Change of the location of the interchange proposed near Dandeniya to Aparekka of Extension of Southern Expressway from Matara to Mattala Project

Supplemental Environmental Impact Assessment (Final Report)

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Volume I – Main Report

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Environmental and Social Development Division
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Executive Summary

Background of the project

Sri Lanka is one of the countries that have the densest road network in the South Asia. Even though trunk and main roads handle most of the transport demand, the Government of Sri Lanka (GOSL) has a plan to construct an Expressway Network connecting each province to the main business and administrative capitals by implementing the National Highway Development Program developed by the Road Development Authority (RDA).

The Extension of Southern Expressway from Matara to Mattala (Hambanthota) is one of the priority projects of the National Highway Development Program which aims to facilitate connection of southern area with other provinces of the country through the expressway network in order to develop the southern area by lodging varies industries as well as to develop underutilized Seaport and Airport. Thereby, it is expected to increase the socio-economic development of the Southern Province by increasing transportation efficiency.

Construction of the Extension of Southern Expressway Project (ESEP) is subdivided into four sections; Section 1 from Matara to Beliatta, Section II from Beliatta to Wetiya, Section III from Wetiya to Andarawewa and Section IV from Hambanthota Sea port to Mattala Air Port via Andarawewa.

Two separate Environmental Impact Assessments (EIA) were carried out for ESEP. Sections, I, II and III, was covered by a single EIA and separate report was prepared for Section IV of the ESEP. And environmental approval was granted for the project on 25th April 2014. As per the original proposal for which the approval was granted, Matara - Beliatta section (Section 1) of ESEP starts from Godagama at Matara and ends at Kahawatta in Beliatta, with an approximate length of 30km, and three interchanges to be developed at Godagama, Dandeniya and Beliatta. However, during the detail designs it was found that construction of the second interchange at Dandeniya is not feasible therefore after several discussions, RDA decided to shift the second interchange from Dandeniya (18+400 km) to Aparekka at 12+900 km. This decision was taken after revealing the fact that the extent of land acquisition and the number of affected houses for Dandeniya Interchange are higher than that of the proposed Aparekka Interchange.

With respect to the environmental safeguards considerations of this deviation, construction of Aparekka Interchange is a supplementary proposal, which was not covered under the original EIA. Subsequently, RDA was requested to conduct a Supplemental Environmental Impact Assessment (SEIA) for the said deviation.

Objectives of the proposed alteration of the interchange are;

- To construct the second interchange of ESEP at the most environmentally and socially feasible location
- To provide better interchanging facility between the Southern Expressway and the existing road network
- To provide access to the expressway network from Aparekka, Yatiyana, Thihagoda, Kambrupitiya, and Hakmana areas
- To enhance the socio-economic development of Aparekka area and Matara District
Need of the project

Construction of the second interchange at Dandeniya will create comparatively higher negative impacts to the existing social set up due to land acquisition and resettlement. 12ha of additional lands are to be acquired if the interchange will be constructed at Dandeniya which will demolish 16 more houses compared with that of Aparekka. In addition, access roads to the Dandeniya area rural nature and narrow roads can be observed. Therefore, in order to facilitate the accessibility to the interchange, the local road network needs to be widened and upgraded which will also result land acquisition and resettlement of people living along such roads. However, in Aparekka, proposed interchange directly serve Meddewatta – Kekanadura - Yatiyana (B284) road which is an existing B class road and need of improvement to the existing road network will be comparatively low. Further Yatiyana, Tihagoda, Kambrupitiya, and Hakmana areas will be conveniently connected to the expressway network along the Meddewatta – Kekanadura - Yatiyana (B284) Road. Furthermore, the topography of Dandeniya is of rolling and hilly and construction of the second interchange at Dandeniya will need more earth works and stability of slopes will be an issue. Therefore, project induced impacts due to construction activities such as earth works, clearing of vegetation, cutting and filling will be comparatively server in Dandeniya.

Therefore, with respect to environmental and social safeguards considerations, construction of the second interchange at Aparekka will comparatively be more feasible than that of Dandeniya.

Supplemental EIA report

SEIA study was conducted to address following objectives;

i) To study the details of the proposed alteration, alternatives considered and the details of the new interchange at Aparekka

ii) To examine the existing physical, ecological and social environments

iii) To determine project induced positive and negative impacts on the existing environment during design, construction and operational stages of the construction of the interchange at Aparekka.

iv) To propose effective mitigation measures to avoid/ minimize the identified adverse impacts while enhancing the beneficial impacts which would be incorporated in to project cycle

v) Preparation of an Environmental Management Plan (EMP) and a monitoring mechanism to ensure that proposed mitigation measures are effectively implemented

The study area for the SEIA includes the area within proposed Right of Way (ROW) and a 100m corridor from the boundary of the ROW. However, the study area was further expanded where and when necessary in order to study significant impacts which may spread beyond the defined study area. The SEIA was conducted by Environmental and Social Development Division (ESDD) of RDA.

Hydrological study for the Aparekka interchange was carried out by Skill International Pvt Ltd in May 2017 and the report was approved by the Sri Lanka Land Reclamation and Development Corporation (SLLRDC).
ESDD of RDA conducted a separate studies on ecology, measurement of ground water and surface water quality, existing noise levels and a social assessment including socio-economic survey, stakeholder consultation and information disclosure.

**Details of Proposed Alteration**

The proposed interchange at Aparekka falls within Matara District of Southern Province of Sri Lanka and is within Thihagoda and Devinuwara Divisional Secretariat Divisions.

Approximate length of the proposed Aparakka interchange is 1.5km and the interchange consists of the main road and six ramps (A – F). The main road within the interchange will be constructed as a via duct and will be of four traffic lanes. The width of the cross section of the main road will be approximately 24m. Other than the merging sections of the ramps with the existing roads, the rest of ramps are also proposed to be elevated. Approximately 22,000 m$^2$ of ground area will be filled for the merging sections. As discussed in detail in the section 3 below, the project area is located within the flood prone area of Nilwala River and around 3 – 3.5m flood level having 100 year return period is experienced to the area. Therefore due consideration has been given to the hydrological aspect in designing the interchange. Subsequently the interchange will be constructed as a via – duct except the approaches where the toll plaza are located. In addition to the via – duct, hydrology study report recommends to introduce box culverts in order to facilitate a smooth drainage across the interchange.

In general most of the ramp roads are located in a paddy field area and ground treatment is one of the major activities. Removal and replacement is the proposed ground treatment method for filling sections while construction of viaduct, spun pile embankment, embankment filling, structure work, pavement structure, construction of toll plaza building are the other key construction activities of the interchange with other incidental activities.

All the construction works will be carried out while complying the approved Environmental Management Plan and work methodologies approved by the Engineer (The Supervision Consultant of the project). In general following activities will be undertaken under the project.

Soil required for filling shall be extracted from the ROW itself of the main trace of the ESEP while the requirement of the rock will be fulfilled from the Lakmal Quarry at Dandeniya.

**Description of the Environment**

With respect to climatic divisions of Sri Lanka, the entire project area belongs to low country - Intermediate zone of Sri Lanka. This region receives a mean annual rainfall between 1750 to 2500mm with a short and less prominent dry season. On the other hand, the project area falls in to IL1a agro-ecological zone.

The general topography in the project area could be classified as rolling, undulating and flat. Topographical variation over the interchange is marginal. Generally the interchange area could be defined as a flat which lays between 6 to 62 m above MSL.

Four types of land use patterns could be observed in the project area which includes cultivated paddy, home gardens and residential areas, road side and irrigation canal.
The project area is located within upper catchment of Nilwala River and the drainage pattern of the project area is mainly governed by Kanduwela Ela (a stream) which is a tributary of Nilwala River. The drainage pattern of the Kanduwela stream can be described as a dendritic type which has a south – west directed flow towards the Nilwala River. A per the Hydrological study carried out for the proposed interchange, the project area is prone to floods due to backwater effect of the Nilwala River. Due to the back water effect, Kanduwela stream overflows creating flood conditions, which inundate the paddy lands in the vicinity of proposed interchange. However it was found that the highlands around the interchange are not affected by floods. As per the hydrological study, around 2.5 – 3m MSL flood level was recorded in the flood event occurred in year 2003 around the project area. On the other hand, it has been calculated in the hydrological report that the 100 year flood level at the Aparekka Interchange ranges between 3 – 3.5 mMSL. Flood in May, 2017 is the most recent flood event occurred in the project area and it was mentioned that the paddy land around the interchange was inundated for about 1m (public consultation).

Paddy lands existing in the project area act as retention areas and runoff from the surrounding gets retained during rains. Therefore the project area plays a major role as retention area of the Nilwala River. And 3.91 ha of such paddy lands will be acquired for the interchange however only the areas allocated for toll plaza at Ramp C and Ramp D/E will be filled.

As mentioned above, drainage canal which drains to Kanduwela stream is the waterway located across the project area. The capacity of the canal is currently reduced due to sediment deposits on the canal bed and growing of vegetation on the banks however the canal does not over flow during normal weather conditions.

As found in the public consultation, well water is commonly used for domestic requirements however now there is trend of shifting towards the pipe borne water supplied by National Water Supply and Drainage Board (NWS&DB). Several dug wells which are major sources for domestic wash and drinking water can also be found within project offsite locations. In order to identify the water quality of ground water resources, monitoring of ground water quality was conducted by the staff of ESDD of RDA under this study. Accordingly the ESDD carried out a water quality monitoring program during six month period from January to June 2017 to assess physical chemical parameters. The test results of the ground water were compared against the Sri Lanka Standard (SLS) for the portable water quality, SLS-614 Part 01 and 02 and results are within the permissible levels.

Surface water quality of the surface water bodies of the project area was measured by the study team of ESDD of RDA. Accordingly the ESDD carried out water quality monitoring program during six month period from January to June 2017 to assess physical chemical parameters. Out of the results, pH values of the ground water samples of wells are slightly lower than that of lower value of the maximum permissible level (6.5) as defined in Sri Lanka Standards (SLS) therefore these wells represent slightly acidic condition.

Ambient air quality is periodically measured at the premises of Purana Viharaya in Kakulangoda as part of the Environmental Monitoring Plan of the main trace of Extension of Southern Expressway Project which is approximately 1km away from the Aparekka Interchange and the measured data provides the baseline status of the air quality of the project area of the interchange. Measured values of air quality parameters at the Kakulangoda Purana Viharaya have not exceeded the
particular maximum permissible levels as specified in the National Environmental (Ambient Air Quality) Regulations, 1994 under the National Environmental Act No. 47 of 1980.

As per gazette notification no. 924/12 dated 21.06.2013 the project area falls in to a Low noise area since the interchange belongs to the Devi Nuwara and Thihagoda Pradeshiya Sabha. The project area is a mixed residential area consisting of residences and commercial establishments. Other than temples, noise sensitive receptors such as school or hospital are not located within the project area. Further, such locations are not found nearby to plant sites and yards. Three temples namely Kakulangoda Purana Viharaya, Thunbodiya temple and Uggoda temple are located within the one kilometer radius of the interchange which can be considered as noise sensitive receptors.

The noise levels at measured location in the project area vary between 54 – 72.5 dB and measured high levels could be due to the noise contribution by ongoing construction activities of the main trace, on-road vehicular, domestic and commercial activities in the area.

The terrestrial habitat in the proposed project site and surrounding habitats are predominantly man made and the fauna mainly comprised of common species that are found in habitats which are associated with modified habitats. A total number of 108 species belonging to 66 families recorded from the study area during the study. Among them, two species of dragonflies, one species of reptiles, two of birds and one species of mammals are found to be endemic.

A total number of 138 plant species belonging to 52 families recorded from the study area during the field study and two of them are endemic species.

None of the fauna or flora species recorded under the study are nationally or globally threatened.

Aparekka interchange was planned to be constructed at Thihagoda and Devinuwara Divisional Secretariat Divisions (DSDs) of Matara District. Matara district is in Southern province and its total land area is 1282.5 km². As per the Department of Census and Statistics, in 2016 estimated mid-year population of Matara district was 845,000 persons of which 405,000 are males and 440,000 are females.

In 2012 the total population in Devinuwara DS division was 48,253 persons with 22,900 males and 25,353 females. In the same year, Thihagoda DS division has recorded a total population of 33,535 with 15,907 males and 17,628 females.

The proposed interchange was in five Grama Niladari (GN) divisions, namely Uduwa East, Kadawedduwa East, Kadawedduwa West, Palle Aperakkka and Uda Aparekka GN divisions. The total population of these GN divisions in 2012 was 5,606 persons with 2,621 males and 2,985 females.

In Matara district majority of population was Sinhalese, which is 94.3%. Moor was the second highest with 3.1%. Regarding the ethnicity of population in DS divisions, in Devinuwara 98.4% were Sinhalese and 0.2% were Sri Lankan Tamils while in Thihagoda DS division, almost all were Sri Lankans.

In May 2017, Environment and Social Development division of RDA carried out a Socio Economic Survey for the project area of Aparekka interchange of Extension of Southern Expressway project. A total of 42 households were surveyed and a population of these households was 171 of which 77 are males and 94 are females. Based on the survey results, the total population of the project area is
Most of the children in the area go to this school while some others go to schools in Matara town area. Survey data shows that 15.8% of the total population have passed G.C.E. (O/L) and 18.1% have passed G.C.E. (A/L). About 13% of population has completed University education.

As per the Department of Census and Statistics (2016) 39.4% of the employed population in Matara District is engaged in the Service sector, 37.4% is engaged in the agricultural sector and 23.3% is engaged in the industrial sector.

77 employed household members were included in the surveyed sample. Out of 77 employed population, 28.6% are Government sector workers, 10% engaged in private sector employments, 9% engaged in business activities and 5% are in agricultural sector.

During the field survey, no archeologically important places were identified within or close to the project area. However, a Buddha statue located in Hingurupathwala junction will be affected and need to be relocated due to construction of this interchange. Three temples, namely; Kakulangoda Purana Viharaya, Thunbodhiya temple and Uggoda temple are located within the one kilometer radius of the project.

**Anticipated Environmental Impacts and proposed mitigation measures**

It is anticipated that constructions of the Aparakka interchange will generate impacts on the existing natural and social environments during preconstruction, construction and operational stages of the project. Feasible mitigation measures were suggested based on environment best practices to minimize the adverse impacts (or manage to acceptable limits) while enhancing the beneficial impacts of the project. Anticipated impacts and proposed mitigation measures are summarized below.

### During pre-construction and construction stages

<table>
<thead>
<tr>
<th>Adverse impacts</th>
<th>Construction of a major portion of the interchange as a via duct and construction of filling sections with necessary drainage provisions as per the Hydrological study report for the Aparekka interchange by Skills International in 2017 and implementation of recommendations by SLLRDC will minimize the impacts on natural drainage pattern of the area.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood impacts</td>
<td>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. 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 LA.</td>
</tr>
<tr>
<td>Impacts on soil -Erosion, siltation and sediment runoff</td>
<td>Bentonite should be disposed only in locations which are approved by CEA and SLLR&amp;DC and specification given by such authorities should be strictly followed.</td>
</tr>
<tr>
<td>-Impacts due to bentonite</td>
<td>Operators of all construction vehicles should be instructed not to travel outside the construction area there by avoid compacting soil outside the project area.</td>
</tr>
</tbody>
</table>
### Contamination of soil

Storing and placing construction material on an impervious surface will minimize any contamination of soil by chemicals. Dip trays should be kept at fuel dispensers to avoid any spilled fuel infiltration the ground.

