Request for Proposals

Government of Sri Lanka (GOSL) has identified the need of an expressway towards Sabaragamuwa province, which will function as a fast road link between Sabaragamuwa and Uva provinces with Colombo the economic capital of the country. With the above perspective, RDA has almost finalized a suitable road corridor to construct the Ruwanpura Expressway considering present and future development scenarios of the country. This expressway project is officially called as "*Ruwanpura Expressway Project*" or REP.

As per the final trace, the proposed expressway is to start from Kahathuduwa Interchange of Southern Expressway and to end at Pelmadulla connecting to Pelmadulla – Nonagama (A018) road.
Length of the Expressway is about 76+450 km and phases for the REP are established as follows.

- Phase I – Southern Expressway (Kahathuduwa) to Ingiriya, (Ch. 0+000 km – Ch. 25+000 km)
- Phase II – Ingiriya to Kiriella (Ch. 25+000 km – Ch. 44+000 km)
- Phase III – Kiriella to Pelmadulla (Ch. 44+000 km – Ch. 76+450 km)

In order to assess the environmental and social feasibility of the final trace and also to obtain the environmental approval from the Central Environmental Authority (CEA) for the Phase II and III, RDA is planning to conduct the EIA, in accordance with the Terms of Reference (TOR) of the CEA. (Refer Annexure 1).

Accordingly, it is found that Geo-Technical Assessments and Designs and Extended Cost Benefit Analysis are to be carried-out as parts of the EIA. Geo-Technical Assessments and Designs are further necessary for future reference for construction purposes.

Terms of Reference (TOR) prepared for outsourcing a qualified Consultant Geo-Technical Engineer (CGE) and Terms of Reference (TOR) prepared for outsourcing a qualified Environmental Economist (EE) are attached hereto for your reference (Refer Annexure 2 and 3 for CGE and EE respectively).

The technical and financial proposals are called from the eligible individual Consultants to carry out the studies as indicated below, and submit the reports as per the TOR's annexed above.

A. Consultant Geo-Technical Engineer (CGE)
   1. Geo-Technical Assessments as necessary for the Environmental Impact Assessment (EIA) and
   2. Geo-Technical Assessments and Designs as necessary for Cut slopes, Soft Ground Treatments, Tunnels, Via Duct and Bridge Foundations and making the Final Geo-Technical Report.

B. Environmental Economist (EE)
   Extended Cost Benefit Analysis as necessary for the (EIA).

The financial proposal should include remuneration of the Consultants and the team members, cost of office, office furniture and equipment, stationary, photo copy, fax, email etc. and all the maintenance cost of the office including transport. Cost of software's shall not be considered. Individuals should submit proposals separately.

You are kindly invited to forward your Technical and Financial proposals in sealed envelopes to the undermentioned address on or before 14.00 pm on 24th January 2022, stating the name of the proposal on the top left hand corner of the envelop.

Address of the proposals to be submitted,
Director, Environmental and Social Development, Road Development Authority, 5th Floor,
Maga Neguma Maha Medura, No.216, Denzil Kobbekaduwa Mawatha, Koswatta, Battaramulla.

L.V.S. Weerakoon
Director General, RDA

TERMS OF REFERENCE

(This ToR is valid only for one and half years from the date of issue)

This ToR has been issued by the Central Environmental Authority (CEA) only as a means of providing guidance for preparation of the Environmental Impact Assessment (EIA) report for the proposed project. Required information on impacts mitigation measures etc. which will be useful in decision making should be incorporated in the EIA report based on the findings of the EIA study.

Issuance of the ToR does not in any way reflect an agreement on the part of the CEA regarding the granting of approval for the project. It is the responsibility of the project proponent to clear any issues regarding land ownership and to obtain approvals required from agencies other than the CEA. In the case where the project is to be sited on state land we recommend obtaining "in principle" approval of the land owner, prior to embarking on the EIA report preparation. The CEA will not be responsible for any costs incurred by the project proponent in EIA report preparation in case the project is rejected.

Project Name	**:**	**Ruwanpura Expressway Project** Phase 2 from Ingiriya (26+300 Km) to Ratnapura (52+500 Km) and Phase 3 from Ratnapura (52+500 Km) to Palmadulla (76+450 Km)
Project Proponent	**:**	Road Development Authority
Project Approving Agency	**:**	Central Environmental Authority
Report requirement	:	Environmental Impact Assessment (EIA) report
Date of issue of the ToR	**:**	04.10.2021

Report format :

Executive Summary

1. Introduction
2. Reasonable alternatives and description of the proposed project
3. Description of the existing environment
4. Anticipated environmental impacts of proposed project
5. Proposed mitigation measures
6. Cost - Benefit Analysis
7. Environmental Management Plan
8. Conclusion and Recommendation

Annexure

I Terms of Reference
II References
III Sources of data & information
IV List of preparers including their work allocation (Report should be authenticated by the preparers)
V Comments made by the public, NGOs and other agencies during formal and informal scoping meetings held by the EIA study Team
VI Relevant approvals and consent letters obtained
VII Complete set of relevant maps, tables, charts, layout plans and other details

Executive Summary

The summary should be a brief, non-technical summary of the justification of the proposed project, description of the salient features of the project, the existing environment of the project sites and its environs, key environmental impacts, the measures proposed to mitigate the environmental impacts, extended cost benefit analysis, monitoring programme and conclusions.

A one page summary table indicating the significant impacts and proposed mitigation measures should be presented.

1. INTRODUCTION

1.1 Background of the project (Brief history of the project, its current status etc.)

1.2 Objective of the proposed project and justification of the project (Summarize the need of the project. Please note that concerns of the planning agencies such as National Physical Planning Department need to be considered).

1.3 Objective of the EIA report (Specify the objectives of the assessment and the relationship of the results to project design and implementation).

1.4 Methodologies and technologies adopted in EIA report preparation

1.5 Conformity with existing or proposed developments and/ or conservation plans in the area/ relevant government policies.

1.6 Preliminary approvals needed for the project and any conditions laid down by state agencies in granting preliminary clearance for the project
Ex: National Physical Planning Department, National Planning Department, Urban Development Authority, Irrigation Department, Archeological Department

2. REASONABLE ALTERNATIVES AND DESCRIPTION OF THE PROPOSED PROJECT

2.1 Evaluation of Alternatives

- Describe reasonable alternatives considered in the course of developing the project and the basic environmental engineering and economic parameters used in their investigation and evaluation. The following alternatives shall be described;

    - No action alternative
    - Alternative routes
    - Siting
    - Design
    - Technology selection
    - Construction methods

- Compare alternatives considered both during pre-feasibility and feasibility stages of the project in terms of potential environmental impacts, mitigation of environmental impacts, capital and operating costs, reliability etc.
- Comparison of the alternatives considered and recommendations should be given with respect to selected option (Give clear reasons for why such alternatives were rejected in preference to the one recommended).

2.2 Description of the proposed project

2.2.1. Project Location land ownership of the proposed project

Following details should be given in order to get a clear picture of the project

- Location, indicating the Divisional Secretariat Division/s and the Local Authority area/s within which the project site falls. GPS coordinates of the Centerline of the final trace.
- Location map(s) of appropriate scale indicating the project site (road trace and surrounding land use). Clear coloured and readable maps together with diagrams and photographs to be provided for reviewer to get a clear understanding of the project area.
- Ownership of the project site (public / private / other- specify**)**
  (If state owned especially either by the Forest Department or Department of Wildlife Conservation, in principle approval/ consent of the state agencies are required for release of the land for the project).

