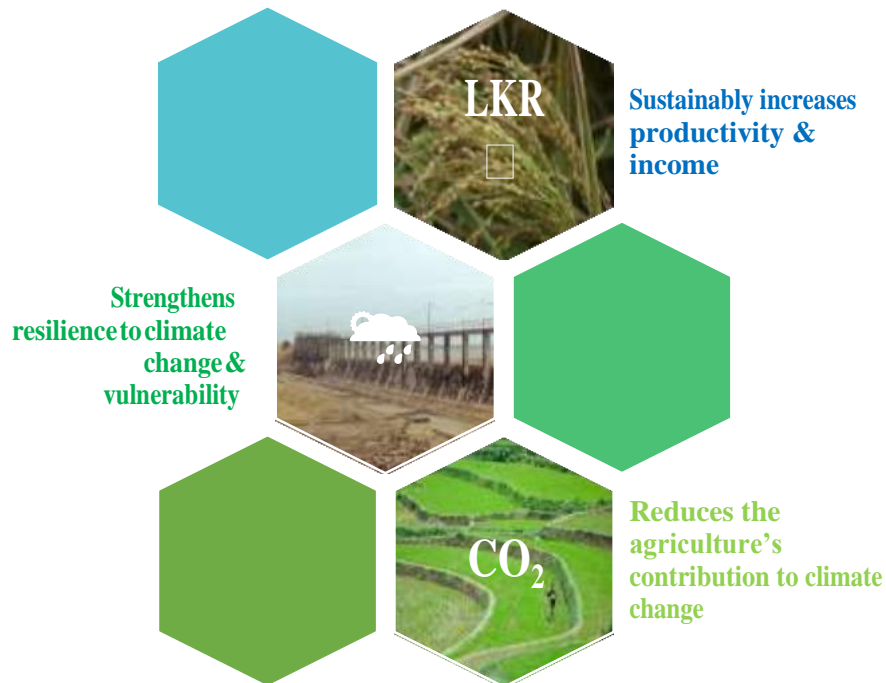


# Climate Smart Irrigated Agriculture Project

## Environmental Assessment & Management Framework



**Democratic Socialist Republic of Sri Lanka**



**Ministry of National Policy & Economic Affairs**  
**Ministry of Agriculture**  
**Ministry of Irrigation & Water Resources Management**  
**Ministry of Local Government & Provincial Councils**  
**Ministry of Disaster Management**  
**Ministry of Mahaweli Development & Environment**  
**Ministry of Public Administration & Home Affairs**

September 6, 2018

## Acronyms and Abbreviations

ABE	Agri-Business Enterprise	IEE	Initial Environmental Examination
ASC	Agrarian Service Centre	ITK	Indigenous Technical Knowledge
ASMP	Agriculture Sector Modernization Project	IWMI	International Water Management Institute
BP	Bank Procedure	LA	Local Authority
BP	Business Plan	MC	Municipal Council
CC	Community Centers	MCM	Million Cubic Meters
CCAC	Coast Conservation Advisory Committee	MIWRM	Ministry of Irrigation and Water Resources Management
CCCRMD	Coast Conservation and Coastal Resources Management Department	MOA	Ministry of Agriculture
CEA	Central Environment Authority	MSME	Micro, small and mid-size enterprise
CMC	Cascade Management Committee	NCDM	National Council for Disaster Management
CRIP	Climate Resilience Improvement Project	NEA	National Environment Act
CSA	Climate Smart Agriculture	NPSC	National Project Steering Committee
CSC	Common Service Center	O&M	Operation and Maintenance
CSIAP	Climate Smart Irrigated Agriculture Project	OP	Operation Policy
DAD	Department of Agrarian Development	OUV	Outstanding Universal Value
DOA	Department of Agriculture	PAA	Project Approving Agency
DSD	Divisional Secretariat Division	PG	Producer Group
DWC	Department of Wildlife Conservation	PID	Provincial Irrigation Department
EA	Environmental Assessment	PIP	Project Implementation Plan
EAMF	Environmental Assessment and Management Framework	PPMU	Provincial Project Management Unit
EHS	Environment, Health and Safety	SLLRDC	Sri Lanka Land Reclamation and Development Corporation
EIA	Environmental Impact Assessment	SNR	Strict Nature Reserve
EMP	Environmental Management Plan	TA	Technical Assistance
EPL	Environmental Protection License	TOR	Terms of Reference
FD	Forest Department	UC	Urban Council
FFPO	Fauna and Flora Protection Ordinance	WFP	World Food Programme
FI	Financial Institution	WH	World Heritage
FI	Financial Intermediary	WMO	Water Management Organizations
FO	Farmer Organization	WRB	Water Resources Board
GHG	Greenhouse Gas		
GND	Grama Niladhari Division		
GOSL	Government of Sri Lanka		
GSMB	Geological Survey and Mines Bureau		
HEC	Human Elephant Conflict		
HIA	Heritage Impacts Assessment		
HSA	Hot-Spot Area		
HSADP	Hotspot Area Agriculture Development Plan		
ICOMOS	International Council on Monuments and Sites		

# Table of Contents

Acronyms and Abbreviations .....	i
Table of Contents .....	ii
Chapter 1: Introduction to Climate Smart Irrigated Agriculture Project.....	1
1.1 Introduction and Background .....	1
1.2 Climate Smart Irrigated Agriculture Project .....	3
1.2.1 Project Development Objective.....	3
1.2.2 Project Description .....	3
1.3 Project Locations.....	7
1.4 Environmental Assessment and Management Framework .....	7
1.4.1 Objectives and rationale for using the Framework .....	7
1.4.2 Applicability of the EAMF to the project activities .....	8
Chapter 2: Status of the environment in the proposed project locations .....	10
2.1 Anuradhapura District .....	10
2.1.1 Bio-physical environment of proposed project locations .....	10
2.1.2 Socio-economic environment of proposed project locations .....	19
2.2 Batticaloa District.....	21
2.2.1 Bio-physical environment of proposed project locations .....	21
2.2.2 Socio-economic environment of proposed project locations .....	26
2.3 Kurunegala District .....	30
2.3.2 Socio-economic environment of proposed project locations .....	38
2.4 Moneragala District.....	39
2.4.1 Bio-physical environment of proposed project locations .....	40
2.4.2 Socio-economic environment of proposed project locations .....	47
2.5 Puttalam District.....	48
2.5.1 Bio-physical environment of proposed project locations .....	48
2.5.2 Socio-economic environment of proposed project locations .....	56
2.6 Trincomalee District.....	57
2.6.1 Bio-physical environment of proposed project locations .....	58
2.6.2 Socio-economic environment of proposed project locations .....	65
2.7 Kilinochei District.....	66
2.7.1 Bio-physical environment of proposed project locations .....	66

2.7.2	Socio-economic environment of proposed project locations.....	74
2.8	Ampara District .....	75
2.8.1	Bio-physical environment of proposed project locations .....	75
2.8.2	Socio-economic environment of proposed project locations.....	82
2.9	Mulaithivu District .....	83
2.9.1	Bio-physical environment of proposed project locations .....	83
2.9.2	Socio-economic environment of proposed project locations.....	89
Chapter 3: Environmental legislation, policies and institutions in Sri Lanka.....		92
3.1	Overview of Environmental Legislation.....	92
3.2	Detail Review of Key Environmental Related Legislation .....	93
3.2.1	The Constitution of Sri Lanka & the 13 <sup>th</sup> Amendment.....	93
3.2.2	The National Environmental Act. No. 47 of 1980 & its amendments.....	93
3.2.3	Environmental Protection License .....	94
3.2.4	The North Western Provincial Environmental Statute No. 12 of 1990 .....	94
3.2.5	State Land Ordinance Act No 13 of 1949 .....	94
3.2.6	The Coast Conservation and Coastal Resources Management Act No.49 of 2011 (Amendment) .....	95
3.2.7	The Flood Protection Ordinance Act No.22 of 1955.....	96
3.2.8	The Fauna & Flora Protection Ordinance Act No. 49 of 1993 and its amendments.....	96
3.2.9	The Sri Lanka Land Reclamation & Development Corporation (SLLRDC) Act No. 15 of 1968	96
3.2.10	The Mines and Mineral Act No.33 of 1992 .....	96
3.2.12	Forest Ordinance including Amendments.....	97
3.2.13	National Wetland Policy .....	98
3.2.14	Mahaweli Authority of Sri Lanka Act (Act No.23 of 1979).....	98
3.2.15	The Antiquities Ordinance .....	98
3.2.16	Disaster Management Act No. 13 of 2005.....	99
3.2.17	Prevention of Mosquito Breeding Act No. 11 of 2007 .....	100
3.2.18	Coconut Development Act 46 of 1971 amended by Coconut Development Law, No 24 of 1975 – Section 63 Regulations stipulated in the Gazette Notification No 331 of August 18, 1978 of Palmyra Development Board.....	100
3.2.19	Occupational Health and Safety .....	101
3.2.20	The World Heritage Convention .....	101
3.3	Adequacy of GOSLE Environmental Clearances.....	102
Chapter 4: World Bank environmental safeguard policy requirements .....		103
4.1	Environmental Assessment (OP/BP 4.01).....	103
4.2	Natural Habitats (OP/BP 4.04).....	105

4.3	Pest Management (OP/BP4.09).....	105
4.4	Physical Cultural Resource (OP/BP 4.11).....	106
4.5	Forests (OP/BP4.36).....	108
4.6	Safety of Dams (OP/BP4.37).....	108
4.7	Involuntary Resettlement (OP/BP4.12).....	109
4.8	The World Bank Group’s Environmental, Health and Safety Guidelines.....	110
Chapter 5: Generic assessment of environmental issues and mitigation measures.....		112
6.1	Overview.....	112
6.2	Component specific impacts.....	112
6.3	Generic environmental issues and mitigation measure .....	114
5.3.1	Impacts on soil at construction and material extraction sites .....	114
5.3.2	Impacts on surface and ground water sources occur due to following activities.....	114
5.3.3	Impacts on ambient air quality and noise within construction sites, material extraction sites and yards 115	
5.3.4	Impacts on fauna and flora and their habitats .....	115
5.3.5	Social Impacts during Construction.....	115
Chapter 6: Environmental Management Framework .....		117
6.1	Strategic Environmental and Social Assessment.....	117
6.2	Environmental screening of sub-project proposals under Component 2.....	117
6.2.1	Screening Method.....	117
6.3	Description of further Environmental Assessment and Management Instruments .....	119
6.4	Other important actions such as clearances and procedures to follow .....	121
6.4.1	Procedure to obtain the Environment Protection License.....	121
6.4.2	Confirming to the Safety of Dams Policy.....	122
6.5	Environmental Monitoring .....	123
6.5.1	Environmental Compliance Monitoring.....	123
6.5.2	Environment Audits .....	124
6.6	Stakeholder Consultation and Information Disclosure .....	125
6.6.1	Objectives of stakeholder consultations.....	125
6.6.2	Elements of Effective Stakeholder Consultations.....	125
6.6.3	Suggested Consultation Methods .....	126
Chapter 7: Institutional Arrangement for Implementation of the project .....		128
7.1	Overall project arrangements .....	128
7.2	Implementation of Safeguards.....	129
7.2.1	Safeguard responsibilities of PMU and PPMUs.....	129

7.2.2	Arrangements for implementation of the EAMF.....	129
7.3	Institutional capacity building for safeguard management.....	130
	Annex 1: Environmental Assessment and impact mitigation under the national legislation .....	132
	Annex 2: Basic Information Questionnaire for the CEA .....	138
	Contact person.....	138
	Annex 3: Guidelines for Developing EMPs.....	142
	Annex 3: Environmental guidelines for agriculture and agro-processing sectors in Sri Lanka.....	144
	Annex 4: Suggested Format for the Environmental Screening Form for Subprojects.....	151
	Annex 5: Dam Safety Screening and Next Steps for Irrigation Subprojects .....	157
	Annex 6: Guidelines for Health and Safety of Workers, Communities and Visitors .....	159
	Annex 7: Generic EMPs and Environment Codes for some of the proposed investments.....	162
	A7.1 Environmental Conditions to be Included in Contracts for Gravel Road Rehabilitation .....	162
	A7.2 General Mitigation Measures to be Included in the EMP for All Construction Projects .....	163
	A7.3 Generic Environmental Management Plan (EMP) for Rehabilitation of C Grade Roads .....	171
	A7.4 Environmental Conditions for the Construction of Dug Wells .....	185
	A7.5 Environmental Best Practices for Minor Tank Rehabilitation .....	186
	Annex 8. Chance find procedure for Physical Cultural Resources.....	189
	Annex 9. Environmental Monitoring Checklist for Project Activities.....	190
	Annex 10. Terms of Reference for the Environmental Audit .....	191
	Annex 11. Terms of Reference for the Strategic Environmental and Social Assessment.....	193

# **Chapter 1: Introduction to Climate Smart Irrigated Agriculture Project**

## **1.1 Introduction and Background**

Sri Lanka's agriculture sector is at critical junction now. Sri Lanka has been undergoing a structural transformation with agriculture's share of GDP declining to 10%. But agriculture's share of total employment has remained steady at 27%, indicating that labor migration out of the sector has been slow (reflecting absence of a vibrant urban job market and structural constraints). Importantly, agriculture is performing well below its potential. Productivity growth in agriculture itself and the transition to higher quality and more diversified employment within the agriculture sector and along value chains has been slow. Value chain development is driven by private sector investors, but progress has been at a limited scale. Low productivity of farming operations is stemming out from inefficient markets, absence of a commercial orientation, poor quality of rural infrastructure, inadequate research & extension, unclear land rights, inadequate supply of seeds, fluctuation of product prices, and effects of climate change. There is growing recognition that long-term business success is tied to healthy communities and ecosystems while working in landscape partnerships with innovative financial instruments can help them address critical issues that go beyond their immediate supply chains.

With rice self-sufficiency secured, a consensus has recently emerged within government that the country should capitalize more strategically on the opportunity to diversify the production structure out of the relatively low value food crops and move towards high-value agriculture and promote agricultural exports. This structural shift is critical to sustain income growth going into the future, accelerating poverty reduction and reversing the trend in increasing inequality. Since most of the fruits and vegetables not only generate higher income as compared to rice but demand more intensive labor input, higher levels of technology input, better crop management, and investments in post-harvest, marketing, and better organized value chains overall, there is also significant potential for employment growth in agriculture. This shift would imply a structural shift towards a more high-value production structure, agro-processing and value addition activities, and increased competitiveness.

Agriculture in Sri Lanka, however, is a risk-prone and exposed to significant recurrent natural and market risks. Price fluctuations and natural calamities frequently affect agricultural production and farmer income and raise concerns among policy-makers about Sri Lanka's food production capacity, aggregate food security, as well as among households raising concerns of household level food security, at the level of poor subsistence farmers. Food price spikes are also of concern for the urban poor that spend a large share of their income on food and are vulnerable to agriculture production risk. Finally, higher-valued agricultural commodities face even greater risks (especially market risks), creating additional disincentives farmers to diversify out of traditional low-value cereals. There is currently very little systematic understanding of the country's agricultural risk profile and how these risks affect food production and food security, and ultimately diversification. Apart from some small agricultural insurance pilots to transfer risk, agriculture risk management remains largely underdeveloped and risk preparedness is low.

Climate change is expected to continue to impact the agricultural sector in general, but this will be especially acute for Sri Lanka's smallholder farmers. The WorldBank-CIAT Climate Smart Agriculture (CSA) country profile for Sri Lanka (2015) points to critical vulnerabilities related to the overreliance on rain-fed systems, limited access to irrigation systems, and limited diversification (paddy rice comprises about 46% of the total harvested area). In addition, smallholder farmers in the highlands typically grow

root and tuber crops, which are highly susceptible to a reduction of the diurnal temperature range that will likely negatively impact these crops' productivity. Droughts and floods are recurrent and are the most common risks to agricultural production. Multiple climate-related risks may cause far-reaching consequences for these farmers due to their limited access to improved technologies, such as watering and silage production techniques, drought/heat tolerant breeds, etc. There is a clear potential for the country to achieve Climate Smart Agriculture's "triple-wins" through: (i) sustainable increases in food & nutrition security and farm incomes (*Productivity*); (ii) enhanced resilience to impacts of climate change and variability (*Adaptation*); and (iii) reduced greenhouse gas (GHG) emissions per unit of agricultural commodities produced, and increased carbon sequestration (*Mitigation*). Even though climate change will affect potential land and water productivities, existing levels of agricultural productivity in Sri Lanka are, in many instances, noticeably below their potential. Land productivity has generally stagnated over the past decade, with limited or no growth of crop yields overall, resulting in marginal agricultural productivity improvements relative to potential achievable yields (World Bank, 2016).

Economic development is a central element of adaptation to climate change. The best way to reduce vulnerability to (current and future) climate events is often through basic development. Overlaps in fact exist between 'development as usual' and 'adaptation activities'. Different categories of activities are identified within the adaptation-development continuum, ranging from interventions aimed at increasing coping capacity that resemble pure development activities to explicit adaptation measures which may either be a response to extreme events or represent a slow onset climate change adaptation process. Actions are needed for flood and drought risk mitigation. It is also seen that female-headed households are more likely to choose a less risky food crop portfolio, while farmers who operate under subsistence conditions tend to be the most risk-averse and larger households (which tend to have more farm labor and off-farm income) are more likely to choose risky food crop portfolio. Agricultural policies that promote smallholder access to weather insurance products are likely to increase farmer ability to take risks. Sri Lanka lacks quality weather data as well as real time data reporting and access to data is also a major challenge given the multiple institutions involved in data collection. The risks faced by smallholder farmers during climate catastrophe events is being addressed by International Finance Corporation (IFC) by establishing an effective/affordable crop insurance for Sri Lanka.

Most of the existing water resources are already developed, and the scope for new large water development are limited due to technical, social and environmental considerations and funding limitations. The appropriate way forward would be to make reasonable investments for rehabilitating dilapidated irrigation schemes, improving efficiency and productivity of the existing irrigation schemes together with investments for priority new water resources development. Also, to make irrigated agriculture a profitable business, it is necessary to put farmers first in safeguarding natural resources, building local access and capacity, enabling access to markets, and prioritizing research imperatives. The note on "Strategic Options for Water Resources Conservation, Management and Development in Sri Lanka" prepared by the Water Global Practice in May 2017 recommends addressing the investment needs on water resources development on a river basin based integrated approach.

Efforts at policy and legal reforms in the recent past have generated valuable lessons, and recent water planning has demonstrated the efficacy of integrated basin approaches and the use of modern water planning technology. Most of the elements of integrated water resources management, such as river basin management, water allocation policy, environmental services, sharing of water shortages, are convincing concepts but their implementation remains extremely difficult given the nature of the country's political, social and cultural dimensions of water resources use. While wider public



consultation is important, wider public education and awareness is also important to avoid unreasonable criticism that could harm or stall reform that could bring genuine benefits and mitigate adverse impacts or conditions that may exist. Dam Safety and Water Resources Planning Project is an ongoing Bank operation assisting the Government of Sri Lanka (GOSL) on water resources planning and a second phase is on pipeline for FY 2019. A comprehensive study has been conducted by the Bank to look at the strategic options for water resources conservation, management and development and the study outcome reveals useful information on policy and institutional arrangement for water resources planning, emerging strategic challenges on water resources management, and a framework for sector priorities.

Moving forward, innovation efforts should aim at improving the competitiveness of agriculture sector. There are several factors constraining agriculture's performance: institutional fragmentation, low capacity, lack of strategic policy direction, policy distortions, and structural constraints. Rice self-sufficiency has been achieved, but it continues to be emphasized, limiting production choices at the farm level. Inward looking policies since the mid-2000s create an implicit export-bias. Taxing producers of exportable; poorly targeted fertilizer subsidies are a major fiscal drain (especially in the current difficult fiscal situation) and pose major negative environmental and health problems. Underspending on productive infrastructure (in particular community-level irrigation facilities) and on research and development (R&D), together with low capacity to deliver extension support or linking demand oriented R&D to the field level, and marketing inefficiencies limit agricultural productivity growth. Land fragmentation and absence of functioning land markets limit the economies of scale of production and productivity. The development of agriculture will help increase rural income, reduce inequality, and through diversification help improve nutritional outcomes. It will support more rapid economic transformation that directs labor out of relatively unproductive primary agricultural production towards sectors of higher productivity, including agro-processing and other agri-business activities, as well as productivity growth and competitiveness within agriculture itself that will benefit those that remain engaged in agriculture. A climate smart watershed based approach to agriculture will link productivity growth with enhanced resilience to shocks and a reduced climate footprint.

## **1.2 Climate Smart Irrigated Agriculture Project**

### **1.2.1 Project Development Objective**

The Project Development Objective is to improve climate resilience of farming communities and productivity of irrigated agriculture in selected climatically vulnerable Hot-Spot Areas in Sri Lanka. This objective will be achieved through improved and modernized management of irrigation, drainage and flood protection systems, increased adaptation of climate-smart agricultural practices and technologies, improved agricultural diversification, better post-crop harvest management practices, and increased access to better prices and markets.

### **1.2.2 Project Description**

The project approach is based on the successful experiences of agriculture interventions in the South Asia Region. It results from a clear understanding with Ministry of National Policies and Economic Affairs that the country needs a comprehensive, long term and systematic approach to managing and coping with climate change and variability. In the past, responses to frequent climate events such as floods and droughts have yielded only limited results and such a short-term approach did not significantly boost

agriculture sector performance, prevent further deterioration of rural socio-economic fabric, or lead to increase in farmer income and prosperity. Therefore, a new paradigm of integrated approach to addressing these climatic challenges in the agriculture and food system is essential. Even though the quality of the lands in the dry zone area is not poor, frequent floods, droughts and lack of reliable irrigation water supply have made it difficult for local cultivators to grow more than their subsistence requirements. The results of hydraulic modelling for flood management in ten river basins (Mahaweli Ganga, Malwathu Oya, Kala Oya, Deduru Oya, Maha Oya, Attanagalu Oya, Kelani Ganga, Gin Ganga, Nilwala Ganga, and Gal Oya) carried out by the Climate Resilience Improvement Project (CRIP) in Sri Lanka will be used in this project. Hot-spot areas in Climate Smart Irrigated Agriculture Project (CSIAP) that overlap the river basins covered in CRIP can be potential areas to extend the modelling in order to assess drought mitigation under CRIP and vice versa because floods and droughts need to be managed together where excess flood water has the potential for drought mitigation. Similarly, designing of agricultural value chain analysis and marketing activities will be informed by the experience of the Agricultural Sector Modernization Project (ASMP).

The proposed project therefore intends to build upon validated approach and successful experiences in Sri Lanka and elsewhere and includes four components: (i) *Promote Infrastructure Planning, Development and Management for Climate Smart Agriculture*, which includes water resource planning, irrigation infrastructure investments and support for capacity building, coordination and O&M arrangements; (ii) *Promote Climate-Smart Agriculture Production Systems and Value-Chains*, which includes activities to increase productivity, introduce Climate Smart Agriculture (CSA) technologies and practices (mitigation), improve climate risk management (increase adaptation), reduce emissions and enhance GHG sequestration, increase access to markets, and enhance value addition; (iii) *Project Management* and (iv) *Contingent Emergency Response*. In view of the complexity and innovativeness of the project, it is planned to develop a long-term implementation plan for the Hot Spot Areas and to learn lessons, the project will be implemented three stages. The first stage (2018 – 2021) will cover three hot-spot areas (Anuradhapura, Kurunegala and Kilinochchi districts), whereas the second (2020 – 2022) and third (2021 - 2024) stages will cover the balance six districts. Progress will be reviewed regularly and prior to completion of each of the stage, to sanction the next stage of implementation.

Given the centrality of tanks in the agrarian livelihoods of the dry zone of Sri Lanka, their current levels of neglect and the increasing vulnerability of these areas to *both* droughts and floods in quick succession with consequent impacts on agricultural production and incomes, the rehabilitation of tank-based irrigated agricultural systems is key to improving the resilience of these areas and the agrarian communities that depend on them. Resilience being ‘the ability of a system to bounce back or return to normal functioning after adversity’, the Hot-Spot Area Development model aims to enhance resilience of these areas and those who depend on it for their livelihoods. Adverse climate shocks add to relatively low paddy productivity and low prices (farmers get barely 25% of prices paid by final consumers, which is much lower than in other rice-producing south Asian countries). Improved resilience will be sought in stable and rising incomes of agrarian families living in these hotspot areas, given increasing climatic variability.

**Hot-Spot Area (HSA) Development Model:** The expected results of this novel model will be achieved by

(1) *flexible and adaptive management of existing and improved irrigation water storage and delivery structures* to make irrigation more reliable in the face of rising climatic variability (including more frequent episodes of high intensity rainfall and flooding and/or drought); (2) *better agricultural inputs, techniques and practices that*, along with the additional water that will be available (eg., for live-saving protective irrigation during sudden dry spells in the middle of the cropping season) to help farmers to

better stabilize crop yields given rising climatic variability – and reduce crop harvest losses; and (3) *better access new markets and higher prices, through marketing higher up the value chain, more competitive agri-enterprises and upgraded infrastructure for agricultural trade*, so that producers and other value chain participants can better stabilize and increase incomes from agricultural livelihoods.

The proposed project will be implemented in nine high poverty districts in five provinces in the dry zone and in climatically-vulnerable Hot-Spot Areas of the country, covering twenty sub-watersheds with a total project area of over 357,000 ha and a population of about one million. A Hot-Spot is a geographic area (~40,000 hectares on average) where farmers and farming livelihoods are highly exposed and vulnerable to increasing adverse climatic variability. Potential Hot-Spots areas were identified through a rigorous, evidence-based analysis by the Department of Agrarian Development (DAD) of the Ministry of Agriculture (MOA), the World Food Program (WFP) and the International Water Management Institute (IWMI), using primary and secondary data on, *inter alia*, (i) drought impacts, including crop losses and expenditures on drinking water and relief supplies; (ii) current climate vulnerability based on income poverty, housing quality, source of drinking water, and participation in safety net programs; and (iii) future climate vulnerability up to 2030 based on an index of 42 indicators measuring exposure, sensitivity, and adaptive capacity. The administrative regions identified as vulnerable by the data analysis were placed on a river-basin map and contiguous areas (sub-watersheds) within these river basins, with a high concentration of vulnerability, were identified as Hot-Spots. This analysis by a Technical Working Group was approved at the National Project Steering Committee for final selection of project areas. All areas are paddy-dominant but with nascent diversification (~10% of area), all of which will be the focus of CSA techniques and practices which, if successful, should be more easily transferred to adjoining dry zone areas given their similarity in terms of topography, agricultural development and patterns of agrarian livelihoods.

## **Project Components**

**Component 1: Agriculture Production and Marketing (US\$42 million).** The objective of this component is to improve agriculture productivity and diversification through the adoption of CSA practices and improved on-farm water management.

**Subcomponent 1.1: Climate Smart Agriculture and Water Technology (US\$21 million).** This subcomponent will support the adoption of CSA and will focus on (a) demonstrating the effectiveness of CSA practices in farmers' fields through Farmer Business Schools (FBSs) and leveraging information and communication technology (ICT) for peer-to-peer learning and (b) supporting the uptake of CSA practices by establishing Producer Groups (PGs). The key activities to be financed include

- (a) Technical assistance (TA) to carry out detailed assessments to identify appropriate technologies relevant to each mini-watershed, including climate impacts and gender analysis;
- (b) TA to develop and deliver training on climate-resilient practices and technologies to extension agents of the Government and the private sector, including on the requirements for adoption;
- (c) The delivery of agronomic extension services to PGs through effective extension approaches (for example, field demonstrations and training events) including the use of

proven water management technologies and ICTs to facilitate adoption of climate-resilient practices and technologies; and

- (d) Capacity development for PGs and support to investments associated with technology transfer to PGs on a pilot basis.

**Subcomponent 1.2: Marketing (US\$21 million).** This subcomponent aims to strengthen the links between PGs and the agriculture commodity markets by (a) upgrading and/or rehabilitating critical market infrastructure and (b) supporting farmers to access markets and develop sustainable links to agribusinesses. The key activities to be financed are

- (a) Common infrastructure for agri-commodity marketing (markets, storage, and access roads) and the construction and/or upgrading of Common Service Centers (CSCs) and
- (b) TA to support PGs to commercialize and link with agribusinesses in commodity value chains.

**Component 2: Water for Agriculture (US\$92 million).** The objective of this component is to facilitate (a) planning for water and other infrastructure necessary to support climate-resilient irrigated agriculture, (b) construction of the planned infrastructure, and (c) co-management of this infrastructure by central/provincial governments and the local community.

**Subcomponent 2.1: Rehabilitation of Irrigation Systems (US\$86 million).** This subcomponent will support the rehabilitation of irrigation systems based on plans derived from hydrologic modelling accounting for projected climate change in the project areas. The key activities to be financed include

- (a) TA to support hydrology modelling and the preparation of Hot Spot Area Agriculture Development Plans (HSADPs) at three levels: hotspots (about 25,000 ha); mini- watersheds within the hotspot areas (about 4,000 ha), including tank cascade systems, stand-alone irrigation systems, and rain-fed agriculture systems; and local administrative levels (Divisional Secretary [DS] Divisions and Grama Niladhari [GN] Divisions);
- (b) Rehabilitation, modernization, and repair of existing cascade tanks and individual village tanks; construction of recharge wells in the tank beds; drainages and flood protection infrastructure; and
- (c) Field implementation of watershed treatment and water harvesting works.

**Subcomponent 2.2: Operation and Maintenance of Irrigation Systems (US\$6 million).** This subcomponent aims to ensure the sustainable operation and maintenance (O&M) of tank systems at the individual tank level and system wide. The main activities to be financed are to

- (a) Establish Cascade Management Committees (CMCs) for each of the cascades of minor irrigation tanks within the watershed-based boundary of the hotspot areas,
- (b) Strengthen FOs that have been set up to manage each tank, and
- (c) Design and implement a monitoring system for water use and availability.

**Component 3: Project Management (US\$6 million).** The objective of this component is to ensure the quality of overall project management, while ensuring smooth coordination of activity implementation by various agencies and strategic partners at national and subnational levels. This component will finance

- (a) The consultancy and operating costs of the Project Management Unit (PMU) and Deputy Project Director (DPD) Offices and of different project executing agencies, including for fiduciary and safeguard aspects;
- (b) The monitoring and evaluation (M&E) of project activities at baseline, midterm, and end of project, including geotagging of the assets created; and
- (c) Information, education, and communication campaigns to make all stakeholders aware of the project.

**Component 4: Contingent Emergency Response (US\$0.0 million).** This emergency response component will allow for rapid reallocation of project proceeds in the event of a natural disaster or crisis that has caused or is likely to imminently cause a major adverse economic and/or social impact.

### **1.3 Project Locations**

The project is focused in 11 administrative districts (Kilinochchi, Mullaitivu, Anuradhapura, Polonnaruwa, Puttalam, Kurunegala, Trincomalee, Batticaloa, Ampara, Hambantota, and Moneragala) spread across six provinces (Northern, North Central, North Western, Eastern, Southern, and Uva) in the dry zone of Sri Lanka. Chapter 2 provides more details of the current status of the project areas 9 out of the 11 districts. Further analysis is planned for the other two districts when Strategic Environmental and Social Assessments are carried out during project implementation.

### **1.4 Environmental Assessment and Management Framework**

#### **1.4.1 Objectives and rationale for using the Framework**

The project is classified as an Environmental Category B. It is expected to bring positive environmental benefits to the project areas through the scale-up of climate-resilient agricultural technologies and farming practices that help improve soil health, water-use efficiency and crop products, catchment area treatment to promote more efficient use of surface water and more sustainable use of groundwater for agriculture and development of water body capacity of climate hotspots. The exact interventions and sites are expected to be identified only after the HSAD plans for each HSA have been prepared. Therefore, this Environmental Assessment and Management Framework (EAMF) has been developed in lieu of an Environmental Assessment that would guide the GOSL in managing the environmental risks of the selected interventions and scaling up of positive impacts.

This EAMF has been designed to be consistent with (a) the national requirements that governs the sector and environmental management according to specifically National Environmental Act and other related acts that that may be of relevance; and (b) the World Bank's operational policies on environmental safeguards.

The EAMF will serve as a template for site-specific environmental assessments to be undertaken for project-supported physical activities prior to contracting and/or disbursement of funds for the respective activity. The main purpose of the EAMF is to develop environmental and baseline for the selected districts, identify potential environmental impacts early in the project cycle and to provide broad guidelines outlining measures, processes, institutional arrangements, procedures tools and instruments that need to be adopted by the project and integrated into project implementation to mitigate environmental risks and impacts including climate and disaster related risks. The EAMF will: (i) articulate the criterion and due diligence processes for generic environmental risks expected under the project; (ii) time-bound action plans to assure compliance; and (iii) guidance for public consultation process and disclosure of safeguard documents. It also included institutional capacity assessment to manage safeguard risks and impact and develop a budgeted capacity building plan for safeguard management. The framework also provides numerous applicable guidelines and best practices to be adopted.

Overall, consistent with existing national legislation and the World Bank policies, the objective of the Framework is to help ensure that activities under the proposed project will:

- Prevent adverse environmental risks and impacts;
- Enhance positive environmental outcomes;
- Ensure protection of environment, health and safety;
- Ensure compliance with applicable national environmental policies and legislation; and Ensure
- compliance with applicable World Bank environmental safeguard policies.

