate warning shall be given prior to blasting. Use of flagmen, siren, etc. should be arranged to the full satisfaction of the Engineer. The public in the area should be informed well in advance about the blasting operation and timing.	-Do-	-Do-	-Do-	-Do-
2.11	Health and safety				
2.11.1	Prevention of vector borne diseases				
(a)	Contractor shall take necessary actions to prevent breeding of mosquitoes at places of work, labour camps, plus office and store buildings. Stagnation of water in all areas including gutters, used and empty cans, containers, tyres, etc shall be prevented. Approved chemicals to destroy mosquitoes and larvae should be regularly applied. All burrow sites should be rehabilitated at the end of their use by the contractor in accordance with the requirements/guidelines issued by the Central Environmental authority and relevant local authorities.	At worker camps, stores, yards	Engineering Cost	Contractor	CSC, RDA/PMU, LA
(b)	Contractor shall keep all places of work, labour camps, plus office and stores clean devoid of garbage to prevent breeding of rats and other vectors such as flies.	-Do-	-Do-	-Do-	-Do-
2.11.2	Workers health and safety				
(a)	Contractor shall comply with the provisions in Health and Safety regulations under the Factory Ordinance with regard to provision of	Within and close to the project area, workshops	Engineering Cost	Contractor	CSC, RDA/PMU

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Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	health and safety measures and amenities at work place(s).	and worker camps			
2.11.3	First aid				
(a)	At every workplace, first aid kit shall be provided as per the regulations. At every workplace an ambulance room containing the prescribed equipment and nursing staff shall be provided.	Within and close to the project area, quarry, crusher, plants, workshops and worker camps	Engineering Cost	Contractor	CSC, RDA/PMU
2.11.4	Potable water				
(a)	In every workplace and labour camps portable water shall be available throughout the day in sufficient quantities.	Within and close to the project area (work sites), quarry, crusher, concrete batching plants, workshops and worker camps	Engineering Cost	-Do-	-Do-
2.11.5	Hygiene				
(a)	The contractor shall provide and maintain necessary (temporary) living accommodation and ancillary facilities for labour to standards and scale approved by the resident engineer.	Within and close to the project area, workshops, worker camps	Engineering Cost	Contractor	CSC, RDA/PMU, LA, CEA
(b)	At every workplace and labour camps sufficient number of bathing facilities, latrines and urinals shall be provided in accordance with the Health and Safety regulations and/or as directed by the Engineer. These bathroom and toilet facilities shall be suitably located within the workplace/buildings. Latrines shall be cleaned at least three times daily in the morning, midday and evening and kept in a strict sanitary condition. If women are employed, separate latrines and urinals, screened from those for men and marked in the vernacular shall be provided. There shall be adequate supply of water, within and close to latrines and urinals.	Worker camps and temporary sheds at work sites	-Do-	-Do-	-Do-
(c)	The sewage system for the camp must be properly designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place.	Worker camps and temporary sheds at work sites	-Do-	-Do-	-Do-
(d)	Garbage bins must be provided in the camp, work sites and regularly emptied and the garbage disposed off in a hygienic manner. Construction camps shall have a clean hygienic environment and	-Do-	-Do-	-Do-	-Do-

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Environment Management Plan

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	adequate health care shall be provided for the work force.				
(e)	Unless otherwise arranged for by the Local Authority, the contractor shall arrange proper disposal of sludge from septic tanks. The contractor shall obtain approval for such disposal from the Public Health Inspector of the area.	-Do-	-Do-	-Do-	-Do-
2.12	Protection of Cultural and Religious Places and Properties				
	2.12.1 Prevention of damage to cultural and religious places and properties				
(a)	During construction activities the contractor should take all necessary and adequate care to minimize impacts on places of worship. Workers should not be allowed to trespass in to such areas.	Within and close to the project area	Engineering Cost	Contractor	CSC, RDA/PMU, DOA, LA, Religious leaders
(b)	Conservation and protection measures shall be taken up as per design and as per the instructions issued by the Department of Cultural Affairs when working close to such sites. Contractor shall seek advice from the Engineer if such instructions are not available. Access to such properties from the road shall be maintained clear and clean.	-Do-	-Do-	-Do-	-Do-
2.13	Environmental Enhancement				
	2.13.1 Roadside landscape				
(a)	Road landscape plantation, re-vegetation of road embankments and other slopes, edge treatment of water bodies shall be taken up as per either detailed design or typical design guidelines given as part of the Bid Documents. The contractor also shall remove all debris, piles of unwanted earth, spoil material, away from the roadsides and from other work places and disposed at locations designated or acceptable to the Engineer.	Within and close to the project area, and all locations used for quarry sites, burrow pits, asphalt plant, concrete batching plants, workshops and labour camps	Engineering Cost	Contractor	CSC, RDA/PMU
(b)	On completion of the works, the temporary structures shall be cleared away in full, all rubbish burnt, waste dumps and septic tank shall be filled and closed and roadsides, workplaces and labour camps, cleared and cleaned.	-Do-	-Do-	-Do-	-Do-
	2.13.2 Utilities				
(a)	Contractor shall take care not to damage/destroy or affect the functional purposes of utilities such as water, electricity, telephone	At all locations where electricity, water and	Engineering Cost	Contractor	CSC, RDA/