### Impacts on ground and surface water quality

Construction material and chemicals should be stored in protected compartments/enclosures and handled carefully to avoid spills. Essentially such enclosure should be built above the ground level with an impervious floor and roofing to avoid any rain water spilling over such material. Waste containers and material should be disposed only in locations approved by CEA and LA. Locations for labor camps should be approved by engineer and comply with guidelines/recommendations issued by the LA and CEA.

### Impacts on air quality

All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations, National environmental air emissions fuel and vehicle standards. The hot mix plant be sited in accordance with CEA guidelines and operated with an EPL. The hot mix plants shall be fitted with the requirements of the relevant current emission control legislation.

### Impacts due to noise and vibration

All heavy equipment and machinery shall be fitted in full compliance with the national regulation, Noise Control Regulations. Reasonable compensation to be paid to those houses that are damaged due to vibration. Contractor should do a pre-condition survey of structures for cracks. Measuring of cracks during construction period and after completion of construction. Adjusting construction activities which cause vibration to permissible level. Providing trenches and barriers for the critical areas.

### Ecological Impacts

- Loss of habitats and vegetation
- Disturbance to animals
- Spreading of invasive species

The low-lying lands should not be used as waste disposal sites and also should not be allowed to be reclaimed or to be encroached. A compensatory tree planting program should be introduced to the project area. The culverts constructed at regular intervals to mitigate the risk of inundation of low lying areas will also serve as passages for small mammals, reptiles and amphibians and minimize the risk of being run over and collision with vehicles and minimize the fragmentation of populations as well. 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. Using native floral species when replanting should be carried out to prevent the risk of new invasion to the project area.

### Socio-economic Impacts

- Land use impacts
  - Impact on fertile agricultural lands
  - Impacts on infrastructure

The compensation for affected private land and properties will be paid at market prices based on the Land Acquisition Act (LAA) and National Involuntary Resettlement Policy (NIRP). All construction operations that are carried out close to utility lines will be supervised by site inspectors. Clear instructions will be given to operators of trucks and machinery having arms and booms to avoid damages to utility lines. Any accidental damage to such utility lines will be repaired by the contractor under supervision of the service provider.
<table>
<thead>
<tr>
<th>Public and worker Health and Safety</th>
<th>Contractor shall take necessary actions to prevent breeding of mosquitoes at places of work, labour camps and store buildings. Proper barricading, night time lighting will be placed around the construction sites. Labour camps shall be provided with adequate and appropriate facilities for disposal of sewerage and solid waste. In addition to Locations selected for labour camps should comply with guidelines/ recommendations issued by the CEA/Local Authority (LA). Construction labourer’s camps shall not be located within 200m from waterways, near to a site or premises of religious, and school. 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. Providing awareness program related to HIV/Aids and other STDs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of access</td>
<td>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.</td>
</tr>
<tr>
<td>Operational stage</td>
<td></td>
</tr>
<tr>
<td>-Blocking of drainage paths</td>
<td>Regular clearing and maintenance of all bridges and culverts and all drains within the ROW should be done to reduce the chances of failures and blocking due to debris. Maintenance manual of RDA should also be followed to maintain the road drainage.</td>
</tr>
</tbody>
</table>
| -Impact due to noise during operation phase | The impacts related to increased level of noise during the operation stage can be minimized by adopting following mitigation measures:  
- Erection of noise barriers shall be considered based on the public complaints on the noise impact during operational phase. The complaints on the noise impact shall be evaluated using a mathematical model and noise barriers shall be erected based on the recommendations of the model.  
- Enforcement of regulations and also making awareness of drivers of the highway shall be implemented with the help of the Police to reduce the noise generation from vehicles. |
| Air quality impacts | Road surface shall be regularly cleaned in order to remove dust and tire debris. Trees planted during the construction phase shall be well maintained in order to provide a wind barrier to the interchange which will reduce blowing of particles accumulated on the road surface. Air quality deterioration due to vehicular emissions from silences during the operational stage can be minimized by strict enforcement of national regulations with the help of Local Police. |
| Animal collisions | Animal movements shall be facilitated across the expressway since the main trace will be elevated at the interchange. Still, continues supervision shall be ensured to avoid animals entering the expressway along the ramps of the interchange. |
Environmental Management and Monitoring Program

The Environmental Management Plan (EMP) was developed to avoid/ minimize the adverse impacts to the physical, biological and social environments during preconstruction, construction and operational stages of the project. EMP will be a part of the bid documents and implementation of the EMP will be the responsibility of the contractor/s except during the operational phase. The Environmental Monitoring Program (EMoP) as required in CEA TOR as well as in the Environmental Safeguards Manual of RDA is developed based on the project cycle. During the pre-construction phase it is important to measure/monitor following aspects which provide baseline data on the existing environment which can be used for comparison purposes during construction and operational phases. Such a comparison will reflect effectiveness of the EMP and help to revise it to rectify any shortcomings that will cause any adverse impacts.

Public Consultation, Information Disclosure and Grievance Redress Mechanism

The study team conducted consultation with government officials related to the interchange and carried out public consultation in the radius of 1 km of the project area. Stakeholders expressed that inclusion of Aparekka interchange to the highway network will develop the area. However, they also mention about the loss of properties and livelihoods due to construction and requested fair compensation for affected people. Further, the flooding on rainy days, dust, noise and vibration were mentioned as possible impacts during construction and has requested proper mitigation measures. Grievances from the affected people on social and environmental issues during project implementation will be addressed mainly through the Grievance Redress Mechanism (GRM) which is to be formed using existing local administrative system. The proposed GRM consists of three levels. This will include National Level, Regional (District) Level and Divisional Level Grievance Redress Committees (GRC).

Conclusions and Recommendations

The proposed Extension of Southern Expressway Project will significantly reduce the travel time between administrative and commercial capitals of the country and Hambanthota and relieve the traffic congestion in the A002 road within the section from Matara to Hambantota. The second interchange for ESEP was initially proposed at Dandeniya however, this creates comparatively higher impacts due to land acquisition and resettlement. Therefore, during the detailed design it was proposed to shift the second interchange to Aparekka where the impacts are comparatively low. Therefore in compliance with the National Environmental Act, RDA is supposed to conduct a SEIA for the proposed alteration.

During the SEIA study, it was explored that the proposed interchange lies on low land area of "Kanduwela Ela" which is influenced by the back water effect of River "Nilwala Ganga". However further it was found that flood impact is not significant in the project area. Nevertheless it is recommended to adhere to the guidelines given in the hydrology report and comments given by SLLRDC in order to enhance smooth surface water hydrology and to reduce the flood impacts. The proposed interchange do not encroach any protected area or unique habitats of fauna and flora.

This project will also affected two houses & seven shops, hence the project intend to provide adequate compensation for the acquired properties.
Other project induced environmental and social impacts as identified in the study are temporary in nature during the construction phase and could be minimized by effective implementation of Environmental Management Plan and frequent monitoring as per the Environmental Monitoring Plan.

Construction of the interchange will not pose any significant impact on physical, hydrological, biological and social environment. Implementation of the EMP proposed in this SEIAR will minimize any adverse impacts during construction and operational stages. Construction of Aparakka interchange of Extension of Southern Expressway will generate positive socio economic impacts while the outcome will ultimately enhance increased transportation efficiency of the country while achieving a sustainable development.
CHAPTER 1: INTRODUCTION

1.1 Background of the project

Sri Lanka is one of the countries that have the densest road network in the South Asia. Even though trunk and main roads handle most of the transport demand, the Government of Sri Lanka (GOSL) has a plan to construct an Expressway Network connecting each province to the main business and administrative capitals by implementing the National Highway Development Program developed by the Road Development Authority (RDA).

The Extension of Southern Expressway from Matara to Mattala (Hambanthota) is one of the priority projects of the National Highway Development Program which aims to facilitate connection of southern area with other provinces of the country through the expressway network in order to develop the southern area by lodging varies industries as well as to develop underutilized Seaport and Airport. Thereby, it is expected to increase the socio-economic development of the Southern Province by increasing transportation efficiency.

In the socio economic development of a country, a transport infrastructure is considered as a basic need. On completion, this expressway will provide access to existing roads of the province at the interchanges. Interchanges are designed normally about 5km interval based on the main roads (category A or B) of the network. In addition, diversion of the traffic is the main objective by introducing the interchanges to the Expressway. This will encourage the socio economic development by providing more convenient access and reduced travel time as well as avoiding local traffic jams.

Construction of the Extension of Southern Expressway Project (ESEP) is subdivided into four sections; Section 1 from Matara to Beliatta, Section II from Beliatta to Wetiya, Section III from Wetiya to Andarawewa and Section IV from Hambanthota Sea port to Mattala Air Port via Andarawewa.

Two separate Environmental Impact Assessments (EIA) were carried out for ESEP. Sections, I, II and III, was covered by a single EIA and separate report was prepared for Section IV of the ESEP. EIA for Section I, II and III was carried out by Environmental and Social Development Division (ESDD) of RDA in year 2013 to fulfil the requirements stipulated in the National Environmental Act (NEA) for approving of projects. And environmental approval was granted for the project on 25th April 2014 through a letter No. 08/EIA/TRANS/04/2013 by Central Environment Authority (CEA). As per the original proposal for which the approval was granted, Matara - Beliatta section (Section 1) of ESEP starts from Godagama at Matara and ends at Kahawatta in Beliatta, with an approximate length of 30km, and three interchanges to be developed at Goadagama, Dandeniya and Beliatta. However, during the detail designs it was found that construction of the second interchange at Dandeniya is not feasible therefore after several discussions, RDA decided to shift the second interchange from Dandeniya (18+400 km) to Aparekka at 12+900 km. This decision was taken after revealing the fact that the extent of land acquisition and the number of affected houses for Dandeniya Interchange are higher than that of the proposed Aparekka Interchange. Further it was found that serving the connectivity to the existing road network is also more convenient at the Aparekka Interchange compared with Dandeniya.
With respect to the environmental safeguards considerations of this deviation, construction of Aparekka Interchange is a supplementary proposal, which was not covered under the original EIA. Hence, in compliance with the NEA, RDA forwarded separate application to CEA in order to obtain a fresh environmental approval for the new interchange at Aparekka. Subsequently, RDA was requested to conduct a Supplemental Environmental Impact Assessment (SEIA) for the said deviation.

And this document presents the findings of SEIA carried out in order to obtain a fresh approval for shifting of the second interchange of ESEP to Aparekka which complies the Terms of Reference (TOR) issued by CEA (Appendix 1.1).

1.2 Objectives of the proposed alteration and justification

1.2.1. Objectives of the proposed alteration

**Broad objective**

- To enhance the economic and social development of the country by providing efficient and safe highway/road network while preserving the nature.

**Specific objectives**

- To construct the second interchange of ESEP at the most environmentally and socially feasible location
- To provide better interchanging facility between the Southern Expressway and the existing road network
- To provide access to the expressway network from Aparekka, Yatiyana, Thihagoda, Kambrupitiya, and Hakmana areas
- To enhance the socio-economic development of Aparekka area and Matara District

1.2.2. Justification of the proposed alteration

As given in the table 1.1 below, construction of the second interchange at Dandeniya will create comparatively higher negative impacts to the existing social set up due to land acquisition and resettlement. 12ha of additional lands are to be acquired if the interchange will be constructed at Dandeniya which will demolish 16 more houses compared with that of Aparekka.

**Table 1.1: Comparisons of Land extend and affected houses due to Dandeniya Interchange and Proposed Aparekka Interchange.**

<table>
<thead>
<tr>
<th>Candidate location for the second interchange</th>
<th>Additional Land area to be acquired for the interchange. (Hectares)</th>
<th>Additional number of houses affected beyond the expressway boundary, due to construction of the Interchange</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dandeniya</td>
<td>18.15</td>
<td>25</td>
</tr>
<tr>
<td>Aparekka</td>
<td>6.15</td>
<td>9</td>
</tr>
</tbody>
</table>
In addition, access roads to the Dandeniya area rural nature and narrow roads can be observed. Therefore, in order to facilitate the accessibility to the interchange, the local road network needs to be widened and upgraded which will also result land acquisition and resettlement of people living along such roads. However, in Aparekka, proposed interchange directly serve Meddewatta – Kekanadura - Yatiyana (B284) road which is an existing B class road and need of improvement to the existing road network will be comparatively low. Further Yatiyana, Tihagoda, Kambrupitiya, and Hakmana areas will be conveniently connected to the expressway network along the Meddewatta – Kekanadura - Yatiyana (B284) Road.

Furthermore, the topography of Dandeniya is of rolling and hilly and construction of the second interchange at Dandeniya will need more earth works and stability of slopes will be an issue. Therefore, project induced impacts due to construction activities such as earth works, clearing of vegetation, cutting and filling will be comparatively server in Dandeniya.

Therefore, with respect to environmental and social safeguards considerations, construction of the second interchange at Aparekka will comparatively be more feasible than that of Dandeniya.

### 1.3 Objectives of the Supplemental EIA report

SEIA study was conducted to address following objectives;

vi) To study the details of the proposed alteration, alternatives considered and the details of the new interchange at Aparekka

vii) To examine the existing;
- **Physical environment** (especially present land use pattern, drainage, surface and ground water hydrology, climate, air quality and noise levels within the project influential area)
- **Ecological resources** (presence of sensitive habitats, endemic/ rare/ threatened species within the project affected area)
- **Socio-economic setup** (including economic activities, land and property ownership, land acquisition, current development trends, infrastructure facilities, existing settlements etc…)

viii) To determine project induced positive and negative impacts on the existing environment during design, construction and operational stages of the construction of the interchange at Aparekka.

ix) To propose effective mitigation measures to avoid/ minimize the identified adverse impacts while enhancing the beneficial impacts which would be incorporated in to project cycle

x) Preparation of an Environmental Management Plan (EMP) and a monitoring mechanism to ensure that proposed mitigation measures are effectively implemented
1.4 Extent and scope of the study

The study area for the SEIA includes the area within proposed Right of Way (ROW) and a 100m corridor from the boundary of the ROW. However, the study area was further expanded where and when necessary in order to study significant impacts which may spread beyond the defined study area. In addition, construction sites located beyond the defined area such as plant locations (Asphalt, crusher and concrete batching plants), material extraction sites, disposal sites etc… were also included to the study area in order to identify off site impacts.

The study methodology was developed based on the TOR of CEA. A scoping was done to identify the most sensitive and important areas of physical, biological and socio-economic environments and on analysing the changes that would result from the construction of the proposed interchange.

A literature survey was done on available information about the study area, project activities and surrounding environment. The EIA conducted for the main trace from Matara to Mattala (Habmanthota), feasibility study conducted for shifting of the second interchange from Dandeniya to Aparekka, hydrological study report conducted for construction of Aparekka Interchange etc… were studied and incorporated to the SEIA as necessary.

Hydrological study for the Aparekka interchange was carried out by Skill International Pvt Ltd in May 2017 and the report was approved by the Sri Lanka Land Reclamation and Development Corporation (SLLRDC) in July 2016 through letter no. RD/PROJ/ESEP/403/GEN dated 28.07.2016. The hydrological study report is attached in Appendix 1.2.