#### **1.4.2 Applicability of the EAMF to the project activities**

Component 1 and 2 may involve physical activities that could have adverse environmental impacts if environmental mitigation measures are not fully integrated into HSAD plans and negative environmental impacts are identified and mitigated properly. Component 1 will promote infrastructure planning, development and management for climate-resilient agriculture systems including facilitating hot-spot area development and modernizing and upgrading irrigation systems focused on water storage and access to irrigation water. Component 2 will enhance climate resilience by facilitating the adoption of CRA practices, diversification into more climate-resilient and higher value crops, efficient and effective on-farm water management, small-scale market infrastructure investments. Specifically, under sub- component 2.3 the project will provide finance for PGs to construct/rehabilitate: infrastructure for agri- commodity storage, processing, and marketing, including the construction and/or upgrading of Common Service Centers (CSCs) and wholesale and periodic rural markets. The project's climate-resilient planning process which requires longer period to undertake, does not allow to determine the actual investments and their specific site locations at appraisal. Specific investments and implementation sites will be determined following the village-level watershed planning process.

At the project level, an Environmental Assessment and Management Framework (EAMF) will be prepared to guide the screening of activities for physical investments, technical assistance project supported-advisory and policy support interventions and resulting implementation from an environmental perspective and manage their environmental impacts. The EAMF will define the screening and decisions-making based on the screening, the content, procedures and responsibilities for the preparation and implementation of individual sub-project Environmental Assessments (EAs) and Environmental Management Plans (EMPs) to address site-specific risks and impacts and subsequent monitoring and reporting requirements. The EAMF will also include sectoral environmental

management guidelines for the subsectors of the agricultural processing which will be applicable under the matching grant program. In addition to EAMF, as part of hot-spot area development, Strategic Environmental and Social Assessments (SESAs) will be undertaken to be integrated into the village-level watershed plans.

## Chapter 2: Status of the environment in the proposed project locations

The following is the status of the environment of the 9 out of the 11 selected districts (i.e. Ampara, Batticaloa, Trincomalee, Kilinochchi, Mullaitivu, Anuradhapura, Puttalam, Kurunegala, and Moneragala) in Eastern, Northern, North Central, North Western, and Uva Provinces of Sri Lanka. The two additional districts; i.e. Polonnaruwa and Hambantota included during latter part of project preparation will be assessed when the Strategic Environmental and Social Assessments will be carried out during implementation.

### 2.1 Anuradhapura District

#### Project Area Details

Divisional Secretariat Division (DSD) Name	ASC Name (ASC No)	River Basin Name	Sub-watershed Name
Kahatagasdigiliya	Galenbidunawewa (15)	Yan Oya (River Basin No 67)	Upper Yan Oya / Yama Oya
Galenbidunwewa	Yakalla (18)		Upper Middle Yan Oya
Horowopothana	Horowopathana (19)		Sallige Oya
	Rathmalgahawewa (20)		
	Konwewa (21)		
	Parangiyawadiya (22)		

#### 2.1.1 Bio-physical environment of proposed project locations

##### 2.1.1.1 Location and geography

Anuradhapura District is multicultural and multi religious District where multi lingual communities live. It is bounded North by Vauniya, Mannar and Mulathivu Districts, South by Kurunegala and Matale Districts, West by Puttalam and Mannar Districts and East by Polonnaruwa and Trincomalee Districts. The district lies entirely in the dry zone and is located between 79<sup>0</sup>45' and 81<sup>0</sup>00' East Longitudes and 7<sup>0</sup>45' and 09<sup>0</sup>00' North Latitudes.

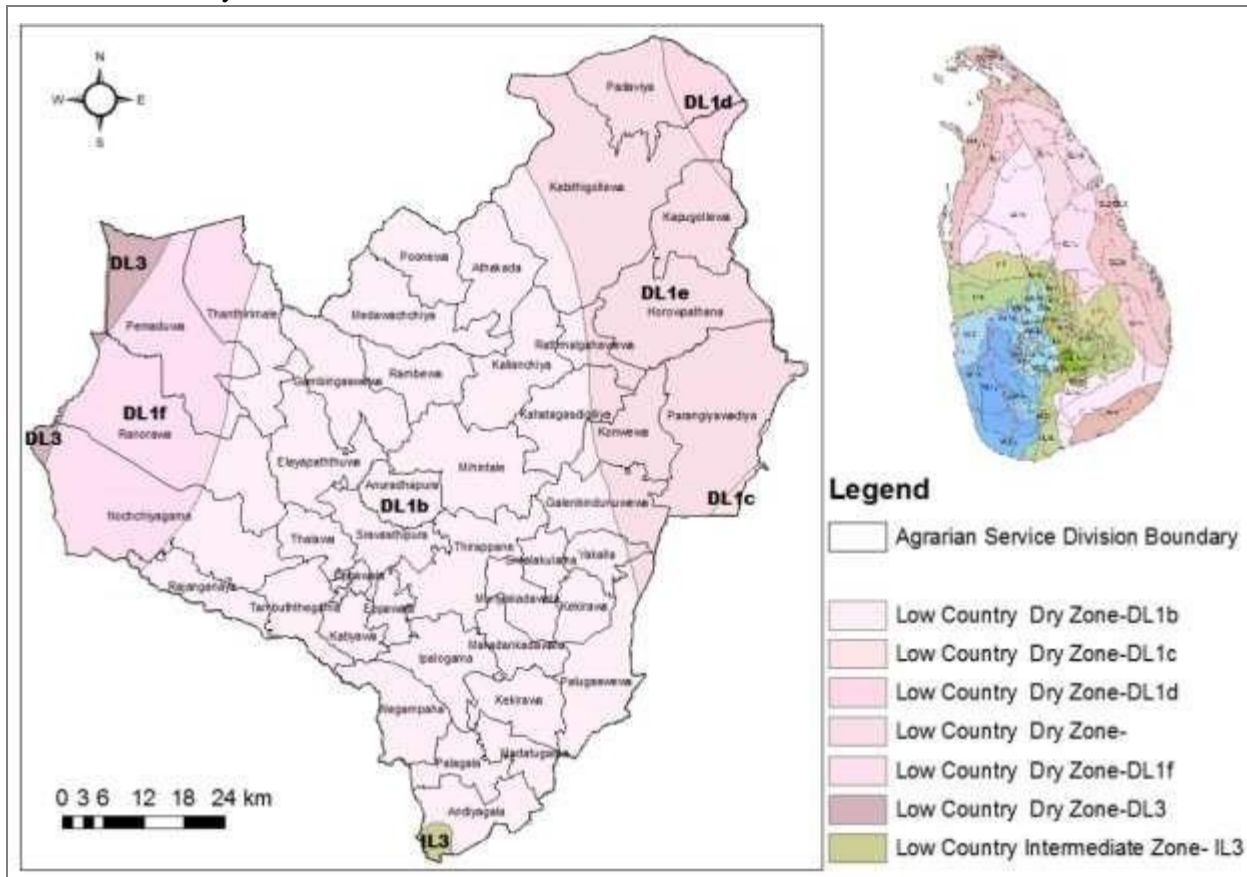
The general morphology of the landscape of the District have an important bearing on the human and agricultural settlement patterns, and also on the differential land use potentials within the inland valley systems. Terrain of Anuradhapura District can be classified as undulating. Presence of a large number of water bodies, remarkable mountains such as Ritigala Kanda, Mihinthale, Thanthirimale, Hisin Bessa Gala, Cock Abbey, Dimbulagala etc along with a number of small hills are among the key geographic features of Anuradhapura District.

### 2.1.1.2 Climate

Situated in the North Central part of Sri Lanka, Anuradhapura District is geographically located mainly in three agro ecological zones of Dry Zone Low Country. According to the zoning data of Department of Agriculture, the project area lies mainly in two agro-ecological regions of DL1b and DL1e. The major characteristics of these agro-ecological regions and the surrounding regions are shown in Figure 2.1 below.

The District's temperature shows a little variation over the year and between places in the District and generally is warm throughout the year. The annual average temperature is calculated at 27.3°C where the monthly average temperature differs in negligible amounts from the annual average. The temperature conditions are most comforting from November to February and quite irritating on the rainless days that come within March and September period. According to the statistics of 2016 by Department of Meteorology, the maximum temperature was recorded in April as 36.4°C and minimum in December as 22.2°C.

Dry season in February – March coincides with the period of maximum solar radiation exceeding 400 calsq cm/day and also a high diurnal range of temperature. The longer dry season from May to September is characterized by strong, dry winds and low diurnal range of temperature, with an open pan evaporation of more than 6mm/day.



Agro-Ecological Region Feature	DL1b	DL1e
75% expectancy of Rainfall (mm)	> 900	> 900
Terrain	Undulating	Undulating
Major Soil Groups	Reddish Brown Earth and Low Humic Clay soils	Reddish Brown Earth and Low Humic Clay soils



Land Use	Rainfed upland crops, Paddy, Scrub, Mixed home gardens, Forest plantations	Rainfed upland crops, Paddy, Scrub, Natural forests, Forest plantations, sugercane
----------	--	--

Source: Department of Agriculture

Figure 2.1 Agro-Ecological Regions in Anuradhapura District

Generally the distribution pattern of the rainfall is bimodal. The Maha rains spread over about three months generally starting from late September or early October is the main mode of rain for the district contributing to about 66% of the annual average precipitation falls. The Maha rains are heavy enabling a good cropping season, filling the tanks and even causing floods. The ecosystem enjoys the greatest abundance of water where it even leaves a surplus of water for succeeding dry season. The Yala rains are experienced around April and lasts for about two months which is considered as the secondary mode of rain for the district which contributed about 27% of the average annual rain.

The Anuradhapura District receives an annual average rainfall of 1420mm. More rain is recorded in the eastern part of the district and towards west through the District, it declines gradually from 1600mm to 1145mm thus the district becomes increasingly wet in the eastern direction. The variation across the district is mainly in the Maha season due to North East monsoon. As per the statistics of the Department of Meteorology, in 2016, the maximum rainfall was recorded as 463.1mm in the month of May.

### 2.1.1.3 Land resources

According to the available information, major component of the land extent consists of dense forest which is 27.78% of the total and secondly an extent of 26.62% is of grass lands / chena and thirdly for paddy cultivation which is 18.28%. The details are given in Table 2.1.

Table 2.1 Land used pattern in Anuradhapura District – 2016

Nature of land	Area (ha)	Percentage (%)
Asweddumized paddy land		
Irrigated	115,785.00	16.13
Rainfed	15,437.00	2.15
Tea	0.00	0.00
Rubber	0.00	0.00
Coconut	1,865.00	0.26
Cinnamon	0.00	0.00
Other crops	8,577.00	1.19
Forests		
Dense forests	199,428.00	27.78
Open forests	15,922.00	2.22
Planted forests	5,477.00	0.76
Grass lands/Chena	191,100.00	26.62
Marshes and Mangroves	2,542.00	0.35
Home gardens	96,424.00	13.43
Reservoirs	55,241.00	7.69
Building	1,585.00	0.22
Sand and Mountain	2,949.00	0.41
Abandoned land	82.00	0.01
Other (sacred places, roads, cemetery etc)	5,486.00	0.76

<b>Total</b>	<b>717,900.00</b>	<b>100.00</b>
--------------	-------------------	---------------

*Source: District Land Use Planning Office, Department of Census and Statistics*

The district is an area of great historical significance where it is a land that has been rediscovered. This is a land that once supported a prosperous hydraulic civilization which went in to disuse and abandoned. This subsequently got covered by dense forest under which its irrigation structures and religious constructions got concealed. The area remains in this state till the British rulers of Sri Lanka discovered the ruins, realized the potential of the land and began redevelopment of the area.

According to the recent records, extents cultivated and abandoned lands in Anuradhapura District are given in Table 2.2

Table 2.2 Extents cultivated and abandoned lands in Anuradhapura District

<b>Nature of land</b>	<b>Extent (ha)</b>	<b>%</b>
Total extent of cultivated	238,088	33.16
Total extent of not cultivated	258,985	36.08
Total extent of forests	220,827	30.76
<b>Total</b>	<b>717,900</b>	<b>100</b>

*Source: Department of Census and Statistics*

Majority of the land in Anuradhapura District is used to cultivate paddy where 130,138.5 ha was cultivated in the year 2016. The cultivated extent by irrigation and rainfed is given in Table 2.3 for the DS division of which the project interventions are proposed and the district as a whole.

Table 2.3 Details of paddy cultivation - extent by irrigation and rainfed

<b>DS Division</b>	<b>By irrigation</b>		<b>Rainfed - ha</b>	<b>Total - ha</b>
	<b>Major - ha</b>	<b>Minor - ha</b>		
Kahatagasdigiliya DSD	1,069.5	6,077	1,597	8,743.5
Galenbindunuwewa DSD	4,368.0	3,754	1,292	9,414
Horowpathana DSD	3,366.7	7,652	3,261	14,279.7
<b>TOTAL ANURADHAPURA DISTRICT</b>	<b>59,224.4</b>	<b>55,158.5</b>	<b>15,755.6</b>	<b>130,138.5</b>

*Source: Department of Census and Statistics*

As per the statistics of the District Statistical Branch, there are many seasonal crops cultivated during the Maha and Yala seasons of which Maize is considered as the crop which has used the majority of the land during 2015/2016 Maha season – 20,201.2 ha to cultivate which had a yield of 50,048.30 MT and 2016 Yala season the District had a yield of 17,806 MT by cultivating in an area of 4,997.7 ha. Land use wise secondly Peanut was cultivated during the 2015/2016 Maha season and 2016 Yala season in 6,382.70 ha and 113.5 ha yielding 427.60 MT and 128.10 MT respectively. The other seasonal crops are Black Gram, Green Chillies, Kurakkan, Pumpkin, Brinjal, etc.

In Galenbindunuwewa DSD, there are two reservoirs namely Huruluwewa and Manankattiya which has contributed to more than 200 acres (81 ha) of cultivated extent.

The more important indicators of land degradation are heavy soil losses, high sediment yields, soil fertility decline and reduction in crop yields; marginalization of agricultural land; salinization; landslides and deforestation and forest degradation.

With respect to the project areas, soil erosion can be considered a threat to agricultural production in the rainfed farming areas. Sedimentation is also taking place in small village tanks. Depletion of soil fertility leads to loss of productivity of agricultural lands. A significant extent of agricultural land have become marginal or uneconomic and are put to only limited use. The quality of the forests has also been declined due mainly to shifting cultivation, illicit felling of trees and encroachments.

Potential sources of GHG emissions have been described in Second National Communication on Climate Change, Ministry of Environment. The National Greenhouse Gas inventory provides country level annual emissions by sources and removal by sinks of all GHGs. With respect to the project areas, GHG emissions causing activities can be identified. In urban areas, the GHGs are produced mainly during the combustion of fossil fuels for generation of energy, both thermal and motive. Agricultural activities such as rice cultivation, ruminant animal rearing and animal waste management contribute to emission of CH<sub>4</sub> and N<sub>2</sub>O. Burning of agriculture residues after harvesting and forest fires result in the emission of CO<sub>2</sub>, CH<sub>4</sub> and NO<sub>2</sub>. Land use changes and soil disturbances cause the emission of CO<sub>2</sub> while changes in woody biomass stocks results in the emission or absorption of CO<sub>2</sub>. Application of Nitrogen fertilizers in agricultural land causes the emission of N<sub>2</sub>O.

#### 2.1.1.4 Water resources

The requirement of water for cultivation is satisfied from both the rain and irrigation system. The irrigation system of the District consists of 12 main tanks such as Kala Wewa, Thisa Wewa, Nuwera wewa, Abhaya Wewa, Nachchaduwa, Rajangana and Padaviya, 85 middle scale irrigations and 2,974 small lakes and the irrigation system of the District is an amazing creation even in the modern engineering field.

Major, Medium and Minor tanks are decided on their irrigable area they command. Major tank commands more than 1,500 acres, medium 200-1,500 acres and minor tank below 200 acres. The minor tanks are managed by Department of Agrarian Development and major and medium tanks by Irrigation Department (National management) or Provincial Irrigation Departments (Provincial management).

Proposed project area comes under the Yan Oya basin and details related to the river basin characteristics, water use and water management practices are as follows;

Table 2.4 Details of Yan Oya Basin

Rainfall Runoff Data	
Catchment Area (km <sup>2</sup> )	1,520
Average Rainfall (mm)	1,500
Discharge Volume to Sea (MCM)	132
Estimated Annual Average Water Availability	
Available Water MCM per Year	562.7

<i>Average Irrigation Water Use by Basin and Water Balance</i>	
Major Irri. Demand (MCM)	68.52
<i>Medium Irri. Demand (MCM)</i>	<i>28.74</i>
<i>Minor Irri. Demand (MCM)</i>	<i>94.09</i>
<i>Total Irrigation Demand (MCM)</i>	<i>191.36</i>
Runoff from Rf	469.1
Balance after meeting Irri. Demand	277.7
Domestic Water Demand by Basin	
Population Dug Wells	73,131
Population Pipe Supply	38,180
Dug well Extraction – MCM/month	0.110
Pipe supply MCM/month	0.137

High Nitrate and Phosphate levels have been identified in several areas in Anuradhapura District as a result of excessive application of fertilizers (Water Resources Board). High Fluoride content in ground water which highly varies with spatially as well as temporally is also identified in many of DSD's of Anuradhapura District. Some areas are identified as hazardous zones with high fluoride enrichment in groundwater.

#### 2.1.1.5 Forest cover and biodiversity

Anuradhapura District belongs to Floristic Region 2: Dry and Arid Lowland and main features are Tropical dry mixed evergreen forests (Manilkara Community); Mixed Community (Chloxyton-Vitex-Benya- Schleichera series); Tropical thorn forests (Manilkara-Chloroxyton-Salvadora-Randia Series); Villu vegetation; Flood Plain; Wetlands; Riverine and gallery forests.

The major forest type of the area is considered as the Tropical dry mixed evergreen forest or the monsoon forests. Occasionally, there are a few patches of Thorny Scrub dwarf forests formations, Villus are found mainly in the Wilpaththu National Park, Riverine Gallery Forests along River Bank Reservations and Grasslands in the abandoned and degraded lands. Out of total land area of 722,178 ha in Anuradhapura District, 164,794.6 ha is covered by dry monsoon forests, while 82.4 ha and 99,525.5 ha are under riverine dry forests and sparse and open forests, according to forest cover assessment of the Forest Department in 1999 (Forest Department, 2016). The coverage under forests is 264,402.5 ha (36.5%) of total land area. In addition to these, forest plantations, coconut lands also contribute the land covered by vegetation.

Wildlife protected areas are managed by DWC under the Flora and Fauna Protection Ordinance (FFPO). There are 8 wildlife protected areas in Anuradhapura District under 3 different conservation status namely; Strict Nature Reserve (SNR), National Parks and Sanctuaries (**Error! Reference source not found.**2.2). Human activities are restricted in SNRs and they are protected as a pure natural system. National parks are areas allowed for the public to see and study wildlife. However necessary rules and regulations are introduced to protect wildlife and their habitats. Nature Reserves are not allowed for public to see and study wildlife, however, scientific studies are encouraged under the supervision of DWC. In Nature Reserves, traditional human activities are allowed to continue. Sanctuaries are areas where habitat protection is conducted in parallel with human activities, and they may include both government and privately-owned land. It is not necessary to obtain a permit for entering into such areas. However, human activities within sanctuaries are regulated by the FFPO.

Table 2.5 Protected Wildlife Areas within Anuradhapura District

Protected Wildlife Area	Date declared	Extent (ha)
<b>Strict Nature Reserve</b>		
Ritigala	1941.11.07	1,528.00
<b>National Parks</b>		
Wilpattuwa (part)	1938.02.25	131,667.00
Horowupatana	2011.12.06	1,698.76
<b>Sanctuaries</b>		
Mihintale	1938.05.27	1,000.00
Anuradhapura	1938.05.27	3,501.00
Padawiya Tank	1963.06.21	6,475.00
Mahakandarawa	1966.12.09	5,193.00
Kahalla_Pallekelle	1989.07.01	21,690.00

Source: DWC

Sensitive areas controlled under different regulating authorities such as archaeological sites, environmental protection areas (CEA), forest reserves (FD), wildlife protected areas (DWC), water bodies, streams, lagoons, landslide prone areas and erodible areas for each district have been mapped by CEA. The environmental sensitive area map of Anuradhapura District is given in Figure 2.2.

With regard to impacts of human-elephant conflict, elephants are found over almost the entire dry zone in an area approximately 60% of the island. The North-central area contains well over 1000 elephants (Fernando et al). The home ranges of most of them encompass both protected areas and areas outside. However, a large part of the outside ranges also lies in state land under the Forest Department. Large herds over 400 elephants can be observed annually during June October in the reservoir beds of Minneriya and Kaudulla to feed on lush grasses as the water recedes in the dry season. During the rest of the year they can be observed in the nearby Hurulu Forest Reserve. Herds with more than 100 elephants can be observed at some reservoirs such as Kala Wewa.

The elephant, considered as one of the important species in the dry zone landscape, needs a large area for its survival. Elephant population of Sri Lanka is currently facing serious threats to its existence due to continuous shrink of favorable habitats, destruction of corridors due to the changes in land use patterns and degradation of the quality of existing habitats. As a result, conflict between Human and Elephant has been rapidly increasing causing property damage; injuries and deaths of both human and elephants. The studies have been suggested that elephants living in fragmented habitats situated in high human-use areas consisting of croplands and homesteads area highly vulnerable to coming into conflict with humans. It has been recommended that such habitat patches be linked with corridors to minimize human-elephant conflicts. Elephant distribution and corridors are provided in Figure 2.3.

Data pertaining to the elephant deaths, human deaths, injuries due to elephant attacks and property damages in Anuradhapura Wildlife Region are illustrated in the following Table.

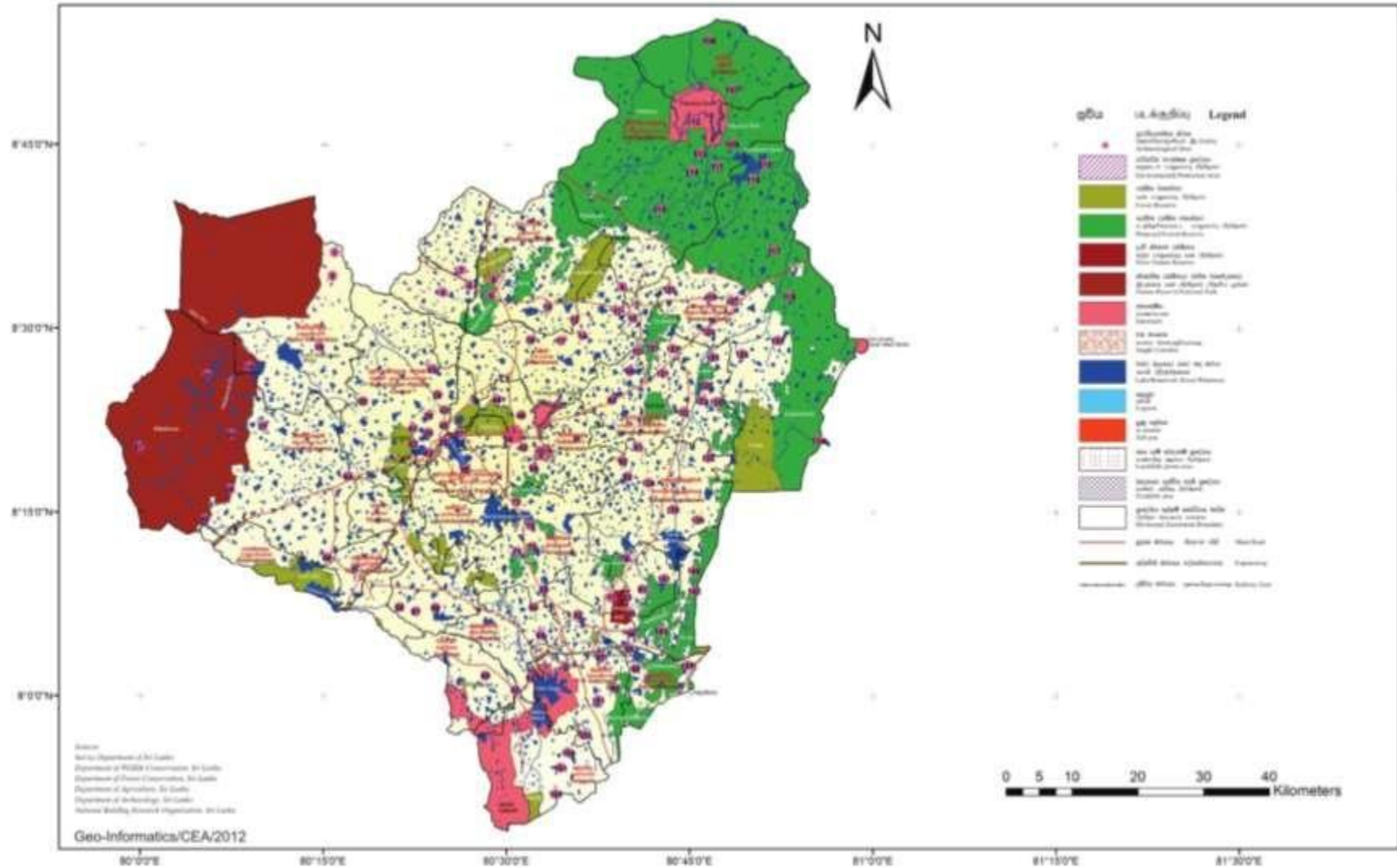
Table 2.6 Incidents Recorded in Anuradhapura Wildlife Regions from 2012-2016

Incident	2012	2013	2014	2015	2016	Total
Elephant Deaths	19	49	32	27	42	169

Number of Human Deaths due to Elephant Attacks	12	07	05	08	13	45
Number of Human Physical Damages	0	13	10	13	11	47
Annual Number of Property Damages	58	69	100	85	122	434

Source: DWC

According to the DWC records in 2016, Elephant Deaths in Anuradhapura were caused by Gun Shot – 05, Electrocutation – 05, Poisoned – 02, Hakka Patas – 11, Train Accidents – 02, Accident – 01, Natural – 02, other causes – 06 and unknown causes – 08



Source: CEA

Figure 2.2 Environmental Sensitive Areas – Anuradhapura District

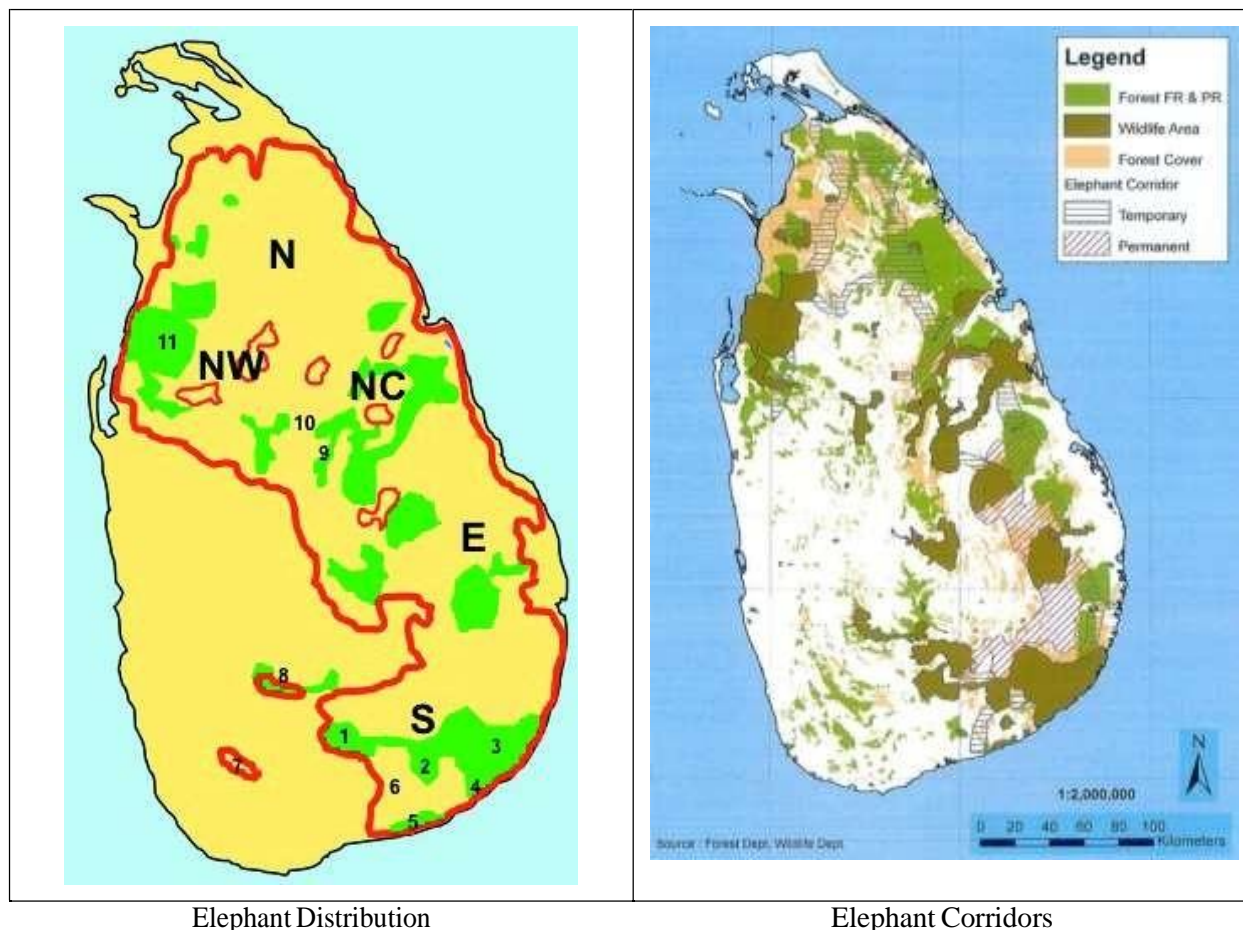


Figure 2.3 Elephant Distribution and Elephant Corridors of Sri Lanka

### 2.1.1.6 Physical cultural resources

Declared by the UNESCO as a world heritage city, Anuradapura is regarded as Sri Lanka’s first known kingdom and the capital of the island for many centuries. Among the many attractions in the city are the Dagabas, tanks, art and architecture which are highly respected for their religious and cultural value. These attractions vary from one of the world’s oldest Bo tree, known as the Sri Maha Bodi to the tallest Dagabas, temples and remains from palaces which are regarded by the Buddhists as the depiction of Buddhism.

## 2.1.2 Socio-economic environment of proposed project locations

### 2.1.2.1 District’s social profile

Out of the nine provinces in Sri Lanka, North Central Province is the largest and Anuradhapura District is the largest District having a total area of 7,179 km<sup>2</sup> of which 6,664 km<sup>2</sup> is land and 515 km<sup>2</sup> is surface water bodies. Anuradhapura District is spread over 68.5% of the North Central Province and comparative to other districts, it is enriched with the most number of surface water bodies having about 2,600 minor and major tanks.

Anuradhapura District is managed by the Municipal Council. There are 7 registered electoral divisions and the administrative structure of the areas where project interventions are proposed and the district as a whole is given in Table 2.7 below;

Table 2.7 Administrative Structure by DS Division

DS Division	Grama Niladari Divisions (GNDs)	Villages	No of Agrarian Service Centers	Local Authorities
Kahatagasdigiliya DSD	40	131	3	1
Galenbindunuwewa DSD	41	163	3	1
Horowpathana DSD	38	276	3	1
TOTAL ANURADHAPURA DISTRICT	694	2584	41	18

Source: Department of Census and Statistics

The total population of Anuradhapura District is 905,000 of which based on the 2016 data, 48.8% of the population is male and 51.2% females having a sex ratio of 95.4. The population density of the District is 126.00 per km<sup>2</sup>. According to the Department of Census and Statistics of Sri Lanka, ethnicity wise, 91% of the total population of the Anuradhapura District is Sinhalese and secondly Sri Lankan Moor being 8% and Sri Lankan Tamil 1%. From the total population 6% is classified under urban population and 94% as rural population.

A 14% of the total population in Anuradhapura District is from the areas where project interventions are proposed and the details of the population distribution based on sex is given in Table A.8 below;

Table 2.8 Population by Sex and Sex Ratio at DS Divisional Level – 2016

DS Division	Male	Female	Total	Sex Ratio	Ares km <sup>2</sup>	Population Density
Kahatagasdigiliya DSD	20,399 (48.1%)	22,022 (51.9%)	42,421	92.6	352	120.52
Galenbindunuwewa DSD	24,207 (49.0%)	25,211 (51.0%)	49,418	96.0	291	169.82
Horowpathana DSD	19,193 (49.3%)	19,706 (50.7%)	38,900	97.4	845	46.03
TOTAL ANURADHAPURA DISTRICT	441,787 (48.8%)	463,213 (51.2%)	905,000	95.4	7,179	126.0

Source: Department of Census and Statistics

According to the available information, ethnicity wise, majority of the population in the DS Divisions of the relevant project locations are Sinhalese and secondly Sri Lankan Moor and religiously majority is Buddhist and secondly Islam. The age wise distribution of the population of the areas where project interventions are proposed and the district as a whole is given in Table 2.9 below which illustrates that the majority of the population comes under the 1-19 age category.