2.2.2. Project Details

- Design details of all project components including the following
  - Length of the trace, width of the Right of Way (RoW), length, width and height of the cut /fill (embankment) sections, length, width, height and vertical clearances of the elevated structures, number of lanes, interchanges, ramps, toll plazas, dimensions and number of grade separated crossings (overpasses, underpasses etc) and tunnels (if any), drainage provisions, service areas to be kept etc
- Methodology of construction
  - Steps in construction process such as methodologies applied for preliminary works, earth works, construction of structures (including installation of foundations, piles, piers, decks within the marshes and water bodies), ground development and removal of unwanted materials, temporary facilities, Greenery works and temporary activities should be described. Construction technology to be applied for plain terrain/hilly area/water bodies should also be described.
  - All relevant details including methodology of construction of any actions/additional structures both permanent and temporary (such as pilot/service roads) to be installed to support the project activities, area earmarked and the removal procedure of such works also need to be described. Any engineering or technical adaptation to be followed to avoid ground subsidence/ any collapses. Management procedures/ technologies to be adopted to be indicated when road traverses through already established public utility services.
  - Construction materials
    - Quantities of raw material required and sources (all sources for material extraction should be proposed upon identification of the availability of such sources with the relevant agencies such as GSMB. Approvals/consent obtained from such agencies needs to be annexed)
    - Locations of material storage, temporary facilities to be established
    - Details of supportive plants such as operation of asphalt batching, metal crushing along with location
  - Temporary stockpiling & disposal of earth/soil/debris with locations, anticipated quantities and suitability of selected sites for such work and any

improvements/developments required at such sites (Attach recommendations received from such relevant agencies).

- Solid waste & wastewater management
  - Anticipated quantity of solid waste such as plastics, cement debris, construction debris etc. / scheduled waste/ with quantities / materials use se for piling/ and its management and final disposal
  - Wastewater generated due to project activities (including labour camps, dewatering process of which water accumulated during the construction/ piling) and its management.

- Project Layout plan
  - The layout plan(s) of the project at appropriate scale. This should indicate all the project components mentioned above and reservations to be maintained. The layout plan should also indicate the project area depicting RoW of the road trace and foot print of elevated structures, embankment/cut sections of the road trace and interchanges.

2.2.3 Implementation plan

- Construction programme (timing and duration of all project activities from preconstruction to full operation)
- Requirement and availability of workforce
- Phased development activities If such activities are envisaged
- Methodology of operation of the project components, any maintenance requirements during operational phase and methodologies to be used
- Environmental monitoring works along with locations for all environmental aspects especially noise, air quality and ground vibration, low lying area filling both construction and operation stages
- Ownership of the project after completion of the project

2.2.4 Project cost, investment and funding sources.

- Project cost including construction, operation, maintenance cost along with break downs
- Investment and funding sources.

3. DESCRIPTION OF THE EXISTING ENVIRONMENT

3.1 Study Area

The study area for the assessment shall include but not be limited to, the following;

i) Project site (area within proposed Right of Way (RoW) and areas where project related constructions such as drainage structures, interchanges etc. are planned)

ii) The area beyond the Right of Way (Row) and 100 m buffer that has a likelihood of being significantly impacted ("influenced area"), which must also include areas in the vicinity of the ancillary constructions. (The limits of "influenced area" should be identified by the study team with clear justification.

iii) Offsite locations which will be affected due to activities of the project.

Assemble, evaluate and present baseline data on the relevant environmental characteristics of the areas identified under (i), (ii) and (iii) above.

This chapter should provide representative information on physical, biological socio-economic, archaeological and cultural aspects of the environment likely to be affected by any activity of the project during and after the project construction period. Information should be presented in a comprehensive format using photographs, tables, maps and diagrams where appropriate. The maps provided must be clear, readable and in coloured form and appropriate scale. An updated satellite images may also be used. The methods used to collect data should be clearly stated under each category.

The existing environment should be described under following;

3.2 Physical aspects

- Description of the existing land use (directly and indirectly affected land use categories/ areas to be indicated)
- Geology and soil types
    - Identify of terrain conditions with the aid of existing contour maps, slope maps, geological and landslide hazard zonation maps. Drone survey/photo geological survey could be provided as required.
    - Describe general geology of the area and detailed description of geology along the road trace of the project. Provide a regional geology map (1:100,000) to describe geology of the region and site specific geology map to describe the detailed geology of the impact area at suitable scale (preferably at 1:10,000 scale on 500m distance either side of the center line, without enlarging existing 1:100,000 regional geology maps)
    - Bore-hole data or augur-hole data to determine the soil type and the thickness of the soil layer and depth to hard bedrock at every major structure locations along the road trace. Provide few geological sections along the road and across the road (Few bore-holes or auger-holes should be drilled at suitable locations up to the bed rock)
    - Include a detailed landslide study report along the road trace to identify landslide risk of the proposed road and to identify previous landslide locations which may affect the road trace (Records of landslide occurrence to be provided).
    - Geophysical survey to identify abandoned gem mining pits and other cavities of voids especially along the river trace.
    - Include detailed groundwater study report of the entire project area.
- Existing ground levels with respect to MSL along the trace (LS) and the immediate vicinity
- Rainfall data both historic and projected for climate change scenarios (monthly rainfall data for the last 10 years for the rainfall stations in the vicinity of the proposed expressway trace, critical rain fall events induced flooding , updated IDF curves)
- Hydrology and drainage
    - List and maps showing rivers, streams, drainage pathways, flood plains etc. encountered (with basic information such as width, peak flows etc.)
    - Flood retention/ detention areas, marshy lands or any other wetland encountered (with basic information such as extents etc.). Relevant maps in this regard needs to be provided additionally.
    - Present flood detention capacity of the lowlands on either sides of the trace
    - List and layout of existing flood protection schemes or irrigation schemes (irrigation structures/ anicuts/ maintenance roads etc.) encountered
    - Drainage pattern in and around the proposed trace including drainage capacity of existing waterways and flood ways to which collected water from the road trace is to be discharged (This should be supported by a map of the stream network of the area, clearly labeled with the names of all the significant streams in the network. The map shall extend up to the catchment boundaries).

- Surface water quality along the affected areas (*including BOD_5, COD, Total Suspended Solids, Oil and grease, e-coli and electrical conductivity*) and water uses including water supply intakes and existing sources of water pollution if any etc

- Ground water quality *(Water Level, pH, Turbidity, BOD_5, COD, Temperature, Electrical conductivity, Total Dissolved Solid, and Total coli form and e-coli*) and present uses of ground water.
- Air quality, ground vibration & noise
  (Baseline information on air quality, ground vibration levels, noise levels, noise & ground vibration sensitive receptors etc. and locations identified for baseline establishement related to identification of ground water quality, Surface water quality, noise and vibration to be provided including all relevent details together with the maps)
- Information regarding natural disaster (occurrence, frequency and duration of incident prevailed to be indicated)
    - Floods- including flood peak value, inundation levels in the last 50/100 years, inundation periods and inundation areas)

3.2 **Ecological aspects** (both terrestrial and aquatic)