ESDD of RDA conducted a separate study to collect information on the other aspects stipulated in the TOR. This included;

- Ecological assessment:
  - This assessment was carried out to investigate the present status of ecological environment and presence of endemic, rare, threatened fauna and flora. Several random visits were conducted to identify and document the fauna and flora, which inhabit the project area by considering the accessibility and spatial distribution of habitats/ vegetation types. Vertebrates groups (freshwater fish, amphibians, reptiles, birds, and mammals) and invertebrate groups (butterflies, dragonflies) were identified and documented during the study.
  - Floral species were identified by direct observations. Species which were difficult to identify in the field were collected and preserved as herbarium specimens. These specimens were taken to the national museum, Peradeniya for identification by comparison with the reference collections available at the Department of Botany.
  - The fauna and flora species identified were classified using recently published scientific literature available in Sri Lanka.

- Measurement of ground water levels, surface and ground water quality and noise:
  - Ground level: Ground water levels (depth to the ground water table) were measured at two locations around the proposed interchange using a measuring tape.
  - Surface and ground water quality: Selected parameters of water were measured using soil and water analysis kit (deep vision) to check the quality of surface and
ground water. The measured parameters included Temperature, pH, Electrical Conductivity (EC), Total Dissolved solids (TDS), DO (Dissolved Oxygen), Turbidity, and Salinity.

- **Noise levels:** In order to establish the baseline data on ambient noise measurements (day time) were recorded for a period of 5 minutes at 5 second intervals at selected three locations in the interchange area.

Please refer Appendix 1.3 for locations where ground water level, surface and ground water quality and noise were measured.

- **Social assessment including socio-economic survey, stakeholder consultation and information disclosure:**

  - Socioeconomic survey was conducted in May 2016 to collect information for the supplemental EIA of the Aparekka interchange of the Extension of Southern Expressway from Matara to Mattala project. This survey attempted to identify socioeconomic information of the people living within 100m radius of the Aparekka interchange. A random sample of 100 households were included to the survey which consisted of both directly and indirectly affected persons of the project. The team is grateful to Divisional Secretariat, Devinuwara and his staff, Grama Niladaris of the area, for giving relevant information and support for the survey.

  - During the survey, the public was also informed about the project, possible impacts and potential mitigation measures that will be implemented in the project. Suggestions and recommendations of the public over the project were also collected during the social assessment and conveyed to the project management for further actions.

- **Identification of anticipated environmental impacts:**

  - Based on the field studies carried out by the study team, information gathered during stakeholder and public consultations, possible environment and social impacts were identified and feasible mitigation measures were proposed in order to avoid/minimise the impact. Anticipated impacts and mitigation measures are summarised in to the Environment Management Plan (EMP) which will be the working document during the construction phase of the project.

The field assessments were carried out during January to June 2017. In advance to the field assessment, desk studies were conducted using by 1:50,000 topographic maps produced by Department of Survey, Sri Lanka and Google maps available on-line.

The SEIA was carried out by a multi-disciplinary team in the ESDD of RDA in collaboration with the Environmental Specialist and his staff of the Supervision Consultant of Section I of ESEP (please refer Appendix 1.4 for list of personnel involved in the assessment). The support given by Director General (DG), RDA, Project Director, and the staff and Supervision Consultant of the Section I of ESEP is highly appreciated in completion of this study. Also the team is grateful to Divisional Secretariat, Devinuwara and his/her staff, Grama Niladari of the area, for giving relevant information and support.
1.5 Preliminary approvals needed for the project and any conditions laid down by state agencies in granting preliminary clearance for the project

According to the National Environmental Act (NEA) No 47 of 1980, and its’ amendment Act No. 56 of 1988 and Act No. 53 of 2000, development of new highways/roads exceeding 10km will fall within the list of “Prescribed Projects” listed in Gazette Extra-ordinary No. 772/22 of 24th June 1993 and subsequent amendments, which needs to go through the Environmental Impact Assessment (EIA) process and subsequent conditional approval from the Central Environmental Authority (CEA) of the Ministry of Mahaweli Development and Environment.

The EIA process for a “prescribed project” involves conducting of an Initial Environmental Examination (IEE) or an Environmental impact Assessment (EIA) based on the ToR prepared by the relevant Project Approving Agency (PAA). Construction of southern expressway extension from Matara to Mattala is categorized as a prescribed project. And construction of Proposed Aparekka Interchange is a supplementary proposal, which was not covered under the original EIA therefore a Supplementary EIA is required to obtain the environmental approval from CEA as per the regulations 17(ii) of the National Environmental (procedure for approval of projects) Act No. 01 of 1993.

Other than the NEA, following national laws and regulations will be applicable for this project.

- Environmental Protection Regulation under NEA; to regulate air and noise pollution during construction
- Agrarian Development Act No. 46 of 2000 for reclamation of paddy lands
- Land Acquisition Act No. 9 of 1950; to acquire private lands for public works and it’s regulations
- Geological Survey and Mines Bureau (GSMB) Act No 33 of 1992; to obtain approval for soil, sand mining, and rock quarrying
- Soil conservation Act No 24 of 1996
- Disposal of solid waste and spoil; Municipal councils, Urban Councils and Divisional Councils (Pradeshiya Saba) Ordinances and by laws of respective local authorities.
- Road Development Act no 73 of 1981.
- Urban Development Authority Act No 41 of 1978
- Irrigation Act No. 1 of 1951
- Motor Traffic Act; to handle the vehicular traffic during construction
- Flora and Fauna protection Ordinance No 2 of 1937 and subsequent amendments Explosive Act No. 36 of 1976
Preliminary clearances/ permits obtained or should be obtained from relevant state agencies and / or local authorities:

- Approval from Department of Agrarian Development for construction activities within and adjacent to paddy lands and streams
- Approval from Sri Lanka Land Reclamation and Development Corporation (SLLR&DC)
- Consent from Department of Irrigation
- Environmental Protection license (EPL) for operation of Asphalt Concrete plants, concrete batch mixing plants, borrow pits and crusher plants from the CEA
- Approval from relevant local authorities for deviation of minor roads, disposal of spoil in municipal solid waste disposal areas.
CHAPTER 2: DETAILS OF PROPOSED ALTERATION AND ALTERNATIVES CONSIDERED

2.1 Location of the proposed interchange
The proposed interchange at Aparekka falls within Matara District of Southern Province of Sri Lanka. Divisional Secretariat Divisions and respective Grama Niladari Divisions (Local level administrative division) which are relevant to the interchange are given in table 2.1 below.

Aparekka Interchange will be placed from 12+434 to 13+810 along the Southern Expressway Extension main line while the approximate coordinates of the location are 102,520 m North and 201,770 m East (7° 00’ 54” N, 79° 53’ 23” E).

Table 2.1: Administrative Divisions of Aparekka Interchange

<table>
<thead>
<tr>
<th>Province</th>
<th>District</th>
<th>Divisional Secretariat Division/s</th>
<th>Grama Niladari Divisions</th>
<th>Local Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern</td>
<td>Matara</td>
<td>Thihagoda</td>
<td>Uduwa East</td>
<td>Thihagoda Pradeshiya Sabha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Devinuwara</td>
<td>Kadaweduwa East</td>
<td>Devinuwara Pradeshiya Sabha</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Kadaweduwa West</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Palle Aparekka</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Uda Aparekka</td>
<td></td>
</tr>
</tbody>
</table>

Location map of the interchange is attached in Appendix 2.1.

2.2. Magnitude of operations
Approximate length of the proposed Aparakka interchange is 1.5km and the interchange consists of the main road and six ramps (A – F). The main road within the interchange will be constructed as a via duct and will be of four traffic lanes. The width of the cross section of the main road will be approximately 24m. Other than the merging sections of the ramps with the existing roads, the rest of ramps are also proposed to be elevated. Approximately 22,000 m² of ground area will be filled for the merging sections. The proposed layout for the interchange and typical cross sections of the main road and the ramps are presented in the Appendix 2.2.

As discussed in detail in the section 3 below, the project area is located within the flood prone area of Nilwala River and around 3 – 3.5m flood level having 100 year return period is experienced to the area (Source: Hydrological Study for Gadagama and Aparekka Interchanges of Southern Extension – Section I by Skills International, 2017). Therefore due consideration has been given to the hydrological aspect in designing the interchange. Subsequently the interchange will be constructed as a via – duct except the approaches where the toll plaza are located. In addition to the via – duct, hydrology study report recommends to introduce box culverts in order to facilitate a smooth drainage across the interchange.
Detail of the drainage provision are listed below

2.0×2.0 Box Culvert at AK0+220
2.0×2.0 Box Culvert at BK0+220
2.0×2.0 Box Culvert at CK0+030
2.0×2.0 Box Culvert at CK0+170
2.0×2.0 Box Culvert at DK0+140
2.0×2.0 Box Culvert at EK0+250
2.0×2.0 Box Culvert at CK0+195
2.0×2.0 Box Culvert at CK0+290
2.0×2.0 Box Culvert at FK0+29

Locations of via-ducts, box culverts and proposed drainage plan under the hydrology study is presented in figure 2.1.

2.2.1 Methodology of construction

A. Methodology of construction

In general most of the ramp roads are located in a paddy field area and ground treatment is one of the major activities. Removal and replacement is the proposed ground treatment method for filling sections while construction of viaduct, spun pile embankment, embankment filling, structure work, pavement structure, construction of toll plaza building are the other key construction activities of the interchange with other incidental activities.

All the construction works will be carried out while complying the approved Environmental Management Plan and work methodologies approved by the Engineer (The Supervision Consultant of the project). In general following activities will be undertaken under the project.

**Earth work:** Earth work involves site clearing, excavation of unsuitable material, rock filling, unclassified soft filling and embankment construction.

Site clearing consists of clearing, grubbing, removing and disposing of vegetation and other debris within the right of way (temporary) and disposal sites approved by the relevant agency.

Unsuitable materials are generally of soft clays, organic clays or silt and peat which cause instability of embankment or settlement. Excavation limits and depth will be directed by the Engineer based on test pits or other testing. These material will be removed disposed with the concurrence of the CEA and other relevant agencies.

Rock filling and unclassified soil filling will be done in unsuitable excavate area as indicated in the design drawings.
Embankment construction will be done using approved unclassified soil and compaction will be done layer by layer using compacting equipment approved by the Engineer.

**Structure Constructions:** Construction of viaduct, underpass, culverts, retaining wall and spun pile work are coming under structures.

Viaduct construction consists of ground investigation, pile driving, foundation construction, tie beam and column erection, capping beam construction, T girder launching and deck construction. T girders are casted separately at casting yard and transported to the required location.

**Underpass Constructions:** Underpass construction basically involves excavation and ground preparation as given in design drawings and erection of underpass using reinforced concrete as per drawing.

**Pavement Construction:** Once embankment construction completed then pavement structure construction will start. Pavement structures consist of granular sub base, graded crushed rock base course and asphaltic binder and wearing course.

Construction of sub base and base and include laying and compaction to the method approved by the Engineer. Hot mixed asphalt concrete will be used for binder and wearing courses. Transporting, laying and compaction will be done based on the approved method.

**Operation of plants, yards etc...:** Plants such as asphalt plants, concrete batch mixing plants, crusher plants and yards such as beam casting yard, vehicle maintenance yard will be established for the project. Project aims to utilise the same plants and other facilities which are already established for the Southern Expressway Extension Project within the section from Matara to Beliatta. Location details and location maps of such sites are presented in Appendix 2.3.

**Incidental Works:** Installation of Guardrail, seeding and mulching, road traffic signs and electric work etc...
Figure 2.1: Proposed drainage plan (Source: Hydrology Report, 2017)
2.2.2. Material Requirement and Sources

Soil required for filling shall be extracted from the ROW itself of the main trace of the ESEP while the requirement of the rock will be fulfilled from the Lakmal Quarry at Dandeniya. Particular requirements and the location of extraction are given in the table below.

Table 2.2: Material requirement and locations of extraction

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Required quantity (m³)</th>
<th>Extraction Location</th>
<th>Quantity (m³)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclassified soil</td>
<td>426,930</td>
<td>15+800 – 16+000</td>
<td>91,890</td>
<td>Within the ROW of the main trace</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16+600 – 16+800</td>
<td>53,430</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>17+300 – 18+000</td>
<td>213,043</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>19+100 – 19+300</td>
<td>68,565</td>
<td></td>
</tr>
<tr>
<td>Boulders for rock filling</td>
<td>43,450</td>
<td>Lakmal Quarry (5°59'9.27&quot;N, 80°37'58.60&quot;E)</td>
<td>Outside the ROW</td>
<td></td>
</tr>
</tbody>
</table>

2.3. Alternative Analysis

2.3.1. Without project alternative

Without project alternative describes about deleting the second interchange from the ESEP. The second interchange serves the access from Aparekka, Dandeniya, Yatiyana, Tihagoda, Kambrupitiya, and Hakmana areas to the expressway network and people from these areas will have to travel either to Godagama or Beliatta interchanges if the second interchange will not be constructed. Further the distance from the Gadagama interchange to the next interchange (Beliatta) will be about 30km if the second interchange will be deleted which does not comply with highway standards. Therefore this alternative is not feasible.

2.3.2. With project alternative

Two alternatives i.e. construction of the second interchange at the original location (Dandeniya) and construction at Aparekka will be discussed under with project alternative. Following table illustrates a comparison of the two alternatives with respect to environmental, social and other considerations.

Table 2.3: Comparison of locations of Dandeniya and Aparekka for the second interchange of ESEP

<table>
<thead>
<tr>
<th>Factors considered</th>
<th>Construction of the interchange at Dandeniya</th>
<th>Construction of the interchange at Aparekka</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land to be additionally acquired</td>
<td>18.15 Ha</td>
<td>6.15 Ha</td>
<td>Impacts due to land acquisition is comparatively high at Dandeniya</td>
</tr>
<tr>
<td>(in addition to the land acquired for the main line)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional Number of houses/buildings to be affected</td>
<td>25</td>
<td>9</td>
<td>Resettlement impact is comparatively higher at Dandeniya</td>
</tr>
<tr>
<td>Access to trunk road</td>
<td>Direct access to the</td>
<td>Direct access is</td>
<td>Improvement of</td>
</tr>
</tbody>
</table>
<pre><code>                                        |                                               |                                             |                                              |
</code></pre>
<table>
<thead>
<tr>
<th>Impacts to existing environment</th>
<th>Terrain around Dandeniya is undulating and hilly therefore the amount of earth work is higher in Dandeniya. The area proposed for the interchange consists of vegetation therefore clearing of vegetation cover is anticipated.</th>
<th>Interchange is located in a paddy land therefore the amount of earth work and the impact to the vegetation is comparatively low.</th>
<th>Existing environment is comparatively less impacted if the interchange is constructed at Aparekka.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts to surface hydrology</td>
<td>Minimum impacts to the surface hydrology due to construction of the interchange at Dandeniya</td>
<td>Aparekka is located within the flood prone area of Nilwala River. Therefore surface water hydrology will be negatively impacted if the interchange is constructed at Aparekka.</td>
<td>Impacts to surface hydrology is comparatively higher in Aparekka. However construction of the interchange over via duct will mitigate this impact.</td>
</tr>
</tbody>
</table>

Overall, construction of the second interchange at Aparekka is found to be more environmentally and socially feasible compared to that of Dandeniya.
CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT

3.1 Physical environment

3.1.1. Climate

With respect to climatic divisions of Sri Lanka, the entire project area belongs to low country - Intermediate zone of Sri Lanka. This region receives a mean annual rainfall between 1750 to 2500mm with a short and less prominent dry season. On the other hand, the project area falls in to IL1a agro-ecological zone. The expected annual rainfall at the 75% probability level in this agro-ecological region ranges from 1100 to 1600mm. The average maximum temperature of the zone ranges from 29 to 35°C while highest values are recorded during the period of late February to early May. The average minimum temperature ranges from 20 to 26°C where the lowest values are generally observed during the period of December to February, which is a common phenomenon for the entire island. The day time relative humidity is generally ranged from 55 to 75% whereas night time values may reach even up to 90% (Source: The National Atlas of Sri Lanka, Second Edition, 2007).