Table 2.9 Age wise Population – 2016

DSDivision	Total	1-19	20-29	30-39	40-49	50-59	60≤
	Population						
Kahatagasdigiliya DSD	42,421	16,223	6,019	6,930	5,389	4,301	3,561
Galenbindunuwewa DSD	49,418	17,120	7,153	8,311	6,329	5,454	5,050
Horowpathana DSD	38,900	15,316	6,002	6,309	4,868	3,658	2,747
TOTAL ANURADHAPURA DISTRICT	905,000	315,095	140,815	149,482	118,889	97,831	82,889

Source: Department of Census and Statistics

### 2.1.2.2 Details on irrigated farming communities

According to the statistic of the Annual Labour Force Survey Report of 2016, when employment by main industry of the population over the age of 15 illustrates that from the total employee population of 348,262, a percentage of 49% which is equivalent to 169,751 is engaged in agriculture, forestry and fishing. 13% is engaged in the wholesale and retail trade, repair of motor vehicles and motor cycles and 10% in manufacturing industry. As a summary 49%, 17% and 34% is engaged in agricultural sector, industry sector and service sector respectively. In the agricultural sector from the total population engaged, 53% is females and 49% is males.

### 2.1.2.3 Economic status of the irrigated farming communities

When the average monthly household income is considered by the main source of income, based on the Household Income Expenditure Survey of 2012/2013, LKR 30,266 is calculated as the monetary income per month and LKR 5,194 is calculated as non-monetary income per month. From the monetary income, LKR 5,856 is from agricultural activities which is 19% of the monthly monetary income.

## 2.2 Batticaloa District

### Project Area Details

DSD Name	ASC Name (ASC No)	River Basin Name	Sub-watershed Name
Eravurpattu	Vantharumoolai	Mundeni Aru (River Basin No 52)	Lower Mundenu Aru
	Karadiyanaru		

### 2.2.1 Bio-physical environment of proposed project locations

#### 2.2.1.1 Location & geography

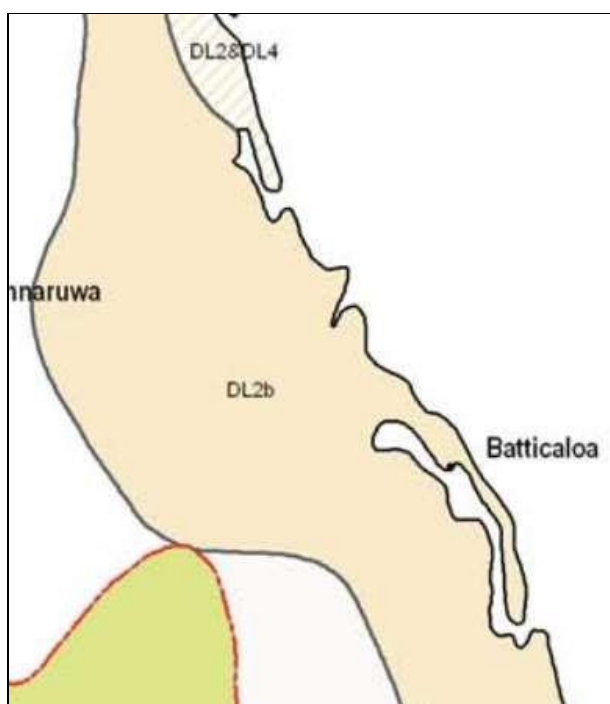
Batticaloa is a District located mainly on the beach side, the main resource of the district can be identified as the ocean. The District is bounded in the North by Verugal River, and on the East by Bay of Bengal. The Southern and Western boundaries are along Ampara and Polonnaruwa districts. It lies entirely in the dry zone and is located east longitudes. 7% of the land is flat terrain comprising of lagoons, villus, forests, isolated hillrocks, streams and rivers. The major rivers originate from Badulla range and meander through the district, discharging in to the lagoons. In the true sense of the meaning of the name of the district and area in extent 229.19 km<sup>2</sup> from Kallaru up to Walachchenei is a lagoon. About 9% of the total area of the district is

covered by this lagoon. The length of this part is 119.43 km.

Fishing is the main livelihoods of the people in this area. Batticaloa is an ancient harbor and the cranes used at that time are still found in Ghandi Park near the lagoon. Pasikuda is famous as a calm sea and it serves as an attraction for both local and foreign tourists. A soil composition which is highly suitable for paddy cultivation can be seen in the Western side. The rice production, which is carried out in high volumes has caused to transform this district as a self - sufficient area.

### 2.2.1.2 Climate

Batticaloa District is geographically located mainly in agro ecological zone of Dry Zone Low Country. According to the zoning data of Department of Agriculture, the project area lies mainly in agro-ecological regions of DL2b. The major characteristics of these agro-ecological regions and the surrounding regions are shown in Figure 2.4 below.



Agro-Ecological Region Feature	DL2b
75% expectancy of Rainfall (mm)	> 1,100
Terrain	Undulating and flat
Major Soil Groups	Non Calcic Brown, Reddish Brown Earth, Old alluvial, Reddish Brown Earth and Low Humic Gley soils, Regosol & Solodized Solonetz soils
Land Use	Paddy, Rainfed upland crops

Source: Department of Agriculture

Figure 2.4 Agro-Ecological Regions in Batticaloa District

The dry zone of Sri Lanka, in which this District is wholly located, its climate is influenced by the North- East and South-West monsoons. The maximum temperature was recorded as 35.1<sup>0</sup>C in August 2016 and minimum as 29.4<sup>0</sup>C in January 2016 according to the Department of Meteorology. The relative humidity

ranges from 60-80% during day and 76-88% during night. The wind speed varies from 9 km/h during inter monsoon to 14.3 km/h during north-east monsoons. A high wind blows from the west during the south-western monsoons.

In general, rainy weather prevails from November to February in the District and average rainfall is around 1400mm. Dry weather prevails in the rest of the year.

### 2.2.1.3 Land resources

According to the available information, major component of the land extent is used as cultivated paddy land which is 24.26% of the total and secondly grass land/ chena which is 21.7%. The details are given in Table 2.10.

Table 2.10 Land used pattern in Batticaloa District – 2016

Nature of land	Area (ha)	Percentage (%)
Asweddumized paddy land		
Irrigated	26,767.20	9.38
Rainfed	42,457.80	14.88
Tea	-	-
Rubber	-	-
Coconut	3,776.48	1.32
Cinnamon	-	-
Other crops	22,006.00	7.71
Forests		
Dense forests	27,870.00	9.77
Open forests	14,290.00	5.01
Planted forests	222.00	0.08
Grass lands/Chena	61,942.00	21.70
Marshes and Mangroves	4586.00	1.61
Home gardens	12,288.00	4.31
Reservoirs	24,000.00	8.41
Building	9,944.00	3.48
Sand and Mountain	6,087.00	2.13
Abandoned land	8,341.00	2.92
Other (sacred places, roads, cemetery etc)	20,822.52	7.30
<b>Total</b>	<b>285,400.00</b>	<b>100.00</b>

Source: District Land Use Planning Office, Department of Census and Statistics

From the total area of 2854 km<sup>2</sup> of Batticaloa District, 91.45% is land area and the rest of 8.55% consists of internal reservoirs. 37.63% is cultivated extent which is 1,073.83 km<sup>2</sup>, 47.52% of extent is not cultivated which is 1,356.35 km<sup>2</sup> and 423.82 km<sup>2</sup> which is 14.85% consists of forests. The details are given in Table 2.11 below.

Table 2.11 Extent of Land Used

Nature of land	Extent Km <sup>2</sup>	Percentage
Land area	2,610.00	91.45
Internal reservoirs	244.00	8.55

Total	2,854.00	100.00
Total extent of cultivated land	1,073.83	37.63
Total extent of not cultivated land	1,356.35	47.52
Total extent of forest	423.82	14.85
Total	2,854.00	100.00

Source: District Statistical Branch

Majority of the land is used to cultivate paddy where 69,225 ha was cultivated in the year 2016. The cultivated extent by irrigation and rained is given in Table 2.12 for the DS division of which the specific project location exists and the district as a whole.

Table 2.12 Cultivated extent of paddy Divisional level – 2016

DS Division	By irrigation		Rainfed - ha	Total - ha
	Major - ha	Minor - ha		
Eravur Pattu	27,77.3	1,101.1	11,417.9	15,296.3
TOTAL BATALOIA DISTRICT	22,841.0	3,926.2	42,457.8	69,225.0

Source: Department of Census and Statistics

As per the statistics of the District Statistical Branch, there are many seasonal crops cultivated during the Maha and Yala seasons of which manioc is considered as the crop which has used the majority of the land during 2015/2016 Maha season – 552.01 ha to cultivate which had a yield of 5,855.95 MT and 2016 Yala season the district had a yield of 3,590.73 MT by cultivating in an area of 244.69 ha. Land use wise secondly maize was cultivated during the 2015/2016 Maha season and Brinjals in 2016 Yala season in 395.04 ha and 133.81 ha yielding 404.25 MT and 1510.16 MT respectively. The other seasonal crops are peanut, green chilies, lady's fingers, bitter-gourd, etc.

With respect of highland crops coconut has used 3,776.5 ha where cashew cultivation has used 652.2 ha. Eravur Pattu has used 585.7 ha to cultivate coconut and 39.3 ha to cultivate cashew as at 2016.

In Batticaloa District, there are 22 reservoirs which has contributed to more than 200 acres cultivated extent. In Eravur Pattu DS Division, there are three reservoirs namely Rugam, Kithulwewa and Weligahakandiya. The details of these three reservoirs are given in the Table 2.13.

Table 2.13 Main agricultural reservoirs more than 200 acres of cultivated land - 2016

Reservoir	Capacity Acre Feet	Catchment are Acres	Surface area Acres
Rugam	18,600.00	13,916.98	2,561.09
Kithulwewa	4,205.00	4,354.00	529.72
Weligahakandiya	1,698.00	2,028.74	208.09

Source: District Statistical Branch

Soil erosion was identified as a widespread and a serious problem in the district. It is a combined effect of the other environment problems of chena cultivation, encroachment of forest and water resources, deforestation, and mono-cropping of sugar cane and tobacco, environmental sanitation and gem mining which are caused by human activities. In the mountainous region of the North-Western part of the

district, mass movement, gully, and rill erosion have occurred but most widespread type of soil erosion caused by clearing of land and burning the vegetation before the onset of the monsoonal rains annually. Clearing the land within a short period of time and burning the slashed jungle destroys the soil structure and makes it very susceptible to movement of the topsoil as thin sheet with run-off water.

The potential GHGs sources with relevant to the project area include combustion of fossil fuels, agricultural activities such as rice cultivation, ruminant animal rearing and animal waste management, burning of agriculture residues after harvesting and forest fires, land use changes and soil disturbances, changes in woody biomass stocks, application of Nitrogen fertilizers in agricultural land etc.

#### 2.2.1.4 Water resources

Proposed project area comes under the Mundeni Aru basin and details related to the river basin's characteristics, water use and water management practices are given in Table 2.14.

Table 2.14 Details of Mundeni Aru basin

Rainfall Runoff Data	
Catchment Area (km <sup>2</sup> )	1,280
Average Rainfall (mm)	1,973
Discharge Volume to Sea (MCM)	757
Estimated Annual Average Water Availability	
Available Water MCM per Year	780.6
Average Irrigation Water Use by Basin and Water Balance	
Major Irri. Demand (MCM)	44.64
Medium Irri. Demand (MCM)	12.78
Minor Irri. Demand (MCM)	20.76
Total Irrigation Demand (MCM)	78.18
Runoff from Rf	912.9
Balance after meeting Irri. Demand	834.7
Domestic Water Demand by Basin	
Population Dug Wells	93,435
Population Pipe Supply	57,513
Dug well Extraction – MCM/month	0.140
Pipe supply MCM/month	0.207

#### 2.2.1.5 Forest cover and biodiversity

Out of total land area of 263,983ha in Batticaloa District, 19,733.8 ha and 17,766.3 ha are covered by Dry Monsoon Forest and sparse forests, while 13,378.2ha and 1,855.0 ha are under moist monsoon forests and mangrove according to forest cover assessment of the Forest Department in 1999 (Forest Department, 2016). The coverage under forests is 52,733.3 ha (20%) of total land area.

Wildlife protected areas are managed by DWC under the Flora and Fauna Protection Ordinance (FFPO). There are 2 wildlife protected areas in Batticaloa District under 2 different conservation statuses namely; National Park and Sanctuary (Table 2.15; Figure 2.5).

Table 2.15 Protected Wildlife Areas within Batticaloa District

Protected Wildlife Area	Date declared	Extent (ha)
<b>National Parks</b>		
Triconamadu (part)	1986.10.24	25,019.00
<b>Sanctuaries</b>		
Seruwila_Allei (part)	1970.10.09	15,540.00

Source: DWC

With regard to impacts of human-elephant conflict, over a thousand elephants are found in the east. The majority are outside national parks. As a result of the armed conflict that took place in the area over the past three decades, many villages and cultivation areas were abandoned and became excellent elephant habitat. The postwar resettlement of people in the east is likely to result in a new area of high HEC (Fernando et al).

Regarding the HEC, data pertaining to the elephant deaths, human deaths, injuries due to elephant attacks and property damages in Eastern Wildlife Region are illustrated in the Table 2.16.

Table 2.16: Incidents Recorded in Eastern Wildlife Regions from 2012-2016

Incident	2012	2013	2014	2015	2016	Total
Elephant Deaths	44	29	49	52	55	229
Number of Human Deaths due to Elephant Attacks	14	18	22	15	20	89
Number of Human Physical Damages	15	11	18	13	35	92
Annual Number of Property Damages	267	403	511	396	431	2,008

According to the DWC records in 2016, Elephant Deaths in Eastern region were caused by Gun Shot – 15, Electrification – 04, Poisoned – 0, Hakka Patas – 11, Accident – 02, Natural – 08, other causes – 08 and unknown causes – 07.

### 2.2.1.6 Physical cultural resources

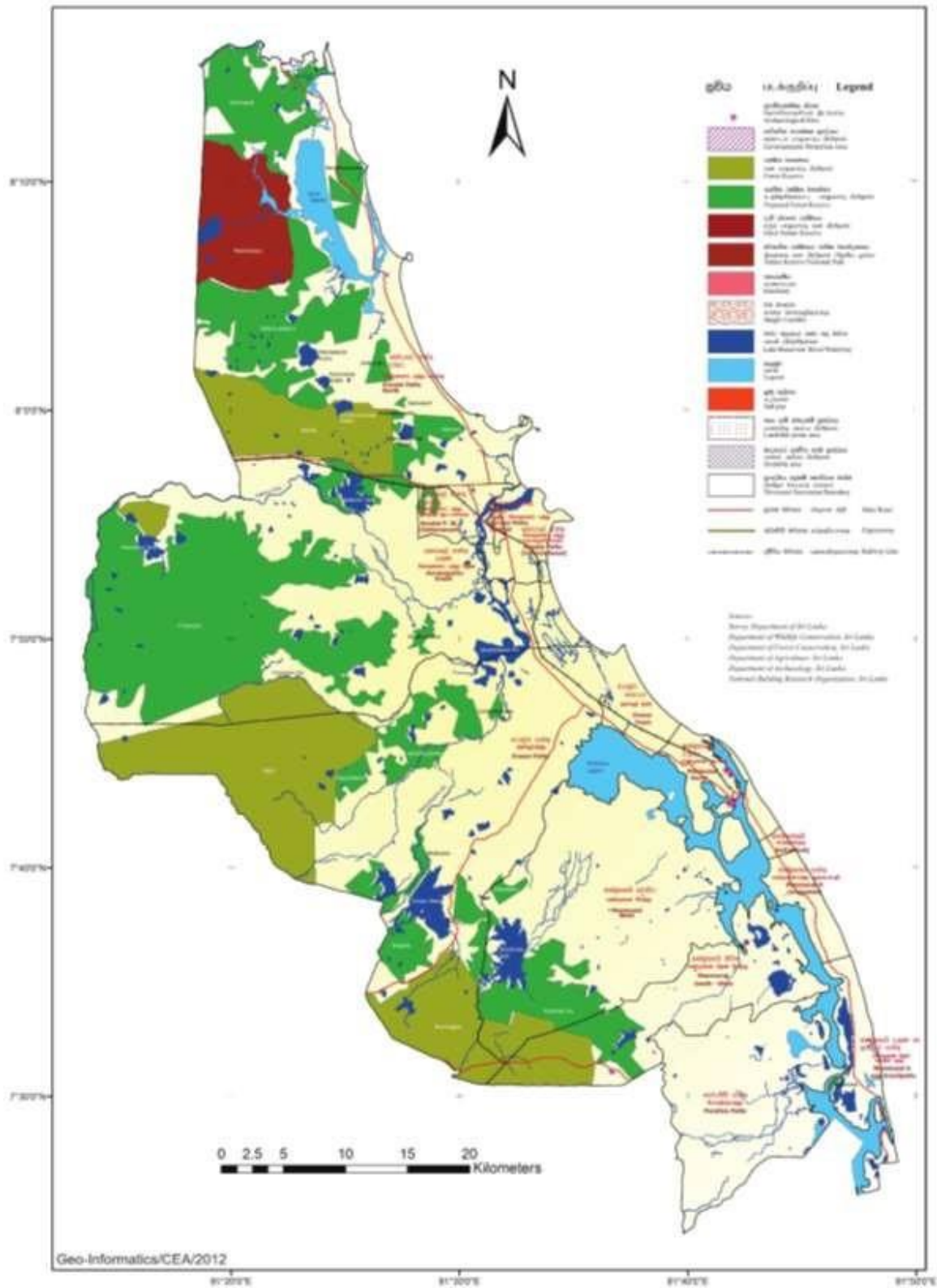
Early Brahmi inscriptions are found on Nelugal Malai and Baron's Cap two hillocks on and open forests exist mainly in Kiran - Wadamune road in Koralai Pattu. Middle historical period inscriptions are found in the Hindu temples in Kokkadicholai Palugamam and Mandoor. Besides the above, the Historical site worth mentioning is the Dutch Fort in Batticaloa which houses the Kachcheri. Constructed by the Portuguese in the late 15<sup>th</sup> century it was rebuilt by the Dutch in 16<sup>th</sup> century. Locations of the archeological sites of the district is given in Figure 2.5 - Sensitive Area Map.

## 2.2.2 Socio-economic environment of proposed project locations

### 2.2.2.1 District's social profile

Batticaloa District consists of 14 DS Divisions. It has 12 local authorities of which one is a Municipal Council and two are urban councils. It is about 4.35% of the total land area of the country and is spread

over 28.55% of the Eastern Province. The administrative structure of the specific project location and the district as a whole is given in Table 2.17.



Source: CEA

Figure 2.5 Environmental Sensitive Areas – Batticaloa District

Table 2.17 Administrative Structure by DS Division – 2016

DS Division	Grama Niladari Divisions (GNDs)	Villages	No of Agrarian Service Centers	Pradeshiya Sabhas (PS)
Eravur Pattu	39	197	3	1
TOTAL BATTICALOA DISTRICT	345	908	17	09

The total population of Batticaloa District is 550,000 of which based on the 2016 data, 47.6% of the population is male and 52.4% females having a sex ratio of 90.9. The population density of the district is 192.71 per km<sup>2</sup>. According to the Department of Census and Statistics of Sri Lanka, ethnicity wise, 68% of the total population of the Batticaloa District is Sri Lanka Tamil and secondly Sri Lankan Moor being 31%. From the total population 28.72% is classified under urban population and 71.28% a rural population.

About 14% of the total population in Batticaloa District is located in Eravur Pattu where the specific project site is located and the details of the population distribution based on sex is given in 2.18 below;

Table 2.18 Population by sex and sex ratio at DS Divisional Level – 2015

DSDivision	Male	Female	Total	Sex Ratio	Ares km <sup>2</sup>	Population Density
Eravur Pattu	37,548 – 47.6%	41,289 – 52.4%	78,837	90.9	695	113.43
TOTAL BATTICALOA DISTRICT	261,831 – 47.6%	288,169 – 52.4%	550,000	90.9	2,854	192.71

Source: Department of Census and Statistics

According to the available information, ethnicity wise, majority of the population in the DS division of the relevant project location is Sri Lankan Tamil being 94.91% and secondly Sri Lankan Moor being 2.73% and religiously majority is Hindu and secondly Roman Catholic. The age wise distribution of the population of the specific project location and the district as a whole is given in table xx below which illustrates that the majority of the population comes under the 1-19 age category.

Table 2.19 Population by age group at DS Divisional Level – 2015

DSDivision	Total Population	1-19	20-29	30-39	40-49	50-59	60≤
Eravur Pattu	78,837	34,865	13,280	10,599	7,945	6,690	5,458
TOTAL BATTICALOA DISTRICT	550,000	226,188	89,815	78,574	63,624	49,874	41,925

Source: Department of Census and Statistics

### 2.2.2.2 Details on irrigated farming communities

According to the statistic of the Annual Labour Force Survey Report of 2016, employment by main industry of the population over the age of 15 illustrates that from the total labour force of 163,292, 24.8% which is equivalent to 40,451 is engaged in agriculture, forestry and fishing. 17.5% is engaged in manufacturing and 15.1% in wholesale and retail trade, repair of motor vehicles and motor cycles.



### 2.2.2.3 Economic status of the irrigated farming communities

According to the Annual Labour Force Survey Report, 94.8% of the total labour force (age over 15 years old) of Batticaloa District is employed which is 163,292 in number of which 24.8% is engaged in the agricultural sector, 29.4% in industry sector and 45.8% in the service sector. The details of the employed population are given in Table 2.20.

Table 2.20 Employed population

Sector	Total		Male		Female	
	Number	Percentage	Number	Percentage	Number	Percentage
Agricultural sector	40,451	24.8	33,779	28.4	6,671	15.0
Industry sector	48,025	29.4	33,740	28.4	14,284	32.2
Service sector	74,817	45.8	51,388	43.2	23,429	52.8
Total	163,292	100.0	118,907	100.0	44,385	100.0

Source: Annual Labour Force Survey Reports, 2016

In Batticaloa District in the year 2016, majority of the labour force by occupation is engaged in elementary occupations which is 25.3%. Skilled agricultural, forestry and fishery workers are 16.2% of the total labour force.

When the average monthly household income is considered by the main source of income, based on the Household Income Expenditure Survey of 2012/2013, LKR 22,945 is calculated as the monetary income per month and LKR 2,528 is calculated as non-monetary income per month. From the monetary income, LKR 851 is from agricultural activities which is 3.7% of the monthly monetary income.

## 2.3 Kurunegala District

### Project Area Details

DSD Name	ASC Name (ASC No)	River Basin Name	Sub-watershed Name
Ambanpola	Mahananneriya	Mi Oya (River Basin No 95)	Upper Mi Oya
Polpithigama	Abanpola	Kala Oya	Siyabalangamuwa Oya
Maho	Mahawa	(River Basin No 93)	
Ehathuwewa	Moragollagama		
Galgamuwa	Galgamuwa		
Gribawa	Ehathuwewa		
	Thabutta		
	Rajangama Left Bank		

### 2.3.1 Bio-physical environment of proposed project locations

### **2.3.1.1 Location & geography**

Kurunegala District is located in the North-Western Province of Sri Lanka with a total land extent of 490,062.50 ha which is about 7.3% of the total area of the country. The District is bounded by Puttalam District in the West, Anuradhapura District in the North, Kandy and Matale Districts in the East and Kegalle and Gampaha Districts in the South. This District is located between 79° 54' and 80° 36' East Longitudes and 7° 12' and 08° 10' North Latitudes.

The District consists of highly jointed metamorphic rocks and all the rocks belong to Highland complex category. Charnockitic, Granulitic and Quartitic rocks are prominent. Kurunegala is surrounded by several major rock outcrops, a distinctive geological feature of the North-Western Province of Sri Lanka. The altitude of 116m above sea level, Kurunegala District is surrounded by coconut plantations. There are eight very noticeable large rocks that encircle and dominate the city. Kurunegala's rocks rise from the plain below the largest among them is the "Elephant Rock" (though the translation is actually Tusker), reaches 325m.

The district consists predominantly of flat or undulating land gently sloping towards the coastal planes. At the south-eastern corner of the district, there is a small area that lies above the elevation of 300m. This strip stretches from Polgahawela DSD at the southern end to Polpitiyagama DSD at the Northern end. Apart from the above formation, bulk of the land from north to south of the District occupies elevations between 50m and 150m. There are isolated outcrops which rise above the surrounding peneplains, scattered in many parts of the District.

The topography of the Kurunegala District towards the south-east is characterized by the incised valleys of upper reaches of Deduru Oya and Maha Oya. Towards the north, the landscape transforms in to a broad network of valleys with gently rolling hills.

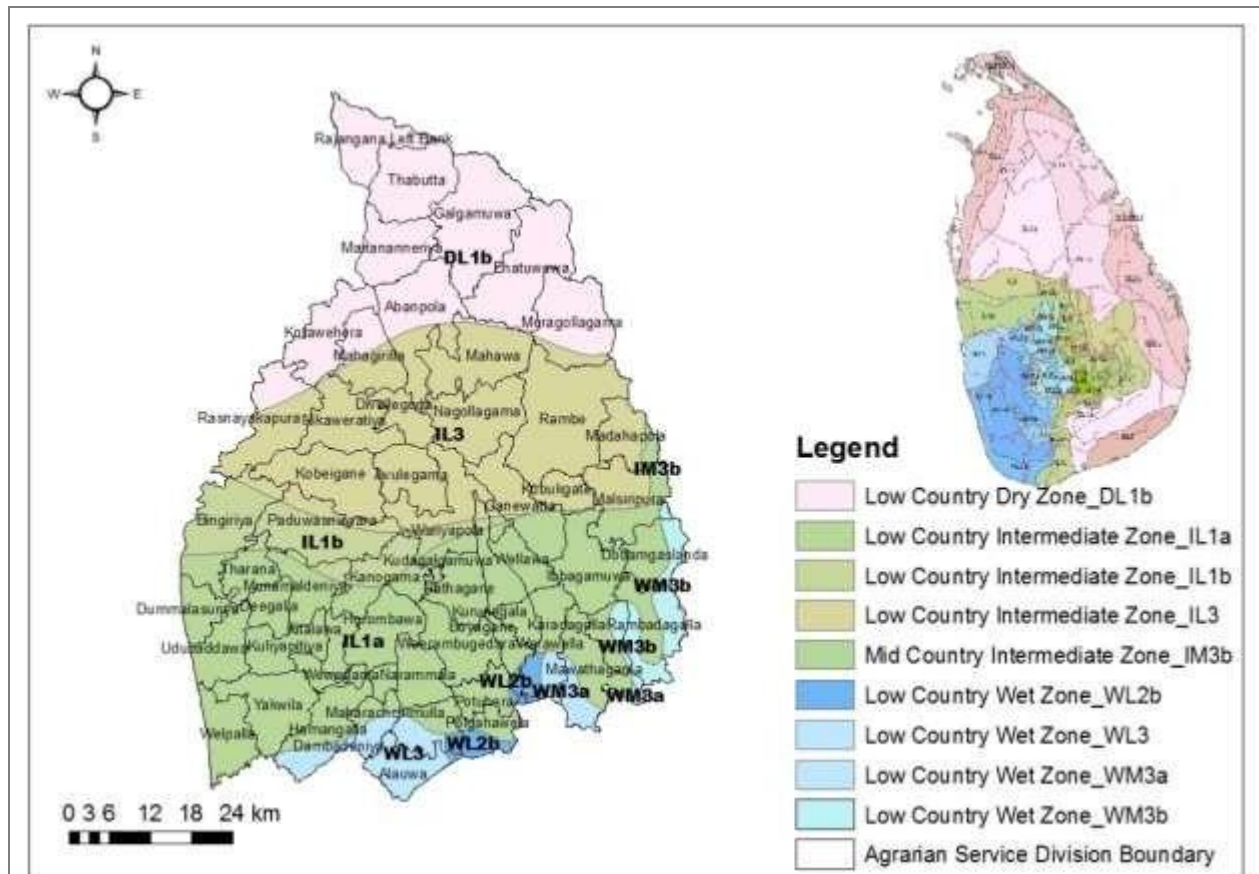
### **2.3.1.2 Climate**

Situated in the North-Western part of Sri Lanka, Kurunegala District is geographically located in 09 agro ecological zones mainly in Dry Zone Low Country and Intermediate Zone. According to information, the intermediate zone (IL1a, IL1b and IL3) covers largest area in the Kurunegala District which is about 75% from the total area of land. However, the project area lies mainly in Dry Zone Low Country agro- ecological region of DL1b. The major characteristics of this agro-ecological regions and the surrounding regions are shown in Figure 2.6 below.

Kurunegala District has the features of a tropical rainforest climate under the Koppen climate classification. It is tropical and hot throughout the year. The surrounding rocks play a major role in determining Kurunegala Districts weather since these rocks increase and retain the heat of the day. The temperature can rise up to about 35°C during the month of April.

The average annual rainfall of the District is 900-2200 mm. The main sources of the rain are South Western and North-Eastern Monsoons and convectional rain. South Western Monsoon brings highest rainfall. The only major change in the Kurunegala Districts weather occurs during these monsoons from May to August and October to January where this is the time of the year where heavy rains can be expected.

Kurunegala District experience a noticeably dry weather during January and February, but it does not qualify as a true dry season as an average precipitating in both months are above 60 mm. In general, temperatures from late November to mid-February period are lower than the rest of the year.



<b>Agro-Ecological Region</b>	<b>DL1b</b>
<b>Feature</b>	
75% expectancy of Rainfall (mm)	> 900
Terrain	Undulating
Major Soil Groups	Reddish Brown Earth and Low Humic Glay soils
Land Use	Rainfed upland crops, Paddy, Scrub, Mixed home gardens, Forest plantations

Source: Department of Agriculture

Figure 2.6 Agro-Ecological Regions in Kurunegala District

### 2.3.1.3 Land resources

According to the available information, major component of the land extent consists of home gardens which is 34% of the total land and secondly is used for coconut cultivations which is 24% and thirdly for paddy cultivation which is 21%. The details are given in Table 2.21.

Table 2.21 Land used pattern in Kurunegala District – 2016

Nature of land	Area (ha)	Percentage (%)
Asweddumized paddy land		
Irrigated	56,654	12
Rainfed	44,960	9
Tea	65	0
Rubber	3,893	1
Coconut	120,015	24
Cinnamon		
Other crops	7,669	2
Forests		
Dense forests	24,985	5
Open forests	22,069	5
Planted forests	3,755	1
Grass lands/Chena		
Marshes and Mangroves	257	0
Home gardens	164,772	34
Reservoirs	25,837	5
Building	1,446	0
Sand and Mountain		
Abandoned land	7179	1
Other (sacred places, roads,cemetery etc)	6506	1
<b>Total</b>	<b>490,062</b>	<b>100</b>

Source: District Land Use Planning Office, Department of Census and Statistics

When the total extent of Kurunagala District is considered, 95% consists of land area while 5% is internal reservoirs. 47.6% of the total extent of the district comprise of cultivated land. The details of the Districts total land use in general is given in Table 2.22.

Table 2.22 Extents Cultivated and Abandoned Lands in Kurunegala District

Nature of land	Extent - ha	%
Land area	464,225.5	95.0
Internal reservoirs	25,837.0	5.0
Total land area	490,062.5	100.0
Total extent of cultivated	233,255.8	47.6
Total extent of not cultivated	50,809.4	10.4
Total land area	490,062.5	100.0

Source: District Statistical Branch

According to the information for the year 2015, the asweddumized extent of paddy of the DS Divisions with respect of the specific project locations is given in table C.3. In the year 2015, from the total of 30 DS Divisions, Polpithigama has used the largest extent of land for paddy cultivation which is 10.17% of the districts total asweddumized extent of paddy.

Table 2.23 Details of Paddy Cultivation - Extent by Irrigation and Rainfed

DS Division	By irrigation		Rainfed - ha	Total - ha
	Major - ha	Minor - ha		
Ambanpola	746	1,380	268	2,394

Polpithigama	2,143	3,853	2,885	8,881
Maho	-	3,305	1,762	5,067
Ehetuwewa	1,840	1,753	592	4,185
Galgamuwa	2,850	2,165	834	5,850
Giribewa	2,569	1,684	348	4,601
TOTAL KURUNEGALA DISTRICT	16,634	40,019	30,708	87,362

Source: District Statistical Branch

The latest available details regarding sown and harvest extent, average yield and production of paddy by season is given in Table 2.24.

Table 2.24 Sawn and harvest extent

DS Division	Sawn extent - ha	Harvest extent - ha	Average yield – kg per ha	Production - MT
2014/2015 Maha	79,375	77,108	3,609	278,269
2015 Yala	62,649	61,318	3,562	218,402

Source: Department of Census and Statistics

With regard to the highland crops cultivated in the district, majority of land is used for coconut cultivation. The other crops are pepper, cashew, rubber, coffee, etc. The statistic with regard to the DS Divisions where the specific project sites are located is given in Table 2.25.

Table 2.25 Highland Crops Cultivated in the District

Crop	Extent in ha					
	Coconut	Cinnamon	Coffee	Pepper	Cashew	Beetle
Ambanpola	661	-	-	-	-	-
Polpithigama	5871	11	23.8	158.8	619.5	27
Maho	3508	-	-	-	-	-
Ehetuwewa	504	-	-	-	273	21
Galgamuwa	1026	-	-	-	382	38
Giribewa	783	-	-	3.2	71.5	5.9

There are many seasonal crops cultivated in the district such as maize, peanut, manioc, gingerly, ginger, green gram, black gram, luffa, lady's fingers, brinjals, etc. According to the districts statistical branch, the land use for these crops shows that during the 2014/2015 Maha season maize, peanut and manioc is cultivated in an extent of 1,329.7, 1,284.4 and 1,238.1 ha with a yield of 1,130.3, 526.6 and 9,286 MT respectively. During the 2015 Yala season the major land use of seasonal crops are gingerly, ginger and manioc cultivated in 1805.4, 1737.4 and 1644 ha with a yield of 796.6, 3,095.5 and 8,907.9 MT respectively.