- A description of protected areas (extent, category etc., ecological services and importance) and other sensitive/reservation habitats (rock outcrops, wetlands, rivers/riverine vegetation, streams etc.) lying within the project area (described under (i, ii, iii above). A map should be provided with the demarcation of the PAs together with the project entities (ROW, other constructions and a 1 km buffer from either side from the centerline).
- A description of the different natural, semi-natural and anthropogenic habitat types (species composition, distribution) in the study area. Ecological significance of the natural/semi-natural habitats should be described.
- Description of fauna and flora including their distribution status (native, endemic, exotic, migrant) and conservation status (threatened status – Critically Endangered, Endangered, Vulnerable, Near Threatened or Least Concern) (if any) within these habitats as divulged through a field survey conducted as part of the EIA and those that have been recorded previously (as evident from published and unpublished documents, informal interviews). Baseline studies and data collection may need to consider seasonal factors.
- Animal movement pathways (including nocturnal spices, avifauna, primates (monkeys etc.) aquatic species etc.)
- Nesting and roosting sites (the latter would also include those of bats) within the study area
- Presence of any commercially important species

3.3 Socio-economic and cultural aspects

- Settlements (number of houses, government institutes, commercial buildings/ workplaces, religious places etc.) within the area directly affected by project and within the influenced area separately
- Existing sensitive receptors on either side of the RoW (such as schools, religious places, court houses, archeological monuments/ heritage sites/ locations envisaged with cultural activities)
- Socio economic status of the affected population
- Principal economic activities carried out within the directly affected area
- Agricultural areas (types of crops, extent, number of farmers affected directly and indirectly)
- Planned development activities
- Presence of infrastructure, public/ common utilities/ facilities within directly affected area (roads, railways, water supply lines, sewerage lines, power transmission lines, telecommunication network etc.)
- Service area covered by existing water supply/ irrigation/ flood control structures
- Any land mark or evidence of historic, religious, archeological or cultural/ heritage importance known to be in the study area
- Existing environmental considerations, problems or issues prevailing in the area.

4. ANTICIPATED ENVIRONMENTAL IMPACTS OF THE PROPOSED PROJECT

This chapter should show the overall impacts of the project on the individual environmental components. Impacts should include the direct and indirect, long and short-term, positive and negative effects. When describing the impacts indicate which are irreversible or unavoidable and which can be mitigated to the extent possible. Wherever possible describe impacts quantitatively.

Significance of impacts should be assessed using appropriate techniques. Impacts should be discussed in the order of significance.

Impacts caused by the project activities during the construction phase may differ from the long-term impacts during the operational phase. Significant short-term impacts have to be considered whenever necessary. Following impacts, among others, have to be analyzed and evaluated.

Special attention should be paid but not limited to;

- **Hydrological and drainage impacts**

  - Impacts on the natural drainage system to be studied using a mathematical model and the model need to calibrated and verified for selected past flood events with observed data. Impacts in both Construction (including temporary filling for pilot road , yards, working platforms etc) and operational phases of the proposed project on the hydrology should be analyzed. Climate change impacts (increase in rainfall frequency/intensity) should be incorporated as appropriate in the design. Future developments in land use should also be incorporated. A suitable critical Design rainfall event should be adopted depending on the catchment characteristics.

  - Evaluation of impacts from floods (10 year, 25 year, 50 year, 100 year etc.) including impacts on flood detention/retention capacity, discharge levels, storage capacity of affected water bodies , for both construction and operational phases . Worst case scenario, which is likely to be the construction stage should be analyzed in depth.
    - Pilot road drainage openings shall be provided for 5 year return period floods.
    - Subsequently, the main trace shall be designed for 100 year return period floods. 10 , 25 , 50 year return period flood impacts should also be checked in terms of inundation extent, flood depths, period of inundation etc against the baseline conditions (without the expressway).
  - Impacts on river/stream flows (including water levels/flows in the downstream part of the catchment), blockage of drainage pathways, inundation areas and inundation time periods including permanent or temporary stream/channel diversions (if any) should also be discussed using proper hydrological studies. Inundation maps, hydrographs, etc shall be presented in the discussion.
  - Any anticipated impacts on flood protection schemes (flood bunds/ gates etc.) and/or other irrigation schemes.
  - All the long-term hydrological impacts must allow for predicted climate change.

- **Impacts on surface water quality and ground water quality due to;**

  - Spillage, leakages and accidental discharge of fossil oil, waste oil generated from maintenance, washing, serving etc.
  - Disposal of liquid (wastewater)/solid wastes (including hazardous) from workers camps, offices, toll plaza buildings, serving at motor pools (if any) etc.

- **Impacts on land stability and soil erosion**
  - Erosion of excavated materials, construction materials etc. and spoil and other waste generated from construction activities and resultant siltation
  - Impacts on the stability of the area due to the project activities and possibility of slope failures (Landslide risk assessment using evaluation criterion to be indicated).
  - Stability assessment of gentle- steep slopes which identified as critical for future failures.
  - Possible impacts due to subsidence/collapsing due to adits (ongoing/abandoned) especially for gem mining
  - Impacts due to natural disaster such as earthquake, landslides

- **Biological /ecological impacts**

  Ecological impacts of the project should be assessed and presented clearly and must include the following.
  - A description of the impacts on natural habitats and ecosystems. A map should be provided indicating the extents of the impacted areas.
  - Habitat fragmentation and loss of connectivity associated with Protected Areas (PA) and Environment Protection Areas (EPA), reservations or other natural habitats should be specifically addressed. Wetlands, forests and the Kaluganga riverine forests should be given specific emphasis.
  - A description of the impacts on species i.e. flora and fauna, particularly on endemic and threatened species, and impacts on migratory or movement paths, foraging, nesting and roosting sites, within PAs and other sensitive habitats. The PAs and EPAs and reservations should be addressed separately.
  - Description of impacts on species/habitats outside the PA, EPA and reservations – e.g. tributaries that might be impacted.
  - Impacts must include the loss of habitats and the death, displacement and disturbance of fauna.
  - A count (species & distribution and conservation status) of trees that would have to be removed due to project activities
  - Loss and alteration of natural functions/balance of habitats / ecosystems
  - Impacts on aquatic habitats and on paddy/coconut/tea/rubber cultivations due to sedimentation, increased turbidity and contamination due to run off containing increased particulate matter, oil, fuel and other hazardous material or due to other pollutants
  - Impacts on ecosystem due to leakages, improper handling of construction materials
    (Note: Impacts in each case must be categorized as impacts during site preparation/ construction/ operation phases; low/ moderate/ high; temporary/ permanent)

- **Socio economic impacts**
  - Impacts due to loses of properties, agricultural lands, public amenities and significance of such impacts
  - Destruction of existing/ongoing economic and livelihood related activities due to construction activities
    Any negative impact on social wellbeing (risk on lives , livelihoods such as gem mining, agriculture based on paddy lands, livestock etc of the people in the vicinity (especially due to flooding, in the vicinity as well as downstream part of catchment as a result of the project. Consultation of farmer organizations/public in the vicinity of highway with respect to flood aspects should be done at a satisfactory level in order to avoid public conflicts during construction stage which may lead to delays and increase of project costs and it should be documented and presented).
  - Loss of social cohesions and impacts of relocation
  - Impacts due to disruption of existing infrastructure facilities

- Impacts due to disruption/ damages to the public/common utilities
- Impacts on public safety including impacts on people and their properties due to sudden collapses and possible failures caused by project activities.
- Social unrest due to accidents and heavy vehicle movements due to project activities
- Possible impacts due to groundwater depletion due to deep cuts /steep slopes
- Impacts due to migration and settlement of workers (social issues, solid waste disposal, waste water disposal etc.)
- Impacts on culturally, historically and archaeologically important objects/places