The characteristics of IL 1a agro-ecological zone is shown in Table 3.1 below.

Table 3.1: Characteristics of IL 1a zone

<table>
<thead>
<tr>
<th>75% expectancy rain of annual rainfall (mm)</th>
<th>Description (land use, terrain, major soil groups)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 1400</td>
<td>Coconut, Mixed home gardens, Export Agricultural crops, Paddy, Rubber</td>
</tr>
<tr>
<td></td>
<td>Rolling, undulation and flat</td>
</tr>
<tr>
<td></td>
<td>Red Yellow Podsolic (RYP) with strongly mottled sub soil, Red Yellow Podsolic (RYP), Low Humic Gley (LHG), Reddish Brown Latosolic and regosol soils</td>
</tr>
</tbody>
</table>


Figure 3.1 below presents the monthly rainfall for the period from 1st April 2016 to 31st May 2017 of the Aparekka Interchange area (From 6+700Km to 14+150Km).
3.1.2. Geology and topography of the study area

The general topography in the project area could be classified as rolling, undulating and flat. Topographical variation over the interchange is marginal. Generally the interchange area could be defined as a flat which lays between 6 to 62 m above MSL.

About 90% of the project area consists of Precambrian rocks, which were metamorphosed and highly deformed under upper amphibolites to granulite facies conditions about 610 - 550 million years ago.

On the basis of rock type, metamorphic grade, structure and isotopic characteristics is subdivided to the litho tectonic unit of Wanni complex. Table 3.2 summarizes the geological formation in the proposed project area (Source: The National Atlas of Sri Lanka, Second Edition, 2007)

<table>
<thead>
<tr>
<th>Lithotetonic Unit</th>
<th>Lithology</th>
<th>Depositional ages of supracrustal rocks (Million years)</th>
<th>Model Ages (Giga years)</th>
<th>Metamorphic age (Million years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wanni Complex</td>
<td>Hornblende gneiss, Hornblende-biotite gneiss, Biotite gneiss</td>
<td>~1100</td>
<td>1.0 – 2.0</td>
<td>Upper amphibolites-Granulite facies ~610-550</td>
</tr>
</tbody>
</table>
3.1.3 Present land use pattern

Four types of land use patterns could be observed in the project area which includes cultivated paddy, home gardens and residential areas, road side and irrigation canal. Present land use pattern is shown in Figure 3.3 below.

Figure 3.3 Existing land use pattern within 1km radius of the proposed Aparakka interchange

Affected land area and number of affected land lots with land use pattern within the acquired land for the interchange are presented in table 3.3 below.

Table 3.3: Affected lands and their land use pattern

<table>
<thead>
<tr>
<th>Lands</th>
<th>No. of households</th>
<th>No. of lots</th>
<th>Affected Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home garden</td>
<td>27</td>
<td>108</td>
<td>3.6018</td>
</tr>
<tr>
<td>Paddy lands</td>
<td>-</td>
<td>49</td>
<td>3.9129</td>
</tr>
<tr>
<td>Canal</td>
<td>-</td>
<td>19</td>
<td>0.1901</td>
</tr>
<tr>
<td>Sub Road</td>
<td>-</td>
<td>23</td>
<td>0.7143</td>
</tr>
<tr>
<td>Owita</td>
<td>(abandoned paddy)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
A. Cultivated paddy Land

The most common land use in the project area is identified as cultivated paddy lands which are cultivated in both cultivation seasons. Out of the affected lands for the interchange, paddy lands cover a major portion which is 3.91ha in 49 land lots. These lands consist of accumulated decomposed organic debris and water logged condition could be observed within these lands.

B. Home gardens and Residential areas

All most all houses in the project area are incorporated with home gardens and they are cultivated with variety of trees which grow under different canopy levels. The lower most layer in the home garden occupies herbal plants, vegetable species, (such as Lady’s finger, Spinach, Brinjal (Egg plant), Alternanthera sessilis [Mukunueanna] and Egg plant Round Green [Elabatu] etc) and flower & ornamentals plants (such as orchids, roses, anthurium, shoeflowers [Hibiscus rosa-sinensis], and crotons etc...). In the next layer of vegetation, fruit trees like banana, sour-sop (custard apple) and mango, Kohomba, Gacinia, Bread-fruit and Arecanut are commonly seen in these home gardens. Coconut, including king coconut, and woody plants such as Jack, Mahogani are the permanent trees cultivated in home gardens occupying uppermost layer of the tree canopy. The affected home garden area is 3.60ha in 108 lots.

C. Road side

This land use category is mainly characterized with the road side environment present along Maddewattha- Kakunadora -Yatiyana road (B 285) and Dandeniya road (PRDA). Both road sides consist of different species of weeds which control soil erosion in both road embankments.

D. Irrigation Canals

The drainage network and behavior of the natural drainage in the project area is mainly based on "Kanduwela Ela" stream which can be considered as the major drainage path that is a tributary of river "Nilwala Ganga". A drainage canal which carries drained water from paddy lands is located across the interchange and drains to the Kaduwela Ela.

3.1.4 Drainage pattern of the area

The project area is located within upper catchment of Nilwala River and the drainage pattern of the project area is mainly governed by Kanduwela Ela (a stream) which is a tributary of Nilwala River. The drainage pattern of the Kanduwela stream can be described as a dendritic type which has a south – west directed flow towards the Nilwala River. The main trace of ESEP around the interchange is located almost parallel to a tributary of Kanduwela stream while the tributary flows across the proposed ramps of the interchange. This tributary of the Kanduwela stream carries the water drained off from paddy lands located in the project area. Drainage pattern of the project area is presented in the Appendix 3.1.
3.1.5 Flood peak values, inundation levels and inundation period

As per the Hydrological study carried out for the proposed interchange, the project area is prone to floods due to backwater effect of the Nilwala River. Due to the backwater effect, Kanduwela stream overflows creating flood conditions, which inundate the paddy lands in the vicinity of proposed interchange. However it was found that the highlands around the interchange are not affected by floods. As per the hydrological study, around 2.5 – 3m MSL flood level was recorded in the flood event occurred in year 2003 around the project area (Please refer to the flood inundation map presented in Appendix 3.2). On the other hand, it has been calculated in the hydrological report that the 100 year flood level at the Aparekka Interchange ranges between 3 – 3.5 mMSL. Flood in May, 2017 is the most recent flood event occurred in the project area and it was mentioned that the paddy land around the interchange was inundated for about 1m (public consultation).

In addition, Thudawe and Thalgahagoda are the nearest flow gauging stations of the Nilwala River to the interchange which are operated by Department of Irrigation and annual maximum flood levels recorded at these stations are presented in table 3.4 below. Out of the recorded levels, the flood in May 2003 represents the peak value.

Table 3.4: Annual maximum flood levels of Tudawe and Thalagahagoda flow gauging stations

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Maximum Flood level (m MSL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tudawe</td>
</tr>
<tr>
<td>1997</td>
<td>0.98</td>
</tr>
<tr>
<td>1998</td>
<td>1</td>
</tr>
<tr>
<td>1999</td>
<td>0.85</td>
</tr>
<tr>
<td>2000</td>
<td>0.65</td>
</tr>
<tr>
<td>2001</td>
<td>0.58</td>
</tr>
<tr>
<td>2002</td>
<td>0.55</td>
</tr>
<tr>
<td>2003</td>
<td>3.34</td>
</tr>
<tr>
<td>2004</td>
<td>0.65</td>
</tr>
<tr>
<td>2005</td>
<td>0.7</td>
</tr>
<tr>
<td>2006</td>
<td>1</td>
</tr>
<tr>
<td>2007</td>
<td>0.78</td>
</tr>
<tr>
<td>2008</td>
<td>1.25</td>
</tr>
<tr>
<td>2009</td>
<td>1.07</td>
</tr>
<tr>
<td>2010</td>
<td>2.21</td>
</tr>
<tr>
<td>2011</td>
<td>1.94</td>
</tr>
<tr>
<td>2012</td>
<td>1.91</td>
</tr>
<tr>
<td>2013</td>
<td>1.48</td>
</tr>
<tr>
<td>2014</td>
<td>2.02</td>
</tr>
<tr>
<td>2015</td>
<td>1.94</td>
</tr>
<tr>
<td>2016</td>
<td>1.54</td>
</tr>
</tbody>
</table>

Source: Revision of hydrological study report for the Godagama and Aparekka Interchanges of Southern Extension - Section I, Skills International Pvt Ltd, May 2017
3.1.6 Existing Irrigation/ drainage/ flood protection schemes encountered

The project area falls within the Stage 2 of Nilwala Flood Protection Scheme which covers the Kadawedduuma Area. Nilwala Flood Protection Scheme was commenced in 1984 aiming cultivation of approximately 24,000 ha with paddy, rubber, coconut and tea. Paddy cultivation was the key crop cultivated under the scheme and about 12,000 ha of lands were cultivated with paddy. One of the main features of the project was construction of 14km flood bunds on either side of the Nilwala River and installations of 24 large pumps in 3 pump houses at Tudawa, Magallagoda, Thalgahagoda to deal with the local drainage. After implementation of the flood protection scheme about 4500 ha of low lying paddy lands were protected from 10 year floods\(^1\). These bunds were to prevent excessive flood water of river Nilwala from spilling over and inundating the low lying areas. These bunds brought immediate relief for the vulnerable communities creating safe areas which were originally susceptible to floods. Local flood water accumulated at these low lying sub catchments are pumped out through the bunds to the Nilwala River using the pumping stations. Location of flood bunds constructed under the Nilwala Flood Protection Scheme is presented in figure 3.4 below.

![Figure 3.4: Location of flood bunds](https://irrigationmataraoffice.weebly.com/flood-protection-schemes.html)

Though the interchange falls within the Nilwala Flood Protection Scheme, no flood bund or flood control structure is located within the project area.

\(^1\) [http://irrigationmataraoffice.weebly.com/flood-protection-schemes.html](http://irrigationmataraoffice.weebly.com/flood-protection-schemes.html)
In addition, any irrigation structures or drainage structures are also not found within the project area which will be affected due to the project activities.

3.1.7 Retention areas, marshlands or any other water bodies encountered

Paddy lands existing in the project area act as retention areas and runoff from the surrounding gets retained during rains. Therefore the project area plays a major role as retention area of the Nilwala River. And 3.91 ha of such paddy lands will be acquired for the interchange however only the areas allocated for toll plaza at Ramp C and Ramp D/E will be filled.

The drainage canal which drains water from paddy lands is the major water body found within the immediate surrounding of the project area.

3.1.8 Drainage capacity of existing waterways and floodways of the area

As mentioned above, drainage canal which drains to Kanduwela stream is the waterway located across the project area. The capacity of the canal is currently reduced due to sediment deposits on the canal bed and growing of vegetation on the banks however the canal does not over flow during normal weather conditions.

3.1.9 Present uses of ground water, ground water quality and ground water levels

As found in the public consultation, well water is commonly used for domestic requirements however now there is trend of shifting towards the pipe borne water supplied by National Water Supply and Drainage Board (NWS&DB). Several dug wells which are major sources for domestic wash and drinking water can also be found within project offsite locations. In order to identify the water quality of ground water resources, monitoring of ground water quality was conducted by the staff of ESDD of RDA under this study. Accordingly the ESDD carried out a water quality monitoring program during six month period from January to June 2017 to assess physical chemical parameters. The test results of the ground water were compared against the Sri Lanka Standard (SLS) for the portable water quality, SLS-614 Part 01 and 02. The results of ground water quality of wells selected for the study is presented in the Appendix 3.3 while the figure 3.5 presents a summary of results of pH, Turbidity and Dissolved Oxygen of the wells.

3.1.10 Present uses of surface water

The project area mainly consists of abandon and cultivated paddy lands. "Kanduwela Ela" and several minor streams are the perennial surface water sources located within the area. Surface water is mostly used for the paddy cultivation and other agricultural activities. However these water bodies are not used for domestic purposes as mainly ground water water is abundant for the residents in the area (Source: Public consultation).

3.1.11 Surface water quality of the water bodies

Surface water quality of the surface water bodies of the project area was measured by the study team of ESDD of RDA. Accordingly the ESDD carried out water quality monitoring program during six month period from January to June 2017 to assess physical chemical parameters. The test results of surface water quality is given in Appendix 3.3. Out of the results, pH values of the ground water
samples of wells are slightly lower than that of lower value of the maximum permissible level (6.5) as defined in Sri Lanka Standards (SLS)\(^2\) therefore these wells represent slightly acidic condition (Figure 3.5).

Figure 3.5: Variation of pH level of ground water samples

Dissolved Oxygen (DO) of surface water bodies of which the samples were grabbed, ranges around the permissible level and has a marginal variation with the time (Figure 3.6). Therefore aquatic life of these water bodies can be affected if the DO levels get further decreased.

Figure 3.6: Variation of DO of surface water bodies

\(^2\) SLS 614: Part I: 1983
3.1.12. Ambient air quality

Ambient air quality is periodically measured at the premises of Purana Viharaya in Kakulangoda as part of the Environmental Monitoring Plan of the main trace of Extension of Southern Expressway Project. The temple is approximately 1km away from the Aparekka Interchange and the measured data provides the baseline status of the air quality of the project area of the interchange.

The atmosphere around the interchange could be possibly polluted with the emissions from ongoing construction activities of Extension of Southern Expressway Project, vehicular emissions from the traffic flow along the B 285 road and domestic and commercial activities in the area. However, measured values of air quality parameters at the Kakulangoda Purana Viharaya have not exceeded the particular maximum permissible levels as specified in the National Environmental (Ambient Air Quality) Regulations, 1994 under the National Environmental Act No. 47 of 1980. Please refer to measured air quality data on presented in Appendix 3.3.

3.1.13. Ambient noise levels and noise sensitive locations

As per gazette notification no. 924/12 dated 21.06.2013 the project area falls in to a Low noise area since the interchange belongs to the Devi Nuwara and Thihagoda Pradeshiya Sabha. The project area is a mixed residential area consisting of residences and commercial establishments. Other than temples, noise sensitive receptors such as school or hospital are not located within the project area. Further, such locations are not found nearby to plant sites and yards as given in the section 2.1.2. Three temples namely Kakulangoda Purana Viharaya, Thunbodhiya temple and Uggoda temple are located within the one kilometer radius of the interchange which can be considered as noise sensitive receptors.

Under the study, existing noise level measurements were also carried out at three locations during January and May 2017. The equivalent continuous “A weighted” sound pressure level (Leq,T) was measured in the fast selection mode of the meter. Sound pressure levels were recorded for a random 5 minutes period during the day time at selected locations. The location information of sampling locations and the results of the monitoring are presented in Annexure 3.2.