The main agricultural reservoirs (more than 200 acres of extent cultivated) in the district is 18 in total. The details of these reservoirs in the DSDs where the project sites are located are given in Table 2.26.

Table 2.26 Main Agricultural Reservoirs (more than 200 acres of extent cultivated) in the District

DS Division	Reservoir	Capacity Acre Feet	Catchment Area Acres	Surface Area Acres
Ambanpola	Mediyawa	2,595	7,040	357
Polpithigama	Hakwatuna Oya	19,727	15,776	825
	Maha Siyambalangamuwa	2,125	8,768	361
Ehetuwewa	Abankoawewa	6,700	42,240	670
Galgamuwa	Atharagalla	3,688	10,240	520
	Usgala Siyambalangamuwa	21,666	45,600	1,900
	Mahanaththandiya	1,892	8,960	370
	Paluwakaduwala	7,688	4,480	750
	Maha Galgamuwa	6,537	2,560	635

Source: District Statistical Branch

With respect to the project areas, soil erosion can be considered a threat to agricultural production in the rainfed farming areas. Sedimentation is also taking place in small village tanks. Depletion of soil fertility leads to loss of productivity of agricultural lands. A significant extent of agricultural land have become marginal or uneconomic and are put to only limited use. The quality of the forests has also been declined due mainly to shifting cultivation, illicit felling of trees and encroachments.

The potential GHGs sources with relevant to the project area include combustion of fossil fuels, agricultural activities such as rice cultivation, ruminant animal rearing and animal waste management, burning of agriculture residues after harvesting and forest fires, land use changes and soil disturbances, changes in woody biomass stocks, application of Nitrogen fertilizers in agricultural land etc.

#### 2.3.1.4 Water resources

Kurunegala District falls within the upper part of the Deduru Oya River Basin which flows 140 km from central Sri Lanka to the west coast, reaching the sea at Chilaw through a basin area of 2,623 km<sup>2</sup> and with 9 tributaries. The city of Kurunegala receives most of its drinking water from Deduru Oya although at times of shortage this is supplemented by water from the recently rehabilitated Kurunegala Tank, which is situated within the city. There are also thousands of ancient irrigation schemes in the District served by 2,481 tanks.

Proposed project area comes under the Mi Oya basin and Kala Oya basin and details related to these river basin characteristics, water use and water management practices are given in Table 2.27.

Table 2.27 Details of Mi Oya basin and Kala Oya basin

	Mi Oya Basin	Kala Oya Basin
Rainfall Runoff Data		
Catchment Area (km <sup>2</sup> )	1,516	2,772
Average Rainfall (mm)	1,250	1,367
Discharge Volume to Sea (MCM)	40	386
Estimated Annual Average Water Availability		
Available Water MCM per Year	739.2	1,340

Average Irrigation Water Use by Basin and Water Balance		
Major Irri. Demand (MCM)	112.44	
Medium Irri. Demand (MCM)	16.55	40.08
Minor Irri. Demand (MCM)	108.51	171.46
Total Irrigation Demand (MCM)	237.50	211.55
Runoff from Rf	662.0	748.8
Balance after meeting Irri. Demand	424.5	256.7
Domestic Water Demand by Basin		
Population Dug Wells	-	286,503
Population Pipe Supply	-	117,496
Dug well Extraction – MCM/month	-	0.430
Pipe supply MCM/month	-	0.423

### 2.3.1.5 Forest cover and biodiversity

Kurunegala District belongs to 3 floristic regions viz Floristic Region 2: Dry and arid lowlands (Tropical dry mixed evergreen forests (Manilkara community); Mixed Community (Chloxyton-Vitex-Benya-Schleichera series); Tropical thorn forests (Manilkara-Chloroxyton-Salvadora-Randia Series); Damana and Villu grasslands; Flood Plain wetlands; Riverine and gallery forests); Floristic Region 3: Northern intermediate lowlands (Tropical moist semi-evergreen forests (Filicium-Euphorbia-Artocarpus-Myristica series); and Floristic Region 5: Northern Wet lowlands (Tropical wet evergreen forests).

Out of total land area of 489,787 ha in Kurunegala District, 11,973.1 ha is covered by sparse forests, while 6,264.6 ha and 1,260.9ha are under dry monsoon forests and moist monsoon forests, according to forest cover assessment of the Forest Department in 1999 (Forest Department, 2016). The coverage under forests is 19,498.6 ha (4.0%) of total land area. In addition to these, forest plantations and coconut lands also contribute the land covered by vegetation.

Wildlife protected areas are managed by DWC under the Flora and Fauna Protection Ordinance (FFPO). There are 02 Sanctuaries located within Kurunegala District (Figure 2.7).

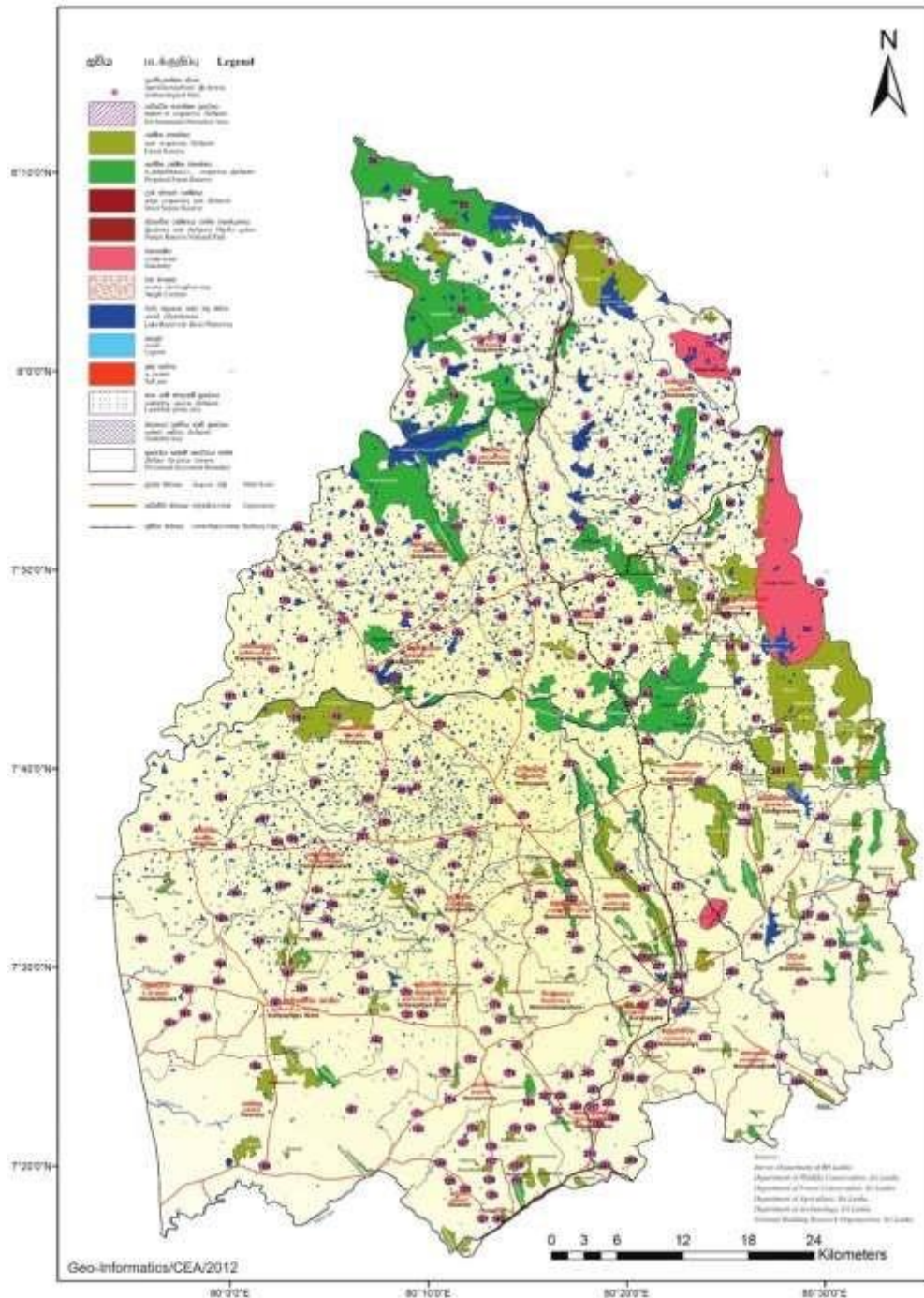
Table 2.28 Protected Wildlife Areas within Kurunegala District

Protected Wildlife Area	Date declared	Extent (ha)
<b>Sanctuaries</b>		
Kahalla_Pallekelle (part)	1989.07.01	21,690.00
Kimbulwanaoaya	1963.06.21	497.00

Source: DWC

As of impacts of human-elephant conflict, there are over a thousand elephants largely outside protected areas dispersed throughout the landscape occupying the same space as humans. Crops are raided regularly and probably constitute a significant part of the diet of most adult males and some herds. Herds with more than 100 elephants can be observed at some reservoirs such as Kala Wewa in the dry season. The north-western region is among the areas having highest levels of HEC in Sri Lanka. With continued conflict, elephants appear to become more accustomed to it, tolerate higher levels of conflict and to raid crops even more frequently and aggressively.

Regarding the HEC, data pertaining to the elephant deaths, human deaths, injuries due to elephant attacks and property damages in North-Western Wildlife Region are listed in Table 2.29.



Source: CEA

Figure 2.7 Environmental Sensitive Areas – Kurunegala District

Table 2.29 Incidents Recorded in North-Western Wildlife Regions from 2012-2016



<b>Incident</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>Total</b>
Elephant Deaths	63	18	15	15	16	127
Number of Human Deaths due to Elephant Attacks	18	25	07	12	06	68
Number of Human Physical Damages	27	12	11	09	00	59
Annual Number of Property Damages	269	113	161	234	191	968

According to the DWC records in 2016, Elephant Deaths in North-Western region were caused by Gun Shot – 05, Electrification – 05, Poisoned – 02, Hakka Patas – 01, Accident – 02 and unknown causes – 01.

### **2.3.1.6 Physical cultural resources**

When considering the historical background of the district, special features are found in the history of the district. Kurunegala emerges proudly as the only district which had 4 kingdoms in the country. They are Panduwasnuwera, Kurunegala, Yapahuwa and Dambadeniya. Many evidences are found to the fact that many glorious kings reined these kingdoms in the past.

There are 291 archaeological monuments situated in the Kurunegala district and out of which 44 sites are located within the project area DSDs.

## **2.3.2 Socio-economic environment of proposed project locations**

### **2.3.2.1 District's social profile**

The number of Divisional Secretary's Divisions in the district is 30 and the number of Grama Niladhari Divisions is 1,610. This District consists of 14 electorates and 4,432 villages. Further, one Municipal Council, one Urban Council and 19 Pradeshiya Sabhas are included in the District. The administrative structure of the DS Divisions of specific project locations and the District as a whole is given in Table 2.30 below:

Table 2.30 Administrative Divisions within Kurunegala District

<b>DS Division</b>	<b>Grama Niladhari Divisions (GNDs)</b>	<b>Villages</b>	<b>No of Agrarian Service Centers</b>	<b>Local Authorities</b>
Ambanpola	28	122	1	-
Polpithigama	82	283	3	1
Maho	68	220	1	1
Ehatuwewa	35	152	1	-
Galgamuwa	62	189	2	1
Giribewa	35	72	2	1
<b>TOTAL KURUNEGALA DISTRICT</b>	<b>1,610</b>	<b>4,432</b>	<b>55</b>	<b>19</b>

Source: District Statistical Branch

The total population according to the Department of Census and Statistics of Kurunegala District for year 2015 is 1,658,000 of which 48% males and 52% females. The details of the population with respect of the DS Divisions of the specific project locations are given in Table 2.31. The Districts urban, rural and estate population is 1.87%, 97.66% and 0.47% respectively. With regard to the DS Divisions where the project sites are located, there are no urban and estate population and 100% of the population is rural population.

Table 2.31 Population Details

DS Division	Male	Female	Total	Sex Ratio	Area ha	Population Density Per ha
Ambanpola	11,289 – 1.4%	12,148 – 1.4%	23,437 – 1.4%	92.9	14,023	1.7
Polpithigama	37,905 – 4.8%	40,094 – 4.7%	77,999 – 4.7%	94.9	41,385	1.9
Maho	28,376 – 3.6%	30,514 – 3.5%	58,889 – 3.6%	93.0	25,871	2.3
Ehatuwewa	12,886 – 1.6%	13,524 – 1.6%	26,411 – 1.6%	95.3	17,830	1.5
Galgamuwa	27,468 – 3.4%	28,955 – 3.4%	56,423 – 3.4%	94.9	27,091	2.1
Giribewewa	15,551 – 2.0%	16,629 – 1.9%	32,179 – 1.9%	93.5	20,850	1.5
TOTAL KURUNEGALA DISTRICT	796,187 – 100%	861,813 – 100%	1,658,000 – 100%	92.4	490,062	3.4

Source: Department of Census and Statistics

The age wise distribution of the population of the specific project location and the district as a whole is given in Table 2.32 below which illustrates that the majority of the population comes under the 1-19 age category.

Table 2.32 Age wise Distribution of the Population

DS Division	Total Population	1-19	20-29	30-39	40-49	50-59	60≤
Ambanpola	23,437	8,027	3,021	3,659	3,211	2,872	2,648
Polpithigama	77,999	25,377	11,201	12,174	10,579	9,709	8,959
Maho	58,889	19,717	7,626	9,172	8,322	7,170	6,881
Ehatuwewa	26,411	8,747	3,509	4,060	3,747	3,299	3,050
Galgamuwa	56,423	19,474	7,793	9,134	7,479	6,484	6,058
Giribewa	32,179	10,902	4,542	5,091	4,326	3,825	3,492
TOTAL KURUNEGALA DISTRICT	1,658,000	529,656	231,682	249,635	225,369	205,963	215,694

Source: Department of Census and Statistics

## 2.4 Moneragala District

Project Area Details

DSD Name	ASC Name (ASC No)	River Basin Name	Sub-watershed Name
----------	-------------------	------------------	--------------------

Wellawaya	Telulla	Kirindi Oya	Maha Ara
Buttala	Wellawaya	(River Basin No 22)	Upper Kirindi Oya
	Buttala	Menik Ganga (River Basin No 26)	Upper Middle Menik Ganga Kuda Oya

## 2.4.1 Bio-physical environment of proposed project locations

### 2.4.1.1 Location & geography

Monaragala District is located between North latitude: 6°17' -7°28' and the East longitude: 80°50' – 81°35' in Uva Province of Sri Lanka bordered by Ampara District on Eastern and Northern sides, Badulla District on Western and Northern sides, Hambantota District on Southern side and Ratnapura District on the South-western side, having a total area of 5,659km<sup>2</sup> as the area, it is considered as the second largest of the 25 districts of Sri Lanka.

Topographically the district is in a transitional zone from central highlands to flat lowland where three terrain types could be identified according to the landscape.

- Highly mountainous terrain - covers the Western boundary towards Badulla and Ratnapura districts; the elevation is between 550 to 1400 m and the underlain parent rocks belonging to highland series.
- Hilly, steep and rolling terrain - situated between the Western boundary area as above and undulating and flat terrain as below within an elevation range of 160 to 550 m.
- Undulating and flat terrain - covers the broad Eastern and Southern plain, occupying about three fourths of the district. The elevation is below 160 m.

Generally, the gradient of the district is from Northwest and West towards North, East and South. Over 60% of the district is less than 30 m where isolated pockets of slopes caused by steep mountains particularly in the Central position of the Western country could be seen. The slopes are gentle in the North, East increasing to the West with increased elevation.

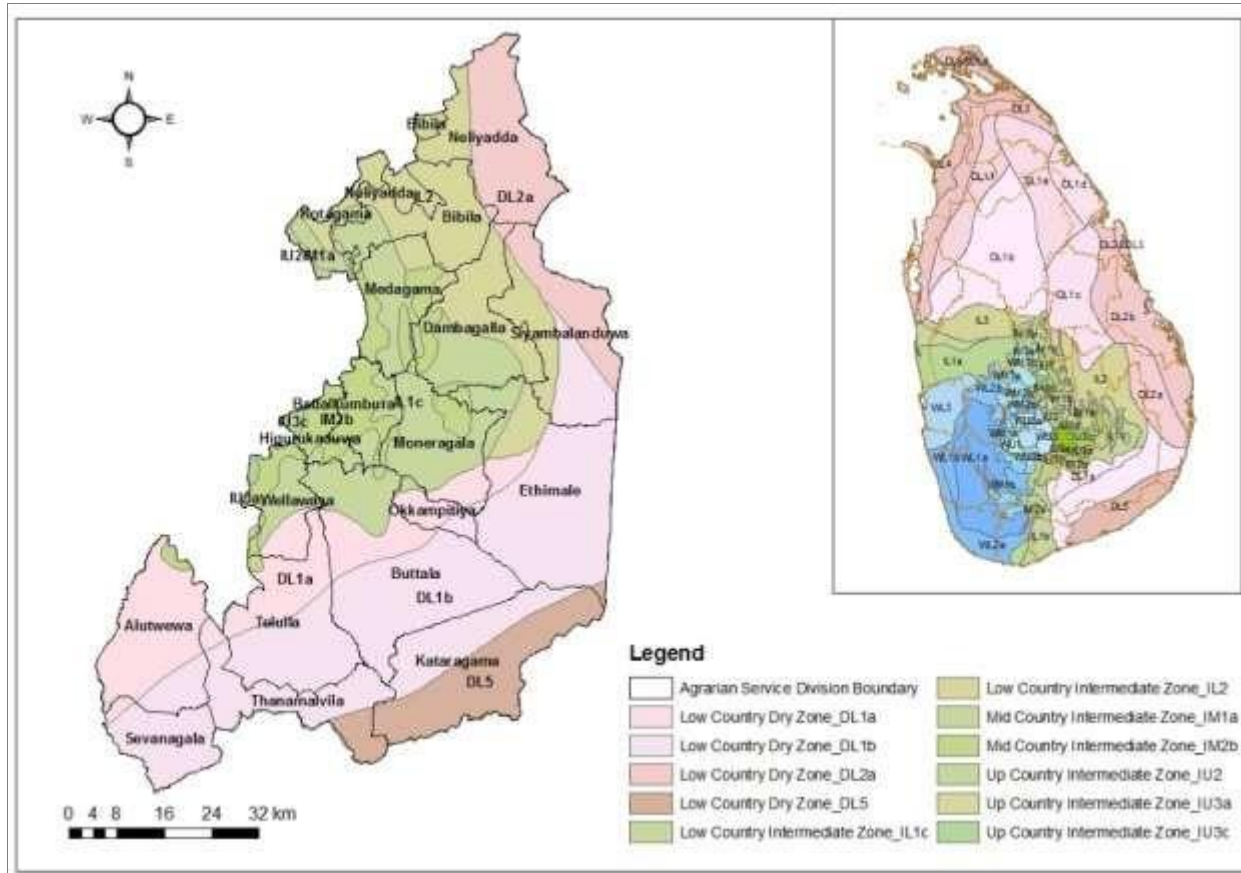
### 2.4.1.2 Climate

With regard to the climate, Monaragala District is considered to as an intermediate and dry climatic region. The significance is that 70% of the District is dry zone where Monaragala mountain ridge characterize of a comparatively wet climate. Monaragala is located mainly in 11 agro ecological zones. According to the zoning data of Department of Agriculture, the area where project interventions proposed lies mainly in three agro-ecological regions of DL1a, DL1b and IL1c. The major characteristics of these agro-ecological regions and the surrounding regions are shown in Figure 2.8 below.

The daily temperature varies very little over the year as the altitude within the vast low country of the district does not exceed 90m. The temperature varies only from 26°C in January to 29°C in June. However, there is a high average annual diurnal temperature range of 8.9°C. The mean annual relative humidity in the district varies from 75 % (day) to 86 % (night).

Total rainfall in the district ranges from 1,300-1,800 mm per year. There are two rainy seasons namely Maha (main) and Yala(minor) which extends from early October to late January and from late March to

late May respectively where over 84% of rain is received during this seven months. The areas of high rainfall receive northeast and south west monsoonal rains. There are also minor but significant regional differences in the amount and distribution of annual rainfall within the Dry Zone and there is thus a regional specification of plant growth. As a common factor in the Dry Zone the district is characterized not only by an uneven average spread of rain over the year but also by very high variability in each month's rainfall from year to year. The physical and human environment of the District is virtually based on this seasonality of the rain.



Agro-Ecological Region Feature	DLa	DL1b	IL1c
75% expectancy of Rainfall (mm)	>1,100	> 900	>1,300
Terrain	Rolling and Undulating	Undulating	Rolling, undulating and flat
Major Soil Groups	Reddish Brown Earth and Low Humic Glay soils	Reddish Brown Earth and Low Humic Glay soils	Reddish Brown Latosolic, Reddish Brown Earth, Low Humic Glay soils & Immature Brown Loam soils
Land Use	Mixed home gardens, Paddy, Forest plantations, Scrub, Sugar cane, Natural forest	Rainfed upland crops, Paddy, Scrub, Mixed home gardens, Forest plantations	Mixed home gardens, Rubber, Paddy, Sugar cane, Export agricultural crops

Source: Department of Agriculture

Figure 2.8 Agro-Ecological Regions in Monaragala District

### 2.4.1.3 Land resources

According to the available information, major component of the land extent consists of dense forest which is 20.6% of the total land, secondly for other crop cultivations which is 18.3% and thirdly open forest consist of 16.3% of a land extent. The details are given in Table 2.33.

Table 2.33 Land used pattern in Monaragala District – 2016

Nature of land	Area (ha)	Percentage (%)
Asweddumized paddy land		
Irrigated	20,637.96	3.6
Rainfed	17,077.82	3.0
Tea	532.00	0.1
Rubber	8,838.87	1.6
Coconut	15,788.00	2.8
Cinnamon	304.20	0.1
Other crops	105,558.76	18.7
Forests		
Dense forests	116,560.00	20.6
Open forests	92,290.70	16.3
Planted forests	5,649.20	1.0
Grass lands/Chena	58,750.70	10.4
Marshes and Mangroves	639.80	0.1
Home gardens	54,026.13	9.5
Reservoirs	24,911.50	4.4
Building	4,397.98	0.8
Sand and Mountain	18,216.90	3.2
Abandoned land	18,296.68	3.2
Other (sacred places, roads,cemetery etc)	3,479.80	0.6
<b>Total</b>	<b>565,930.00</b>	<b>100.00</b>

Source: District Land use Planning Office, Department of Census and Statistics

In Monaragala District, an extent of 37,715.5 hawas used to cultivate paddy in the year 2016. The cultivated extent by irrigation and rainfed is given in Table 2.34 for the DS Division of which the project interventions are proposed and the district as a whole.

Table 2.34 Details of Paddy Cultivation - Extent by Irrigation and Rainfed

Administrative Division	By irrigation		Rainfed - ha	Total - ha
	Major - ha	Minor -ha		
Wallavaya	1,003.1	1,365.2	694.0	3,062.3
Buttala	2,382.3	1,596.1	1,151.0	5,129.4
Monaragala District	9,867.7	10,770.1	17,077.7	37,715.5

Source: Department of Census and Statistics

Soil erosion was identified as a widespread and a serious problem in the district. It is a combined effect of the other environment problems of chena cultivation, encroachment of forest and water resources, deforestation, and mono-cropping of sugar cane and tobacco, environmental sanitation and gem mining

which are caused by human activities. In the mountainous region of the North-Western part of the district, mass movement, gully, and rill erosion have occurred but most widespread type of soil erosion caused by clearing of land and burning the vegetation before the onset of the monsoonal rains annually. Clearing the land within a short period of time and burning the slashed jungle destroys the soil structure and makes it very susceptible to movement of the topsoil as thin sheet with run-off water.

The potential GHGs sources with relevant to the project area include combustion of fossil fuels, agricultural activities such as rice cultivation, ruminant animal rearing and animal waste management, burning of agriculture residues after harvesting and forest fires, land use changes and soil disturbances, changes in woody biomass stocks, application of Nitrogen fertilizers in agricultural land etc.

#### 2.4.1.4 Water resources

There are seven river basins, which drain the Moneragala District. The origin of these rivers are from the West central highlands and flow towards East, Southeast and South. Most of these rivers originate outside the district boundary and strengthen the volume by several tributaries within the district and then flow outside the district to meet the Indian Ocean. The main river drainage through the district is Heda Oya, Kubukkan Oya, Wila Oya, Menik Ganga, Kirindi Oya Malala Oya and Walawe Ganga of which Menik Ganga has the largest river basin in the district with 117,480 ha representing 20.8% of the district's land area having excess water and good soil for lowland cultivations. The second largest is the Kubukkan Oya having a river basin of 112,930 ha while Walawe Ganga is the third largest river in the district. Malala Oya represents the smallest river basin with only 11,400 ha representing 2% of the district's land area. There are also a number of manmade tanks in the district that hold water during the dry season, these include the Senanyake Smaudraya.

Proposed project area comes under the Kirindi Oya basin and Menik Ganga basin and details related to those river basin's characteristics, water use and water management practices are given in Table 2.35.

Table 2.35 Details of Kirindi Oya basin and Menik Ganga basin

	Kirindi Oya	Menik Ganga
<b>Rainfall Runoff Data</b>		
Catchment Area (km <sup>2</sup> )	1,165	1,272
Average Rainfall (mm)	1,455	1,576
Discharge Volume to Sea (MCM)	74	347
<b>Estimated Annual Average Water Availability</b>		
Available Water MCM per Year	675.4	765.4
<b>Average Irrigation Water Use by Basin and Water Balance</b>		
Major Irri. Demand (MCM)	256.68	12.24
Medium Irri. Demand (MCM)	8.04	7.37
Minor Irri. Demand (MCM)	24.88	19.73
Total Irrigation Demand (MCM)	289.60	39.34
Runoff from Rf	560.4	520.8
Balance after meeting Irri. Demand	270.8	481.5
<b>Domestic Water Demand by Basin</b>		
Population Dug Wells	50,511	31,930

Population Pipe Supply	57,230	35,120
Dug well Extraction – MCM/month	0.076	0.048
Pipe supply MCM/month	0.206	0.126

#### 2.4.1.5 Forest cover and biodiversity

Mainly two floristic regions are represented in Monaragala District namely, Floristic Region 2: Dry and arid lowlands (Mixed Community (Chloxydon-Vitex-Benya-Schleichera series); Tropical thorn forests (Manilkara-Chloroxydon-Salvadora-Randia Series); Damana and Villu grasslands; Flood Plain wetlands; Riverine and gallery forests); and Floristic Region 4: Eastern intermediate lowlands (Tropical moist semi- evergreen forests and Savanna forest.

Out of total land area of 576,763 ha in Monaragala District, 104,089.7 ha is covered by dry monsoon forests, while 57,579.8 ha and 56,769 ha are under sparse forests and moist monsoon forests, according to forest cover assessment of the Forest Department in 1999 (Forest Department, 2016). The coverage under forests is 220,208.7 ha (38.2%) of total land area. In addition to these, SubMontane Forest, Lowland Rain Forest and Riverine Dry Forest also contribute the land covered by forests.

Wildlife protected areas are managed by DWC under the Flora and Fauna Protection Ordinance (FFPO). There are 10 wildlife protected areas in Monaragala District under 3 different conservation statuses namely; National Parks, Nature Reserves and Sanctuaries (Figure 2.9).

Table 2.36 Protected Wildlife Areas within Monaragala District

Protected Wildlife Area	Date declared	Extent (ha)
<b>National Parks</b>		
Ruhuna (Yala) NP (part)	1938.02.25	97,881.00
Gal Oya (part)	1954.02.12	25,900.00
Udawalawa (part)	1972.06.30	30,821.00
Lunugamwehera	1995.12.08	23,499.00
.Kumana(Yala-East) (part)	2006.07.05	35,665.00
<b>Nature Reserves</b>		
Vetahirakanda	2002.06.07	3,229.00
<b>Sanctuaries</b>		
Kataragama	1938.05.27	838.00
Senanayakasamudraya (part)	1954.02.12	9,324.00
Galoya South West (part)	1954.02.12	15,281.00
Dahaiyagala	2002.06.07	2,685.00

Source: DWC

With regard to impacts of human-elephant conflict, over a thousand elephants are present in the south. Elephant herds and males can easily be observed at all times of the day and year in the Udawalawe National Park. Research based on individual identification estimated a population of 804-1160 elephants in the Udawalawe National Park at a density of 1.02-1.16 elephants/km<sup>2</sup> (de Silva et al. 2011). Other national parks (NP) in the area such as Yala and Lunugamwehera also hold elephants. Based on individual identification, around 200 elephants use Yala Block I (Fernando). However, their home ranges are not limited to Block I but extend over adjacent areas. Based on individual identification and demographic

assessment (Fernando et al.), there are over 400 elephants in the Mattala area south of the Udawalawe NP which is contiguous with the Bundala NP and Wilmanne Sanctuary. Those elephants live mainly outside any protected area. The Mattala area has been identified as a 'Managed Elephant Range' where elephants will continue to remain and its implementation will be a landmark for elephant management in Sri Lanka (Fernando et al). Data pertaining to the elephant deaths, human deaths, injuries due to elephant attacks and property damages in Uva Wildlife Region are illustrated in the Table 2.37.





According to the DWC records in 2016, Elephant Deaths in Uva region were caused by Gun Shot – 02, Hakka Patas – 01, Accident – 02, Natural – 01, other causes – 01 and unknown causes – 07.

Table 2.37 Incidents Recorded in Uva Wildlife Regions from 2012-2016

Incident	2012	2013	2014	2015	2016	Total
Elephant Deaths	18	22	16	13	14	83
Number of Human Deaths due to Elephant Attacks	01	02	04	02	04	13
Number of Human Physical Damages	02	09	08	03	02	24
Annual Number of Property Damages	26*	157	168	102	96	54

\*Yala/Bundala – 5

#### 2.4.1.6 Physical cultural resources

Before the colonial reign of British Government, Monaragala District was known as Wellassa which has had an era of highly developed agriculture. The Monaragala District is enriched with historically valued places of which many are stupas, caves and ruins. Locations of the archeological sites of the district is given in Figure 2.9.

### 2.4.2 Socio-economic environment of proposed project locations

#### 2.4.2.1 District's social profile

Out of the 25 Districts in Sri Lanka, Monaragala District is the second largest district having a total area of 5,659.3 km<sup>2</sup>. Monaragala District is spread over 67% of the Uva Province. The District is managed by the District Secretariat. There are 3 registered electoral divisions and the administrative structure of the specific project location and the district as a whole is given in table D.6 below;

Table 2.38 Administrative Divisions within the Monaragala District

DS Division	Grama Niladari Divisions (GNDs)	Villages	No of Agrarian Service Centers	Pradeshiya Sabhas (PS)
Buttala	29	134	2	1
Wellawaya	29	147	2	1
TOTAL MONARAGALA DISTRICT	319	1,330	18	10

Source: District Statistical Branch

The total population of Monaragala District is 479,000 of which based on the 2016 data, 49.67% of the population is male and 50.33% females having a sex ratio of 99. The population density of the district is 85 per km<sup>2</sup>. According to the Department of Census and Statistics of Sri Lanka, ethnicity wise, 94.9% of the total population of the Monaragala district is Sinhalese and secondly Sri Lankan Moor being 2.1% and Sri Lankan Tamil 1.8%. From the total population 98.15% is classified under rural population and 1.85% as estate population.

22.67% of the total population of Monaragala District is from the DS Divisions of the specific project area and the details of the population distribution based on sex is given in Table 2.39 below;

Table 2.39 Population Details

DS Division	Male	Female	Total	Sex Ratio	Ares km <sup>2</sup>	Population Density
Buttala	28,386 – 11.9%	27,986 – 11.6%	56,372	101	685.2	82
Wellawaya	31,864 – 13.4%	31,917 – 13.2%	63,781	100	597.9	107
TOTAL MONARAGALA DISTRICT	238,055 – 100%	240,945 – 100%	479,000	99	5,659.3	85

Source: Department of Census and Statistics

According to the available information, ethnicity wise, majority of the population in the DS divisions of the relevant project areas are Sinhalese and secondly Sri Lankan Moor and religiously majority is Buddhist and secondly Islam. The age wise distribution of the population of the specific project location and the district as a whole is given in Table 2.40 below which illustrates that the majority of the population comes under the 1-19 age category.

Table 2.40 Age wise distribution of the population

DS Division	Total Population	1-19	20-29	30-39	40-49	50-59	60≤
Buttala	56,372	19,421	9,618	8,658	7,675	6,211	4,789
Wellawaya	63,781	22,351	10,653	10,199	8,069	6,854	5,655
TOTAL MONARAGALA DISTRICT	479,000	168,947	77,738	74,453	62,207	51,421	44,234

Source: Department of Census and Statistics

## 2.5 Puttalam District

### Project Area Details

DSD Name	ASC Name (ASC No)	River Basin Name	Sub-watershed Name
Karuwalagaswewa	Tabbowa	Mi Oya (River Basin No 95)	Tabbowa
Nawagaththegama	Nawagaththegama	Kala Oya (River Basin No 93)	Lower Middle Kala Oya
	Puliyankulama Upper		

### 2.5.1 Bio-physical environment of proposed project locations

#### 2.5.1.1 Location and geography

Puttalam District is a coastal strip of land of which the height is below 300 m from the sea level. The administrative district of Puttalam is situated in the North-Western province of Sri Lanka and surrounded on the North by Kal aru Bordering Mannar district, East by Kurunegala and Anurdhapura Districts, and South by 'Ma Oya' bordering Gampaha District and West by Indian Ocean.