- **Impacts on land stability and soil erosion**
  - Erosion of excavated materials, construction materials etc. and spoil and other waste generated from construction activities and resultant siltation
  - Impacts on the stability of the area due to the project activities and possibility of slope failures (Landslide risk assessment using evaluation criterion to be indicated).
  - Stability assessment of gentle- steep slopes which identified as critical for future failures.
  - Possible impacts due to subsidence/collapsing due to adits (ongoing/abandoned) especially for gem mining
  - Impacts due to natural disaster such as earthquake, landslides

- **Noise and vibration impacts during construction and operation.**
  - Noise / vibration impacts during construction (predicted cumulative impacts during pilling, compaction etc. need to be considered)
  - Distribution of noise levels at expected different fleet compositions should be predicted using a validated mathematical model and results should be presented to identify the impact area and affected population etc,

- **Extraction, process and transportation of construction materials (sand, soil and metal etc.)**
  - Impacts due to extraction of borrow material at such locations
  - Impacts caused by metal crusing plants, asphalt plants, concrete batching plants, precast yards etc.
  - Damages to roads due to movement of heavy vehicles

- **Waste Disposal (Solid & Liquid)**
  - Disposal of dredged material and other solid waste and its impacts on surface/ground water and/or air
  - Waste types (hazardous, domestic, recyclable waste etc.), quantities of and possible impacts (e.g. accumulation & wash off etc)
  - Types and quantities of wastewater generated due to project activities. (including dewatering process of water accumulated during the construction/piling)
  - Wastewater disposal method (type of wastewater with quantities / treatment process (if any) and final discharge) and its impacts on surface /ground water

5. PROPOSED MITIGATION MEASURES

This chapter should set out the proposed measures to minimize the impacts identified in Chapter 4 to maximum possible level including conformity to regulations and national standards. Alternative methods of mitigation should be discussed and effectiveness of the proposed measures that are to be provided should be stated. Mitigation methods should be defined in specific practical terms. A rationale should also be presented for selection of chosen mitigattion measures.

A contingency plan for unexpected events for constructional and operational stage should be provided. This plan should indicate anticipated occurrences of accidents such as fire, pollution, natural hazards etc.

Special emphasis should be paid on the following

- Mitigation plan for drainage impacts
    - The drainage management plan should be prepared in order to minimize the flood impacts to the maximum possible level. Drainage management plan for 100 year return period should considered as the worst case scenario which shall be the construction stage with temporary filling (pilot road, yards, working platforms etc).The drainage management plan should comprise of layout plan of drainage structures such as viaducts/ bridges/culverts/toe drains/cut off drains etc with dimensions for main trace and drainage structures for pilot road. Mitigation measures (such as retention ponds in the upstream, resettlement of people during construction stage etc) for the people affected due to flood impacts due to temporary filling (based on 10, 25, 50 , 100 return period flood analysis) should be provided.
    - Emergency management plan (with breaching sections, criteria for breaching etc) addressing impact due to temporary fillings such as pilot road, working platforms, yards, etc. should also be provided
- Mitigation plan for any ecological and/or biological impacts especially susceptible fauna and flora (reptiles, amphibians and birds etc.)
- Mitigation plan for the affected agricultural lands and wetland functions during operational and construction periods
- Resettlement plans along with schedules, compensation packages
- Measures to salvage/ relocate archeological/ cultural monuments
- Restoration of lands, water bodies, disturbed areas and infrastructure
- Landslide and slope failure mitigation strategies/ plan covering possible geotechnical hazards due to implementation of the project
- Soil conservation plan with siltation and erosion control measures
- Noise & Vibration control measures
- Pollution control measures air quality and water quality aspects
- Emergency preparedness plan in consultation with relevant agencies including identification of breaching sections in pilot/access roads for discharging floods during construction phase, landslides

6. EXTENDED COST BENEFIT ANALYSIS

Extended cost benefit analysis for the project. (The cost of the proposed remedial/ mitigation measures including the cost incurred by the loss of ecosystem services due to the proposed land use changes should be considered additionally).

7. ENVIRONMENTAL MANAGEMENT PLAN

A suitable Environmental Management Plan (EMP) should be submitted to mitigate potential adverse impacts and monitor the changes of environment and implementation of mitigation measures. This plan should include the following;

(i) Mitigation

- Identifies and summarizes anticipated significant adverse environmental impacts and risks
- Describes each mitigation measure with technical details, including the type of impact to which it relates and conditions under which it is required, together with designs, equipment descriptions, and operating procedures as appropriate
- Contingency plans for maintain services in the event of accident/floods that disrupt project operation.

(ii) Monitoring

A suitable monitoring programme should be submitted to monitor the changes of environment and implementation of mitigation measures. This plan should include the following;

- Parameters to be monitored
- Frequency of monitoring, detection limits and definition of thresholds that will signal the need for corrective action
- Location / timing of sampling
- Institutional framework for mitigation of impacts
- Responsible agency / agencies of monitoring

(iii) Implementation arrangements

- Specifies the implementation schedule showing phasing and coordination with overall project implementation
- Describes the institutional framework, namely who is responsible for carrying out the mitigation and monitoring, which may include, additional topics to strengthen environmental management capability, technical assistance programs, training programs, organizational changes etc,
- Identify the capital and recurrent costs to implement mitigation and monitoring measures described above. Identify the availability and source of funds to implement the measures.

8. CONCLUSION AND RECOMMENDATION

The environmental acceptability of the proposed project and key findings and recommendations of the assessment should be clearly stated.

Any programme to improve general environmental conditions can also be stated here.

MINISTRY OF HIGHWAYS
ROAD DEVELOPMENT AUTHORITY
ENVIRONMENTAL AND SOCIAL DEVELOPMENT DIVISION
AND
RESEARCH AND DEVELOPMENT DIVISION

TERMS OF REFERENCE FOR ENGAGEMENT OF A CONSULTANT GEOTECHNICAL ENGINEER (CGE) TO CARRY OUT THE GEOTECHNICAL ASSESSMENTS FOR THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) & GEOTECHNICAL DESIGNS FOR RUWANPURA EXPRESSWAY – PHASE II and III FROM INGIRIYA TO PALMADULLA

1. Background

Government of Sri Lanka (GOSL) has identified the need of an expressway towards Sabaragamuwa province, which will act as a fast road link between Sabaragamuwa and Uva provinces with Colombo the economic capital of the country. This project is considered as one of the key infrastructure development projects in the country that needs to be implemented in the near future. With the above directive, RDA initiated a Feasibility Study (FS) in year 2016 to find out a suitable road corridor to construct the Ruwanpura Expressway considering present and future development scenarios of the country. The study also considered having minimum possible impacts on the environment including the social environment (i.e., minimum resettlement impacts to general public and land acquisition cost). This expressway project was officially called as "Ruwanpura Expressway Project" or REP.

Different route alternatives were studied during the FS conducted in 2016 and a final trace was selected to conduct detailed investigations. As per the final trace of the FS, the proposed expressway is to start from Kahathuduwa Interchange of Southern Expressway and end at Pelmadulla connecting with Pelmadulla – Nonagama (A018) road.

The expressway had a length of about 74 kilometers (km) and consisted of three (3) stages as;

- Phase I – Southern Expressway (Kahathuduwa) to Ingiriya, (Ch. 0+000 km – Ch. 26+300 km)
- Phase II – Ingiriya to Ratnapura (Ch. 26+300 km – Ch. 52+500 km)
- Phase III – Ratnapura to Pelmadulla(Ch. 52+500 km – Ch. 73+900 km)

As per the National Environmental Act (NEA) regulations, REP was categorized as a Prescribed Project so that RDA conducted and Environmental Impact Assessment (EIA) for the trace selected under the FS of 2016 seeking the environmental approval from Central Environmental Authority (CEA) who is the Project Approving Agency (PAA). However, due to location of the major parts of the Phase II and III of the expressways within the Central Fragile Area (CFA) of the country and considering the adverse impacts to the land use changes, possible urbanization around the interchanges in the CFA and impacts due to construction works, National Physical Planning Department (NPPD) being a key stakeholder of the project was not in a position to grant their consent for the EIA for Phase II and III of REP. As a result, the environmental approval was granted only for the Phase I of the REP in 2021.