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Environment Management Plan

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
	posts. The arrangements the contractor made with those service providers shall be informed to the Engineer in writing (advance work). Contractor shall assist the service providers in whatever possible manner to minimize disruption to such services.	telecommunication supply lines located close to the project area			PMU
(b)	In case of an inadvertent damage cause to a utility, the contractor shall immediately inform the Engineer and service provider and help to restore the service without delay.	Within and close to the project area	-Do-	-Do-	CSC, RDA/PMU, Service Provider
2.13.3	Road furniture				
(a)	Road furniture including footpaths, railings, storm water drains, crash barrier, traffic signs, speed zone signs, pavement markers and any other such items will be provided as per design given in the Bid Documents.	Throughout the project area	Engineering Cost	Contractor	CSC, RDA/PMU
(b)	Intersections, rotaries, traffic islands, roadside protection and other structures or furniture shall be constructed, complete with the landscape elements as per design in the above manner.	-Do-	-Do-	-Do-	-Do-
2.14	Handling Environmental Issues During Construction				
(a)	The Contractor will appoint a suitably qualified Environmental Officer following the award of the contract. The Environmental Officer will be the primary point of contact for assistance with all environmental issues during the pre-construction and construction phases. He/ She shall be responsible for ensuring the implementation of EMP.	Throughout the project construction period	Engineering Cost	Contractor	CSC, RDA/PMU
(b)	The Contractor shall appoint a person responsible for community liaison and to handle public complaints regarding environmental/ social related matters. All public complaints will be entered into the Complaints Register. The Environmental Officer will promptly investigate and review environmental complaints and implement the appropriate corrective actions to arrest or mitigate the cause of the complaints. A register of all complaints is to be passed to the Engineer within 24 hrs they are received, with the action taken by the Environmental Officer on complains thereof.	-Do-	Engineering Cost	-Do-	-Do-
(c)	Contractor shall develop suitable method to receive complaints. The complain register shall be placed at a convenient place, easily accessible by the public.	Throughout the project construction period At local authority and	-Do-	-Do-	-Do-

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Environment Management Plan

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
		divisional secretary offices			
(d)	Contractor shall prepare detailed Environmental Method Statement (EMS) clearly stating the approach, actions and manner in which the EMP is implemented. It is required from the contractor to prepare the EMS for each work site, if work will be carried out at more than one site at once and time plan for implementation. The EMS shall be updated regularly and submit for Engineers review and approval.	Throughout the project construction period	-Do-	-Do-	-Do-
2.15	Grievances of people due to project activities				
(a)	A Grievance Redress Mechanism (GRM) will be introduced to project to solve grievances arising due to project activities. The proposed structure of GRM will be included in the Resettlement Plan.	Locations where grievances occur	Environmental cost	Contractor, RDA	CSC, RDA/ PMU
3.0 Operational stage					
3.1	Stagnation of water at hydraulic structures during heavy rains due to siltation and blocking of openings with debris.				
(a)	Maintaining of cross drainage structures to facilitate uninterrupted flow is of paramount importance. If any hindrance occurs within the system it could lead to flooding and long term inundation of upstream side. This aspect should be looked with a wide perspective as there are many agencies who are responsible for the drainage in the system and RDA will only be able to (and mandated to) maintain the drainage structures within the ROW. Hence even RDA upkeeps all drainage structures within the ROW and if there is a lapse in maintain a structure downstream it will lead to even inundate the expressway.	At all hydraulic structures within the project area	Maintenance Cost	RDA	RDA
3.2.	Road safety				
(a)	All road furniture described under item 2.13.3 should be maintained by RDA	Throughout the project area	Maintenance Cost	RDA	RDA
(b)	A management plan should be formulated with the local police to avoid any vehicle to carry loads that exceed the carrying capacity (load) of the new highway. Weigh stations could be introduced at selected locations to measure the load of vehicle.	Throughout the project area	-Do-	RDA	RDA, LA, local police
3.3	Encochment on to ROW				

Environment Management Plan

Environmental Issues	Protection and preventive measures	Locations/ Project phase	Mitigation ¹ Cost	Institutional Responsibility	
				Implement	Supervision
(a)	Continuous monitoring and strict regulations should be followed to avoid the encroachment. Executive Engineers under direct supervision of Chief Engineer and Provincial Director should conduct regular checking along the road and remove any unauthorized activities within the ROW.	Throughout the project area	Maintenance Cost	RDA	RDA

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

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