The length of the District is 120 km and the width is 50 km. This district consists of a coastal area of 288 km and the total area including internal water bodies of 3,072 km<sup>2</sup>. Puttalam District which is a part of coconut triangle makes its contribution to the Sri Lanka economy exporting coconut related by products.

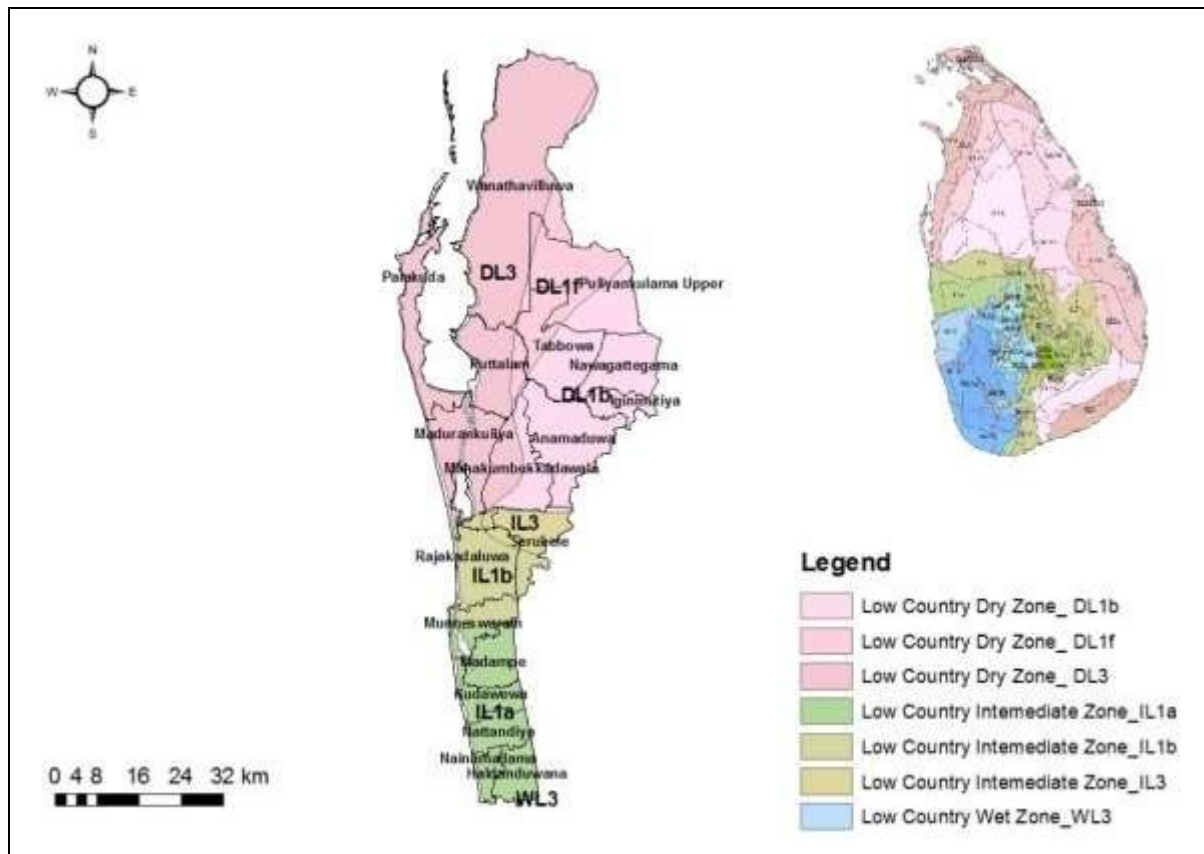
The historical irrigation system of the district has caused to determine the paddy cultivation as the main livelihood of the people.

Famous for salt and fishing, Puttalam is the home to one of Sri Lanka’s largest lagoons, also called Puttalam lagoon. Apart from salt and fishing, the main income from agriculture and trading. Many people own coconut estates in the areas surrounding the town. Aquaculture is an attractive investment opportunity for both people within and outside Puttalam. One of country’s main cement plant is located in Puttalam.

Deduru Oya, Mee Oya, Battulu Oya and Rathambala Oya, which flow through the district, have contributed immensely for the prosperity of the district in various means.

### 2.5.1.2 Climate

There are three identifiable climate zones in the district. These are wet zone within Ma Oya and Deduru Oya, an intermediate zone bordering from Deduru Oya to south of the Puttalam Lagoon. Northern part of the district including Kalpitiya Peninsular belongs to the dry zone. Puttalam District is located in 07 agro ecological zones. However, the project area lies mainly in two of Dry Zone Low Country agro- ecological regions of DL1b and DL1f.



Agro-Ecological Region	DL1b	DL1f
Feature		
75% expectancy of Rainfall (mm)	> 900	> 800

Terrain	Undulating	Undulating
Major Soil Groups	Reddish Brown Earth and Low Humic Clay soils	Reddish Brown Earth, Low Humic Gley & Grumusol soils
Land Use	Rainfed upland crops, Paddy, Scrub, Mixed home gardens, Forest plantations	Rainfed upland crops, Paddy, Scrub, Natural forests

Figure 2.10 Agro-Ecological Regions in Puttalam District

According to the Department of Meteorology, for the year 2015, the average maximum temperature was recorded as 31.82<sup>o</sup>c and the average minimum as 25.4<sup>o</sup>C. The relative humidity ranges from 57-82 during day and 84-96 during night.

The annual rainfall for the year 2015 was 1,664.3mm, where the maximum and minimum rainfall was 416mm in November and minimum rainfall was 0.5mm in July.

### 2.5.1.3 Land resources

According to the available information, major component of the land extent is used as other (sacred places, roads, cemetery, etc.) which is 20.2% of the total, secondly for coconut cultivation which is 17.9% and thirdly as home gardens of 17.6%. The details are given in Table 2.41.

Table 2.41 Land used pattern in Anuradhapura District – 2016

Nature of land	Area (ha)	Percentage (%)
Asweddumized paddy land		
Irrigated	25,750.1	8.4
Rainfed	2,802.0	0.9
Tea		
Rubber	5.1	0.0
Coconut	54,978.9	17.9
Cinnamon		
Other crops	11,843.3	3.9
Forests		
Dense forests	5,165.7	1.7
Open forests	26,973.5	8.8
Planted forests	4,020.3	1.3
Grass lands/Chena	29,687.6	9.7
Marshes and Mangroves	5,966.2	1.9
Home gardens	54,214.9	17.6
Reservoirs	14,857.3	4.8
Building	3,996.3	1.3
Sand and Mountain	4,021.4	1.3
Abandoned land	734.5	0.2
Other (sacred places, roads, cemetery etc)	62,182.9	20.2
<b>Total</b>	<b>307,200.0</b>	<b>100.0</b>

Source: District Land use Planning Office, Department of Census and Statistics

From the total area of 307,200 ha of Puttalam District, 95.16% is land area and the rest of 4.84% consists of internal reservoirs. 48.70% is cultivated extent which is 149,594 ha, 39.53% of extent is not cultivated which is 121,446 ha and 36,159 ha which is 11.77% consists of forests. The details are given in Table 2.42 below.

Table 2.42 Extents cultivated and abandoned lands in Anuradhapura District

Nature of land	Extent (ha)	%
Land area	292,343	95.16
Internal reservoirs	14,857	4.84
Total	307,200	100.00
Total extent of cultivated land	149,594	48.70
Total extent of not cultivated land	121,446	39.53
Total extent of forest	36,159	11.77
Total	307,200	100.00

Source: District Statistical Branch

The cultivated extent of paddy cultivation as per 2015 statistic, was seen in a limited land area of 23,041.62 ha. The cultivated extent by irrigation and rainfed is given in Table 2.43 for the DS division of which the specific project location exists and the district as a whole.

Table 2.43 Details of paddy cultivation - extent by irrigation and rainfed

DSDivision	By irrigation		Rainfed - ha	Total - ha
	Major - ha	Minor - ha		
Karuwalagaswewa	1,676.28	1924.20	134.54	3,735.03
Nawagaththegama	1,326.99	1,284.90	132.74	2,744.64
TOTAL PUTTLAM DISTRICT	8,183.88	12,056.05	2,801.70	23,041.62

Source: District Statistical Branch

As per the statistics of the District Statistical Branch, there are many seasonal crops cultivated during the Maha and Yala seasons of which red onion is considered as the crop which has used the majority of the land during 2014/2015 Maha season – 702,61 ha to cultivate which had a yield of 14,676,812 MT and 2015 Yala season the district had a yield of 10,627,625 MT by cultivating in an area of 610.35. Land use wise secondly peanut was cultivated during the 2014/2015 Maha season and long beans in 2015 Yala season in 696.6 ha and 451.45 ha yielding 1,433,085 MT and 4,537,467 MT respectively. The other seasonal crops are manioc, green gram capsicum, brinjal, etc.

With respect of highland crops, for the year 2015, a land extent of 6,947 ha was used for cashew cultivation where plantain was cultivated by using 2,122.03 ha. The major highland crop cultivated in the Karuwalagaswewa and Nawagaththegama was coconut which is 1,369.96 ha and 1,827.56 respectively.

In Puttalam District, there are 16 reservoirs which has contributed to a more than 200 acres asweddumized extent. In Karuwalagaswewa DS Division, there are two reservoirs namely Thabbowa and Pahariya and two reservoirs in Nawagaththegama DS Division namely Inginimitiya and Maha Andarawewa. The details of these reservoirs are given in Table 2.44.

Table 2.44 Main agricultural reservoirs more than 200 acres of cultivated land

Reservoir	Capacity Acre Feet	Catchment are Acres	Surface area Acres
Thabbowa	12,400	150	1,620
Pahariya	1,800	144.5	247
Inginimitiya	58,883	150	4,550
Maha Andarawewa	1,815	4.5	308

Source: Divisional Irrigation Engineer's Office - Puttalam

With respect to the project areas, soil erosion can be considered a threat to agricultural production in the rainfed farming areas. Sedimentation is also taking place in small village tanks. Depletion of soil fertility leads to loss of productivity of agricultural lands. A significant extent of agricultural land has become marginal or uneconomic and are put to only limited use. The quality of the forests has also been declined due mainly to shifting cultivation, illicit felling of trees and encroachments.

Puttalam cement factory and Norachchulai coal power plant are the major GHG emission sources within Puttalam district. The potential GHGs sources with relevant to the project area include agricultural activities such as rice cultivation, ruminant animal rearing and animal waste management, burning of agriculture residues after harvesting and forest fires, land use changes and soil disturbances, changes in woody biomass stocks, application of Nitrogen fertilizers in agricultural land etc.

#### 2.5.1.4 Water resources

Water use and Water management practices. Proposed project area comes under the Mi Oya basin and Kala Oya basin and details related to these river basin characteristics, water use and water management practices are given in Table 2.45.

Table 2.45: Details of Mi Oya basin and Kala Oya basin

	Mi Oya Basin	Kala Oya Basin
Rainfall Runoff Data		
Catchment Area (km <sup>2</sup> )	1,516	2,772
Average Rainfall (mm)	1,250	1,367
Discharge Volume to Sea (MCM)	40	386
Estimated Annual Average Water Availability		
Available Water MCM per Year	739.2	1,340
Average Irrigation Water Use by Basin and Water Balance		
Major Irri. Demand (MCM)	112.44	
Medium Irri. Demand (MCM)	16.55	40.08
Minor Irri. Demand (MCM)	108.51	171.46
Total Irrigation Demand (MCM)	237.50	211.55
Runoff from Rf	662.0	748.8
Balance after meeting Irri. Demand	424.5	256.7
Domestic Water Demand by Basin		
Population Dug Wells	-	286,503
Population Pipe Supply	-	117,496

Dug well Extraction – MCM/month	-	0.430
Pipe supply MCM/month	-	0.423

A pilot study conducted by Water Resources Board in Vanathavillu and Kalpitiya DSD's in Puttalam District, has identified a threat on groundwater due to excessive application of fertilizers. This was confirmed by the high levels of NO<sub>3</sub> and PO in groundwater of Kaltpitiya area. In most of groundwater sources of the Vanathavillu area were encountered with high PO<sub>4</sub> contamination which exceeded the maximum permissible level of drinking water standards.

### 2.5.1.5 Forest cover and biodiversity

Puttalam District belongs to 3 floristic regions viz Floristic Region 1: Coastal and marine belt (Marine mangroves, Salt marsh and dunes and Stand vegetation); Floristic Region 2: Dry and arid lowlands (Tropical dry mixed evergreen forests (Manilkara community); Mixed Community (Chloxyton-Vitex- Benya-Schleichera series); Tropical thorn forests (Manilkara-Chloroxyton-Salvadora-Randia Series); Damana and Villu grasslands; Flood Plain wetlands; Riverine and gallery forests); and Floristic Region 3: Northern intermediate lowlands (Tropical moist semi-evergreen forests (Filicium-Euphorbia-Artocarpus- Myristica series).

Out of total land area of 315,485ha in Puttalam District, 66,615.1 ha and 17,545.6 ha are covered by dry monsoon forests and sparse forests, while 2337.5 ha and 129.4 ha are under mangrove and riverine dry forests, according to forest cover assessment of the Forest Department in 1999 (Forest Department, 2016). The coverage under forests is 86627.6 ha (27.5%) of total land area. In addition to these, forest plantations and coconut lands also contribute the land covered by vegetation.

Wildlife protected areas are managed by DWC under the Flora and Fauna Protection Ordinance (FFPO). There are 02 Sanctuaries located within Puttalam District (Figure 2.11).

Table 2.46 Protected Wildlife Areas within Puttalam District

Protected Wildlife Area	Date declared	Extent (ha)
<b>National Parks</b>		
Wilpattu (Part)	1938.02.25	131667.00
<b>Sanctuaries</b>		
Bar Reef island	1992.04.03	30670.00
Anawilundawa	1997.06.11	1397.00
Tabbowa	2002.07.19	2193.00

Source: DWC

When impacts of human-elephant conflict is considered, there are over a thousand elephants largely outside protected areas dispersed throughout the landscape occupying the same space as humans. Crops are raided regularly and probably constitute a significant part of the diet of most adult males and some herds. Herds with more than 100 elephants can be observed at some reservoirs in the dry season. The north-western region is among the areas having highest levels of HEC in Sri Lanka. With continued conflict, elephants appear to become more accustomed to it, tolerate higher levels of conflict and to raid crops even more frequently and aggressively.

Regarding the HEC, data pertaining to the elephant deaths, human deaths, injuries due to elephant attacks and property damages in North-Western Wildlife Region are illustrated in the Table 2.47.

According to the DWC records in 2016, Elephant Deaths in North-Western region were caused by Gun Shot – 05, Electrification – 05, Poisoned – 02, Hakka Patas – 01, Accident – 02 and unknown causes – 01.





Table 2.47 Incidents Recorded in North-Western Wildlife Regions from 2012-2016

Incident	2012	2013	2014	2015	2016	Total
Elephant Deaths	63	18	15	15	16	127
Number of Human Deaths due to Elephant Attacks	18	25	07	12	06	68
Number of Human Physical Damages	27	12	11	09	00	59
Annual Number of Property Damages	269	113	161	234	191	968

### 2.5.1.6 Physical cultural resources

It was “Thambapanni” in Puttalam district where the first Sinhalese’s king Vijaya firstly set his foot. It is here the longest stone inscription of Sri Lanka also found out. Some fossils of human who lived B.C 2000 have also been found out in the Ponparippu area at Wanathawilluwa D.S Division in Puttalam District. The Munneswaram Temple, situated in Chilaw D.S. Division is the sacred place for both Hindus and Buddhists. The St. Anne’s. Thalawila church, the sacred place of Catholics is also situated in Kalpity D.S division in the district of Puttalam.

## 2.5.2 Socio-economic environment of proposed project locations

### 2.5.2.1 District’s social profile

Puttalam District administered by the District Secretariat headed by the District Secretary appointed by the central government of Sri Lanka. It has 18 local authorities of which two are Urban Councils. Also, it consists of 16 DS Divisions. The administrative structure of the specific project location and the district as a whole is given in Table 2.48 below;

Table 2.48 Administrative Divisions within Puttalam District

DS Division	Grama Niladari Divisions (GNDs)	Villages	No of Agrarian Service Centers	Local Authorities
Karuwalagaswewa	26	67	2	1
Nawagaththegama	19	75	2	1
TOTAL PUTTALAM DISTRICT	548	1,273	18	10

Source: District Statistical Branch

The total population of Puttalam District is 790,000 of which based on the 2015 data, 48.39% of the population is male and 51.61% females having a sex ratio of 93.78. The population density of the district is 2.57 per km<sup>2</sup>. From the total population, 8.77% is classified under urban population, 91.00% a rural population and .21% as estate population is recorded.

4.97% of the total population in Puttalam District is from the Karuwalagaswewa and Nawagaththegama DS Divisions where the project interventions are proposed and details of the population distribution based on sex is given in Table 2.49 below;

Table 2.49 Population Details

DS Division	Male	Female	Total	Sex Ratio	Ares km <sup>2</sup>	Population Density
Karuwalagaswewa	12,196 – 3.19%	12,093 – 2.97%	24,289	3100.86	49,040	0.50
Nawagathhegama	7,389 – 1.93%	7,618 – 1.87%	15,007	96.99	16,700	0.90
TOTAL PUTTALAM DISTRICT	382,330 – 100%	407,670 – 100%	790,000	93.78	307,200	2.57

Source: Department of Census and Statistics

The age wise distribution of the population of the specific project location and the district as a whole is given in table xx below which illustrates that the majority of the population comes under the 1-19 age category.

Table 2.50 Age wise distribution of the population

DSDivision	Total Population	1-19	20-29	30-39	40-49		50-59	60≤
Karuwalagaswewa	24,289	8,382	3,955	3,898	3,075		2,644	2,335
Nawagathhegama	15,007	5,038	2,381	2,405	1,986		1,784	1,413
TOTAL PUTTALAM DISTRICT	790,000	285,672	123,074	121,062	97,017		80,680	82,484

Source: Department of Census and Statistics

### 2.5.2.2 Economic status of the irrigated farming communities

According to the Annual Labour Force Survey Report of 2016, Puttalam District from the labour force, 24.6% is engaged in the agricultural sector, 28.5% in industry sector and 47.0% in the service sector. The details of the employed population are given in Table 2.51.

Table 2.51 Details of the Employed Population

DSDivision	Total		Male		Female	
	Number	Percentage	Number	Percentage	Number	Percentage
Agricultural sector	75,392	24.6	47,649	23.3	27,743	27.1
Industry sector	87,434	28.5	61,775	30.2	25,658	25.1
Service sector	144,229	47.0	95,371	46.6	48,858	47.8
Total	307,054	100.0	204,795	100.0	102,259	100.0

Source: Annual Labour Force Survey Reports, 2016

## 2.6 Trincomalee District

### Project Area Details

DS Division	ASC Name (ASC No)	River Basin Name	Sub-watershed Name
Gomarankadawala	Gomarankadawala	Yan Oya	Lower Middle Yan Oya
Morawewa	Morawewa	(River Basin No 67)	Lower Yan Oya

Kuchchaveli	Kuchchaveli	
Padavi Sripura	Padavi sripura	

## 2.6.1 Bio-physical environment of proposed project locations

### 2.6.1.1 Location and geography

Trincomalee District which is situated in the Eastern part of Sri Lanka, is an area enriched with places with natural beauty. Further, it has an ancient history and a natural harbor. This district makes enough opportunities for economic affairs in agricultural, fisheries and commercial aspects. It is bounded North by Mulathivu District, West by Anuradhapura District, South by Batticaloa and Polonnaruwa Districts.

The District is spread over 2,728.8 km<sup>2</sup>. It consists of 230 Grama Niladhari Divisions and 11 Divisional Secretary's Division. Main livelihoods of the area are agriculture and fisheries industry and paddy is main agricultural crop.

Some of the main tanks of the area are Kanthale Tank, Wenrasa Wewa, Morawewa, Mahadivulwewa and Paravikulam. Further, there are three major irrigation projects such as Kanthale, Allakanthale and Morawewa. Animal husbandry and livestock management are some other important livelihoods. Trincomalee is considered as a place with strategic value. Due to that reason as well as the natural harbor, the world-famous companies such as Prima Sri Lanka and Tokyo Cement have established their distribution centers in Trincomalee city.

### 2.6.1.2 Climate

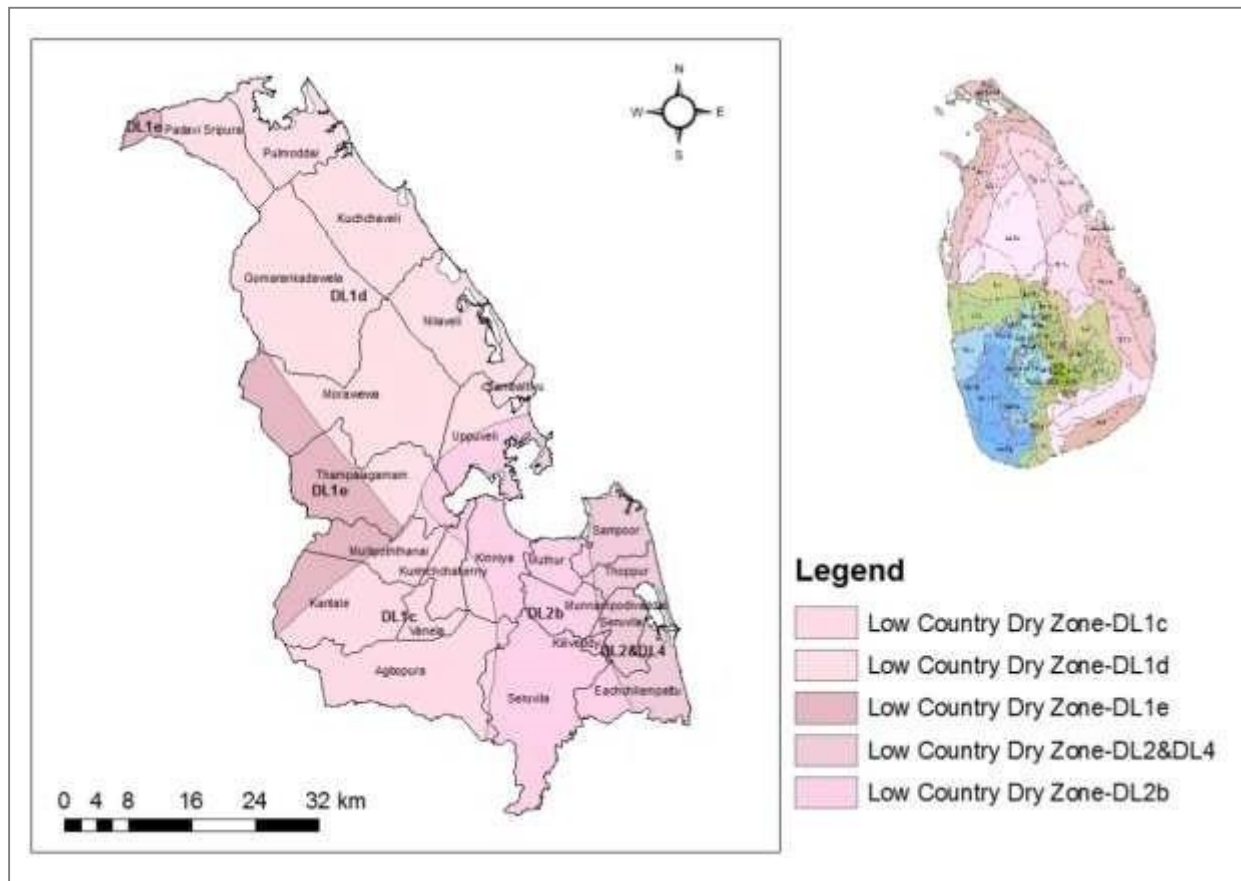
Trincomalee District is geographically located in 5 agro ecological zones of Dry Zone Low Country. According to the zoning data of Department of Agriculture, the project area lies mainly in agro-ecological region of DL1d. The major characteristics of the agro-ecological region and the surrounding regions are shown in Figure 2.12 below.

Trincomalee District is located in the east of Sri Lanka in the Eastern. The annual rainfall in year 2016 was 2,030.3mm where the maximum rainfall was recorded in November as 647.7mm and minimum in July as 9.5mm. The maximum temperature was recorded as 35.9<sup>o</sup>c in August 2016 and minimum as 23.4<sup>o</sup>C in February 2016 according to the Department of Meteorology. The relative humidity ranges from 57-85 during day and 73-95 during night.

### 2.6.1.3. Land resources

According to the available information, major component of the land extent consists of dense forest which is 23.7% of the total and secondly is used for other crop cultivations which is 18.3% and thirdly for aswedumized paddy land which is 12.6%. The details are given in Table 2.52.

From the total area of 272,700 ha of Trincomalee District, 92.8% is land area and the rest of 7.2% consists of internal reservoirs. 43.7% is cultivated extent which is 119,200 ha, 26.3% of extent is not cultivated which is 71,790ha and 81,710ha which is 30% of the land consists of forests. The details are given in Table 2.53.



<b>Agro-Ecological Region Feature</b>	<b>DL1d</b>
75% expectancy of Rainfall (mm)	>900
Terrain	Undulating and flat
Major Soil Groups	Reddish Brown Earth, Regosol & Low Humic Gley soils
Land Use	Rainfed upland crops, Scrub, Paddy

Source: Department of Agriculture

Figure 2.12 Agro-Ecological Regions in Trincomalee District

Table 2.52 Land used pattern in Trincomalee District – 2015

Nature of land	Area (ha)	Percentage (%)
Asweddumized paddy land		
Irrigated	27,045.02	9.9
Rainfed	9,121.54	3.3
Tea	-	-
Rubber	-	-
Coconut	2,420	0.9
Cinnamon	-	-
Other crops	49,832.44	18.3
Forests		
Dense forests	64,530	23.7
Open forests	16,310	6.0

Planted forests	870	0.3
Grass lands/Chena	33,490	12.3
Marshes and Mangroves	15,570	5.7
Home gardens	18,830	6.9
Reservoirs	19,760	7.2
Building	1,230	0.5
Sand and Mountain	-	-
Abandoned land	11,951	4.4
Other (sacred places, roads, cemetery etc)	1,740	0.6
<b>Total</b>	<b>272,700</b>	<b>100.00</b>

*Source: District Land use Planning Office, Department of Census and Statistics*

Table 2.53 Extents cultivated and abandoned lands in Trincomalee District

Nature of land	Extent (ha)	%
Land area	252,940	92.8
Internal reservoirs	19,760	7.2
<b>Total</b>	<b>272,700</b>	<b>100.00</b>
Total extent of cultivated land	119,200	43.7
Total extent of not cultivated land	71,790	26.3
Total extent of forest	81,710	30.0
<b>Total</b>	<b>272,700</b>	<b>100.00</b>

*Source: District Statistical Branch*

The cultivated extent by irrigation and rainfed is given in Table 2.54 for the DS division of which the specific project areas exist and the district as a whole.

Table 2.54 Details of Paddy Cultivation - extent by Irrigation and Rainfed

DS Division	By irrigation		Rainfed - ha	Total - ha
	Major - ha	Minor - ha		
Gomarankadawala	617.2	1,723.1	103.6	2,443.8
Marawewa	2,609.7	625.5	127.9	3,363.0
Kuchchaweli	593.7	2,012.3	1,063.5	3,669.6
Padavisiripura	1,995.4	866.2	902.0	3,763.6
<b>TOTAL TRINCOMALEE DISTRICT</b>	<b>18,328.9</b>	<b>8,039.2</b>	<b>7,751.7</b>	<b>34,119.8</b>

*Source: Department of Census and Statistics*

As per the statistics of the District Statistical Branch, there are many seasonal crops cultivated during the Maha and Yala seasons of which maize is considered as the crop which has used the majority of the land during 2014/2015 Maha season – 404.9 ha to cultivate which had a yield of 97,615 MT and during 2015 Yala season the manioc had a yield of 2,204,500 MT by cultivating in an area of 198.8 ha. Land use wise secondly manioc was cultivated during the 2014/2015 Maha season and peanut in 2015 Yala season in 285.3 ha and 115.4 ha yielding 4,214,325 MT and 211,100 MT respectively. The other seasonal crops are green chillies, red onion, brinjal, green gram, ash plantain, brinjal, etc.

With respect of highland crops plantain was cultivated in 264.8 ha and mango in 244 ha. In Gomarankadawala and Kuchchaweli DS Division the major highland crops are plantain and papaw, where in Morawewa DS Division plantain and mango is recorded to have used majority of the land. Mango and cashew was cultivated as the main highland of Padavisiripura DS Division during the year 2015.

In Trincomalee District, there are 8 reservoirs which has contributed to a more than 200 acres asweddumized extent. In Morawewa DS Division, there are two reservoirs namely Morawewa and Mahadaivulwewa tank and in Padavisiripura DS Division, there is one reservoir namely Yan oya tank. The details of these three reservoirs are given in Table 2.55.

Table 2.55 Main agricultural reservoirs in District – 2015

Reservoir	Capacity Acre Feet	Catchment are Acres	Surface area Acres
Morawewa tnk	38.13	94.54	1,635.39
Mahadaivulwewa tank	20.17	139.86	562.53
Yan oya tank	-	1,497.02	588.84

Source: District Statistical Branch

#### 2.6.1.4 Water resources

Kanthale Tank, Wenrasa Wewa, Morawewa, Mahadivulwewa and Paravikulam are located in Trincomalee district. Further, there are three major irrigation projects such as Kanthale, Allakanthale and Morawewa.

Proposed project area comes under the Yan Oya basin and details related to the river basin's characteristics, water use and water management practices are given in Table 2.56.

Table 2.56 Details of Yan Oya Basin

Rainfall Runoff Data	
Catchment Area (km <sup>2</sup> )	1,520
Average Rainfall (mm)	1,500
Discharge Volume to Sea (MCM)	132
Estimated Annual Average Water Availability	
Available Water MCM per Year	562.7
Average Irrigation Water Use by Basin and Water Balance	
Major Irri. Demand (MCM)	68.52
Medium Irri. Demand (MCM)	28.74
Minor Irri. Demand (MCM)	94.09
Total Irrigation Demand (MCM)	191.36
Runoff from Rf	469.1
Balance after meeting Irri. Demand	277.7
Domestic Water Demand by Basin	
Population Dug Wells	73,131
Population Pipe Supply	38,180

Dug well Extraction – MCM/month	0.110
Pipe supply MCM/month	0.137

According to the Irrigation Department, there were instances where dry weather conditions have caused an increased salinity levels of rivers including the Mahaweli due to increased inflow of sea water. In some occasions, sea water had reached about 07 kilometres inland, through the Mahaweli River. The gates of the Verugal Aru anicut had been opened and fresh water was released into the Mahaweli River to control the salinity intrusion.

### 2.6.1.5 Forest cover and biodiversity

Out of total land area of 267,991 ha in Trincomalee District, 108,710.0 ha is covered by Dry Monsoon Forest, while 14,446.7 ha and 1,823.7 ha are under sparse forests and riverine dry forests according to forest cover assessment of the Forest Department in 1999 (Forest Department, 2016). The coverage under forests is 126,746.0 ha (47.3%) of total land area.

Wildlife protected areas are managed by DWC under the Flora and Fauna Protection Ordinance (FFPO). There are 8 wildlife protected areas in Trincomalee District under 3 different conservation statuses namely; National Parks, Nature Reserves and Sanctuary (Table 2.57).

Table 2.57 Protected Wildlife Areas within Trincomalee District

Protected Wildlife Area	Date declared	Extent (ha)
<b>National Parks</b>		
Somawathiya (part)	1986.09.02	37646.00
Pigeon Island	2003.06.04	471.00
<b>Nature Reserves</b>		
Trikonamadu (part)	1986.10.24	25019.00
<b>Sanctuaries</b>		
Kokkilai (part)	1951.05.18	1995.00
Navel Headworks	2009.07.13	16896.69
Great Sober Island & Little Sober Island	1963.06.21	65.00
Little Sober Island	1963.06.21	7.00
Seruwila Allei	1970.10.09	15540.00

Source: DWC

With regard to impacts of human-elephant conflict, over a thousand elephants are found in the east. The majority are outside national parks. As a result of the armed conflict that took place in the area over the past three decades, many villages and cultivation areas were abandoned and became excellent elephant habitat. The post-war resettlement of people in the east is likely to result in a new area of high HEC (Fernando et al).

Regarding the HEC, data pertaining to the elephant deaths, human deaths, injuries due to elephant attacks and property damages in Trincomalee Wildlife Region are illustrated in the following Table 2.58.

Table 2.58 Incidents Recorded in Trincomalee Wildlife Regions from 2012-2016

Incident	2012	2013	2014	2015	2016	Total
Elephant Deaths	-	-	-	22	30	53
Number of Human Deaths due to	-	-	-	04	04	08



Elephant Attacks						
Number of Human Physical Damages	-	-	01	02	-	03
Annual Number of Property Damages	-	-	-	19	42	61

According to the DWC records in 2016, Elephant Deaths in Trincomalee region were caused by Gun Shot –02, Electrification –01, Poisoned –0, Hakka Patas –09, Accident –01, Natural –0, other causes –04 and unknown causes – 13.