In 2020, RDA under the guidance of Ministry of Highways took actions to revisit the FS in order to explore alternative routes for the Phase II and III of the REP having the least impacts to the CFA and avoiding tunnels, and accordingly the work was entrusted to the University of Moratuwa (UOM). As a result, UOM conducted a new FS and proposed a new trace having comparatively less impacts to the CFA and also avoiding tunnels. The new trace proposed by the UOM for the Phase II is deviating about 19km from the trace selected under the FS of 2016 and no change in Phase III.

The location map of the new trace is presented in figure shown below.

As per the new trace, length of the Expressway is 76+225 km and phases for the REP were revised as follows.

- Phase I – Southern Expressway (Kahathuduwa) to Ingiriya, (Ch. 0+000 km – Ch. 25+000 km)-Work already started.
- Phase II– Ingiriya to Kiriella (Ch. 25+000 km – Ch. 44+000 km) (diverted section- End Ch. 44+000 km can be slightly changed)
- Phase III– Kiriella to Pelmadulla (Ch. 44+000 km – Ch. 76+450 km) (Ch. 44+000 km and end Ch. 76+450 km can be slightly changed)

Therefore, in order to assess the environmental and social feasibility of the new trace and also to obtain the environmental approval from the CEA, RDA is planning to conduct a new EIA for the Phase II. Subsequently, the Basic Information Questionnaire (BIQ) was submitted to the CEA and the Terms of Reference (TOR) for the EIA was received from CEA on 04thOctober 2021 through the letter 08/EIA/Trans/07/2014 Vol. V.

Location map of the selected trace for Phase II of REP and TOR is attached.

Environmental and Social Development Division (ESDD) of RDA was assigned to conduct the EIA in compliance with the TOR issued by the CEA, and to obtain the environmental approval from the CEA and Research & Development Division (R&D) was assigned to conduct the Geotechnical Designs for Phase II and III on behalf of the Project Management Unit (PMU) of the RDA.

ESD & R&D divisions have planned to complete the EIA & Geotechnical Assessments including the Designs in combining with the experts are to be hired for the specialized areas required for the EIA and Geotechnical Designs. Accordingly, ESDD shall obtain the expert inputs of a Consultant Geotechnical Engineer (CGE) who will work in association with the Team Leader (TL) of the EIA in order to complete the EIA and to obtain the environmental approval from the Central Environmental Authority. At the same time he/she will work with R&D division to provide the geotechnical designs.

This document presents the TOR for the services and inputs required from the CGE in carrying out the EIA study, preparation of EIA Report (EIAR) ,obtaining the environmental approval from the CEA in respect of the works associate with the ESD division, RDA and geotechnical studies, geotechnical designs, soft ground improvement techniques and designs, earth cut designs for identified locations in respect of the works associate with the R&D division, RDA.

2. Objectives of the TOR

- To specify the qualifications and experience required by the SGE in order to qualify for the said assignment,
- To specify the scope of work of the SGE under

  Part 1- Inputs connected to EIA work with ESD division

  i. Chapter 3 Physical Aspects, Chapter 4 Anticipated Environmental Impacts, Chapter 5 Proposed Mitigation measures, Chapter 7 Environmental Management Plan (EMP) with respect to Geotechnical assessments and available literature for conducting the EIA study, preparation of EIAR and obtaining the environmental approval from the CEA.
  ii. Geotechnical interpretation on reasonable Geotechnical assessments and available literature on 2 Tunnel locations with respect to the Geological structures prevalent in these 2 locations in association with the Consultant outsourced from University of Peradeniya for the Geological assessments.
  iii. Determining the adequacy or inadequacy for the 2 Tunnels on the merits of above ii.

Part 2- Inputs connected to Geotechnical designs work with R&D division

i. If Tunnels are adequate (finalized through part 1studies) carry out geotechnical study, additional geotechnical investigations if necessary and geotechnical designs for Tunnels with necessary recommendations for size, stability etc.
ii. Providing soft ground improvement techniques and earth cut designs for identified locations.
iii. Proposing foundations for Viaducts, Express way Bridges and Overpass Bridges.
iv. Submission of Final Geotechnical Design Report based on above.

- To mention the requirements stipulated in the EIA TOR forwarded by CEA (Ref. Appendix).
- To indicate the assistance provided by the RDA (ESDD, R&D and PMU, REP) for the studies during the assignment.
- To indicate the time allocation for the assignment and the financial disbursement related to the assignment of CGE.

3. Required Qualifications of the Consultant Geotechnical Engineer

PhD/M.Sc. in Civil Engineering with 15 years experience, out of which at least 8 years of demonstrated experience in geotechnical /civil engineering field or experience of related field in carrying out the Geotechnical assessments necessary in Environmental Impact Assessments (EIA) and/or geotechnical designs for road development and other projects..

4. Scope of the Service

In general, the Consultant Geotechnical Engineer to carry out the,

Part 1- Inputs connected to EIA work with ESD division

- Geotechnical assessments necessary in the Environmental Impact Assessment (EIA) and
- Geotechnical interpretation on reasonable Geotechnical assessments and available literature on 2 Tunnel locations with respect to the Geological structures prevalent in these 2 locations in association with the Consultant outsourced from University of Peradeniya for the Geological assessments.
- Determining the adequacy or inadequacy for the 2 Tunnels on the merits of above.
- Presenting the final outcomes of the study to the RDA top management.

Part 2- Inputs connected to Geotechnical designs work with R&D division

- If Tunnels are adequate (finalized through part 1studies) carry out geotechnical study, additional geotechnical investigations if necessary and geotechnical designs for Tunnels with necessary recommendations for size, stability etc.
- Analyze Borehole investigation reports carried out for the above sections and produce a standard Geotechnical report with on-the job involvement of R&D Engineers and providing guidance to them.
- Detailed analysis and discussion on interpretation of the findings of the investigation work presenting the Project's geotechnical issues and recommendation for embankments, foundation designs for structures, and as appropriate to the Project. Geotechnical software packages like GeoStudio, Plaxis to be utilized, and laboratory testing to be conducted as applicable.

  In this respect:

  - Analysis of the behavior and propose countermeasures of road embankment over soft grounds.
  - Analysis of stability and propose counter measures for cut slopes.
  - Analysis of geotechnical capacity of sub soils and propose foundations for Viaducts, Express way Bridges and Overpass Bridges.
- Field inspection and identify soft ground improvement locations.
  The consultant will inspect the site with R&D division Engineers and identify the locations

where soft ground treatments should be specifically applicable.

- Providing soft ground improvement techniques and earth cut designs for identified locations. The Consultant will guide R&D Engineers to provide suitable methods and detail design for such locations.
- Present the final outcomes of the study to the RDA top management
- Geotechnical assessments, analysis and approach should be used to determine the impacts and to make necessary remediation measures on the stability of the earth fills, and possibility of slope failures in earth cuts of the project.
- Geotechnical interpretation should be used to evaluate, analysis and approach for the adequacy of Tunnels at 2 locations identified with any repercussions and mitigation solutions.