The noise levels at measured location vary between 54 – 72.5 dB and measured high levels could be due to the noise contribution by ongoing construction activities of the main trace, on-road vehicular, domestic and commercial activities in the area. Fluctuation of the measured noise level at selected locations are shown below in figure 3.3.
3.2. Ecological Resources

3.2.1. Existing habitats (both natural and manmade) and their ecological significance to the ecosystem

A survey to record Terrestrial and Aquatic Ecology of the proposed Aparekka Interchange area of Extension of Southern Expressway from Matara to Beliatta was carried out to ascertain the habitat types present and the possible impacts on sensitive flora, fauna and the habitats as a result of establishing the proposed interchange.

Faunal and the floral transect survey was carried out together at the same time. Within the transect area, direct observations were made to identify flora and fauna at the vicinity of proposed project site and surrounding area about 250 meters away from the proposed project site. In addition indirect observations, animal sings such as pellets, foot prints, food remains were carried out to understand the mammalian species in the area. In some case reliable evidence from villages also been used to understand the species occurrence.

A. Habitats

Four main habitats were identified in and around the proposed project area with respect to flora. These include three terrestrial habitats (Paddy fields, Road Reservations, Home gardens & Residences) and a single aquatic habitat (Irrigation canal).

**Home Gardens and Residences:** Common home garden species such as Jack (*Artocarpus heterophyllus*), coconut (*Cocos nucifera*), Areca nut (*Areca catechu*), breadfruit (*Artocarpus indicus*), mango (*Mangifera indica*), banana (*Musa x paradisiaca*), *Tamarindus indica* (tamarind) Goraka (*Garcinia quaesita*) as well as cultivated timber species *Melia azedarach* (Lunumidella), *Swietenia macrophylla* (Mahogani), *Tectona grandis* (Teak) etc., are commonly found in home garden and residential lands. In addition, different species of ornamental plants cultivated in home gardens and cultivated Rubber (*Hevea Brasiliensis*) plots also located around residences.
**Paddy fields**: Paddy (*Oryza sativa*) is the only cultivated species in paddy lands. In addition different species of herbs and grasses grow as weeds (*Ageratum conyzoides* (Hulantala), *Vernonia cinerea* (Monarakudumbiya), *Cassia occidentalis* (Panitora), *Desmodium triflorum* (Heen undupiyali), *Hibiscus micranthus*, (Bebila), *Panicum sp.* (Iluk), *Alternanthera sessilis* (Mukunu Wenna), *Amaranthus viridis* (Koora tampala), *Centella asiatica* (Gotukola), *Mimosa pudica* (Nidikumba)) can be observed within the cultivated and uncultivated paddy fields. Considerable amount of paddy lands located within the proposed project site.

**Road reservations**: Flora recorded from road reservations mainly include weeds and common species of herbs. *Maduru Thala* (*Ocimum tenuiflorum*), *Nidikumba* (*Mimosa pudica*), *Thumba* (*Leucas zeylanica*), *Epala* (*Urenalo bata*), *Heen Undupiyaliya* (*Desmodium triflorum*) *Wal Tippili* (*Croton hirtus*), *Kura Thampala* (*Amaranthus viridis*), *MonaraKudumbiya* (*Vernonia cinerea*), *Panicum sp.* (Iluk) are common weeds and herbs found in the road reservations.
Irrigation canal: A medium size irrigation canal is running right side of the proposed trace of Southern Highway from Matara to Beliatta. Several small field canals also connected to the irrigation canal and no any impact to the existing canal due to construction activities of proposed interchange.

Figure 3.7 Irrigation canal

B. Presence of the rare, threatened and endemic species

The terrestrial habitat in the proposed project site and surrounding habitats are predominantly man made and the fauna mainly comprised of common species that are found in habitats which are associated with modified habitats. A total number of 108 species belonging to 66 families recorded from the study area during the study. A list of fauna observed during the survey is given in Appendix 3.4.

Table 3.6 includes a summary of all the faunal species recorded in the proposed project area with their conservation status.

<table>
<thead>
<tr>
<th>Faunal Group</th>
<th>Number of Families</th>
<th>Number of Species</th>
<th>Endemic</th>
<th>Exotic</th>
<th>VU</th>
<th>EN</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dragonflies</td>
<td>04</td>
<td>11</td>
<td>02</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Butterflies</td>
<td>05</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Snails</td>
<td>02</td>
<td>02</td>
<td>-</td>
<td>01</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Freshwater fish</td>
<td>04</td>
<td>06</td>
<td>-</td>
<td>01</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Amphibians</td>
<td>02</td>
<td>02</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Reptiles</td>
<td>10</td>
<td>13</td>
<td>01</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Birds</td>
<td>33</td>
<td>44</td>
<td>02</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mammals</td>
<td>06</td>
<td>08</td>
<td>01</td>
<td>-</td>
<td>-</td>
<td>01</td>
<td>-</td>
</tr>
<tr>
<td>Total fauna</td>
<td>66</td>
<td>108</td>
<td>06</td>
<td>02</td>
<td>-</td>
<td>01</td>
<td>-</td>
</tr>
</tbody>
</table>

C. Flora of the proposed project area:

A total number of 138 plant species belonging to 52 families recorded from the study area during the field study. A list of flora observed during the survey is given in Appendix 3.5. Table 3.7 includes a number of floral species recorded in the proposed project area with their conservation status.
Table 3.7: Summary of the flora species recorded during the field survey

<table>
<thead>
<tr>
<th>Number of Family</th>
<th>Number of Species</th>
<th>Endemic Species</th>
<th>Nationally Threatened</th>
<th>Globally Threatened</th>
</tr>
</thead>
<tbody>
<tr>
<td>52</td>
<td>138</td>
<td>02</td>
<td>00</td>
<td>00</td>
</tr>
</tbody>
</table>

3.3. Existing social and socio-economic environment

3.3.1. Existing Settlements

A. Population

Aparekka interchange was planned to be constructed at Thihagoda and Devinuwara Divisional Secretariat Divisions (DSDs) of Matara District. Matara district is in Southern province and its total land area is 1282.5km². As per the Department of Census and Statistics, in 2016 estimated mid-year population of Matara district was 845,000 persons of which 405,000 are males and 440,000 are females.

In 2012 the total population in Devinuwara DS division was 48,253 persons with 22,900 males and 25,353 females. In the same year, Thihagoda DS division has recorded a total population of 33,535 with 15,907 males and 17,628 females.

The proposed interchange was in five Grama Niladari (GN) divisions, namely Uduwa East, Kadawedduwa East, Kadawedduwa West, Palle Apperakka and Uda Aparekka GN divisions. The total population of these GN divisions in 2012 was 5,606 persons with 2,621 males and 2,985 females.

**Population Distribution by Ethnicity:** In Matara district majority of population was Sinhalese, which is 94.3%. Moor was the second highest with 3.1%. Regarding the ethnicity of population in DS divisions, in Devinuwara 98.4% were Sinhalese and 0.2% were Sri Lankan Tamils while in Thihagoda DS division, almost all were Sri Lankans. Refer Table 3.8 for details.

Table 3.8 Population distribution by ethnicity in Devinuwara and Thihagoda DSDs

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Devinuwara DSD</th>
<th>Thihagoda DSD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Sinhalese</td>
<td>47,492</td>
<td>98.42</td>
</tr>
<tr>
<td>Sri Lankan Tamil</td>
<td>81</td>
<td>0.20</td>
</tr>
<tr>
<td>Indian Tamil</td>
<td>9</td>
<td>0.02</td>
</tr>
<tr>
<td>Moor</td>
<td>657</td>
<td>1.40</td>
</tr>
<tr>
<td>Other</td>
<td>14</td>
<td>0.03</td>
</tr>
<tr>
<td>Total</td>
<td>48,253</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Department of Census and Statistics data, 2012

In May 2017, Environment and Social Development division of RDA carried out a Socio Economic Survey for the project area of Aparekka interchange of Extension of Southern Expressway project. A total of 42 households were surveyed and a population of these households was 171 of which 77 are males and 94 are females. Based on the survey results, the total population of the project area is identified as Sinhalese.
### Population distribution by age composition

Table 3.9 below presents the population distribution by age composition in the affected GNDs.

<table>
<thead>
<tr>
<th>DS Division</th>
<th>GN Divisions</th>
<th>Total Population</th>
<th>Age composition Less than 14 years</th>
<th>15-59 years</th>
<th>60 years and over</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devinuwara</td>
<td>Kadaweduwa East</td>
<td>806</td>
<td>182</td>
<td>454</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>Kadaweduwa West</td>
<td>1,420</td>
<td>343</td>
<td>801</td>
<td>276</td>
</tr>
<tr>
<td></td>
<td>PalleAparekka</td>
<td>936</td>
<td>223</td>
<td>528</td>
<td>185</td>
</tr>
<tr>
<td></td>
<td>UdaAparekka</td>
<td>1,664</td>
<td>343</td>
<td>964</td>
<td>357</td>
</tr>
<tr>
<td>Thihagoda</td>
<td>Uduwa East</td>
<td>780</td>
<td>163</td>
<td>447</td>
<td>170</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>5,606</td>
<td>1254</td>
<td>3194</td>
<td>1158</td>
</tr>
</tbody>
</table>

Source: Department of Census and Statistics data, 2012

### B. Housing

According to DS data in 2015, there are 25,774 housing units in these two DS divisions, of which 93.4% are permanent houses. Table 3.10 presents the type of housing units within two DS divisions.

<table>
<thead>
<tr>
<th>Type of House</th>
<th>Devinuwara DS division</th>
<th>Thihagoda DS division</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>Permanent</td>
<td>15,040</td>
<td>92.8</td>
<td>9,027</td>
</tr>
<tr>
<td>Semipermanent</td>
<td>915</td>
<td>5.6</td>
<td>453</td>
</tr>
<tr>
<td>Temporary</td>
<td>249</td>
<td>1.5</td>
<td>90</td>
</tr>
<tr>
<td>Total</td>
<td>16,204</td>
<td>100.0</td>
<td>9,570</td>
</tr>
</tbody>
</table>

Source: Administrative data of Devinuwara and Thihagoda Divisional secretariats, 2015

### C. Education

There are 58 schools located in Matara district, of which 22 are National schools, 34 are Provincial schools and two (2) are Private schools. Aparekka Maha Vidyalaya is located about 800m away from the project area. Most of the children in the area go to this school while some others go to schools in Matara town area. Table 3.11 depicts the distribution of the population by education attainments in the project area. Survey data shows that 15.8% of the total population have passed G.C.E. (O/L) and 18.1% have passed G.C.E. (A/L). About 13% of population has completed University education.

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of persons</td>
<td>%</td>
<td>No. of persons</td>
</tr>
<tr>
<td>Illiterate</td>
<td>0</td>
<td>0.0</td>
<td>2</td>
</tr>
</tbody>
</table>
### Education Level

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of persons</td>
<td>%</td>
<td>No. of persons</td>
</tr>
<tr>
<td>Can place signature</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Waiting for Schooling</td>
<td>3</td>
<td>3.9</td>
<td>1</td>
</tr>
<tr>
<td>Grade 1-5</td>
<td>8</td>
<td>10.4</td>
<td>7</td>
</tr>
<tr>
<td>Grade 6 - to G.C.E. (O/L)</td>
<td>16</td>
<td>20.8</td>
<td>22</td>
</tr>
<tr>
<td>G.C.E. (O/L) Pass</td>
<td>12</td>
<td>15.6</td>
<td>15</td>
</tr>
<tr>
<td>Up to G.C.E. (A/L)</td>
<td>13</td>
<td>16.9</td>
<td>15</td>
</tr>
<tr>
<td>G.C.E.(A/L) Pass</td>
<td>16</td>
<td>20.8</td>
<td>15</td>
</tr>
<tr>
<td>Graduate &amp; above</td>
<td>8</td>
<td>10.4</td>
<td>14</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>1.3</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>77</td>
<td>100</td>
<td>94</td>
</tr>
</tbody>
</table>

Source: Socio Economic Survey May 2017, Environment and Social Development Division, RDA

### 3.3.2. Principal economic activities, agricultural pursuits

#### A. Livelihood Activities

As per the Department of Census and Statistics (2016) 39.4% of the employed population in Matara District is engaged in the Service sector, 37.4% is engaged in the agricultural sector and 23.3% is engaged in the industrial sector.

77 employed household members were included in the surveyed sample. Out of 77 employed population, 28.6% are Government sector workers, 10% engaged in private sector employments, 9% engaged in business activities and 5% are in agricultural sector.

Table 3.12 provides monthly household income in the study area. About 26% are earning monthly income between Rs.25, 001 - 50,001 and 48% earn more than Rs 50,000 per month. However, it should be noted that monthly income of about 7% of the households, monthly income is Rs. 5,000 or less than Rs 5,000.

#### Table 3.12: Monthly income distribution of the households

<table>
<thead>
<tr>
<th>Income category (Rs.)</th>
<th>No. of Household</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rs. 5000 and below</td>
<td>3</td>
<td>7.14</td>
</tr>
<tr>
<td>5000 -10,000</td>
<td>3</td>
<td>7.14</td>
</tr>
<tr>
<td>10,001-15,000</td>
<td>3</td>
<td>7.14</td>
</tr>
<tr>
<td>15,001-25,000</td>
<td>2</td>
<td>4.77</td>
</tr>
<tr>
<td>25,001-50,000</td>
<td>11</td>
<td>26.19</td>
</tr>
<tr>
<td>50,001 and more</td>
<td>20</td>
<td>47.62</td>
</tr>
<tr>
<td>Total</td>
<td>42</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Socio Economic Survey May 2017, Environment and Social Development Division, RDA
B. Agricultural pursuits

Agriculture is the main economic activity which is carried out successfully in Matara district. As per the Department of Census and Statistics (2015), in Matara district, 33.4% of the total population is engaged in agricultural sector. Large scale and small holding tea, rubber and cinnamon plantations and paddy are the major agricultural cultivations in the district. The common land use in the project area is identified as cultivated paddy lands.

3.3.3. Land and property ownership

Out of the total surveyed households, 90.5% have title deeds. One non titled owner with permit and three lessees were also identified during the survey. Refer Table 3.13 for information.

<table>
<thead>
<tr>
<th>Ownership status</th>
<th>No of Households</th>
<th>Percentage (out of total families)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sole Deed/Title Holder</td>
<td>38</td>
<td>90.5</td>
</tr>
<tr>
<td>Non-Title Owner with Permit</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>Lessee / rent</td>
<td>3</td>
<td>7.1</td>
</tr>
<tr>
<td>Total</td>
<td>42</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Socio Economic Survey May 2017, Environment and Social Development Division, RDA

3.3.4. Proposed and ongoing Development Projects

A. Matara - Kataragama Railway Line

Construction of New railway line from Matara to Kataragama is traversing through Devinuwara DS division and it is about 5km away from the project area. Phase 1 of the railway line project which is from Matara to Beliatta, the construction work has already started. Length of this stretch is 30km. Phase 2 is from Beliatta to Hambantota and Phase 3 is from Hambantota to Kataragama. Kataragama is a pilgrimage town sacred to Buddhist, and Hindu people. This railway project will facilitate efficient transport service by connecting cities from Colombo to Kataragama and it will provide a more comfortable journey to passengers.