### 2.6.1.6 Physical cultural resources

Trincomalee Fort is a fort built by the Portuguese, completed in 1624 AD, built on Swami Rock-Konamamalai from the debris of the world famous ancient Hindu Koneswaram temple (Temple of a Thousand Pillars). Seruwawila Mangala Raja Maha Vihara is an ancient Buddhist temple located in Trincomalee district, which is among the sixteen or seventeen holiest Buddhist shrines (Solosmasthanas) in Sri Lanka.

## 2.6.2 Socio-economic environment of proposed project locations

### 2.6.2.1 District's social profile

Trincomalee District consists of 11 DS Divisions. It has 21 local authorities of which two are urban councils. It is about 4.1% of the total land area of the country and is spread over 27.3% of the Eastern Province. The administrative structure of the project location and the district as a whole is given in Table below.

Table 2.59 Administrative Structure by DS Division – 2015

DS Division	Grama Niladari Divisions (GNDs)	Villages	No of Agrarian Service Centers	Local Authorities
Gomarankadawala	10	50	1	1
Morawewa	10	39	1	1
Kuchchaweli	24	78	3	1
Padavisiripura	10	29	1	1
TOTAL TRINCOMALEE DISTRICT	230	658	22	21

Source: District Statistical Branch, Trincomalee

The total population of Trincomalee District is 397,000 of which based on the 2015 data, 49.39% of the population is male and 50.61% females having a sex ratio of 98. The population density of the district is 20.827 per ha. From the total population 22.43% is classified under urban population and 77.57% as rural population. No estate population is recorded.

16% of the total population in Trincomalee District is from the DS Divisions of the specific project areas and the details of the population distribution based on sex is given in table 2.60 below;

Table 2.60 Population by Sex and Sex Ratio at DS Divisional Level – 2015

DS Division	Male	Female	Total	Sex Ratio	Ares ha	Population Density
Gomarankadawala	3,959 – 2.0%	3,762 – 1.9%	7,722	105	28,800	0.26811
Morawewa	4,307 – 2.2%	4,027 – 2.0%	8,335	107	32,900	0.25333
Kuchchaweli	17,675 – 9.0%	17,071 – 8.5%	34,746	104	43,800	0.79329
Padavisiripura	6,119 – 3.1%	6,309 – 3.1%	12,429	97	15,200	0.81767
TOTAL TRINCOMALEE DISTRICT	196,096 – 49.39%	200,904 – 50.61%	397,000	98	272,700	20.827

Source: Department of Census and Statistics

The age wise distribution of the population of the specific project location and the district as a whole is given in table 2.61 below which illustrates that the majority of the population comes under the 1-19 age category.

Table 2.61 Population by Age Group as DS Divisional Level – 2015

DS Division	Total Population	1-19	20-29	30-39	40-49	50-59	60≤
Gomarankadawala	7,722	2,676	1,149	1,339	1,069	844	644
Morawewa	8,335	3,072	1,222	1,361	1,078	877	724
Kuchchaweli	34,746	15,389	5,563	5,210	3,474	2,920	2,190
Padavisiripura	12,429	4,428	1,919	1,961	1,761	1,179	1,180
TOTAL TRINCOMALEE DISTRICT	397,000	164,864	63,385	58,255	45,138	34,959	30,399

Source – Department of Census and Statistics

### 2.6.2.2 Economic status of the irrigated farming communities

According to the statistic of the Annual Labour Force Survey Report of 2016, employment by main industry of the population over the age of 15 illustrates that from the total household population of age 15 above of 272,940, 128,924 which is equivalent to 47.2% is considered as the total labour force of which, 123,872 which is 96.1% of the total labour force is employed. According to the survey statistics 30,964 (25%) is engaged in agriculture industry, 28,774 (23.2%) in industries and 64,134 (51.8%) in service industry.

## 2.7 Kilinochchi District

### Project Area Details

DSD Name	ASC Name (ASC No)	River Basin Name	Sub-watershed Name
Poonagary	Mulankavil	Mandekal Aru (River Basin No 84)	-
Tunukkai	Poonagary		
(In Mulaithivu District)	Akkarayankulam		

### 2.7.1 Bio-physical environment of proposed project locations

#### 2.7.1.1 Location and geography

Kilinochchi District is located in the Northern part of Sri Lanka where geographically most of the area of the District lies on the main land. The District has a total extent of 1,681.41 km<sup>2</sup> of which 1237.11 km<sup>2</sup> is covered with land area and inland water covers an area of 444.30 km<sup>2</sup>. It is bordered by Jaffna District on the North, Mullaitivu District on the Eastern and Southern borders and Mannar District on the Western and Southern borders.

Geographically Kilinochchi District could be categorized as flat with less than 10% slope. There are 4 major, 5 medium and 394 minor tanks all over the District connected to conserve rain water. The soil is

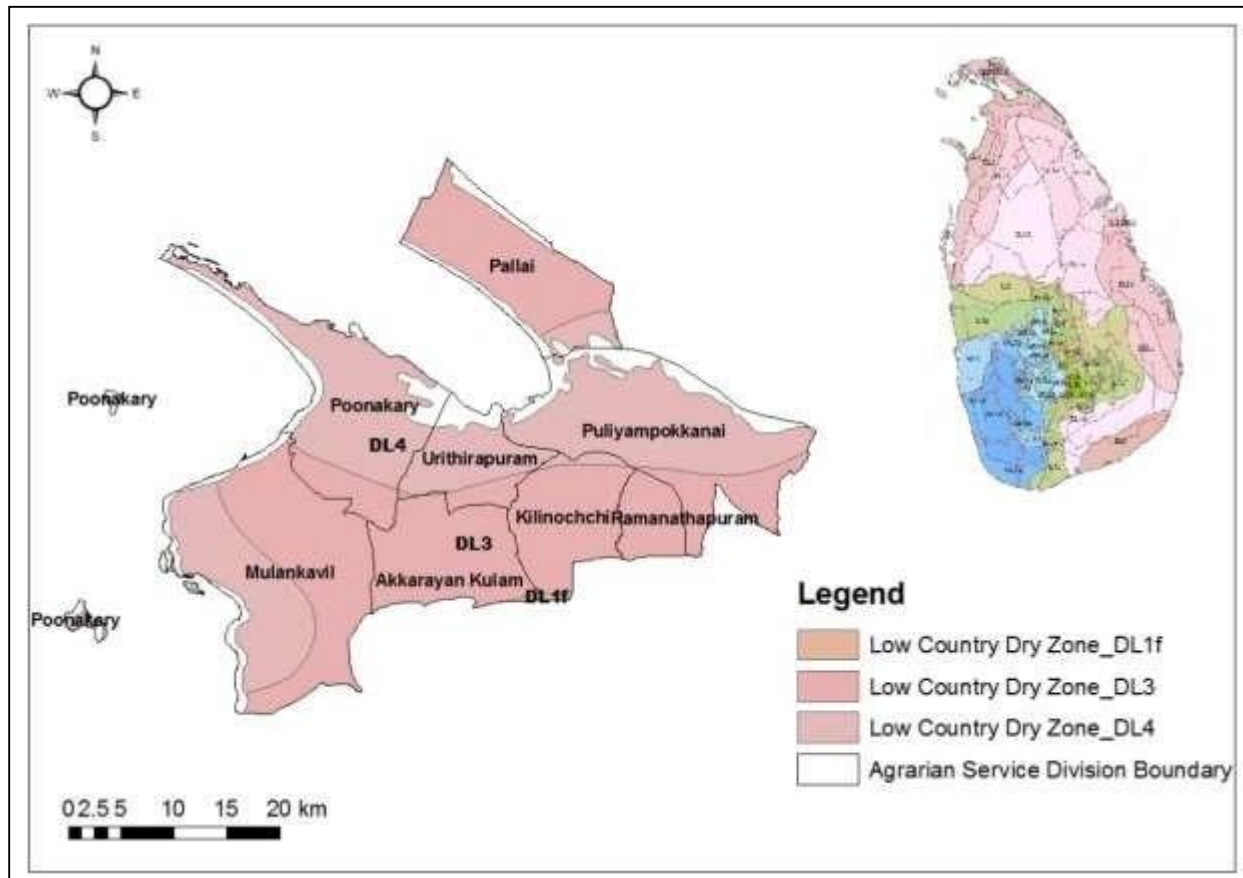
fertile and fortified with minerals which allows any kind of crop growth. The soil structure of the district is as following:

- Red and Yellow laterite – 12.04%
- Flat to slightly undulating terrain – 27.96%
- Solarized of solo check flat terrain – 25.96%
- Alluvial soil of various drainage and texture – 11.99%
- Raga soil on recent beach and dourer sand flat terrain – 17.99%
- Eroded land – 04.06%

### 2.7.1.2 Climate

Kilinochchi District is geographically located in 3 agro ecological zones of Dry Zone Low Country. According to the zoning data of Department of Agriculture, the project area lies mainly in agro-ecological region of DL1d. The major characteristics of the agro-ecological region and the surrounding regions are shown in Figure 2.14 below.

The Districts climatic conditions are dry, humid and tropical. The average annual rainfall in is 4,420.6 mm and 75% of the rainfall is received during the period of September by North-East monsoon periodical winds. The rest of the period of the year is dry and warm. Due to the warm temperature experienced each year, from June to August, this time period is considered as the dry season. The monthly average temperature of Kilinochchi District is around 25°C to 30°C.



Agro-Ecological	DL3	DL4
-----------------	-----	-----

<b>Region Feature</b>		
<b>75% expectancy of Rainfall (mm)</b>	> 800	> 750
<b>Terrain</b>	Flat and slightly undulating	Flat
<b>Major Soil Groups</b>	Red Yellow Latosol; Rogosols	Solodized Slonetz; Solonchaks; Grumusol
<b>Land Use</b>	Cashew, coconut, condiments, scrub, natural forest	Scrub, paddy, rain-fed upland crops;

Source: Department of Agriculture

Figure 2.14 Agro-Ecological Regions in Kilinochchi District

### 2.7.1.3 Land resources

According to the available information, major component of the land extent is of dense forest which is 20.1% of the total, secondly for paddy cultivation which is 19% and thirdly as for cultivation of other crops 14.9%. The details are given in table 2.62.

Table 2.62 Land used pattern in Kilinochchi District – 2015

<b>Nature of land</b>	<b>Area (ha)</b>	<b>Percentage (%)</b>
Asweddumized paddy land		
Irrigated	11,361	9.2
Rainfed	12,124	9.8
Tea		
Rubber		
Coconut	3,080	2.5
Cinnamon		
Other crops	18,460	14.9
Forests		
Dense forests	24,850	20.1
Open forests	10,250	8.3
Planted forests	10	0.0
Grass lands/Chena	10,650	8.6
Marshes and Mangroves	5,680	4.6
Home gardens	13,200	10.7
Reservoirs		
Building	650	0.5
Sand and Mountain		
Abandoned land		
Other (sacred places, roads, cemetery etc)	13,396	10.8
<b>Total</b>	<b>123,711</b>	<b>100.0</b>

Source: District Land Use Planning Officer

When the total extent of Kilinochchi District is considered, 97.4% consists of land area while 2.6% is internal reservoirs. 50.6% of the total extent of the district comprise of cultivated land, 24.4 of uncultivated land and 25% forest cover. The details of the districts total land use in general is given in table 2.63.

Table 2.63 Extents cultivated and abandoned lands in Kilinochchi District

Nature of land	Extent - ha	Percentage
Land area	120,540	97.4
Internal reservoirs	3,171	2.6
Total land area	123,711	100.0
Total extent of cultivated	62,650	50.6
Total extent of not cultivated	30,170	24.4
Total extent of forest	30,891	25.0
Total land area	123,711	100.0

Source: District Statistical Branch

According to the information for the year 2015, the asweddumized extent of paddy of the DS division with respect of the specific project area is given in table 2.64.

Table 2.64 Details of paddy cultivation - extent by irrigation and rainfed

DS Division	By irrigation		Rainfed - ha	Total - ha
	Major - ha	Minor - ha		
Poonagary DSD	914	-	3,586	4,500
TOTAL KILINOCHCHI DISTRICT	10,778	490	12,407	23,675

Source: District Statistical Branch

The latest available details regarding sown and harvest extent, average yield and production of paddy by season is given in table 2.65.

Table 2.65 Sown, Harvested Extent, Average Yield and Production of Paddy by Season

Season	Sown extent - ha	Harvest extent - ha	Average yield – kg per ha	Production - MT
2014/2015 Maha	23,675	21,172	3,689	69,319
2015 Yala	6,854	6,854	4,634	28,189

Source: Department of Census and Statistics

With regard to the highland crops cultivated in the district, majority of land is used for plantain cultivation. The other crops that are mainly cultivated are cashew, mango and jack. The statistic with regard to the DS Divisions of the specific project areas are given in table 2.66.

Table 2.66 Highland Crop Statistics by Divisional Level

Crop	Extent in ha						
	Cashew	Mango	Orange	Lime	Jack	Plantain	Papaw
Poonagary DSD	164	15	7	11	25	46	9
TOTAL KILINOCHCHI	164	160	12	57	120	173	30

DISTRICT							
----------	--	--	--	--	--	--	--

There are many seasonal crops cultivated in the district such as peanut, green chilies, green gram, black gram, maize, brinjal, manioc, gingerly, red onion, etc. According to the districts statistical branch, the land use for these crops shows that during the 2014/2015 Maha season peanut, green chilies and green gram is cultivated in an extent of 326, 223 and 195.5 ha land with a yield of 125, 69.2 and 167 MT respectively.

During the 2015 Yala season the major land use seasonal crops are brinjal, manioc and lady's fingers cultivated in an extent of 222, 216 and 176.3 ha land with a yield of 130.9, 109 and 68.6 MT respectively.

The main agricultural reservoirs in the district were more than 200 acres of extent is asweddumised is 9 in total. The details of reservoirs in the DS Division of the project area is given in table 2.67.

Table 2.67 Main Agricultural Reservoirs in District – 2015

DS Division	Reservoir	Capacity Acre Feet	Catchment Area Acres
Poonagary DSD	Kariyalainagapaduvan	11,791	1,505
	Kudamuruddy	2,950	1,600

Source: District Statistical Branch

#### 2.7.1.4 Water resources

Proposed project area comes under the Mandekal Aru basin and details related to the river basin's characteristics, water use and water management practices are as follows;

Table 2.68 Details of Mandekal Aru Basin

Rainfall Runoff Data	
Catchment Area (km <sup>2</sup> )	297
Average Rainfall (mm)	1,250
Discharge Volume to Sea (MCM)	111
Estimated Annual Average Water Availability	
Available Water MCM per Year	124.4
Average Irrigation Water Use by Basin and Water Balance	
Major Irri. Demand (MCM)	-
Medium Irri. Demand (MCM)	0.00
Minor Irri. Demand (MCM)	4.48
Total Irrigation Demand (MCM)	63.21
Runoff from Rf	85.7
Balance after meeting Irri. Demand	81.2
Domestic Water Demand by Basin	
Population Dug Wells	17,461
Population Pipe Supply	557
Dug well Extraction – MCM/month	0.026



Pipe supply MCM/month	0.002
-----------------------	-------

### 2.7.1.5 Forest cover and biodiversity

Out of total land area of 132,499 ha in Kilinochchi District, 32149.2 ha is covered by Dry Monsoon Forest, while 5026.6 ha and 424.0 ha are under sparse forests and mangrove according to forest cover assessment of the Forest Department in 1999 (Forest Department, 2016). The coverage under forests is 37599.8 ha (28.4%) of total land area.

Wildlife protected areas are managed by DWC under the Flora and Fauna Protection Ordinance (FFPO). There are two wildlife protected areas in Kilinochchi District under two different conservation statuses namely; National Parks and Nature Reserves (Table 2.69).

Table 2.69 Protected Wildlife Areas within Kilinochchi District

Protected Wildlife Area	Date declared	Extent (ha)
<b>National Parks</b>		
Chundikulam (part)	2015.06.22	19565.33
<b>Nature Reserves</b>		
Nagarkovil (part)	2016.03.01	7882.00

Source: DWC

Little information is available on elephants in the northern areas. A larger part of the north is still covered in mature forests hence elephant densities are likely to be low with perhaps a few hundred elephants in total. However, as in the East, the area was largely abandoned during the war and elephant numbers may have increased in response to habitat changes. Resettlement is starting now and is likely to cause increased conflict in the future (Fernando et al).

Regarding the HEC, data pertaining to the elephant deaths, human deaths, injuries due to elephant attacks and property damages in Kilinochchi Wildlife Region are illustrated in the following Table.

Table 2.70 Incidents Recorded in Kilinochchi Wildlife Regions from 2012-2016

Incident	2012	2013	2014	2015	2016	Total
Elephant Deaths	-	-	05	04	02	11
Number of Human Deaths due to Elephant Attacks	-	-	01	-	01	02
Number of Human Physical Damages	0	0	0	0	01	01
Annual Number of Property Damages	-	-	-	-	0	0

According to the DWC records in 2016, Elephant Deaths in Kilinochchi region were caused by Natural – 01 and unknown causes – 01.

### 2.7.1.6 Physical cultural resources

There are 5 Archaeological Protected Monuments located in Poonagary DSD. Pooneryn Fort is located in Poonagary and it was built by Portuguese to protect their possessions in Jaffna. The fort was captured

by the Dutch in 1658, and subsequently by the British in 1796. During Dutch possession, the square shaped fort had two bastions. In 1805, British built a rest house at the fort.



## 2.7.2 Socio-economic environment of proposed project locations

### 2.7.2.1 District's social profile

Administratively, Kilinochchi District is divided into four Divisional Secretary Divisions, namely Karachchi, Kandawalai, Ponagari and Pachchilaipalli. The administrative structure of the DS Divisions of specific project locations and the district as a whole is given in table 2.71 below;

Table 2.71 Administrative Structure by DS Division – 2015

DSDivision	Grama Niladari Divisions (GNDs)	Villages	No of Agrarian Service Centers	Local Authorities
Poonagary DSD	19	93	2	1
TOTAL KILINOCHCHI DISTRICT	95	329	8	4

Source: District Statistical Branch

The total population according to the Department of Census and Statistics of Kilinochchi District for year 2015 is 120,000 of which 49.14% males and 50.86% females. With regard to the DS Divisions where the project sites are located, there are no urban and estate population and 100% of the population is rural population. The details of the population by Sex and Sex Ratio as DS Division level of the project areas is given in table 2.72.

Table 2.72 Population by Sex and Sex Ratio at DS Divisional Level – 2015

DSDivision	Male	Female	Total	Sex Ratio	Ares ha	Population Density Per Hec
Poonagary	10,664 – 18.1%	10,799 – 17.7%	21,463	98.7	44,875	2.09
TOTAL KILINOCHCHI DISTRICT	58,972 – 49.14	61,028 – 50.86	120,000	96.6	123,711	1.03

Source: Department of Census and Statistics

The age wise distribution of the population of the specific project location and the district as a whole is given in table 2.73 below which illustrates that the majority of the population comes under the 1-19 age category.

Table 2.73 Population by Age Group as DS Divisional Level – 2015

DSDivision	Total Population	1-19	20-29	30-39	40-49	50-59	60≤
Poonagary	21,463	9,301	3,645	3,025	2,129	1,800	1,563
TOTAL KILINOCHCHI DISTRICT	120,000	50,901	18,813	18,055	11,858	9,833	10,540

Source: Department of Census and Statistics

### 2.7.2.2 Economic status of the irrigated farming communities

Kilinochchi District is predominantly an agriculture economy depending mainly on tanks and irrigation network. The soil condition in certain parts of the District is more suitable for cultivation of vegetables and other field crops, high value cash crops and fruit crops. The development policy objective is to break away from subsistence agriculture by promoting high value crops under intensive and commercially oriented agriculture system since it will increase production, incomes and provide greater employment and higher standards of living.

According to the statistic of the Annual Labour Force Survey Report of 2016, employment by main industry of the population over the age of 15 illustrates that from the total household population of the age 15 years and above of 80,217, 36,212 is considered as the labour force which is equivalent to 45.1%. From the eligible labour force, 93.7% which is equivalent to 33,926 is employed. According to the survey statistics 9,167 (27%) is engaged in agriculture industry, 8,623 (25.4%) in industries and 16,135 (47.6%) in service industry.

## 2.8 Ampara District

### Project Area Details

DSD Name	ASC Name (ASC No)	River Basin Name	Sub-watershed Name
Lahugala	Lahugala	Heda Oya (River Basin No 36)	Lower Heda Oya
Pothuvil	Pothuvil	Karanda Oya (River Basin No 37)	Lower Karanda oya
	Panama		
	Komari		

### 2.8.1 Bio-physical environment of proposed project locations

#### 2.8.1.1 Location and geography

Ampara District which consists of 205,978 h of land and 19,280 h of internal reservoirs. It is bounded North by Polonnaruwa and Batticaloa Districts, East by Indian Ocean, South by Hambanthota and Moneragala District and West by Badulla and Matale Districts. The Total area of Ampara District is 4,415 km<sup>2</sup> and it is a district which witnesses cultural and religious heritages with historical value. According to the geomorphology, Ampara District is situated in the third peneplain, which is coastal and flat, mostly below and altitude of 50 m above mean sea level, although some areas may rise up to 300m. Geologically Ampara District is predominantly Precambrian, usually consisting of crystalline rocks unaffected by volcanic activity and mountain building for more than 500 million years.

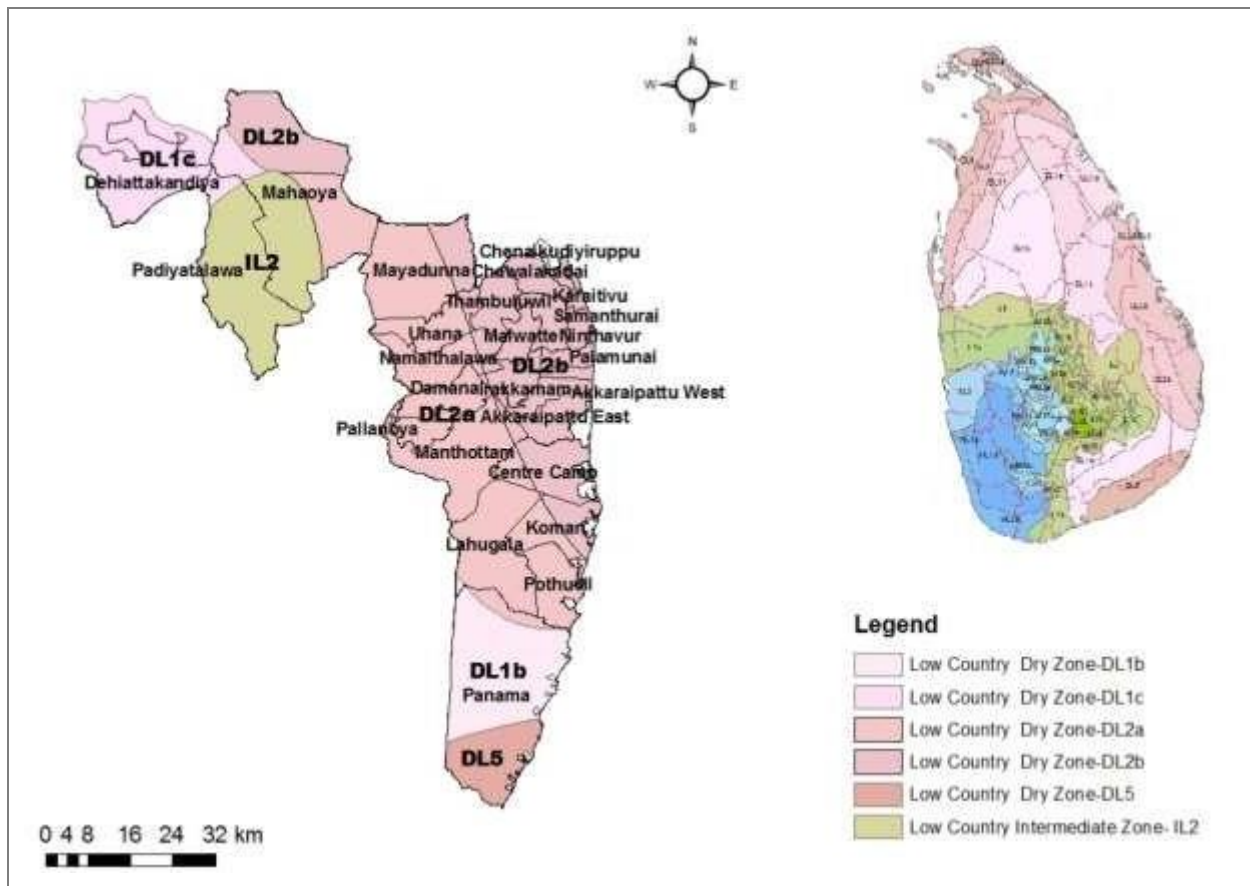
#### 2.8.1.2 Climate

With regard to the climate, Ampara District is located within the dry zone of Sri Lanka, which has a hot and humid tropical climate. The district receives rain primarily from North-East monsoons which is about 60% during the months of October to February. Winds during this period originate from the Indo-Asian landmass, unlike the Southwest monsoon, which originate from the ocean and brings relatively little precipitation (Swan, 1980). Inter-monsoon conventional rains account for most of the balance,

although some rain falls during Southwest monsoons. The rainfall distribution is the most important determinant of the climate and the environment. Winds are generally moderate, ranging from 7–15 km per hour with the evening winds being stronger. The Kanchana, a dry wind that blows after shedding rains during the southwest monsoon (July/August) is much stronger.

As per the information from the Department of Meteorology, for the year 2014, the annual rainfall was recorded as 1,861mm. The highest rainfall was experienced in the month of December which was 658.9mm and the lowest in April which was 1.30mm. With respect of the temperature, the maximum was recorded in June as 35.50°C and the minimum as 22.7°C in February. The relative humidity ranges from 64-85 during day.

Ampara District is located in 05 agro ecological zones belongs to Low Country Dry Zone. According to the zoning data of Department of Agriculture, the area where the project interventions proposed lies mainly in three agro-ecological regions of DL5, DL1b and DL2a. The major characteristics of these agro-ecological regions and the surrounding regions are shown in Figure 2.16 below.



Agro-Ecological Region Feature	DL5	DL1b	DL2a
75% expectancy of Rainfall (mm)	>650	> 900	>1,300
Terrain	Undulating and flat	Undulating	Undulating
Major Soil Groups	Reddish Brown Earth Soils with high amount of gravel in subsoil, Low Humic Gley	Reddish Brown Earth and Low Humic Clay soils	Non Calcic Brown, Reddish Brown Earth, Low Humic Claysoils & Old alluvial soils

	& Solodized soils		
Land Use	Scrub, Natural forest, Rainfed upland crops, Paddy,	Rainfed upland crops, Paddy, Scrub, Mixed home gardens, Forest plantations	Rainfed upland crops, Paddy, Natural forest, Sugar cane, Scrub

Source: Department of Agriculture

Figure 2.16 Agro-Ecological Regions in Ampara District

### 2.8.1.3 Land resources

According to the available information, major component of the land extent is of dense forest which is 22.4% of the total, secondly for paddy cultivation which is 17.6% and thirdly as for cultivation of other crops 14.8%. The details are given in table 2.74.

Table 2.74 Land Use Pattern in District – 2014

Nature of land	Area (ha)	Percentage (%)
Asweddumized paddy land		
Irrigated	66,007.9	15.0
Rainfed	11,314.0	2.6
Tea	-	-
Rubber	-	-
Coconut	8,298.0	1.9
Cinnamon	-	-
Other crops	65,404.0	14.8
Forests		
Dense forests	99,053.0	22.4
Open forests	31,745.0	7.2
Planted forests	12,274.0	2.8
Grass lands/Chena	21,778.0	4.9
Marshes and Mangroves	5,959.0	1.3
Home gardens	8,298.0	1.9
Reservoirs	17,650.0	4.0
Building	43,576.0	9.9
Sand and Mountain	10,160.0	2.3
Abandoned land	31,307.0	7.1
Other (sacred places, roads, cemetery etc)	8,676.0	2.0
<b>Total</b>	<b>441,499.9</b>	<b>100.00</b>

Source: District Land use Planning Office, Department of Census and Statistics

From the total area of 441,500 ha of Ampara District 95.6% is land area and the rest of 4.4% consists of internal reservoirs. 37.86% is cultivated extent which is 167,156 ha, 16.58% of extent is not cultivated which is 73,209 ha and 201,135 ha which is 45.46% consists of forests. The details are given in table 2.75 below.

Table 2.75 Extent of Land Used

Nature of land	Extent ha	Percentage
Land area	422,210	95.6
Internal reservoirs	18,290	4.4
Total	441,500	100.00
Total extent of cultivated land	167,156	37.86
Total extent of not cultivated land	73,209	16.58
Total extent of forest	201,135	45.46
Total	441,500	100.00

Source: District Statistical Branch

The asweddumized extent by irrigation and rainfed is given in table xxx for the DS division of which the project areas exist and the district as a whole.

Table 2.76 Asweddumized extent of paddy Divisional level – 2014

DS Division	By irrigation		Rainfed - Ha	Total - Ha
	Major - Ha	Minor - Ha		
Lahugala DS	1968	1,388	2,213	5,568
Pothuvil DS	6,157	1,960	6,280	14,397
TOTAL AMPARA DISTRICT	130,067	10,280	38,953	179,300

Source: Department of Census and Statistics

As per the statistics of the District Statistical Branch, there are many seasonal crops cultivated during the Maha and Yala seasons of which maize is considered as the crop which has used the majority of the land during 2012/2013 Maha season – 6,611.91 ha to cultivate which had a yield of 21,199.95 MT and 2013 Yala season the district had a yield of 1,396.29 MT by cultivating in an area of 11,431.44 ha. Land use wise secondly cowpea was cultivated during both 2012/2013 Maha and 2014 Yala seasons in 1,428.52 ha and 1,132.27 ha yielding 2,306.14 MT and 2,228 MT respectively. The other seasonal crops are peanut, manioc, green chilies, kurakkan, lady's fingers, brinjals, etc.

In Ampara District, there are 26 reservoirs which have contributed to a more than 200 acres asweddumized extent. No reservoirs serving more than 200 acres is found in Lahugala DS Division and in Pottuvil DS Division there are two reservoirs namely Semmani and Naulla. The details of these three reservoirs are given in table 2.77.

Table 2.77 Main agricultural reservoirs more than 200 acres of cultivated land – 2010

Reservoir	Capacity Acre Feet	Catchment are Acres	Surface area Acres
Semmani	345.0	15.0	364.3
Naulla	922.0	1.8	145.9

Source: District Statistical Branch

#### 2.8.1.4 Water resources



The rivers and streams drain water from highland and direct it to the sea. Most of them are seasonal and drain only during the rains. A few of the rivers drain water from the central highlands and are perennial or at least have water for most of the years such as Kumbukkan Oya.

Six major tanks and 7 medium tanks located in Ampara District are managed by the National management while 4 major tanks and 6 medium tanks are under Provincial management.

Proposed project area comes under the Heda Oya basin and Karanda Oya basin and details related to these river basin characteristics, water use and water management practices are as follows;

Table 2.78 Details of Heda Oya basin and Karanda Oya basin

	Heda Oya basin	Karanda Oya basin
<b>Rainfall Runoff Data</b>		
Catchment Area (km <sup>2</sup> )	604	422
Average Rainfall (mm)	1,912	2,000
Discharge Volume to Sea (MCM)	394	253
<b>Estimated Annual Average Water Availability</b>		
Available Water MCM per Year	441.2	269.2
<b>Average Irrigation Water Use by Basin and Water Balance</b>		
Major Irri. Demand (MCM)	27.00	
Medium Irri. Demand (MCM)	5.84	2.33
Minor Irri. Demand (MCM)	13.42	5.02
Total Irrigation Demand (MCM)	46.26	7.35
Runoff from Rf	309.6	213.1
Balance after meeting Irri. Demand	263.3	205.7
<b>Domestic Water Demand by Basin</b>		
Population Dug Wells	22,608	10,600
Population Pipe Supply	27,284	12,301
Dug well Extraction – MCM/month	0.034	0.016
Pipe supply MCM/month	0.098	0.044

Ampara is one of highest agricultural areas in the country and therefore has a major impact on groundwater resources due to heavy agricultural activities in the region with the extensive application of pesticides and weedicides. The possible salinity intrusion is envisaged along the coastal stretch of Ninthavur and Navithaveli. However, high salinity zones at Malwatta and Deegavapiya may result due to inherited formation characteristics (WRB).

### 2.8.1.5 Forest cover and biodiversity

Out of total land area of 450,031 ha in Ampara District, 67,197.0 ha and 45,519.2 ha are covered by Dry Monsoon Forest and Moist Monsoon Forests, while 40,966.2 ha and 10,148.0 ha are under sparse forests and riverine dry forests according to forest cover assessment of the Forest Department in 1999 (Forest Department, 2016). The coverage under forests is 164,129.4 ha (36.5%) of total land area.

Wildlife protected areas are managed by DWC under the Flora and Fauna Protection Ordinance (FFPO). There are 12 wildlife protected areas (wholly/partly) in Ampara District under 3 different conservation statuses namely; National Parks, Nature Reserves and Sanctuaries (Figure 2.79).