The methodology should include but not limited to the following steps.

- Obtaining the project objectives and scope from ESD/R&D divisions of RDA.
- Defining the project options which form the basis of the Geotechnical assessments and designs.
- Defining the base case against which the options are compared.
  - Use of Engineering classification of rock mass in Tunnel design and predict Tunnel supporting system with respect to Rock type, weathering stage of rock, faults, joints, structures presenting in the rock, presence of Ground Water in the rock, fall axis, strike and dip vs the tunnel alignment.
  - Defining the geomorphological and geological investigations further required in selection of the best alignment for making construction drawings.
- Affirming the feasibility of having Tunnels, if feasible recommending the most appropriate type, size and orientation of the Tunnel/s including other details related to air venting, draining etc.
- Reviewing the stability of tunnels against spalling ground, seepage, moving of rock mass etc.
- Identifying the incremental costs and benefits (pros and cons) that might be expected.
- Assessing and making necessary recommendations for stabilizing the overburden against any possible instability due to vibration that may cause in drilling of Tunnel.
- Assessing and making necessary recommendations for early recharging of Water Table.
  - If Tunnels are not anyway feasible, making recommendations for appropriate cut angle, berm width, single cut height, drains, and stabilization methods etc.to avert the possible erosion failures and instability of the highly erodible Central Fragile Area located in the surrounding.
- Obtaining necessary endorsement from NBRO for the recommendations made by the Consultant Geotechnical Engineer.
- Preparing the Final Geotechnical Design Report for future use summarizing the findings of above.
- CGE is expected to deliver the inputs necessary for both Part 1and Part 2 during the initial period nearly 5 month, in order to complete the EIA and to complete Part 2 during the balance time after getting the CEA approval for the submitted EIA.
  - In consultation with the Team Leader (TL) of the EIA, CGE's inputs may be delivered to the levels (perhaps Chapters wise as suit with the process of compiling the EIA) in order to complete the EIA within the given timeline.

To facilitate the above scope of work the CGE will be provided with following facilities by ESDD, R&D and PMU of RDA.

- The final trace of the Phase II and III of REP in KML formats and hard formats (with adequate resolution) with defined start and end points; locations of links, entry and exit ramps, tall gates etc.
- Feasibility report or any other relevant report which includes following information;

1. Design and construction related information including different options considered for construction of the highway (alternative route, design, technology and construction techniques),
2. Bore Hole and other Investigation reports available.

- All relevant maps or row data to prepare maps as indicated and required to fulfill the information requirement of the EIAR.
- Reports on hydrological impact assessment, studies on landslide impacts report etc.
- And any other information related to preparation of EIAR as requested by CGE.

Immediately after signing the agreement with RDA, the prospective CGE should study all available information provided by RDA or obtained by other sources and provide a list of further details in case he needs so, to carry out the required studies related to Ruwanpura Expressway Phase 2 and 3.

5. Time Schedule

Time duration for the said assignment is 9 (Nine) calendar months from the date on which the contractual agreement is signed between both parties (RDA and CGE), unless otherwise extended due to unavoidable externalities as mutually agreed by both parties.

Consultant Geotechnical Engineer who will work in association with the Team Leader (TL) of the EIA may issue the details to suit with the level of the process of the EIA in order to complete the EIA within the given time line.

6. Expected deliverables

Following deliverables are expected from the Consultant Geotechnical Engineer during the specified time period.

- Chapter 3 Physical Aspects, Chapter 4 Anticipated Environmental Impacts Chapter 5 Proposed Mitigation measures and Chapter 7 Environmental Management Plan (EMP) for Draft final EIA based on Geotechnical assessments.
- Geotechnical interpretation on 2 Tunnel locations, determining the adequacy or inadequacy.
- Inputs in Final EIA after incorporating CEA and stakeholder comments.
- Proposed methods and designs for Soft ground treatment and earth cut slopes in the locations which are identified during field inspection.
- Proposed foundations for Viaducts, Express way Bridges and Overpass Bridges.
- Defining the geomorphological and geological investigations further required in selection of the best alignment for making construction drawings.
- Affirming the feasibility of having Tunnels, if feasible recommending the most appropriate type, size and orientation of the Tunnel/s including other details related to air venting, draining etc.
- Reviewing the stability of tunnels against spalling ground, seepage, moving of rock mass etc.
- Identifying the incremental costs and benefits (pros and cons) that might be expected.
- Assessing and making necessary recommendations for stabilizing the overburden against any possible instability due to vibration that may cause in drilling of Tunnel.
- Assessing and making necessary recommendations for early recharging of Water Table.
- If Tunnels are not anyway feasible, making recommendations for appropriate cut angle, berm width, single cut height, drains, and stabilization methods etc.to avert the possible erosion failures and instability of the highly erodible Central Fragile Area located in the surrounding.
- Obtaining necessary endorsement from NBRO for the recommendations made by the Consultant Geotechnical Engineer.
- Submission of Final Geotechnical report for the Section II & III with recommendations.
- A summary report of activities completed when submitting a claim for payment. This summary report shall include key activities carried in completion of the task for which the claim is made.
- The Consultant is expected to exercise with utmost care during the process to avoid any accidents at site and any unfair situation, and if the Consultant will be found

responsible for any faults/conflicts, no claims will be accepted by RDA on this regard.

7. Payments

Payments shall be made to the CGE as detailed in the table below.

Task	**(A) Outputs/Reports on EIA to be handled by ESD division of RDA**	**(B) Outputs/Reports on Geotechnical studies & designs to be handled by R&D division of RDA**	**Tentative duration to complete the task**	**Percentage of payment eligible**	**Cumulative Payment Ceiling (% of Total cost)**
Task 1	Advance payment		**After the contract agreement**	**5%**	
Task 2	Completion of field reconnaissance		**1 week**		
Task 3	Collection of relevant secondary data and compilation with reasonable Geo-Technical Assessments.	B3-1 Submission of field inspection report. B3-2 Completion and Submission of Draft Geotechnical Investigation report. B. 3-3 Submission of proposed additional investigation details if necessary for design works.	**2 weeks**	**35%**	**40%**
Task 4	Completion of Draft Final EIAR based on reasonable Geotechnical assessments and submission to ESDD/R&D/ PMU,RDA Determining the adequacy or inadequacy for the 2 Tunnels	B 4-1Analysis of data and evaluation of existing and proposed surface/ stability conditions. B.4-2 Geo-Technical recommendations based on reasonable Geotechnical assessments for improvements/ structures (Tunnels/slope stability methods, Soft ground improvements etc.) B.4-3 Submission of interim Design Report.	**6 weeks**	**20%**	**60%**
Task 5	Presenting the EIAR to TEC		**1 day**		
		Presenting the interim report for Geo-Technical Recommendations.	**1 day**	**5%**	**65%**
Task 6	Attending to comments, requests made by TEC and submission of Final EIAR to ESDD/R&D PMU,RDA		**3 weeks**	**10%**	**75%**
Task 7	Attending any public comments and attending to queries made by public during public disclosure of EIAR	B6-1, B7-1, B8-1 Submission of Draft Geotechnical design Report to R&D, RDA.	**6 weeks**	**5%**	**80%**
Task 8	Addressing public and stakeholder comments made during public disclosure and technical evaluation and preparation of the addendums to the EIAR.		**3 weeks**	**10%**	**90%**
Task 9		Submission of Final Geotechnical report Including all Geotechnical designs to R&D,RDA and present it to RDA higher management	**15 weeks**	**10%**	**100%**
		Total Duration	9 Month		

MINISTRY OF HIGHWAYS ROAD DEVELOPMENT AUTHORITY
ENVIRONMENT AND SOCIAL DEVELOPMENT DIVISION

TERMS OF REFERENCE FOR ENGAGEMENT OF AN ENVIRONMENTAL ECONOMIST TO CARRY OUT THE EXTENDED COST BENEFIT ANALYSIS FOR THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR RUWANPURA EXPRESSWAY – PHASE II and III

1. Background

Government of Sri Lanka (GOSL) has identified the need of an expressway towards Sabaragamuwa province, which will act as a fast road link between Sabaragamuwa and Uva provinces with Colombo the economic capital of the country. This project is considered as one of the key infrastructure development projects in the country that needs to be implemented in the near future. With the above directive, RDA initiated a Feasibility Study (FS) in year 2016 to find out a suitable road corridor to construct the Ruwanpura Expressway considering present and future development scenarios of the country. The study also considered having minimum possible impacts on the environment including the social environment (i.e., minimum resettlement impacts to general public and land acquisition cost). This expressway project was officially called as "Ruwanpura Expressway Project" or REP.