B. iRoad Project –Southern Province

Road Development Authority (RDA) under Ministry of Highways and Road Development (MOH&RD) introduced an investment program where an efficient road transport will be established between rural communities and socio-economic centers. The program includes rehabilitation and upgrading of both rural and national roads. The program is officially termed as “Integrated Road Investment Program” or simply iRoad Program. Under this program 67 roads will be improved in Matara district of which 3 roads are located in Devinuwara and Thihagoda DS divisions. Refer Table 3.14 for details.
Table 3.14: Selected roads under the iRoad project in Matara District

<table>
<thead>
<tr>
<th>DS Division</th>
<th>Road name</th>
<th>Length of the road</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thihagoda DS division</td>
<td>Samagi Mawatha via Siri Devapriya mawatha</td>
<td>2.7km</td>
</tr>
<tr>
<td>Devinuwara DS division</td>
<td>Ashokarama road</td>
<td>1.7km</td>
</tr>
<tr>
<td></td>
<td>Sri Priyarathnamawatha (Kekuluwangoda mawatha)</td>
<td>1.9km</td>
</tr>
</tbody>
</table>

Source: PMU data, iRoad project

3.3.5. Availability of infrastructure facilities

A. Energy sources of households

The electricity is the main source of energy used for lighting the households. As per the Department of Census and Statistics data in 2012, more than 90% of households in all affected GN divisions have electricity facility. E.g. 97.3% households in Kadawedduwa west GN division and 97% households in Palle Aparekka GN division have this facility. Around 6.5% of households in Kadawedduwa East GN division have no electricity facility and they use kerosene for lighting their housing units. According to the socioeconomic survey result findings, 100% of surveyed households have electricity facility.

B. Drinking Water

As per the Department of Census and Statistics in 2012, majority of households in affected GN divisions get drinking water from wells. E.g. 97% households in Palle Aparekka GN division and 96.2% households in Kadawedduwa west GN division use well water. About 11% of households in Uda Aparekka GND have access to Pipe born water which is provided by National Water supply and Drainage Board. Some households get water from other sources such as common well or tap...etc.

As per the socio economic survey data, 92.9% of households use protected well water as the main source of drinking water. Around 4.8% of households get drinking water from common well or Tap. The Table 3.17 summarizes the source of drinking water in the project area.

Table 3.17: Sources of drinking water of Surveyed Households

<table>
<thead>
<tr>
<th>Source of Drinking water</th>
<th>No of Households</th>
<th>Percentage of Households (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Well (Protected)</td>
<td>39</td>
<td>92.9</td>
</tr>
<tr>
<td>Private Well (Un Protected)</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>Pipe born water</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Common Well / Tap</td>
<td>2</td>
<td>4.8</td>
</tr>
<tr>
<td>Total</td>
<td>42</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Socio Economic Survey, Environment and Social Development Division, RDA
C. Sanitary Facilities

As per the Department of Census and Statistics data, almost all households in all affected GN divisions have water seal toilets. E.g. Kadawedduwa East GND, its 9.5% and Kadawedduwa west, its 99.2%. Very few households in these GNDs have flush toilets and Pit toilets.

Primary data also summarizes that majority of households in the project area use water seal toilets, i.e. 66.7%. From remaining households, 19.0% and 14.3% use pit toilets and flush toilets respectively.

Table 3.18: Sanitation facilities of the surveyed household

<table>
<thead>
<tr>
<th>Sanitary Facilities</th>
<th>No of Households</th>
<th>Percentage of Households (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pit</td>
<td>8</td>
<td>19.0</td>
</tr>
<tr>
<td>Water Seal</td>
<td>28</td>
<td>66.7</td>
</tr>
<tr>
<td>Flush Toilet</td>
<td>6</td>
<td>14.3</td>
</tr>
<tr>
<td>Total</td>
<td>42</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Socio Economic Survey, Environment and Social Development division, RDA

D. Telecommunication

In the project area most of the households have access to telecommunication facilities. Out of 42 surveyed households, 32 have cellular phones, and 17 have land based telecommunication.

E. Transport Facilities

Present road network of the project area: The proposed interchange provides direct access to Maddewattha - Kakunadora - Yatiyana Road (B285). Dandeniya road belongs to Provincial Road Development Authority (PRDA) is also located within immediate project influenced area. The Maddewattha- Kakunadora -Yatiyana road (B 285) links Matara - Hakmana Road (B275) which ultimately connects Colombo – Galle - Hambanthota – Wellawaya (A002) road. Present road network of the surrounding of the project area is shown in Figure 3.8 below.

Rail Transportation: The rail transportation in Southern Coast ends at Matara city which is 14km away from the project area. The construction of new railway line from Matara to Kataragama as mentioned above will facilitate the people in the project area in future.
3.3.6. Culturally, historically and archaeologically important places in Project area

During the field survey, no archeologically important places were identified within or close to the project area. However, a Buddha statue located in Hingurupathwala junction will be affected and need to be relocated due to construction of this interchange. Three temples, namely; Kakulangoda Purana Viharaya, Thunbodiya temple and Uggoda temple are located within the one kilometer radius of the project.
CHAPTER 4: ANTIPOIATED ENVIRONMENTAL IMPACTS

Constructions of Aparakka interchange identify the significant impacts on the environment during preconstruction, construction and operational stages of the project.

Feasible mitigation measures were suggested based on environment best practices to minimize the adverse impacts (or manage to acceptable limits) while enhancing the beneficial impacts of the project.

4.1 Operational Period

4.1.1. Physical Impacts

A. Hydrological Impacts

Flood impacts

i. Impacts on natural drainage pattern (Flow pattern) including existing storm water drainage system

As mentioned in section 2.2 above, the main trace of the Extension of the Southern Expressway within the Aparekka Interchange as well as the ramps (A – F) of the interchange except for the merging sections with the existing roads will be constructed over via – ducts therefore the impact on the existing drainage pattern will be minimal. However still if the merging sections which will be filled with soil, are intercepted with the existing streams, the drainage pattern of the area will be disturbed. On the other hand, construction of the pilot road (although a temporary construction) will also block or alter the existing drainage paths if adequate cross drainage openings are not introduced. The impact will be prominent during the heavy rainy periods since the project area is prone to floods.

In addition, natural drainage pattern will be disturbed if construction material is temporary stored or if waste soil and any other debris are dumped within natural drainage pathways and paddy lands. This will also result in stagnation of storm water in the upstream during heavy rains which ultimately leads to flood conditions.

ii. Impacts on storage capacity of the existing canals/drains

The storage capacity of existing drainage system of the area will be reduced and drainage pattern will be blocked by the ramps of the interchange if they are intercepted with streams and temporarily by the pilot road during construction period. This will lead to flood situations in up streams and immediate surroundings of the project area.

In addition, the drainage capacity will be reduced if construction material is temporary stored or if waste soil and any other debris are dumped within natural drainage pathways and paddy lands. This will also result in stagnation of storm water in the upstream during heavy rains, which ultimately leads flood conditions.
iii. Impacts on flood retention capacity and discharge rates

As mentioned above, the project area is located within the upper catchment of the Nilwala River which consists of paddy lands therefore plays a major role in retaining storm water runoff. However as most of the sections the interchange will be elevated, loss of the retention area due to construction of the interchange will be insignificant. However still an area of 22,000m² will be filled for merging sections of the ramps resulting loss of paddy lands which act as retention areas by the same area.

Further, following impacts to the discharge rates of the waterways will also be possible during construction phase, if construction material is stored or waste soil and construction debris are disposed within the paddy land area, within drainage paths or blocking canals and drains and if soil will be washed of and get deposited in stream beds;

- Reduction of drainage capacity of drainage network
- Reduction of retention capacity of the project area
- Disturbance to flow pattern of the drainage network

iv. Impacts on water quality (ground / surface)

There is a possibility of deteriorating surface water quality of the waterways and ground water table of the project area due to contamination with;

- Emissions from construction vehicles and equipment such as fuel, oil and grease
- Disposal, spilling and leaking of construction chemicals when storing and handling
- Sewage, solid waste and wastewater from labour camps and other accommodations due to inadequacy of sanitary facilities and supply of water, neglecting timely removal of sewage, solid waste and wastewater in such labour camps
- Emissions from concrete batch mixing plants
- And ground water also gets polluted if these substances leak to the ground water table.

Yards, vehicles servicing stations, chemical stores, labour camps and concrete batch mixing plants are the possible locations where above impacts are possibly occurred.

v. Potential increments of flood levels and flood prevailing time at 10 year, 25 year, 50 year and 100 year return period due to the project and its impacts.

As per the hydrological study report for the Godagama and Aparekka Interchanges of ESEP Section I, there will be no significant change of 100 year flood level at the Aparekka area due to construction of the Aparekka Interchange (Figure 4.1).

vi. Impacts on the ground water table

Since the interchange is constructed over a via – duct, the effective ground area for storm water infiltration will not be significantly covered therefore impacts on the amount of ground water recharge will not be significantly changed due to construction of the interchange.

However, along the filled sections such as at merging sections of the ramps, ground treatment will be practiced which results discharging of ground water. Therefore, there can be negative impacts to the ground water table during the ground treatment.
Figure 4.1: Maximum 100 year difference of flood levels (in m) at Aparekka Interchange with and without expressway
Erosion, Siltation and sediment runoff

i. Soil erosion from exposed area and impacts on waterways and adjacent lands

If soil dumps and un-compacted earth surfaces/embankment slopes are kept exposed to heavy rainfalls it will cause soil erosion. And if waste soil dumps and material stores are kept near or within natural drainage paths, or paddy lands or project area which is a flood plain they are susceptible to be eroded with the storm water/flood water. Further there is a possibility of washing off the disturbed soil if earth works are carried out during heavy rainy days.

Eroded soil can get deposited in adjoining streams, canals, drains and paddy areas which can reduce the drainage capacity of canals and drains, deteriorate the surface water quality as well as can alter the natural drainage pattern. Reduction of drainage capacity of canals due to siltation can increase the chance of occurring flash floods during intensive rainfalls. And also if sedimentation is occurred in paddy areas and flood plains in larger amounts it will reduce the flood retention capacity of the project area as well as productivity of the paddy lands.

Impacts on Irrigation works

As stated above no major irrigation structure or scheme is found within the project area and only Kanduwela stream which is a drainage canal and field canals which supply irrigation water to paddy lands are located within the project area. These irrigation canals will be shifted at locations where piers of the via duct will be located overlapping these irrigation canals.

B. Noise, air quality and vibration impacts

Noise impacts during construction phase

Pile driving, compaction activities, operation of machineries and heavy vehicles will generate noise during construction phase and noise levels exceeding the particular permissible levels will result nuisance to the public of the project area. Higher levels of noise for prolong periods will be a significant impact to schooling children, persons who are medically unfit and elderly people who live closer to the project area. The people will be particularly vulnerable during the night time if the construction noise is exceeding the given permissible levels at night due to stress and lack of sleep. It is planned to adopt the similar construction methodology which is being carried out for via duct sections and the embankments of the main trace of the ESEP for the interchange as well. Under the activity based monitoring, noise levels generated from construction activities of the main race by ESEP Section I at the premises of Purana Viharaya, Kekulangoda which is 1km away from the interchange was measured by National Building Research Organization (NBRO) and measured noise levels are presented in figure 4.2. And it can be expected that the noise levels generated from the construction activities of the interchange will also be similar to that of the main trace.

In addition to the interchange area, higher noise levels will be possible at material extraction sites such as quarries and plants such as crusher plants, asphalt plants etc… However as mentioned in the section 3.1.15, noise sensitive receptors such as schools, places of worship are not located around the plant sites used for the project. However houses which are located around the plant sites will be disturbed due to excessive noise from the plants and yards. Further material transportation will also result noise which will negatively affect the public residing along roads used to transport material.
Impacts on air quality during construction phase

Construction activities such as removal of buildings/structures, filling of land, site clearing and grubbing, transportation of construction material, material handling, operation of construction vehicles, machineries and plants (asphalt plants and batching plants), and metal crusher activities will lead to generation of dust and other pollutants to the atmosphere. The health effects caused by air pollutants may include difficulty in breathing, wheezing, coughing and aggravation of existing respiratory and cardiac conditions. And children in the project area are particularly vulnerable to these impacts which could cause health hazards.

Vibration impacts during construction phase

Vibration generated from pile driving, compaction activities, movement of heavy vehicles etc... will cause temporary impacts to the surrounding environment in and around the project area. Especially the residents living nearby to the trace will particularly be vulnerable to the vibration impact.

Construction work during evening, night time, weekends and holidays will create comparatively significant impacts especially. Loss of comfort, sleeping disturbance, stress will be the possible impacts to the residents.

Further continuous exposure of residents to excessive vibration levels will also cause stress and discomfort of the life and the impact will be significant if differently able persons, persons with illnesses etc... are living nearby to the interchange.

On the other hand, there will be structural damages could also be occur such as crack formation of the buildings located nearby to the interchange due to excessive vibration.
However, as per the figure 4.3 below, construction activities of the main trace of the ESEP has not resulted excessive vibration levels and it is observed that measured values during the construction activities are below the relevant permissible levels.

In addition, movements of material transporting trucks will also cause vibration to the surrounding of the interchange and also to the residents living along the roads which are used for material transportation.

![Graph showing measured vibration levels](image)

**Figure 4.3: Measured vibration levels of the main trace**  
(Source: Monthly Progress Report on Environmental and Social Safeguards Compliance of Section I of ESEP, March 2018)

### 4.1.2 Ecological Impacts

**A. Loss of habitats and vegetation**

It is anticipated that the 22,000m$^2$ of lands including paddy and residential will be lost due to filling activities owing to construction of the interchange. This will result direct loss of habitats of fauna and flora. Due to loss of habitats, the breeding, feeding, resting grounds of animals will be lost. Fragmentation of habitats is not expected to cause as a major impact as floral and faunal species have a wide distribution in the adjoining areas where similar land use is found.

**B. Disturbance to flora and fauna**

Already the fauna in the project area may already been disturbed due to the ongoing construction activities in the project area. Free movement of remaining faunal species such as amphibians, reptiles and small mammals will be impeded due to noise and vibration resulted from the construction activities. During night time bright lights installed in construction sites will attract nocturnal insects which will lead to mortality.

Project activities will result soil erosion if adequate measures will not be adopted. Eroded soil particles will get deposited on nearby water bodies which are inhabited by aquatic and amphibian fauna. The soil particles will develop turbidity in such water bodies. This will result a decrease in the amount of light penetration and will adversely affect the survival of aquatic flora and fauna. Further,
the suspended particles may clog the gills of fish and mechanically injure them resulting increase mortality. In addition, soil will settle down on the bottom of water bodies negatively affecting aquatic flora & fauna habitats.

If accidental spills of toxic or hazardous material take place near water bodies, it may lead to contaminate water and therefore fauna and flora which depend on such water bodies will be significantly affected. If waterways in the project area is blocked or diverted, the free movement of aquatic animals will be disturbed. Further habitats of fauna and flora will also be impacted due to degradation of air quality due to emissions from construction activities such as dust and other pollutants.

C. Spreading of invasive species

During the construction stage, soil will be brought into the project area from outside. This soil may contain seeds of alien invasive species. Also the construction machinery and vehicles can accidentally introduce seeds of weedy plants if used without proper cleaning.

On the other hand, several invasive species were found in surface water bodies, paddy lands, water bodies and highlands in the project area. There is a possibility of invading such invasive species to new areas if the waste plant material generated during site clearing and dredging (if any) activities is disposed to areas away from the project.

4.1.3. Socio-economic Impacts

A. Land use impacts

Loss of land: For the project about, a total of 8.57ha of land need to be acquired. The land use pattern of affected land is given below (Refer table 4.1). The paddy lands and home gardens are the most affected types of land with approximately 88% of affected land area.