Table 2.79 Protected Wildlife Areas within Ampara District

Protected Wildlife Area	Date declared	Extent (ha)
<b>National Parks</b>		
Gal Oya (part)	1954.02.12	25,900.00
Maduruoya (part)	1983.11.09	58,850.00
Kumana(Yala-East)	2006.07.05	35,665.00
Lahugala-Kitulana	2006.07.20	5131.00
Ruhuna (Yala) NP (part)	1938.02.25	97,881.00
<b>Nature Reserves</b>		
Riverine (part)	1991.07.31	824.00
<b>Sanctuaries</b>		
Senanayakasamudraya (part)	1954.02.12	9,324.00
Galoya North East (Ampara)	1954.02.12	12432.00
Galoya South West (part)	1954.02.12	15,281.00
Sagamam	1963.06.21	616.00
Buddangala	1974.11.01	1841.00
Kudumbigala-Panama	2006.02.20	6534.00

Source: DWC

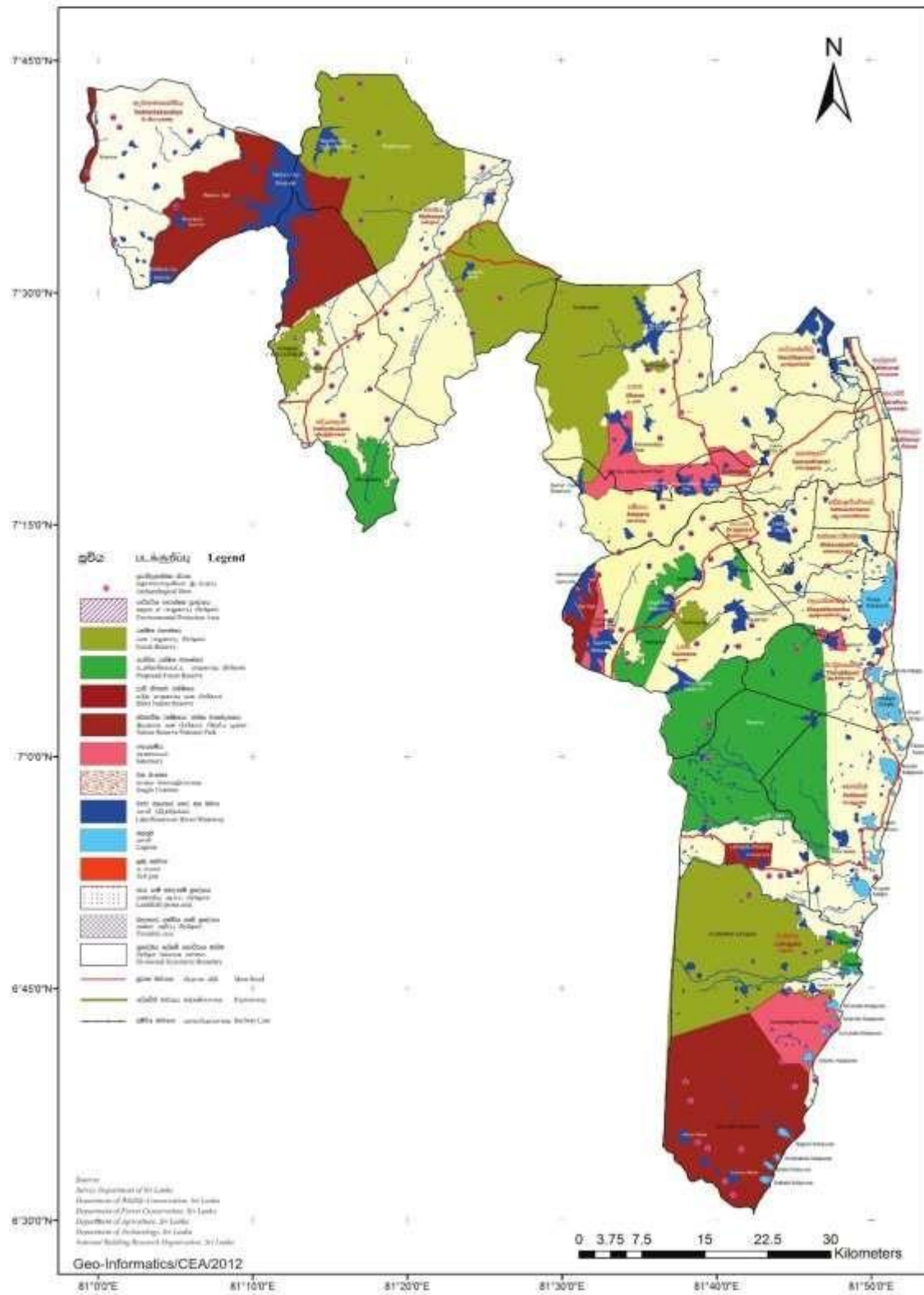
With regard to impacts of human-elephant conflict, over a thousand elephants are found in the east. The majority are outside national parks. As a result of the armed conflict that took place in the area over the past three decades, many villages and cultivation areas were abandoned and became excellent elephant habitat. The postwar resettlement of people in the east is likely to result in a new area of high HEC (Fernando et al).

Regarding the HEC, data pertaining to the elephant deaths, human deaths, injuries due to elephant attacks and property damages in Eastern Wildlife Region are illustrated in the following Table.

Table 2.80 Incidents Recorded in Eastern Wildlife Regions from 2012-2016

Incident	2012	2013	2014	2015	2016	Total
Elephant Deaths	44	29	49	52	55	229
Number of Human Deaths due to Elephant Attacks	14	18	22	15	20	89
Number of Human Physical Damages	15	11	18	13	35	92
Annual Number of Property Damages	267	403	511	396	431	2,008

According to the DWC records in 2016, Elephant Deaths in Eastern region were caused by Gun Shot – 15, Electrification – 04, Poisoned – 0, Hakka Patas – 11, Accident – 02, Natural – 08, other causes – 08 and unknown causes – 07.



Source: CEA

Figure 2.17 Environmental Sensitive Areas – Ampara District

### 2.8.1.6 Physical cultural resources

Aranya Senasanas such as Piyangala, Buddangala and religious places with archeological value such as Rajagala, Deegawapi, Magul Maha Vihara, Muhudu Maha Vihara, Neelagala Seya and Kudumbigala are among the most important places. The hot water springs at Maha Oya and Padiyathalawa areas, the enchanting coats at Arugambay and the foot path of Tamil pilgrims who walk to Katharagama every year serve as tourist attractions. This district marks some cultural differences from other districts since the settlements of Adiwasi people (indigenous people) are inhabited at Pollebedda Henanigala.

## 2.8.2 Socio-economic environment of proposed project locations

### 2.8.2.1 District's social profile

The district is administered by a District Secretariat headed by a District Secretary appointed by the central government of Sri Lanka. The district was carved out of the southern part of Batticaloa District in April 1961. Ampara District is spread over 44% of the Eastern Province. The administrative structure of the DS Divisions of the specific project areas and the district as a whole is given in table 2.81 below.

The district consists of Kalmunei Municipal Council, Ampara Urban Council and 17 Pradeshiya Sabhas such as namal Oya, Uhana, Damana, Maha Oya, Padiyathalawa, Dehiattakandiya, Lahugala, Sammanthure, Akkareipattu, Addalachchena, Aleyadiwembu, Thirukkivil, Navidanweli, Eragama, Nindawur, Karthivu and Pothuvil.

Table 2.81 Administrative Structure by DS Division – 2014

DS Division	Grama Niladari Divisions (GNDs)	Villages	No of Agrarian Service Centers	Local Authorities
Lahugala DSD	12	19	2	1
Pothuvil DSD	27	36	2	1
TOTAL AMPARA DISTRICT	503	614	29	24

Source: District Statistical Branch

The total population of Ampara District is 666,000 of which based on the 2014 data. 48.41% of the population is male and 51.59% females having a sex ratio of 93.8. The population density of the district is 2 per ha. From the total population 23.61% is classified under urban population, 76.39% as rural population and no estate population is identified.

6.73% of the total population of Ampara District is from the DS Divisions of the specific project area and the details of the population distribution based on sex is given in table 2.82 below;

Table 2.82 Population by Sex and Sex Ratio at DS Divisional Level – 2014

DS Division	Male	Female	Total	Sex Ratio	Ares ha	Population Density
Lahugala DSD	4,478 – 1.39%	4,664 – 1.36%	9,142	96.01	61,690	15
Pothuvil DSD	17,294 – 5.36%	18,405 – 5.36%	35,699	93.96	36,750	97
TOTAL AMPARA DISTRICT	322,389 – 48.41%	343,611 – 51.59%	666,000	93.80	441,500	2

Source: Department of Census and Statistics

According to the available information, ethnicity wise, majority of the population in the DS divisions of the relevant project areas are Sri Lankan Moor about 44%, Sinhalese, 39% and Sri Lankan Tamil of 17%. Religiously majority is Islam about 44%, secondly Buddhist 39% and Hindu 15%. The age wise distribution of the population of the district as a whole is given in table 2.83 below which illustrates that the majority of the population comes under the 1-19 age category.

Table 2.83 Population by Age Groups within the District – 2014

	<b>Total Population</b>	<b>1-19</b>	<b>20-29</b>	<b>30-39</b>	<b>40-49</b>	<b>50-59</b>	<b>60≤</b>
Lahugala DSD	9,142	868	890	797	870	757	772
Pothuvil DSD	35,699	3,831	4,254	3,845	3,791	3,096	2,825
TOTAL AMPARA DISTRICT	666,000	258,769	107,508	97,744	84,205	63,561	54,213

Source: Department of Census and Statistics

### 2.8.2.2 Economic status of the irrigated farming communities

According to the statistic of the Annual Labour Force Survey Report of 2016, employment by main industry of the population over the age of 15 illustrates that from the total household population of the age 15 years and above of 483,489, 214,952 is considered as the labour force which is equivalent to 44.5%. From the eligible labour force, 93.4% which is equivalent to 200,720 is employed. According to the survey statistics 55,896 (27.8%) is engaged in agriculture industry 49,846 (24.8%) in industries and 94,077 (47.3%) in service industry.

## 2.9 Mulaithivu District

### Project Area Details

<b>DSD Name</b>	<b>ASC Name (ASC No)</b>	<b>River Basin Name</b>	<b>Sub-watershed Name</b>
Oddusuddan	Oddusuddan	Per Aru (River Basin No 75)	Per Aru
Oddusuddan	Oddusuddan		Karuwile Aru
Maritimepattu	Mulliyawalai		Lower Per Aru
Puthukudiyiruppu	Puthukudiyiruppu		

### 2.9.1 Bio-physical environment of proposed project locations

#### 2.9.1.1 Location and geography

Mulaithivu is one of the districts which were newly established in 1979 by integrating certain parts of Mannar, Trincomalee and Vauniya districts and situated in the Eastern part of Northern Province. Mulaithivu District is located between North latitude: 08° 56' - 9° 27' and the East longitude: 80° 12' – 80°. The district is bounded North by Kilinochchi district, South by Trincomalee district, Vauniya district and a part of Mannar district, West by Mannar district and East by Indian Ocean. The total ground area of this district is nearly 25,169 km<sup>2</sup> (Including forest areas and excluding large internal reservoirs).

This district which is mostly a plain slopes to North and East and again slopes towards South West. The coastal belt of the district is nearly 70 km and the area of the district consists of four lagoons namely Chalai, Nandikadal Nayaru and Kokilai.

The latosol soil which is in red, brown and yellow mixing with red is highly suitable for cultivation. The land of the area is used as agricultural lands and used for coconut cultivation, settlements and other buildings.

The district consists of 251690 h and 167850 h (64.1% of the above) is covered by forests and shrubs. Another 21390h (5.2%) are remaining as barren lands and areas covered with water. In the meantime, 44040 h (5.1%) are used for agriculture. The remaining area is used for settlements and other buildings. Further, three large scale irrigation schemes, 16 middle scale irrigation, 198 small scale irrigations are also found in the district.

### **2.9.1.2 Climate**

Mulaithivu District is geographically located in 5 agro ecological zones of Dry Zone Low Country. According to the zoning data of Department of Agriculture, the project area lies mainly in agro-ecological regions of DL3 and DL1e. The major characteristics of the agro-ecological region and the surrounding regions are shown in Figure 2.18 below.

Mullaitivu's recorded average temperature is 27.8°C and maximum and minimum averages are 32.9 and 22.4°C respectively. The average annual rainfall varies from 1,300 mm to 2,416 mm. Relative Humidity varies from 70% during the day to 90% at night.

### **2.9.1.3 Land resources**

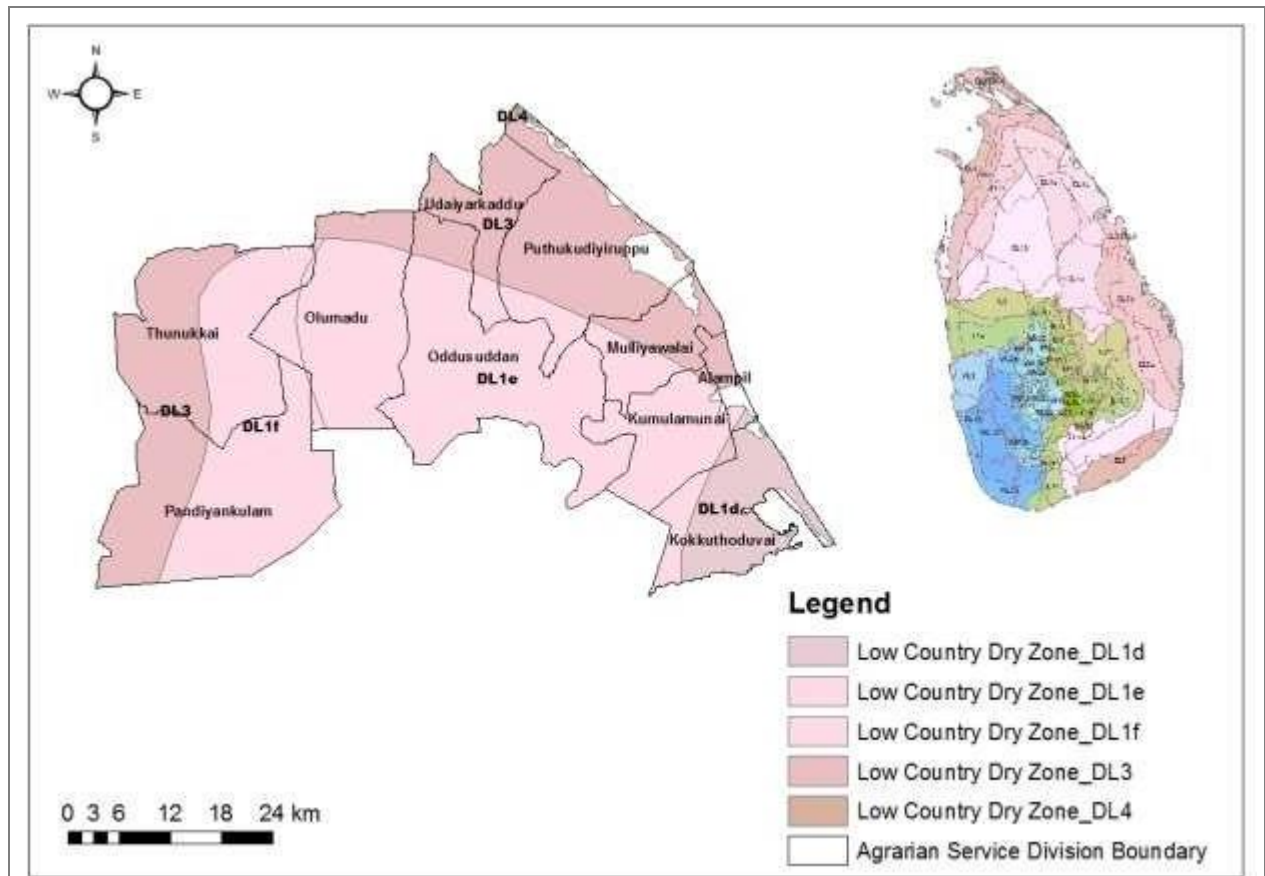
This District consists of different Eco-Systems such as forest land, shrub land, coconut plantation, agriculture land and water bodies etc. Total land area (Including forest area and excluding large inland water bodies) is 251,690 ha. Approximately 167,850 ha which is 64.1% of the total land area consists of forest, agriculture covers nearly 44,040 ha (16.9%), range land accounts for 13,650 ha (5.2%) another 26,150 ha constitutes of water homestead and build up land accounts for 5.1%. The details are given in table 2.84.

When the total extent of Mulaithivu District is considered, 92.3% consists of land area while 7.7% is internal reservoirs. 24.2% of the total extent of the district comprise of cultivated land, 15.5% of uncultivated land and 60.2% forest cover. The details of the districts total land use in general is given in table 2.85.

According to the information for the year 2010, the aswedumized extent of paddy of the DS division with respect of the specific project area is given in table 2.86.

The latest available details regarding sown and harvest extent, average yield and production of paddy by season is given in table 2.87.

With regard to the highland crops cultivated in the district, majority of land is used for mango cultivation. The other crops that are mainly cultivated are lime, jack and orange. The statistic with regard to the DS Divisions of the specific project areas are given in table 2.88.



Agro-Ecological Region Feature	DL3	DL1e
75% expectancy of Rainfall (mm)	> 800	> 900
Terrain	Flat and slightly undulating	Undulating
Major Soil Groups	Red Yellow Latosol; Rogosols	Reddish Brown Earth and Low Humic Glay soils
Land Use	Cashew, coconut, condiments, scrub, natural forest	Rainfed upland crops, Paddy, Scrub, Natural forests, Forest plantations, sugercane

Source: Department of Agriculture

Figure 2.18 Agro-Ecological Regions in Mulaithivu District

Table 2.84 Land used pattern in Mulaithivu District – 2010

Nature of land	Area (ha)	Percentage (%)
Asweddumized paddy land		
Irrigated	12,562.0	4.8

Rainfed	7,728.0	3.0
Tea	-	-
Rubber	-	-
Coconut	1,250.0	0.5
Cinnamon	-	-
Other crops	22,400.0	8.6
Forests		
Dense forests	123,256.5	47.1
Open forests	31,620.0	12.1
Planted forests	2,740.0	1.0
Grass lands/Chena	640.0	0.2
Marshes and Mangroves	1,530.0	0.6
Home gardens	19,465.0	7.4
Reservoirs	20,160.0	7.7
Building	125.0	0.1
Sand and Mountain	1,422.0	0.5
Abandoned land	1,230.0	0.5
Other (sacred places, roads, cemetery etc)	15,561.5	6.0
<b>Total</b>	<b>261,690.0</b>	<b>100.0</b>

Source: District Land Use Planning Officer

Table 2.85 Extents cultivated and abandoned lands in Mulaithivu District

Nature of land	Extent - ha	Percentage
Land area	241,530	92.3
Internal reservoirs	20,160	7.7
Total land area	261,690	100.0
Total extent of cultivated	63,405	24.2
Total extent of not cultivated	40,669	15.5
Total extent of forest	157,617	60.2
Total land area	261,690	100.0

Source: District Statistical Branch

Table 2.86 Details of paddy cultivation - extent by irrigation and rainfed

DSDivision	By irrigation		Rainfed - ha	Total - ha
	Major - ha	Minor - ha		
Oddusuddan DSD	32	2,026	1,247	3,305
Maritimepattu DSD	1,613	779	2,455	4,847
Puthukudiyiruppu DSD	607	239	1,692	2,538
TOTAL MULAITHIVU DISTRICT	7,141	4,050	5,578	16,769

Source – District Statistical Branch

Table 2.87 Sown, Harvested Extent, Average Yield and Production of Paddy by Season



Season	Sawn extent - ha	Harvest extent - ha	Average yield – kg per ha	Production - MT
2009/2010 Maha	1,160	1,158	4,000	4,361
2010 Yala	1,120	1,118	4,000	4,211

Source: Department of Census and Statistics

Table 2.88 Highland Crop Statistics by Divisional Level

Crop	Extend in ha			
	Mango	Orange	Lime	Jack
Oddusuddan DSD	18	4	9	13
Maritimepattu DSD	13	-	9	-
Puthukudiyiruppu DSD	-	-	-	-
TOTAL MULAITHIVU DISTRICT	46	6	49	13

There are many seasonal crops cultivated in the district such as gingerly, green gram, brinjal, red onion, etc. According to the districts statistical branch, the land use for these crops shows that during the 2009/2010 Maha season gingerly, green gram and brinjal is cultivated in an extent of 116,77 and 26 ha land with a yield of .45,0.98 and 24.03 MT respectively. During the 2010 Yala season the major land use seasonal crops are red onion, green gram and cowpea cultivated in an extent of 104,92 and 57 ha land with a yield of 14.88, 0.98 and 0.98 MT respectively.

The main agricultural reservoirs in the district were more than 200 acres of extent is as weddumised is 2 in total. The details of reservoir located in Oddusudan DS Division which is one of the project area is given in table 2.89.

Table 2.89 Main Agricultural Reservoirs in District – 2015

DS Division	Reservoir	Capacity Acre Feet	Catchment Area Acres
Oddusudan DSD	Muththaiyankaddu	34,900	41,575

Source: District Statistical Branch

#### 2.9.1.4 Water resources

This district is bestowed with water resources, which could be utilized for agriculture development. There are no major perennial rivers that could be tapped to provide irrigation cultivation. The district has four major irrigation tanks with irrigable areas 12,980 in acre ft, another 16 medium tanks with irrigable areas 11,848 in acre ft, and minor irrigation tanks numbers 250 were water level with irrigable area 11,788 acre. Rain water is the only major source of irrigation for agriculture.

Proposed project area comes under the Per Arubasin and details related to the river basin's characteristics, water use and water management practices are as follows;

Table 2.90 Details of Per AruBasin

Rainfall Runoff Data	
Catchment Area (km <sup>2</sup> )	374
Average Rainfall (mm)	1,500
Discharge Volume to Sea (MCM)	168
Estimated Annual Average Water Availability	
Available Water MCM per Year	178.4
Average Irrigation Water Use by Basin and Water Balance	
Major Irri. Demand (MCM)	48.48
Medium Irri. Demand (MCM)	2.00
Minor Irri. Demand (MCM)	12.73
Total Irrigation Demand (MCM)	63.21
Runoff from Rf	128.2
Balance after meeting Irri. Demand	65.0
Domestic Water Demand by Basin	
Population Dug Wells	2,652
Population Pipe Supply	140
Dug well Extraction – MCM/month	0.004
Pipe supply MCM/month	0.001

### 2.9.1.5 Forest cover and biodiversity

Out of total land area of 260,946 ha in Mulaithivu District, 148,745.5 ha is covered by Dry Monsoon Forest, while 20,152.8 ha and 405.2 ha are under sparse forests and mangrove according to forest cover assessment of the Forest Department in 1999 (Forest Department, 2016). The coverage under forests is 169,303.5 ha (64.9%) of total land area.

Wildlife protected areas are managed by DWC under the Flora and Fauna Protection Ordinance (FFPO). There are 06 wildlife protected areas in Mulaithivu District under three different conservation statuses namely; National Parks, Nature Reserves and Sanctuaries (Table 2.91).

Table 2.91 Protected Wildlife Areas within Mulaithivu District

Protected Wildlife Area	Date declared	Extent (ha)
<b>National Parks</b>		
Madu Road (part)	2015.06.22	63816.00
Chundikulam (part)	2015.06.22	19565.33
<b>Nature Reserves</b>		
Nayaru	2017.01.24	4,464.35
Nandikadal	2017.01.24	4,141.67
<b>Sanctuary</b>		
Kokilai	1951.05.18	1,995
Vavunikulam	1963.06.21	4856.00

Source: DWC

Little information is available on elephants in the northern areas. A larger part of the north is still covered in mature forests hence elephant densities are likely to be low with perhaps a few hundred

elephants in total. However, as in the East, the area was largely abandoned during the war and elephant numbers may have increased in response to habitat changes. Resettlement is starting now and is likely to cause increased conflict in the future (Fernando et al).

Regarding the HEC, data pertaining to the elephant deaths, human deaths, injuries due to elephant attacks and property damages in Vavuniya Wildlife Region are illustrated in the following Table.

Table 2.92 Incidents Recorded in Vavuniya Wildlife Regions from 2012-2016

Incident	2012	2013	2014	2015	2016	Total
Elephant Deaths	-	-	09	12	16	37
Number of Human Deaths due to Elephant Attacks	-	-	01	01	02	04
Number of Human Physical Damages	0	0	0	0	01	01
Annual Number of Property Damages	-	-	-	07	02	09

According to the DWC records in 2016, Elephant Deaths in Vavuniya region were caused by Gun Shot – 04, Electrification – 01, Poisoned – 0, Hakka Patas – 02, Train Accident – 04, Accident – 01, Natural - 01 and unknown causes – 03.

### 2.9.1.6 Physical cultural resources

According Department of Archaeology, there are 19 Archaeological Protected Monuments located in Oddusudan and Puthukudiyiruppu DSD. Ruins with hillock of chaityas, ruins of buildings with stone pillars, ancient settlement are among these archaeological sites. Mullaitivu fort is located in Mulaithivu town area and was built by the Dutch.

## 2.9.2 Socio-economic environment of proposed project locations

### 2.9.2.1 District's social profile

*Admin divisions.* Mullaitivu District is divided into 6 Divisional Secretary's Division (DS Divisions), each headed by a Divisional Secretary of the DS Divisions are further sub-divided into 127 Grama Niladhari Divisions (GN Divisions). It is about 3.99% of the total land area of the country and is spread over 29.45% of the Northern Province. The administrative structure of the specific project location and the district as a whole is given in table 2.93 below;

Table 2.93 Administrative Structure by DS Division – 2010

DS Division	Grama Niladhari Divisions (GNDs)	Villages	No of Agrarian Service Centers	Local Government Institutions
Oddusuddan DSD	27	114	2	-
Maritimepattu DSD	46	219	4	2
Puthukudiyiruppu DSD	19	179	2	3
TOTAL MULAITHIVU DISTRICT	127	619	10	7

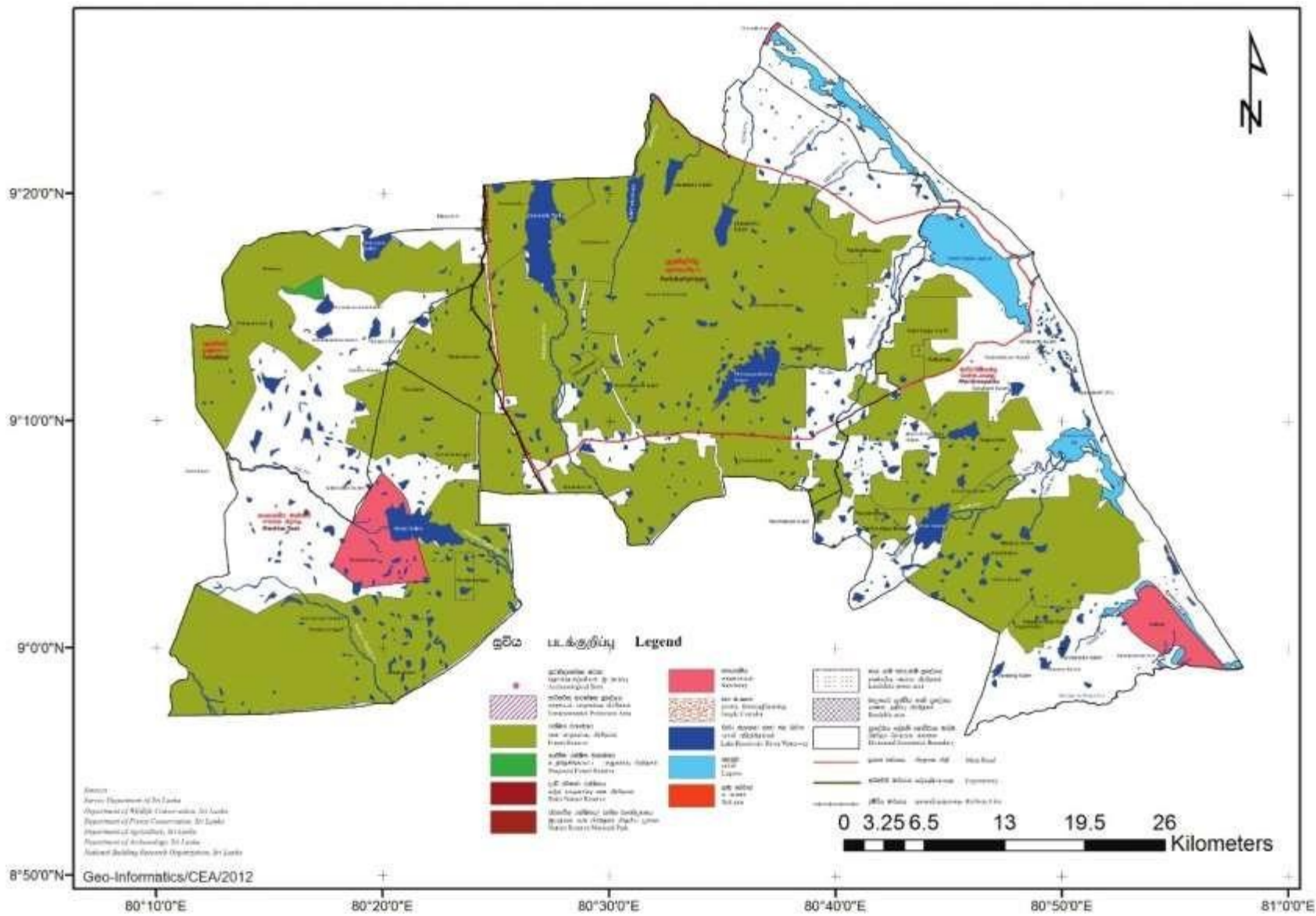


Figure 2.19 Environmental Sensitive Areas – Mulaiithivu District

*Population.* The total population of Mullaitivu District is 66,518 of which based on the 2010 data, 48.23% of the population is male and 51.77% is females having a sex ratio of 93.2. The population density of the District is 3.93 per km<sup>2</sup>. According to the Department of Census and Statistics of Sri Lanka, ethnicity wise, 86% of the total population of the Mullaitivu District is Sri Lanka Tamil and secondly 10% Sinhalese and 2% Indian Tamil. From the total population 100% is classified under rural population. No urban and estate population is recorded as per the statistics of Department of Census and Statistic.

67.05% of the total population in Mullaitivu District is located in the Oddusudan, Maritimé pattu and Puthukudiyiruppu DS Divisions of the specific project areas the details of the population distribution is given in table 2.94 below;

Table 2.94 Population by sex and sex ratio at DS Divisional Level – 2010

DS Division	Total	Ares km <sup>2</sup>	Population Density
Oddusuddan DSD	15,259	63,900	4.19
Maritimé pattu DSD	25,945	74,460	2.86
Puthukudiyiruppu DSD	7,169	37,100	5.18
TOTAL MULAITHIVU DISTRICT	66,518	261,690	3.93

Source – Department of Census and Statistics

According to the available information, ethnicity wise, majority of the population in the District is Hindu being 76%, secondly Christian 13% and 9% Buddhist.

The age wise distribution of the population of the DS Divisions of the specific project areas and the district as a whole is given in table 2.95 below which illustrates that the majority of the population comes under the 1-19 age category.

Table 2.95 Population by age group at DS Divisional Level – 2015

DS Division	Total Population	1-19	20-29	30-39	40-49	50-59	60≤
Oddusuddan DSD	15,259	6,202	2,471	2,144	1,771	1,582	1,089
Maritimé pattu DSD	25,945	7,880	4,325	3,771	3,397	2,903	1,269
Puthukudiyiruppu DSD	7,169	2,982	1,089	1,053	663	639	743
TOTAL MULAITHIVU DISTRICT	66,518	26,567	11,627	9,424	7,893	6,782	4,225

Source – Department of Census and Statistics

### 2.9.2.2 Economic status of the irrigated farming communities

According the statistic of the Annual Labour Force Survey Report of 2016, employment by main industry of the population over the age of 15 illustrates that from the total household population of age 15 above of 69263, 37,674 which is equivalent to 54.4% is considered as the total labour force of which, 36,072 which is 95.7% of the total labour force is employed. According to the survey statistics 14,617 (40.5%) is engaged in agriculture, 6,865 (19%) in industries and 14,591 (40.4%) in service industry.

## **Chapter 3: Environmental legislation, policies and institutions in Sri Lanka**

### **3.1 Overview of Environmental Legislation**

Sri Lanka is one of the leading countries in the South Asian region in enacting environmental legislations. Its concern for environment dates back to over two and a half millennia. The constitution of the Democratic Socialist Republic of Sri Lanka under chapter VI Directive Principles of State policy and Fundamental duties in section 27-14 and in section 28-f proclaim “The state shall protect, preserve and improve the environment for the benefit of the community”, “The duty and obligation of every person in Sri Lanka to protect nature and conserve its riches” thus showing the commitment by the state and obligations of the citizens.

The overall environmental concerns are addressed by the National Environmental Act No. 47 of 1980 (and subsequent amendments by act no 56 of 1988 and act no 53 of 2000). It is the umbrella legislation for environmental protection in the country. In addition, several other sectoral legislative enactments are in place. The national organization that has the mandate to protect and take measures to safeguard the environment is the Central Environmental Authority. It currently operates in the entire country except in the North Western Provincial Council (NWPC), where the NWPC has enacted a separate statute under the 13th amendment to the Constitution of Sri Lanka and had created a separate provincial institute.

There are several other key national agencies with a mandate for environmental management and protection. The Forest Department, Department of Wildlife Conservation, Department of Archaeology, Department of Coast Conservation and Coastal Resources Management, Disaster Management Center and Geological Survey and Mines Bureau have their regional offices and staff to cater to and monitor the environmental safeguards as per the policies and regulations governing them. In addition, there are several national agencies that are impacting on the environment and adopting environmental safeguards as well. They are the Sri Lanka Land Reclamation and Development Corporation, Urban Development Authority, Water Supply and Drainage Board, Water Resources Board and Irrigation Department.