Different route alternatives were studied during the FS conducted in 2016 and a final trace was selected to conduct detailed investigations. As per the final trace of the FS, the proposed expressway is to start from Kahathuduwa Interchange of Southern Expressway and end at Pelmadulla connecting with Pelmadulla – Nonagama (A018) road.

The expressway had a length of about 74 kilometers (km) and consisted of three (3) stages as;

- Phase I – Southern Expressway (Kahathuduwa) to Ingiriya, (Ch. 0+000 km – Ch. 26+300 km)
- Phase II – Ingiriya to Ratnapura (Ch. 26+300 km – Ch. 52+500 km)
- Phase III – Ratnapura to Pelmadulla(Ch. 52+500 km – Ch. 73+900 km)

As per the National Environmental Act (NEA) regulations, REP was categorized as a Prescribed Project so that RDA conducted and Environmental Impact Assessment (EIA) for the trace selected under the FS of 2016 seeking the environmental approval from Central Environmental Authority (CEA) who is the Project Approving Agency (PAA). However, due to location of the major parts of the Phase II and III of the expressways within the Central Fragile Area (CFA) of the country and considering the adverse impacts to the land use changes, possible urbanization around the interchanges in the CFA and impacts due to construction of tunnels, National Physical Planning Department (NPPD) being a key stakeholder of the project was not in a position to grant their consent for the EIA for Phase II and III of REP. As a result, the environmental approval was granted only for the Phase I of the REP in 2021.

In 2020, RDA under the guidance of Ministry of Highways took actions to revisit the FS in order to explore alternative routes for the Phase II and III of the REP having the least impacts to the CFA and avoiding tunnels, and accordingly University of Moratuwa (UOM) was entrusted the work. As a result, UOM conducted a new FS and proposed a new trace having comparatively less impacts to the CFA and also avoiding tunnels. The new trace proposed by the UOM for the Phase II is deviating about 19km from the trace selected under the FS of 2016 and no change in Phase III.

The location map of the new trace is presented in figure 1.1 below.

As per the new trace, length of the Expressway is 76+225 km and phases for the REP were revised as follows.

- Phase I – Southern Expressway (Kahathuduwa) to Ingiriya, (Ch. 0+000 km – Ch. 25+000 km)-Work already started.
- Phase II– Ingiriya to Kiriella (Ch. 25+000 km – Ch. 44+000 km)(diverted section- End Ch. 44+000 km can be changed)
- Phase III– Kiriella to Pelmadulla (Ch. 44+000 km – Ch. 76+450 km) (Ch. 44+000 km and end Ch. 76+450 km can be slightly changed)

Therefore, in order to assess the environmental and social feasibility of the new trace and also to obtain the environmental approval from the CEA, RDA is planning to conduct a new EIA for the Phase II. Subsequently, the Basic Information Questionnaire (BIQ) was submitted to the CEA and the Terms of Reference (TOR) for the EIA was received from CEA on 04th October 2021 through the letter 08/EIA/Trans/07/2014 Vol. V

(Location map of the selected trace for Phase II and III of REP and TOR are attached).

Environmental and Social Development Division (ESDD) of RDA was assigned to conduct the EIA for Phase II and III on behalf of the Project Management Unit (PMU) of RDA in compliance with the TOR issued by the CEA, and to obtain the environmental approval from the CEA.

ESDD has planned to complete the EIA in combining with the specialists hired for the specialized areas required for the EIA. Accordingly, ESDD shall obtain the expert inputs of an Environmental Economist (EE) who will work in association with the Team Leader (TL) of the EIA in order to complete the EIA and to obtain the environmental approval.

This document presents the TOR for the services and inputs required from the Environmental Economist in carrying out the EIA study, preparation of EIA Report (EIAR) and obtaining the environmental approval from CEA.

2. Objectives of the TOR

- To specify the qualifications and experience required by the EE in order to qualify for the said assignment,
- To specify the scope of work of the Extended Cost Benefit Analysis under Chapter 6 of the EIA in relation to conducting the EIA study, preparation of EIAR and obtaining the environmental approval from CEA,
- To describe the requirements stipulated in the EIA TOR forwarded by CEA (Ref. Appendix).and requirements of other stakeholder agencies.
- To indicate the assistance provided by the RDA (ESDD and PMU) for the study during the assignment,
- To indicate the time allocation for the assignment and the financial disbursement related to the assignment of Environmental Economist.

3. Required Qualifications of the Environmental Economist

- PhD/M.Sc. in Economics/Environmental Economics ,Natural Science, Environment Management, Environmental Engineering, or related field Minimum of 8 years proven experience in carrying out the Extended Cost Benefit Analysis for the Environmental Impact Assessments (EIA) for road development and other projects which were approved by CEA.

4. Scope of the Service

In general, the Environmental Economist of the EIA to carry out the Extended Cost Benefit Analysis (ECBA)

A cost-benefit analysis approach should be used to estimate the economic worth of the project. The methodology should involve the following steps:

- Obtaining the project objectives and scope from RDA
- Defining the project options which form the basis of the economic evaluation
- Defining the base case against which the project options are compared
- Identifying the incremental costs and benefits that might be expected in moving from the base case to each of the options
- Obtain related traffic study results of the options studied by RDA
- Identifying and agreeing the core parameters of the evaluation (e.g., time scale, base year for prices to calculate present values, discount rate)
- Where possible, quantifying the costs and benefits over the expected lifecycle and discounting future values to express them in current equivalent values
- Building the Cost Benefit Analysis (CBA) model using discounted cash flow techniques over the evaluation period and generating performance measures including,
  - Amalgamating Environmental Costs(e.g., fauna and flora loss, habitat fragmentation, degradation, in the riverine ecosystem and the other areas associated to Central Fragile Area) and Social Costs (Land acquisition and resettlement cost etc.) to the CBA
  - Amalgamating Environmental and Social Benefits (e.g., emission reduction) to the CBA.
  - Computing Net Present Value (NPV).
  - Computing the Benefit Cost Ratio (BCR).
  - Computing the Internal Rate of Return (IRR).
- Testing the sensitivity of these performance measures to changes in the underlying assumptions utilized.
- Confirmation of the validity of the computed parameters to show that the project is economically and environmentally feasible.