Table 4.1: Affected lands and their land use pattern

<table>
<thead>
<tr>
<th>Lands</th>
<th>No. of lots</th>
<th>Affected Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home garden</td>
<td>108</td>
<td>3.6018</td>
</tr>
<tr>
<td>Paddy lands</td>
<td>49</td>
<td>3.9129</td>
</tr>
<tr>
<td>Canal</td>
<td>19</td>
<td>0.1901</td>
</tr>
<tr>
<td>Sub Road</td>
<td>23</td>
<td>0.7143</td>
</tr>
<tr>
<td>Other</td>
<td>06</td>
<td>0.1563</td>
</tr>
<tr>
<td>Total</td>
<td>205</td>
<td>8.5754</td>
</tr>
</tbody>
</table>

Source: PMU data 2017, Extension of Southern Expressway Project

B. Impact on agricultural lands

Due to construction of this interchange 3.9129 hectares of paddy lands (49 lots) will have to be acquired. These lands are cultivated both Yala and Maha seasons and livelihoods of the farmers will be affected due to the acquisition. Adjacent paddy lands in the project area may be silted due to the soil erosion caused by the interchange construction activities.
C. Adverse Social Impacts

Impact on Livelihood: During the socio-economic survey, it was revealed that livelihood of the people in the area solely depend on the paddy cultivation. Some farmers in the area are identified as tenant farmers. Due to acquisition of paddy lands livelihood of the people will be adversely affected. Due to land acquisition about seven (7) shops will have to be demolished and livelihoods of the shop owners will also be affected.

Number of structures to be demolished and relocated: As per the land acquisition plans, about two (2) houses and seven (7) shops will have to be demolished. They have no enough space to resettle in the same land and need to be relocated elsewhere.

D. Impacts on infrastructure

Road infrastructure: Movement of construction and material transport vehicles may cause damages to public roads around the project area. Pot holes and damaged culverts may lead to accidents. In addition people will be affected by traffic congestions.

Telecommunication and electricity: During the land acquisition utility supply lines such as telecommunication and electricity (No water supply lines in the project area) within the acquired land will be removed and thereby these supplies need be temporarily disconnected and it will affect surrounding communities.

E. Public Health and Safety

During construction phase, public health and safety issues become prominent. Migrant labor adds possibilities of poor sanitation, use of illicit liquor, indecent behavior and violence and spread of diseases. Generation of dust and deterioration of air quality are unavoidable threats for lives of the people caused by various construction activities such as site cleaning, filling, drilling, pile driving, surfacing and paving activities etc.

Transportation materials and waste disposal will affect the health and safety of the people of project area. Improper disposal of waste materials can potentially cause obstruction to natural drainage systems, makes local flooding situations and spreads mosquitoes breeding.

The effect of dust emissions and other emissions from construction activities will have more negative impacts on vulnerable populations like children, pregnant women and sick and elderly persons.

Fatal accidents may possible to happen at the construction site due to entrance of public to the site and at junctions where construction vehicles cross, enter or exit. And also, if night time work is carried out, there will be accidents due to poor visibility.

F. Workers health and Safety

Inadequate sanitary facilities and poorly designed labour camps could lead to spread of diseases (especially vector borne diseases). Over-crowded labour camps may cause scarcities of drinking,
washing and bathing facilities to labourers. Unsystematic waste disposal and resulting water stagnation points spread mosquitoes and other insects. This gives rise to several types of vector borne diseases.

Workers will engage in diverse types of construction activities, including some hazardous activities such as welding, pile driving, quarrying. Some of the construction works may have to be carried out during night time. The workers will be prone to accidents if they do not wear proper protective clothing and if they do not follow the instructions given by the site supervisors.

G. Positive Social impacts

Increase in business and industrial activities: During the construction period, due to migrant labor, demand for food and beverages will be increased. Accordingly, traders in the areas will be positively impacted.

Increase access: This interchange connects Meddawatta - Kakenadura-Yatiyana (B284) road to Extension of Southern Expressway. Thus, this will provide access to expressway network of the country. Thereby road users will be benefited by this project.

Land value: The land value of the area will be increased with the economic development of the area facilitated by the interchange.

Increase employment: This project will create more employment opportunities. Therefore, unemployed people in the project area will be able to find labor, clerical and technical jobs from the project.

New source of revenue to the government: After opening this interchange the toll revenue will be a new source of revenue to the government.

H. Impact on historical/ cultural monuments/ areas

During the field survey, no archeologically important places were indentified within or close to the project area. A buddha statue located in Hingurupathwala junction will be affected and need to be relocated due to construction of this interchange. Two temples, namely; Thunbodhiya temple and Ugada temple are located within the one kilometer radius of the project.

I. Disruption to traffic flow

During the construction period, residents may be disrupted and inconvenienced by detours and road closures. Therefore, they will face many problems in day to day life as they cannot reach their destinations on expected time.
4.2. During operation stage

4.2.1. Hydrological impacts

A. Blocking of drainage paths

Water stagnations, flash floods will be possible if culverts and drains will be blocked with debris and other waste material.

B. Soil erosion, slope instability

If the mulch over the embankments slopes are not properly maintained, the slopes can be eroded and silted in adjoining water bodies as well as it will badly affect to the stability of the embankment.

4.2.2. Impact due to noise during operation phase

There is a possibility of increased noise levels as a result of high traffic volume at the interchange as per the traffic forecast. Traffic noise can affect the ability to work, learn, rest, relax, sleep, etc... Excessive noise can ultimately lead to mental and physical health problems.

4.2.3. Impacts due to degradation of air quality

Air quality around the interchange during the operational phase could be degraded due to emissions of vehicles which are accelerating and decelerating at the interchange. Further accumulation of dust and tyre debris on the road surface can be blown to the surrounding reducing the air quality. Health impacts to the surrounding community especially to infants, elders and sick persons can be possible due to degraded air quality.

4.2.4. Animal collisions

Animal collision could be possible due to entering of animals to the expressway and low flying birds across the trace. The interchange can be a location where animals such as dogs enter the main trace.
CHAPTER 5: MEASURES TO MITIGATE OR MANAGE ENVIRONMENTAL CONSEQUENCES

5.1 During pre-construction and construction stages

5.1.1. Measures to mitigate hydrological Impacts

A. Flood impacts

Impacts on natural drainage pattern

Except for the merging sections, the interchange will be elevated therefore the impact on natural drainage pattern across the interchange will not be significantly affected. Locating culverts across the merging sections of the ramps and construction of drainage paths as given in the figure 2.1 above will facilitate smooth drainage of storm water across the interchange. As recommended in the hydrology report, lead in and lead away canals will also be constructed to properly direct the flow to particular structures. Therefore the natural flow pattern of the area will not be affected due to the construction of the interchange.

Pilot road (which is a temporary construction) shall also have adequate number of cross drainage openings to avoid any flash floods. Provisions should be kept during construction period to break open the pilot road and allow dissipating any floods that may occur during an intense rain fall events. Consent from the SLRDC will be obtained for construction of the pilot road well in advance.

On the other hand, any material stock pile or dump of unsuitable material shall not be located blocking drainage paths of the project area. If such blocking is occurred due to construction activity, RDA shall take immediate actions to restore them through the Contractor.

Impacts on storage capacity of existing canals/drains

Existing drainage paths shall not be blocked by the temporary works such as construction of the pilot road, storing of material, establishment of temporary huts etc... New drains as recommended in the Hydrology Report in the drainage plan (Figure 2.1 above) will help to facilitate the continuity of the drainage across the interchange. In addition, it will be ensured that the storage capacities of waterways will not be reduced by siltation, dumping of soil disposal of other wastes etc... during the construction phase. Immediate actions will be taken to restore the waterway if such deposits are occurred as a result of the construction activities.

Reduction of flood retention capacity and discharge levels

Construction of the merging sections of the ramps of the interchange will reduce the land area for retention by around 2.2ha. However based on the Hydrological Report, the increment to the flood level due to construction of the Aparekka Interchange will be negligible. On the other hand, with the implementation of the drainage plan as given in figure 2.1, excess water if any will be drained off during normal weather conditions.

Further RDA will ensure that material stock piles, temporary dumps of disposal material and filling for temporary activities such as for establishment of yards etc... will not be located within the low-lying area especially in paddy lands of the project area. And appropriate site specific measures will be adopted to minimize erosion of soil and siltation of low-lying areas and drainage paths.
B. Impacts on ground and surface water quality and contamination of soil

All construction vehicles and machineries shall be serviced and maintained only at servicing yards/stations which are operated with valid Environmental Protection License (EPL).

Construction material such as cement, bitumen and other chemicals including any harmful substances shall be stored in protected sealed compartments/enclosures and handled carefully to avoid spills. Essentially such enclosures shall be built above the ground level with an impervious floor and roofing to avoid any rain water spilling over such material. Waste containers and material will be disposed only in locations approved by CEA and LA or shall be handed over to the collectors who recycle/reuse them. If a water body is contaminated as result of a construction activity, RDA will restore the water body as early as possible through the Contractor. Oil/fuel dispensers shall be equipped with oil traps and shall not be allowed to mix with runoff.

Approval for locations for the labour camps shall be obtained from the respective LA and will comply with guidelines/recommendations issued by the LA and/or CEA. Labour camps shall be provided with adequate and appropriate facilities for disposal of sewerage, solid waste and waste water in a hygienic manner. The sewage systems shall be properly designed, built and operated so that no pollution to ground water or adjacent water bodies/watercourses takes place. Septic tanks and garbage bins/solid waste collecting pits shall be regularly emptied to avoid any contamination to ground or surface water sources.

Emissions from plants such as concrete batching plants, crusher plants and asphalt plants shall not be disposed to the open environment without a proper treatment and the effluent shall be in compliance with the required standards as specified under the NEA. Silt traps shall be installed at locations where soil can be eroded to water bodies due to construction activities with adequate capacity and shall be properly maintained.

C. Impacts on the ground water table

During construction a close monitoring of ground water levels will be done to monitor any undue residence of ground water levels. If such observation appears the contractor shall be advised to provide an alternative water source to rectify the situation. However, depletion of ground water levels (especially in wells) will not severely affect the people in the project area as they use pipe born water for their domestic needs.

5.1.2. Impacts on soil

A. Erosion, siltation and sediment runoff

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. Temporary soil dumps should be kept avoiding drainage canals and wetland. If it is left at the site for a long time those piles shall be covered with thick polythene sheets not to be exposed to direct rainfall. Also embankment slopes should be compacted to the required degree of compaction and covered with proper mulch.

Waste soils and other denuded materials shall not be left in places where it may be carried by rain water/flood to downstream flood plains. 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 LA. Site specific soil conservation measures shall be adopted based on the location of the disposal site as recommended by the LA or the Engineer. And if directed by the engineer the debris and residual spoil material including any left earth can be used to refill the borrow sites. Silt traps will be installed at all pilling locations, locations where earth works are carried out in order to minimize soil washing away to the outside of the ROW.

B. Impacts due to bentonite

Following measures shall be adhered when handling and disposing bentonite resulted from construction activities;

I. Bentonite shall be disposed only in locations which are approved by CEA and SLLR&DC and specification given by such authorities will be strictly followed

II. Bentonite shall not be allowed to drain off when temporary stored within the site and lagoons used for the storage will be lined with thick polythene

III. Bentonite clay slurry shall be disposed mixed with soil.

IV. If abandoned quarries are used as disposal sites, stagnated water if any will be pumped out prior to disposal

V. Adequate silt traps shall be constructed to avoid bentonite mixed soil run off to surrounding area at disposal sites.

VI. All vehicles shall be sufficiently covered when transporting of bentonite mixed soil from the construction site to disposal area.

VII. Special attention shall be given to avoid leakages when transporting of bentonite mixed soil.

VIII. During filling activity neighbours and their properties should not be affected. If any damage arises to nearby properties due to filling activities, contractor has to take the responsibility regarding damage and it shall be compensated.

C. Soil compaction

Construction of the interchange on piers will reduce the land area that needs to be filled. However, operators of all construction vehicles should be instructed not to travel outside the construction area there by to avoid unnecessary compacting the soil outside the project area.

5.1.3. Noise, air quality and vibration impacts

A. Measures to mitigate impacts due to noise and vibration

The impacts related to increased level of noise and vibration during the construction stage can be minimized by adopting following mitigation measures

- 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 E.O Gazette 937/7 April 1997.

- All machinery and equipment shall be well maintained and fitted with noise reduction devices in accordance with manufacturer’s instructions.
• Ensuring that construction plant and equipment is maintained to a high operable standards and that exhaust baffles are fitted and maintained in a high serviceable condition.

• Limiting operations to times when they have least impact in settlement areas.

• Construction activities shall be modified based on the location in order to reduce noise and vibration impact such as using small vibration rollers and small power tools in settlement areas etc...

• A pre-condition crack survey of houses and other buildings will be carried out through the Contractor within an agreed corridor with the Engineer and if cracks are formed or developed as a result of the project activities during the construction phase, a reasonable compensation shall be paid to restore the damage of such buildings.

• Providing location specific mitigation measures to reduce vibration impact such as trenches and barriers for the settlement areas.

• Periodic monitoring shall be carried out to monitor noise and vibration and construction methodology shall be revised if measured levels are exceeding than that of the permissible levels.

B. Measures to mitigate impacts on air quality

Adhering to the following mitigation measures can minimize the airborne particulate matter released to the atmosphere.

• All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations, National environmental air emissions fuel and vehicle standards E.O Gazette 1137/35 of June 2000 updated by air emissions fuel and vehicle standards (importation standards) 1268/18 December 2002 and 1295/11 June 2003 and further amendment, 1557/14 July 2008.

• Water sprinkling systems shall be installed to reduce dust generation from the crusher plant, asphalt plant & batching plant and in material handling. And it shall be ensured that all emissions from the construction activities will not exceed the standards as stipulated in National ambient air quality standards (Gazette Notification No. 1562/22 of 15th August 2008).

• Storage locations of sand, metal, soil shall be located away from settlements and other sensitive receptors

• Care should be taken in stockpiling construction material with adequate coverage (with artificial barriers or natural vegetation) against wind, Sun and rain.

• Speed limits to be rigorously enforced and transport through settlement areas should be avoided where possible.

• Care should be taken to avoid spillage of construction material and dust emissions during unloading of construction material to the project site.

• Effectively managing 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.
• All vehicles delivering materials shall be covered to avoid spillage and dust emission

• Avoid, where possible and take suitable action to prevent dirt and mud being carried to the roads (particularly following wet weather).

• Employ a water truck to sprinkle water for dust suppression on all exposed areas as required (note: the use of wastewater / waste oil for dust suppression is prohibited)

• All cleared areas shall be rehabilitated without delay.

• All earthwork shall be protected in a manner acceptable to the minimize generation of dust.

• All existing public roads used by construction vehicles, material transporting vehicles and other roads which are used for construction activities shall be kept clean and clear of all dust/mud or other extraneous materials dropped by such vehicles or their tyres.

• Plants, machinery and equipment shall be handled (including dismantling) so as to minimize generation of dust.

• The contractor shall take every precaution to reduce the level of dust emission from the hot mix plants and the batching plants up to the satisfaction of the Engineer in accordance with the relevant emission norms.

• The hot mix plant be sited in accordance with CEA guidelines and operated with an EPL and conditions stipulated in the EPL shall be strictly implemented.

5.1.4. Measures to mitigate Impacts upon ecological resources in the marshes and valuable beneficial water uses

Following mitigation measures are proposed to minimize impairment of ecological resources and impact on other beneficial water uses due to construction of proposed interchange.

   A. Loss of habitats/loss of vegetation

The paddy lands other than acquired shall not be used as waste disposal sites and shall not also be allowed to be reclaimed or to be encroached.

A compensatory tree planting program will be introduced through the Contractor and land space left at the interchange will be used for planting. If the space is not adequate, possible lands for tree planting will be explored with the help of Department of Forest and Divisional Secretariat of the project area. For replanting, a mixture of native floral species naturally growing in the related areas (e.g.: Kumbuk (Terminalia arjuna), Halmilla (Berrya cordifolia), Kon (Schleiclera oleosa) and Nedun (Pericopsis mooniana) could be selected. Once the interchange is constructed suitable species could be planted as shade trees.

During construction, if a rare/threatened/endangered floral species is found, it shall be immediately informed to the PMU by the Contractor. If found, all activities that could destroy such flora and/or its habitat shall be stopped with immediate effect. Such activities shall be restarted 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.
B. Disturbance to animals:

The duct and the drainage structures constructed will serve passages for cross movement of small mammals, reptiles and amphibians and minimize the risk of being run over and collision with vehicles will therefore be reduced and the impact on fragmentation of populations shall also be minimized.

C. Spreading of invasive species:

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. Material extraction sites (especially soil) shall be studied for existence of invasive species when getting the approval from the Engineer. And if such species is found, the Contractor or his subcontractors will be advised to follow the measures as instructed by the Engineer to avoid spreading the identified species with the material.

Using native floral species when replanting should be carried out to prevent the risk of new invasion to the project area.

5.1.5. Social impacts

A. Loss of lands and livelihood

The compensation for affected persons who lose private land and properties and livelihood including tenants will be paid at market prices based on the Land Acquisition Act (LAA) and LARC payment.

B. Impact on infrastructure

Road infrastructure: Any damages to public roads due to the movement of construction vehicles and material transport vehicles will be repaired and restored to the satisfaction of the relevant authority who manages such roads.

Telecommunication and electricity: All construction operations that are carried out close to utility lines will be supervised by site inspectors. Clear instructions will be given to operators of trucks and machinery having arms and booms to avoid damages to utility lines. Any accidental damage to such utility lines will be repaired by the contractor under supervision of the engineer and the service provider.

C. Public health and safety

Service roads and all access roads within the project area shall be sprinkled with water for dust suspension. The Storage locations of sand, metal, soil should be located away from settlements and other sensitive receptors and covered by artificial barriers or natural vegetation.

Contractor shall take necessary action to prevent breeding of mosquitoes at places of work, labour camps and store buildings. Stagnation of water in all areas including gutters, used and empty cans,
containers, tiers, etc... shall be prevented. Approved chemicals to destroy mosquitoes and larvae should be regularly applied.

Proper barricading, night time lighting will be placed around the construction sites. No public will be allowed to enter the construction area. Flagmen will be placed at all junction locations to manage safe passage of vehicles.

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 pollution to ground or adjacent water bodies takes place. Garbage bins shall be provided to 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/Local Authority (LA) shall be strictly adhered and RDA supervision engineer shall monitor whether these conditions are adhered by the contractor.

In addition to 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, and school.

Contractor shall 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.

Providing awareness program related to HIV/Aids and other STDs will minimize chance of exposing to STDs of nearby communities and labors.

D. Workers health and safety

To prevent vector borne diseases, contractor shall ensure that all camps are kept clean and hygienic. Labour camps shall be provided with adequate and appropriate facilities for disposal of sewerage and solid waste.

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. Design should be approved 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 with markings in local languages shall be provided. There shall be adequate supply of water, within and close to latrines and urinals

Contractor shall supply all necessary safety appliances such as safety goggles, helmets, masks, boots, etc., to the workers and staff. Contractor should make sure whether these safety appliances are followed by the workers.
The contractor must comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, excavations, trenches and safe means of entry and egress. At every workplace, first aid kit shall be provided.

Notice boards will be put up at construction sites and camps to alert all workers on safety standards and requirements.

**E. Disruption to traffic flow**
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.

**F. Impact on historical/ cultural monuments/ areas**
A Buddha statue located in Hingurupathwala junction will be affected. PMU will discuss with villagers to relocate the structure in a suitable location with all the religious services required.

**5.2 Mitigation measures during operation stage**

**5.2.1. Hydrological impacts**

**A. Blocking of drainage paths**
Regular clearing and maintenance of all culverts and drains within the ROW shall be done to reduce the chances of failures and blocking due to debris. Maintenance manual of RDA should also be followed to maintain the road drainage.

**B. Soil erosion, slope instability**
The embankment slopes shall be properly maintained with replacing the mulch if damaged and it shall be ensured that soil erosion from embankments and other areas of the interchange will be minimized.

**5.2.2. Measures to mitigate impacts due to noise during operation phase**
The impacts related to increased level of noise during the operation stage can be minimized by adopting following mitigation measures

- Erection of noise barriers shall be considered based on the public complaints on the noise impact during operational phase. The complaints on the noise impact shall be evaluated using a mathematical model and noise barriers shall be erected based on the recommendations of the model.
- Enforcement of regulations and also making awareness of drivers of the highway shall be implemented with the help of the Police to reduce the noise generation from vehicles.
5.2.3. Mitigation measures for air quality impacts during operation phase

Road surface shall be regularly cleaned in order to remove dust and tire debries. Trees planted during the construction phase shall be well maintained in order to provide a wind barrier to the interchange which will reduce blowing of particles accumulated on the road surface.

Air quality deterioration due to vehicular emissions from silences during the operational stage can be minimized by strict enforcement of national regulations with the help of Local Police.

5.2.4. Animal collisions

Animal movements shall be facilitated across the expressway since the main trace will be elevated at the interchange. Still, continues supervision shall be ensured to avoid animals entering the expressway along the ramps of the interchange.
CHAPTER 6: INSTITUTIONAL ARRANGEMENTS FOR SAFEGUARDS
COMPLIANCE AND ENVIRONMENTAL MANAGEMENT AND
MONITORING PLAN

6.1. Institutional Arrangements

The Ministry of Highways and Road Development is the Executing Agency (EA) for the ESEP under which the Aparekka Interchange will be constructed and the Secretary to the ministry will be responsible for decisions on overall approvals and operational policies of the project. RDA will be the Implementing Agency (IA). A Project Management Unit (PMU) which has been already setup for ESEP headed by a Project Director (PD) will be responsible for construction of the interchange. The PD is assisted by a staff of engineers, Environment and Social Safeguards Officer (ESSO) and other administrative staff. The PMU is assisted by a Supervision Consultant (SC), the Engineer who will be responsible to review and approve designs prepared by contractor, supervise civil works of contractor and review and certify bills submitted by contractor. A team of experts including engineers, quantity surveyors, Environmental Specialists are working in the SC headed by a Team Leader (TL).

Road Development Authority holds the primary responsibility of Environmental and Social Safeguards Compliance of this project while ESSO of the PMU, Environmental Specialist of PIC and the contractor are responsible for implementing measures to ensure safeguards compliance of all activities carried out under project in the ground. Environmental and Social Development Division (ESDD) which is the safeguards arm of RDA shall monitor the safeguards compliance of the project while ESDD will assist the PMU in meeting the safeguards considerations as necessary.

6.2. Environmental Management Plan and Monitoring Plan

The Environmental Safeguards Manual of RDA, outlines the requirements for an Environmental Management Plan (EMP) which is presented as a matrix developed based on best practices for environmental management as described in Chapter 5 of this report. This SEIA report includes EMP prepared for construction of the Aparekka Interchange which is given in Appendix 6.1. This EMP covers all impacts and mitigation measures identified within the project. RDA shall implement the mitigation measures as given in the EMP through the Contractor under the supervision of PMU and SC during the construction phase while implementation of the mitigation measures recommended for the operational phase shall be undertaken by the Expressway Management Unit (EMU) of RDA. All costs for implementing the mitigation measures during the construction phase shall be included in the Bill of Quantities (BOQ) by the contractor.

In addition there will be an Environmental Monitoring Plan (EMOP) based on the project cycle to monitor EMP implementation by measuring environmental parameters. During the pre-construction phase baseline data on air, water quality and noise levels will be collected. This data will provide baseline information on the existing conditions which could be used to compare the changes in
quality levels during construction and operational phases. Such a comparison will reflect how effective the EMP is and help to revise it to rectify any shortcomings that will cause any adverse impacts. Appendix 6.2 presents the EMOP prepared for construction of the Aparekka Interchange. EMOP shall also be implemented through the contractor with the help of an approved monitoring agency.

In addition to the parameter monitoring as per the EMOP, monitoring of compliance of the construction activities against the mitigation measures as given in the EMP shall also be carried out. The Environmental Specialist of SC is primarily responsible for the compliance based monitoring with the ESSO of the PMU. ESDD of RDA shall also carry out regular monitoring sessions to the project jointly with PMU, SC and the Contractor in order to monitor the safeguards compliance.
CHAPTER 7: PUBLIC CONSULTATION, INFORMATION DISCLOSURE AND GRIEVANCE REDRESS MECHANISM

7.1. Public consultation process

The study team conducted consultation with government officials related to the interchange and carried out public consultation in the radius of 1 km of the project area. A summary of public consultation is given in Appendix 7.1.

Stakeholders expressed that inclusion of Aparekka interchange to the highway network will develop the area. However, they also mention about the loss of properties and livelihoods due to construction and requested fair compensation for affected people. Further, the flooding on rainy days, dust, noise and vibration were mentioned as possible impacts during construction and has requested proper mitigation measures.

The farmers expressed their concern over the loss of paddy lands. Some of the farmers have lost their lands for the trace also and they requested fair compensation for their lands. Affected residential and business community asked timely adequate compensations. People highlighted the issue of noise and vibration as one of the main issues during construction period.

Objective of this activity was to understand the viewpoints of the stakeholders, respond to their concerns and suggestions during the early stages of the project there by reduce any objections towards the project, develop a satisfactory compensation mechanism for the Affected Persons (APs), incorporate any valuable suggestions by the public in to the design so as to reduce any adverse impacts to the environment.

7.2. Disclosure of information

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

7.3. Proposed Grievance Redress Mechanism (GRM) for the project

Grievances from the affected people on social and environmental issues during project implementation will be addressed mainly through the Grievance Redress Mechanism (GRM) which is to be formed using existing local administrative system. The proposed GRM consists of three levels.
This will include National Level, Regional (District) Level and Divisional Level Grievance Redress Committees (GRC).

7.3.1. Composition of Grievance Redress Committee (GRC) - National level

This is located at the Ministry of Highways and Road Development, and chaired by a Secretary of the Ministry or a designated representative of him/her. The Director General RDA will serve as the secretary to the committee. This committee receives appeal cases from unsatisfied DPs with regard to the decisions of the committees at lower levels. The committee consists of following members;

<table>
<thead>
<tr>
<th>Table 7.1: Members of the GRC at National level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Representative of the Supervision firm member</td>
</tr>
<tr>
<td>Representative from construction firm member</td>
</tr>
<tr>
<td>Representatives from a Social Organization (if necessary) member</td>
</tr>
<tr>
<td>(A national level NGO/CBO operating in the field and have operations in project area)</td>
</tr>
<tr>
<td>A representative from the agency which happen to be a party of the dispute, if relevant Member</td>
</tr>
<tr>
<td>Affected DP or his/her representative Nonvoting member</td>
</tr>
</tbody>
</table>

7.3.2. Composition of Grievance Redress Committee (GRC) - Regional/ District level

This committee is expected to resolve disputes that could not be resolved by the DS level committee. The committee consists of following members;

<table>
<thead>
<tr>
<th>Table 7.2: Members of the GRC at Regional/District level</th>
</tr>
</thead>
<tbody>
<tr>
<td>District Secretary of the area/ or representative of him/her Chairman</td>
</tr>
<tr>
<td>Representative from PMU Secretary</td>
</tr>
<tr>
<td>Divisional Secretary of the concern area Observer</td>
</tr>
<tr>
<td>An officer from RDA Member</td>
</tr>
<tr>
<td>A representative from an NGO/CBO operative in the area Member</td>
</tr>
<tr>
<td>A respected clergy of the area or Community Leader Member</td>
</tr>
<tr>
<td>Affected DP /his representative Member</td>
</tr>
</tbody>
</table>

7.3.3. Composition of Grievance Redress Committee (GRC) - DS level

This is the most basic committee established at the lowest level. The affected people can lodge complaints at respective Grama Niladari Office, Divisional Secretariat office, at the Construction Site or at the Executive Engineer office, RDA.

GRC meetings will be held at the PMU site office or at DS office. The DPs will be informed about the GRC, seven (7) days prior to its meeting.
Secretary of GRC is requested to coordinate with all relevant parties to get necessary information. In addition to that the secretary should keep records of all complaints and reports. All complaints should be in written form.

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

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

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

DS level GRC consist of following members;

**Table 7.3: Members of the GRC at DS level**

<table>
<thead>
<tr>
<th>Divisional Secretary of the area</th>
<th>Chairman</th>
</tr>
</thead>
<tbody>
<tr>
<td>Representative of PMU</td>
<td>Secretary</td>
</tr>
<tr>
<td>Grama Niladari</td>
<td>Member</td>
</tr>
<tr>
<td>Representative of Supervision Consultant</td>
<td>Member</td>
</tr>
<tr>
<td>Representative of Contractor</td>
<td>Member</td>
</tr>
<tr>
<td>Representative of a social organization (NGO/CBO) of the area</td>
<td>Member</td>
</tr>
<tr>
<td>A community member/religious leader</td>
<td>Member</td>
</tr>
<tr>
<td>A repetitive from the agency who is a party of the dispute, if applicable</td>
<td>Member</td>
</tr>
</tbody>
</table>
CHAPTER 8: CONCLUSIONS AND RECOMMENDATIONS

The proposed Extension of Southern Expressway Project will significantly reduce the travel time between administrative and commercial capitals of the country and Hambanthota and relieve the traffic congestion in the A002 road within the section from Matara to Hambantota. The second interchange for ESEP was initially proposed at Dandeniya however, this creates comparatively higher impacts due to land acquisition and resettlement. Therefore, during the detailed design it was proposed to shift the second interchange to Aparekka where the impacts are comparatively low. Therefore in compliance with the National Environmental Act, RDA is supposed to conduct a SEIA for the proposed alteration.

During the SEIA study, it was explored that the proposed interchange lies on low land area of "Kanduwela Ela" which is influenced by the back water effect of River "Nilwala Ganga". However further it was found that flood impact is not significant in the project area. Nevertheless it is recommended to adhere to the guidelines given in the hydrology report and comments given by SLLRDC in order to enhance smooth surface water hydrology and to reduce the flood impacts. The proposed interchange do not encroach any protected area or unique habitats of fauna and flora.

This project will also affected two houses & seven shops, hence the project intend to provide adequate compensation for the acquired properties.

Other project induced environmental and social impacts as identified in the study are temporary in nature during the construction phase and could be minimized by effective implementation of Environmental Management Plan and frequent monitoring as per the Environmental Monitoring Plan.

Construction of the interchange will not pose any significant impact on physical, hydrological, biological and social environment. Implementation of the EMP proposed in this SEIAR will minimize any adverse impacts during construction and operational stages. Construction of Aparakka interchange of Extension of Southern Expressway will generate positive socio economic impacts while the outcome will ultimately enhance increased transportation efficiency of the country while achieving a sustainable development.