To facilitate the above scope of work the EE will be provided with following facilities by ESDD and PMU

- The final trace of the Phase II and III of REP in KML formats and hard formats (with adequate resolution) with defined start/ end points; locations of links, entry and exit ramps, tall gates etc.
- Feasibility report or any other relevant report which includes following information;
  1. Design and construction related information including different options considered for construction of the highway (alternative route, design, technology and construction techniques),
  2. Description of the project including objective of the project, funding source, financial and economic analysis (where the economic analysis should include the environment cost), timing and possible phasing of the project,
  3. Quantities of material (including cement, sand, soil and aggregate) and possible sites of extraction with proximity to the project site,
  4. Quantity of construction waste that would be generated and potential location/s of disposal (With the concurrence from landowners and local authorities).
- All relevant maps or row data to prepare maps as indicated and required to fulfill the information requirement of the EIAR.
- Relevant chapters/sections on Social Impact Assessment as required in the CEA TOR for the EIA

- A complete report on public and stakeholder consultation and awareness programs conducted by ESDD and PMU,
- Information on baseline condition of air, water and noise parameters with respect to national standards,
- Reports on hydrological impact assessment, studies on landslide impacts, noise model report etc.
- Relevant chapters/sections of the EIAR on ecological assessment as required in the CEA TOR for the EIA including baseline condition, impacts to the ecological environment and feasible mitigation measures to avoid/reduce or mitigate the impacts
- Consents from key stakeholder agencies as required in the CEA TOR for the EIA
- And any other information related to preparation of EIAR as requested by EE.

Immediately after signing the agreement with RDA, the prospective Environmental Economist should study all available information provided by RDA or obtained by other sources and provide a list of further details in case he needs, to carry out the ECBA and to prepare Chapter 6 of the CEA ToR related to Ruwanpura Expressway Phase 2 and 3.

5. Time Schedule

Time duration for the said assignment is 4 (four) calendar months from the date on which the contractual agreement is signed between both parties (RDA and EE), unless otherwise extended due to unavoidable externalities as mutually agreed by both parties.

Environmental Economist (EE) who will work in association with the Team Leader (TL) of the EIA may issue the details to suit with the level of the process of the EIA in order to complete the EIA within the given time line.

6. Expected deliverables

Following deliverables are expected from the Environmental Economist during the specified time period.

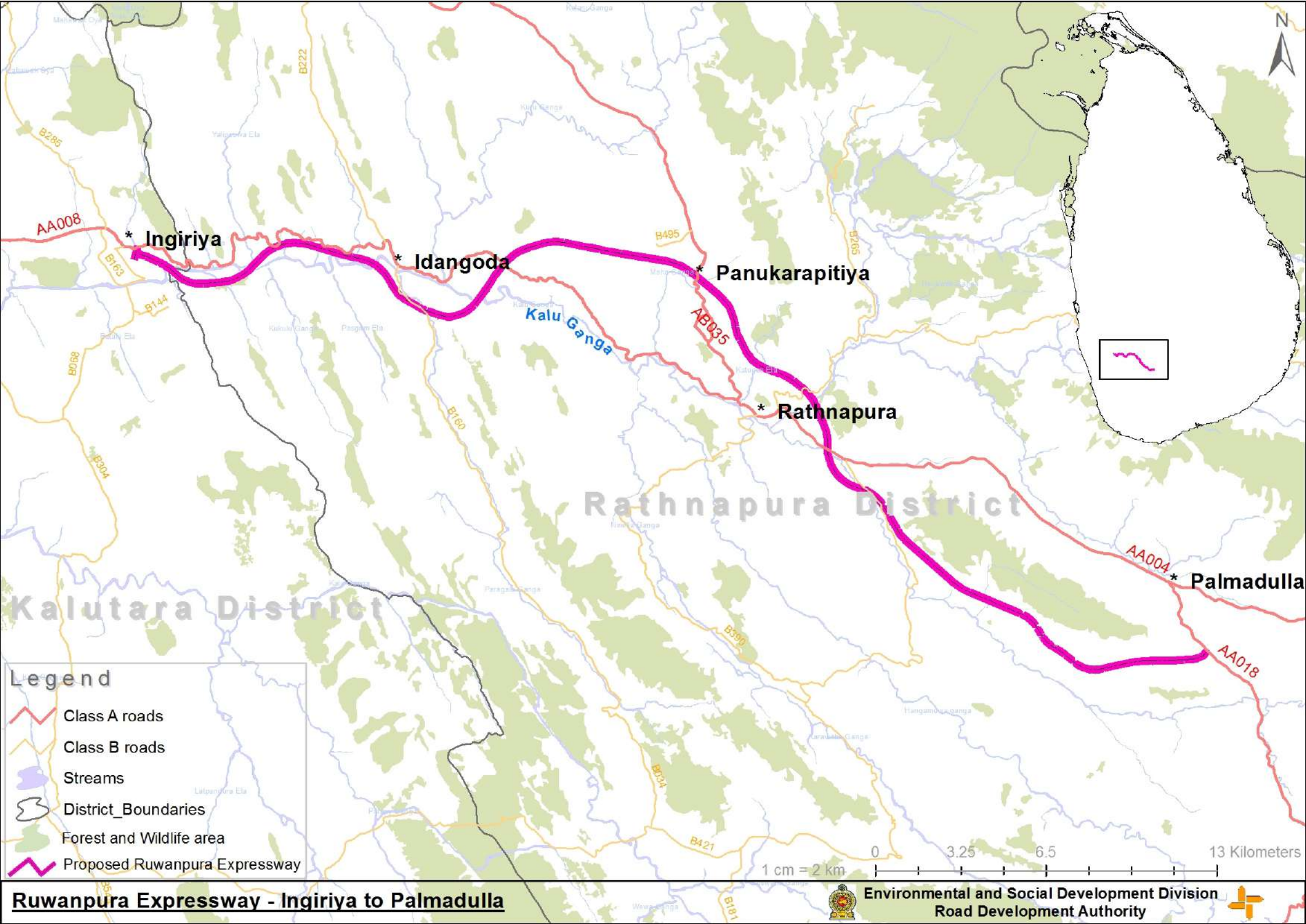
- Chapter 6 (ECBA) for Draft final EIA.
- Chapter 6 (ECBA) - Final EIA after incorporating CEA and public, stakeholder comments.
- A summary report of activities completed when submitting a claim for payment. This summary report shall include key activities carried in completion of the task for which the claim is made.
- The Consultant is expected to exercise with utmost care during the process to avoid any accidents at site and any unfair situation and if the Consultant is found responsible for any faults/conflicts, no claims will be accepted by RDA on this regard.

7. Payments

Payments shall be made to the Environmental Economist as detailed in the table below.

Task	**Outputs/Reports**	**Tentative duration to complete the task**	**Percentage of payment eligible**	**Cumulative Payment Ceiling (% of Total cost of the Assignment)**
Task 1	Advance payment	**After the contractual agreement**	**5%**	
Task 2	Collection of relevant secondary data and compilation	**2 weeks**	**45%**	**50%**
Task 3	Completion of Draft Final EIAR and submission to ESDD/RDA	**7 weeks**	**20%**	**70%**
Task 4	Presenting the EIAR to TEC	**1 day**	**5%**	**75%**

Task 5	Attending to comments, requests made by TEC and submission of Final EIAR to ESDD/RDA	**3 weeks**	**10%**	**85%**
Task 6	Attending any public comments and attending to queries made by public during public disclosure	**1.5 months**	**5%**	**90%**
Task 7	Addressing public and stakeholder comments made during public disclosure and technical evaluation and preparation of the addendums to the EIAR	**3 weeks**	**10%**	**100%**



Ruwanpura Expressway - Ingiriya to Palmadulla

Environmental and Social Development Division
Road Development Authority