The Local Authorities (LA) are also have provisions under their respective acts to safeguards and provide useful facility and maintain the same for the convenience of the public in their respective areas. The Municipal Council (MC) Act No. 19 of 1987 & Urban Council (UC) Act No. 18 of 1987 provide for the establishment of MCs and UCs with a view to provide greater opportunities for the people to participate effectively in the decision-making process relating to administrative and development activities at a local level and it specify the powers, functions and duties of such LAs and provide for matters connected therewith or incidental thereto. These acts contain sixteen and eight parts respectively, several schedules and 327 & 249 sections respectively. The MC act, spell out its status, powers & functions in Section IV, Section V and Section VI in sections 34 to 154 and covers public health, drainage, latrines, unhealthy buildings, conservancy & scavenging, nuisance etc. Further the respective local authorities have mandate regionally to implement the project activities and monitor the progress of compliance work.

## **3.2 Detail Review of Key Environmental Related Legislation**

### **3.2.1 The Constitution of Sri Lanka & the 13<sup>th</sup> Amendment**

The Constitution of Sri Lanka contains several provisions, relating to the environment 9 Article 27 (14) and article 28 (f). The 13<sup>th</sup> amendment to the constitution introduced a new level of institution for environmental protection and management. Therefore, the provincial government also has legislative and executive power, the North Western Provincial Environmental Authority to control, prevent and monitor all environmental related activities.

**Application to CIAP:** Overall responsibility of individuals and organizations to protect and conserve the natural environment. All project proponents/implementers and communities are responsible.

### **3.2.2 The National Environmental Act. No. 47 of 1980 & its amendments**

The National Environmental Act (NEA) provides conservation and development guidelines for natural resources including water, soil, fisheries resources, forest, flora and fauna in Sri Lanka. It also paved the way for the creation of the Central Environmental Authority (CEA). Further it spells out the creation of an Environmental Council in collaboration with the respective line agencies to advise the CEA (Section7) and provide necessary guidelines to establish District Environmental Agency under the chairmanship of the District Secretary. The NEA is the basic national decree for environmental protection. The three main regulatory tools implemented under the NEA are Environmental Impact Assessment/Initial Environmental Examination, Environment Protection License (EPL) and Schedule Waste Management License supported by standards for discharge and waste disposal guidelines.

A comprehensive description of EIA/IEE process is given in Annex 1. It is the key regulatory tool enabling any developer to implement the development activity in line with the NEA and thereby assuring the long-term sustainability of the development undertaken while paying due respect to the environment.

The second regulatory tool under the provisions of the National Environmental Act is the EPL. The EPL procedure has been introduced to prevent or minimize the release of discharges and emissions in to the environment from industrial activities in compliance with national discharge and emission standards, to provide guidance on pollution control for polluting processes and to encourage the use of pollution abatement technology such as cleaner production, waste minimization etc. Here the industries are classified into three lists named A, B and C. List A is comprised of 80 potentially high polluting industries, List B is comprised of 33 medium polluting industries and List C is comprised of low polluting industrial activities. The operational details are given in CEA website ([www.cea.lk](http://www.cea.lk)).

The third regulatory tool deals with the disposal of scheduled waste. The gazette notification No 1534/18 of 1<sup>st</sup> February 2008 made by the Minister under section 23A and 23B of the National Environmental Act No. 47 of 1980 is referred to as the National Environmental (Protection & Quality) regulations No. 1 of 2008. It deals with waste from specific and non-specific sources. The notification has three parts and eight schedules. The Part I deals with the Issue of Environmental Protection License for Emission of Disposal of waste. Part II deals on issue of license for the management of scheduled waste (Hazardous Waste) and Part III on General matters including definitions and the effectiveness and validity of the license issued under National Environment (Protection & Quality) regulation No 1 of 1990

published in extraordinary gazette No 595/16 of February 1990. The eight schedules include the tolerance limits, applications, formats for reporting, categorization of non-specific and specific waste etc.

The 1994 amendment delegated the authorization to the local authorities to issue EPL for low polluting industries. The CEA's environmental management functions are holistic and they are very well set out in section IV of the act. Along with the EPL procedures several standards also have been gazette with regard to disposal of effluents to land and water bodies.

**Application to CSIAP:** The EIA/IEE regulations will apply to any new activities proposed under the MGP and under any physical interventions proposed under Component 2 if initial screening reveals they have potential to trigger adverse environmental impact.

For further information of prescribed projects please visit: [www.cea.lk](http://www.cea.lk)

### 3.2.3 Environmental Protection License

The Environmental Protection License (EPL) is Sri Lanka's major regulatory program for control of industrial pollution stipulated in the National Environmental Act No. 47 of 1980, which was amended by Acts No.56 of 1988 and No. 53 of 2000. Industries and activities that have to be issued EPLs are classified under three categories: Category A, B and C. If a proposed project falls under Category A, the project proponent requires an EPL from the CEA, while Category C projects require EPLs from the respective local authorities. Like Category A, Category B projects require EPLs from the CEA, but the EPLs can be processed through the regional office of the CEA.

**Application to CSIAP:** EPLs will be required for activities undertaken under the categories, relevant to the agriculture sector and project activities, as specified in the Gazette namely Parts A, B & C.

### 3.2.4 The North Western Provincial Environmental Statute No. 12 of 1990

Provincial Environmental Act of 1991 implemented by the North Western Provincial Council applies for areas coming under the North-Western Province. Environmental Assessments are required for prescribed projects that have been gazetted in Gazette Extraordinary 1020/21 of 27<sup>th</sup> March, 1998. It specifies two lists of project types (a) where EIA/IEE is mandatory and (b) where the EA can be requested if the Project Approving Agency (PAA) decides so. The process is similar to that of the NEA and will be headed by one of the two listed PAAs; (a) Provincial Environmental Authority or (b) Provincial Ministry of Fisheries and Aquaculture.

**Application to CSIAP**– Similar to IEE/EIA regulations applicable under the NEA. In areas of the North-Western Province, this Act will supersede the NEA, except areas under the DWC or Department of Coast Conservation and Coastal Resources Management.

### 3.2.5 State Land Ordinance Act No 13 of 1949

The State Lands Ordinance provides necessary guidelines to:

- The protection of the source, course or bed of any public stream
- The protection of springs, reservoirs, lakes ponds lagoons, creeks, canals, aqueducts etc.



- The construction or protection of roads, paths, railways and other means of internal communication.
- The prevention of the erosion of soil.
- The preservation of water supplies.

In addition, section 75 of the State Land Ordinance highlights on riparian proprietors' activities. The occupier of land on the bank of any public lake or public stream shall have the right to use the water in that lake or stream for domestic purpose and shall not be diverted through a channel, drain or pipe or by means of a pump or other mechanical contrivance but shall be removed in a bucket or other receptacle.

**Application to CSIAP** – Applicable to be adhered to as there will be number of investments on surface water resources.

### **3.2.6 The Coast Conservation and Coastal Resources Management Act No.49 of 2011 (Amendment)**

The Coast Conservation and Coastal Resources Management Act makes provisions for the regulation and control of development activities within the coastal zone as well as formulates and executes schemes of work for coast conservation. Under the section 6 of the act, there is provision to appoint a Coast Conservation Advisory Council (CCAC) which would advise the Coast Conservation and Coastal Resources Management Department (CCCRMD) on all development activities proposed to be implemented in the coastal zone and review its coastal zone management plans. The law specifies that projects located wholly or partly within the coastal zone (the area lying within a limit of three hundred meters landwards of the Mean High Water line and a limit of 2km seawards of the Mean Low Water line and in the case of rivers, streams, lagoons, or any other body of water connected to these either permanently or periodically, the landward boundary shall extend to a limit of 2km measured perpendicular to the straight base line drawn between the natural entrance point thereof and shall include waters of such rivers, stream and lagoons or any other body of water so connected to the sea) must undergo the approval process that is laid down in the Act irrespective of its size.

Only those projects located totally outside the Coastal Zone will be subject to the approval process laid down in the National Environmental Act. Therefore, any development work taking place within this zone falls under the jurisdiction of CCCRMD. According to the Act, a Director of the CCCRMD has the discretion to request for an EIA/IEE from the project proponent if the initial screening reveals significant impacts in the coastal areas by the project. The process is very much similar to the NEA excepting that the Director of the CCCRMD reserves the right to request for an EIA/IEE depending on the nature and scale of anticipated impacts of the proposed investments rather than on pre-determined prescribed limits as in the NEA and also to make a final decision. The Director is advised by the CCAC on the findings of EIA/IEEs.

**Application to CSIAP:** Any project with potential to cause negative impacts on the coastal zone needs to comply with the EIA/IEE regulations of the Coast Conservation and Coastal Resources Management Act in addition to NEA.

### 3.1.1 The Flood Protection Ordinance Act No.22 of 1955

This Act provides the respective Minister to declare any area in the country as a flood area. It has provisions to prepare schemes for protection of a flood area, creation of a flood authority, regulations for management of flood area and acquisition of land for the purpose of the ordinance. The flood authority is usually the District Secretary of the affected area. In case of a large area of a Municipality coming under flood the Minister may substitute the District Secretary by appointing the Mayor of the Municipality.

**Application to CSIAP:** Flood mitigation measures should be built in to the essential design of the projects as well as storm water management interventions and improve drainage which need to be built in to the project designs to ensure potential impacts are mitigated. Site selection procedures will ensure that projects are located well away from flood plains and areas known as high-risk inundation areas.

### 3.1.2 The Fauna & Flora Protection Ordinance Act No. 49 of 1993 and its amendments

This Act provides for the protection, conservation and preservation of the fauna and flora of Sri Lanka. Under the Fauna and Flora Protection Ordinance (FFPO), five categories of protected areas are established viz. Strict Nature Reserves, National Parks, Nature Reserves, Jungle Corridors and Intermediate Zones including sanctuaries. According to the FFPO, any development activity of any description what so ever proposed to be established within a national reserve or within one mile from the boundary of any national reserve is required to be subjected to EIA/IEE, and written approval should be obtained from the Director General, DWC prior to implementation of such projects. The FFPO follows a similar process as the NEA in conducting scoping, setting the TOR, preparation of EA, review of EA and public consultation and disclosure. The Director General of the DWC finally grants the decision of project approval or disapproval.

**Application to CSIAP:** Any activity which will be implemented in close proximity of protected areas/wildlife reserves will require clearance from the Department of Wildlife Conservation.

### 3.1.3 The Sri Lanka Land Reclamation & Development Corporation (SLLRDC) Act No. 15 of 1968

The Act provides for the formation of the SLLRDC. The latest amendment to this Act is No 35 of 2006 which incorporated section 2A- Prohibiting filling or developing and reclaiming land, section 2B- declaring areas as low lying marshy or swampy and section 20 C- stipulating that pollution of canal as an offence. In addition, Section 28 of the principal enactment has added new definition—retention areas. The gazette regulations under this act also had declared several areas as wetland.

**Application to CSIAP:** Any activity that will impact low-lying areas such as wetlands will require to adhere to the above Act, as well as other legislation that provides protection to such areas such as FFPO, FO, EPA etc.

### 3.1.4 The Mines and Mineral Act No.33 of 1992

The Geological Survey and Mines Bureau established under the Mines and Minerals Act No. 33 of 1992. Under this act, mining falls within the purview of the Geological Survey and Mines Bureau (GSMB). Mining and exploitation for minerals, including sand, must be licensed under the Act by the GSMB. Mining licenses are issued only to qualified individuals and companies registered to do business in Sri Lanka. Mining is not permitted within Archaeological Reserves and within specified distance of monuments. New mining licenses are subject to the EIA process, if the type and extent of mining is listed under the EIA regulations. Additionally, the GSMB has power to stipulate conditions including the taking of deposits and insurance for the protection of environment. Regulations made by the GSMB under the Act cover a variety of environmental stipulations, criteria and conditions for licensing and operating mines.

This also covers the disposal of mine wastes. The Act also deals with the health, safety and welfare of miners. Reclamation of mines is a major problem in Sri Lanka and due to current practice requires the mining enterprise to make a deposit to cover costs of recovery. The deposit however is inadequate for the purpose. Large extents of mined areas, particularly areas mined for clay and sand remain open. Mining rights on public and private land are subject to licensing by the GSMB and all minerals wherever situated belonging to the state. The right to mine particular parcels of public lands may be subject to EIA procedures as well as to lease for permit conditions.

**Application to CSIAP:** Earth, sand and quarry material may be needed for the development work undertaken for the sub- projects. In such cases quantities specified need to be extracted and permission from the GSMB is required in addition to EPLs. Alternatively, the project contractors can procure them from the open market but they will have to make sure that such sources/traders are operating with valid licenses.

### **3.1.5 Water Resources Board Act No. 29 of 1964**

The Water Resources Board is a key player in the formulation of national policies relating to the control and use of water resources of the country, as well as coordination of projects undertaken by Government departments, local authorities and public corporations relating to the conservation, utilization development of the subterranean water resources of the country and the assessment of the possibilities, benefits and economic feasibilities of such projects.

**Application to CSIAP:** For PPP projects on the water sector, this Act becomes applicable.

### **3.1.6 Forest Ordinance including Amendments**

The Forest Ordinance is one of the oldest ordinances in the country, first enacted in 1887 under which the Forest Department was established in 1887. This act has been amended several times in the past. The Forest Reserves gazetted under the provisions of the ordinance and all proposed reserves that are not gazetted under these provisions but selected for conservation based on biological and hydrological importance should be taken into account in implementation of this project.

**Application to CSIAP:** Any projects conducted in proximity to buffer areas of forest reserves should obtain guidance from the Forest Department prior to implementation.

### 3.1.7 National Wetland Policy

The National Policy and Strategies on Wetlands (2005) seeks to give effect to the National Environment Policy and other relevant national policies, while respecting national commitments towards relevant international conventions, protocols, treaties and agreements on wetland protection to which Sri Lanka is a party. Among the International Conventions, Ramsar Convention on Wetlands of International Importance (1971), the Convention on Conservation of Migratory Species of Wild Animals (1979) and the Convention on Biological Diversity (1992) are significant.

The definition given for Wetlands in the policy is “Areas of marsh, fen, peat and or water, where natural or artificial, permanent or temporary with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters and may incorporate riparian and coastal zones adjacent to the wetlands and islands or bodies of marine water deeper than six meters at low tide within the wetlands”.

All sectoral development plans should be based on principles of wetland ecosystem management.

Institutional arrangement to manage wetlands is well established at present. A multi- stakeholder National Wetland Steering Committee has been established in the Ministry of Environment to advise on wetland issues in the country and wetland management unit has been set up at the Central Environmental Authority to oversee and facilitate policy implementation.

**Application to CSIAP:** Project investments that have the potential to cause impacts to wetlands should have specific mitigation measures as per the relevant regulations embedded in to the project design to ensure that they are managed within the purview of these regulations.

### 3.1.8 Mahaweli Authority of Sri Lanka Act (Act No.23 of 1979)

This act established the Mahaweli Authority of Sri Lanka, which is the authority responsible for the implementation of the Mahaweli Ganga Development Schemes including the construction and operation of reservoirs, irrigation distribution systems and installations for the generation and supply of electrical energy.

Further, the functions of the authority include fostering and securing the full and integrated development of any special area, conservation and maintenance of the physical environment within any special area, optimizing agricultural productivity, employment potential and generation and securing economic and agricultural development within any special area, promotion and securing the co- operation of Government Departments, State Institutions, Local Authorities, public cooperation and other persons, whether private or public, in the planning and implementation of the Mahaweli Ganga Development Schemes and in the development of any special area etc.

**Application to CSIAP:** Development interventions in and around the Mahaweli Development area should obtain consents from the Mahaweli Authority of Sri Lanka.

### 3.1.9 The Antiquities Ordinance

The Antiquities Ordinance (Revised in 1956 & 1998) is the main legislation dealing with the preservation of cultural assets in Sri Lanka. Section 16 covers Ancient Monuments and their declaration as well as the declaration of specified trees as ancient monuments. According to Section 21, the restoration, repair, alteration or addition in connection with any protected monuments has to be conducted in accordance with the conditions of a permit issued by the Director General of Archaeology, or in accordance with an agreement entered in to under Section 20. Section 24 prohibits or restricts subjects to certain prescribed conditions, the erection of buildings or carrying out mining, quarrying, or blasting operations on any land within the prescribed distance of any ancient monument situated on Crown land or any protected monument. As per the ordinance the Director General of Archaeology “shall cause an impact assessment survey to be undertaken at the expense of the sponsors of such project or scheme to assess the consequences thereof upon the antiquarian, historical or archaeological aspects or value of the land in question or on any antiquities upon it and shall, within such period of time as may be agreed on.

**Application to CSIAP:** There may be project activities in the vicinity of archaeological sites that will require prior clearance from the Department of Archaeology before investments are being done. Specific measures to ensure chance find physical cultural resources are managed accordingly as per this ordinance, should be embedded in to project environmental due diligence procedures.

### **3.1.10 Disaster Management Act No. 13 of 2005**

Under the Disaster Management Act No.13 of 2005, there is a provision to establish a National Council for Disaster Management (NCDM). The Act defines “disaster” as an actual or imminent occurrence of a natural or man-made event, which endangers or threatens to endanger the safety or health of any person or group of persons in Sri Lanka, or which destroys or damages or threatens to destroy or damage any property, and inter alia includes:

- An industrial hazard
- A fire
- An explosion
- A chemical accident
- Oils spills including inland oil spills
- Cyclones
- Tsunamis

Disasters may happen as the result of a malfunction of the normal operating procedures or precipitated by the intervention of an outside force such as a cyclone, flood or deliberate acts of arson or sabotage. The major objective of this act is to protect human life, property and the environment of Sri Lanka from any event defined as a disaster. Therefore, this act plays key role to protect the environment and provides necessary guidelines for the protection of human life, property and the environment of the country.

Major functions of the NCDM include, to formulate a National Policy and Program on the management of disasters which shall provide for the protection of life of the community and environment and the maintenance and development of disaster affected areas; the effective use of resources for preparedness prevention, response, relief, reconstruction and rehabilitation; and the enhancement of public awareness and training to help people to protect themselves from disasters.

Section 10 of the Sri Lanka Disaster Management Act stipulates that “It shall be the duty of every ministry, Government Department and public corporation to prepare a Disaster Management Plan with respect to such ministry, Government Department or public corporation to counter any disaster or impending disaster based on the National Disaster Management Plan and in accordance with such guidelines as may be specified by the National Council for Disaster Management. As per the definition of public corporation provided under Section 25 of the said act, a Disaster Management Plan is compulsory for coal-based thermal power plant operations.

**Application to CSIAP:** All activities should be prepared taking Disaster Management Plan of the respective sectors into consideration including specific measures to reduce impacts to the investments by potential disasters.

### **3.1.11 Prevention of Mosquito Breeding Act No. 11 of 2007**

This Act was passed for the purpose of ensuring the prevention and eradication of all mosquito-borne diseases. Under this Act, it is the duty of every owner or occupier of any premises to cause, (a) open tins, bottles, boxes, coconut shells, split, coconuts, tyres or any other article or receptacle found in or within such premises, capable of holding water, to be removed, destroyed or otherwise effectively disposed; (b) any well found in the premises and its surroundings to be maintained and kept in good repair so as to make it mosquito-proof and thereby prevent the breeding of mosquitoes; (c) any artificial pond or pool found in a premises to be emptied at least once every week; (d) any casual collection of water within the premises which is conducive to mosquito breeding, to be regularly drained; (e) shrubs, undergrowth and all other types of vegetation, other than those grown for the purpose of food or those which are ornamental, found within or outside any building or structure within the premises used as a dwelling place which has become a breeding place for mosquitoes, to be removed; (f) the removal and destruction of water plants having the botanical name *Pistia stratiotes* and commonly known as “diyaparandal”, “kondepasei”, “telpassy”, “barawa-pasi”, “nanayaviraddi” and of any other water plant, or plants, found within the premises, which may facilitate the breeding of mosquitoes.

**Application to CSIAP:** All activities during construction and operational stages should comply with the Prevention of Mosquito Breeding Act requirements to control or mitigate or avoid generation breeding sites.

### **3.1.12 Coconut Development Act 46 of 1971 amended by Coconut Development Law, No 24 of 1975 – Section 63 Regulations stipulated in the Gazette Notification No 331 of August 18, 1978 of Palmyra Development Board**

Ministry of Plantation constituted by the Gazette Notification 331 of August 18, 1978 published in terms of introduction of amendments of 74 of 1975 to the Sri Lanka Coconut Development Act of 46 of 1971 to carry out all forms of cultivation and development in relation to Palmyra Plantation. Under this gazette notification, Palmyra Development Board established and its main office located in Jaffna district. According to this gazette notification, engaging in the regulation, control, supervision, direction, management and inspection of the cultivation and utilization of land in Palmyra plantation and the cultivation of land with Palmyra palms.

**Application to CISAP:** Any activities requiring use of Coconut and Palmyra cultivated lands, should obtain the prior approval from the Palmyra Development Board.

### **3.1.13 Occupational Health and Safety**

Project interventions involve multifarious activities during construction and operation and maintenance phases. These activities are also associated with problems of occupational health and safety. The problems envisaged during construction and erection stages can mainly be due to exposure to dust, accidents and noise. The problems envisaged during the operation and maintenance phase are accidents, exposure to heat, noise, arc lights, chemicals etc.

The National Policy on Occupational Safety and Health in Sri Lanka is in the drafting stage. The Labour and Labour Relations Ministry in collaboration with 25 ministries, trade unions, employers and other authorities are involved in the drafting with the intention of reducing work place related injuries and other mishaps.

**Application to CSIAP:** All project activities, during construction should comply with, as far as applicable, with the requirements related to occupational, health and safety and International Labour Organization guidelines on the same.

### **3.1.14 The World Heritage Convention**

The United States initiated the idea of cultural conservation with nature conservation. A White House conference in 1965 called for a 'World Heritage Trust' to preserve "the world's superb natural and scenic areas and historic sites for the present and the future of the entire world citizenry." The International Union for Conservation of Nature developed similar proposals in 1968, and they were presented in 1972 to the United Nations conference on Human Environment in Stockholm. States Parties are countries which have adhered to the World Heritage Convention. They thereby agree to identify and nominate properties on their national territory to be considered for inscription on the World Heritage List. When a State Party nominates a property, it gives details of how a property is protected and provides a management plan for its upkeep. States Parties are also expected to protect the World Heritage values of the properties.

Under the World Heritage Committee signatory countries are required to produce and submit periodic data reporting providing the World Heritage Committee with an overview of each participating nation's implementation of the World Heritage Convention and a "snapshot" of current conditions at World Heritage properties. State parties that have ratified the World Heritage (WH) Convention, agree to assure the effective implementation of any measure to protect designated WH properties. They are bound to ensure that development or change does not impact negatively on the "Outstanding Universal Value (OUV)", integrity and/or authenticity of the property. Despite this, management deficiencies of nations that have ratified the convention and aggressive development, especially in urban areas, are the two major threats to WH properties. These are typical scenarios under the World Heritage context within which the WH Convention has a strong mandate to ensure that proper due diligence mechanisms are undertaken.

According to the UNESCO WH Committee, over the last decade they have addressed a considerable number of Status of Conservation Reports related to threats to WH properties from various forms of

large-scale development. These developments include roads, bridges, tall buildings, “box” buildings (e.g. malls), inappropriate, a contextual or insensitive developments, renewals, demolitions and new infrastructure typologies like wind farms, as well as land-use policy changes and large scale urban frameworks. The Committee has also examined threats from excessive or inappropriate tourism. WH properties need to be seen as single entities that manifest OUV. The OUV of Heritage Assets, both designated and non-designated, is reflected in a range of attributes, and in order to sustain OUV it is those attributes that need to be protected. Heritage Impact Assessments (HIAs) have been identified by The WH Committee as the most appropriate tool to evaluate effectively the impact of potential development on the OUV of properties and ensure proper management mechanisms are put in place to mitigate any potential negative impacts.

In order to provide a clear directive on the HIA requirements the International Council on Monuments and Sites (ICOMOS) published the Guidance on Heritage Impact Assessments for Cultural World Heritage Properties in January 2011. ICOMOS is the Advisory Body to the WH Committee for cultural World Heritage properties. The guidance document was prepared in order to contribute to an effective impact assessment of potential development on the OUV of properties. It is addressed to managers, developers, consultants, donors and decision-makers, but also to the WH Committee and States Parties. The HIA process increases objectivity related to individual assessments while providing better protection of OUV attributes. It also facilitates a clear understanding not only of the key threats and causes to OUV attributes but also on the level of integrity of OUV attributes, while considering both substantive and procedural effectiveness and continual conservation and management of the heritage asset.

### **3.2 Adequacy of GOSL Environmental Clearances**

The composite GOSL environmental clearance process, in principle, is consistent with the World Bank environmental and public disclosure requirements. The exception being the screening criteria adopted in the GOSL process under the NEA, where project thresholds are used to determine the type of clearance required and the content of public consultation.

Activities to be invested under the CSIAP will require to adhere to both national environmental regulations as well as the World Bank’s environmental safeguard policies (discussed in the next Chapter). The CEA’s and other Project Approving Agencies (PAAs) regulated EA procedures have been in place for more than three decades and substantial experience has been made by the CEA and other PAAs in evaluation of EIAs/IEEs. Hence, there will be no need for the project to provide technical assistance to the CEA and other PAAs to provide support to the project on environmental matters where it may become applicable. However, capacity for the project management and implementing agencies to respond to national and the World Bank safeguard requirements and to manage and monitor the environmental impacts will need to be built as part of project planning and implementation.



## Chapter 4: World Bank environmental safeguard policy requirements

The World Bank has several Operational Policies (OPs) and Bank Procedures (BPs) concerning environmental and social issues, which together are referred to as the Bank's Safeguard Policies. If, during the designing of a project, it is considered that it is possible that a proposed project activity could be the subject of one of the safeguard policies, that policy is considered to have been triggered or applicable. The sections below provide some details of those environmental safeguard policies that may be applicable for this project and the actions need to be taken to ensure that the requirements of those policies will be met adequately.

### 4.1 Environmental Assessment (OP/BP4.01)

This policy is triggered as the project is likely to have potential (adverse) environmental risks and impacts in its area of influence due to rehabilitation of existing physical infrastructure and new investments. The policy requires environmental assessment (EA) of projects proposed for World Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making. Safeguard Instruments should consider the natural environment, human health and safety and social aspects in an integrated way. It should also consider the variations in project and country conditions, the findings of country environmental studies, national environmental action plans, the country's overall policy framework and national legislation, the project sponsor's capabilities related to the environment and social aspects, and obligations of the country, pertaining to project activities, under relevant international environmental treaties and agreements.

When this policy is triggered, the World Bank classifies proposed projects into one of four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

- A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works.
- A proposed project is classified as Category B if its potential adverse environmental impacts on human populations or environmentally important areas including wetlands, forests, grasslands and other natural habitats are less adverse than those of Category A projects. These impacts are site specific; few if any are irreversible; and in most cases mitigatory measures can be designed more readily than for Category A projects. The scope of an EA for Category B projects may vary from project to project, but it is narrower in scope when compared with Category A projects.
- A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. For example, technical assistance projects on institutional development, computerization, and training fall in Category C.
- A proposed project is classified as FI when the Bank provides funds to participating national banks, credit institutions and other financial intermediaries (FIs) for on lending at the FIs' risk to final borrowers. In the case of such projects, the FI screens each subproject proposed for financing, and classifies it into any one of three categories: A, B or C. FIs must prepare an Environmental and Social Management Framework, following the Bank's consultation and disclosure requirements as in the case of other safeguards documents. The screening process for categorization of subprojects, must be spelled out in the operational manual.

The CSIAP is classified as an Environmental Category B based on the likely investments that would be supported. The World Bank OP 4.01 is very clear that as appropriate for Category B projects during the EA process, the project implementing agencies should consult project-affected groups and local NGOs about the project's environmental aspects and take their views into account. The EA should particularly incorporate such comments to improve the project's social acceptability and environmental sustainability. In addition, the project implementing agencies should consult with such groups throughout project implementation, as necessary to address EA related issues that affect them.

It has been agreed with the World Bank in order to be in compliance with the OP4.01 – Environmental Assessment during the project preparation stage, this EAMF will be prepared that would guide the processes to be followed including project-specific environmental instruments to be used for the physical interventions that will be supported by the project. The EAMF outlines the necessary safeguards measures to be undertaken over the course of project implementation including the requisite due diligence measures to be taken at all steps of project implementation, including consultations, procedures for environmental management during construction and operation and monitoring. Operations are required to be in line with both national environmental guidelines as well as the World Bank Group General and Sectoral Environmental, Health and Safety Guidelines. All safeguards instruments to be prepared during project implementation: (i) must be carried out independently to the feasibility studies; and (ii) will be subjected to consultation, clearance and disclosure.

**Compliance with OP 4.01 Annex C Environmental Action Plans (or Environmental Management Plans).**

According to Annex C of the World Bank OP4.01, an EMP is an essential element for majority of physical investments under the project. The EMP should consist of a set of mitigation, management, monitoring, and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, reduce them to acceptable levels or offset them. The plan should also include the actions needed to implement these measures. In preparation of an EMP, the EA consultant should:

- Identify the set of responses to potentially adverse impacts;
- Determine requirements for ensuring that those responses are made effectively and in a timely manner
- Describe the means for meeting those requirements.

More specifically, the EMP should include the following components:

- The EMP should identify feasible and cost-effective measures that may reduce potentially significant adverse environmental impacts to acceptable levels. The plan includes compensatory measures if mitigation measures are not feasible, cost-effective, or sufficient.  The EMP should define monitoring objectives and specify the type of monitoring needed, with linkages to the impacts assessed in the EA report and the mitigation measures described in the EMP.
- To strengthen the project implementing agency's environmental management capability, EMPs should mention any technical assistance that may be needed by the borrower.
- For all three aspects (mitigation, monitoring, and capacity development), the EMP should provide (a) an implementation schedule for measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans; and (b) the capital and recurrent cost estimates and sources of funds for implementing the EMP.

- The EMP must be integrated into the project's overall planning, design, budget, and implementation.

During project implementation, the project sponsor should report on compliance with:

- Measures agreed with World Bank on the basis of the findings and results of the EA, including implementation of any EMP, as set out in the project documents
- The status of mitigatory measures; and
- The findings of monitoring programs.

## **4.2 Natural Habitats (OP/BP4.04)**

This policy is triggered to ensure due diligence actions are in place as part of the EAs if projects are carried out closer to sensitive natural habitats require specific measures to mitigate potential impacts to these natural habitats and associated fauna and flora. The World Bank does not support projects that, in its opinion, involve the significant conversion or degradation of critical natural habitats. Therefore, the short-listed PPP projects should not conduct any activities within designated or on the buffer zones of protected areas and project interventions will facilitate in mitigating pollution and degradation of such ecosystems due to project investments.

Wherever feasible, the projects should be sited on lands already converted (excluding any lands that in the Bank's opinion were converted in anticipation of the project). The Bank does not support projects involving the significant conversion of natural habitats unless there are no feasible alternatives for the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs. If the environmental assessment indicates that a project would significantly convert or degrade natural habitats, the project includes mitigation measures acceptable to the Bank. Such mitigation measures include, as appropriate, minimizing habitat loss (e.g., strategic habitat retention and post-development restoration) and establishing and maintaining an ecologically similar protected area. The Bank accepts other forms of mitigation measures only when they are technically justified.

In deciding whether to support a project with potential adverse impacts on a natural habitat, the Bank considers the borrower's ability to implement the appropriate conservation and mitigation measures. If there are potential institutional capacity problems, the project includes components that develop the capacity of national and local institutions for effective environmental planning and management. The mitigation measures specified for the project may be used to enhance the practical field capacity of national and local institutions.

## **4.3 Pest Management (OP/BP4.09)**

This policy is triggered as the project involves support to agriculture sectors where pest management may also be supported. If such interventions are identified to be financed by the project, it is expected that those interventions adopt a strategy that promotes the use of biological or environmental control methods and reduces reliance on synthetic chemical pesticides. In Bank-financed projects, the borrower addresses pest management issues in the context of the project's environmental assessment. An assessment will be made on the capacity of the country's regulatory framework and institutions to promote and support safe, effective, and environmentally sound pest management.

**Agricultural Pest Management.** The World Bank has financed number of projects in the past (including currently ongoing operations) that have developed and supported integrated pest management (IPM) and the safe use of agricultural pesticides. The Pest Management Plan<sup>1</sup> already developed for Bank- financed Agriculture Sector Modernization Project will be adopted under this project. In Bank-financed agriculture operations, pest populations are normally controlled through IPM approaches, such as biological control, cultural practices, and the development and use of crop varieties that are resistant or tolerant to the pest. The Bank may finance the purchase of pesticides when their use is justified under an IPM approach.

**Criteria for Pesticide Selection and Use.** The procurement of any pesticide in a Bank-financed project is contingent on an assessment of the nature and degree of associated risks, considering the proposed use and the intended users. With respect to the classification of pesticides and their specific formulations, the Bank refers to the World Health Organization's *Recommended Classification of Pesticides by Hazard and Guidelines to Classification* (Geneva: WHO 1994-95). The following criteria apply to the selection and use of pesticides in Bank-financed projects:

- They must have negligible adverse human health effects;
- They must be shown to be effective against the target species;
- They must have minimal effect on nontarget species and the natural environment. The methods, timing, and frequency of pesticide application are aimed to minimize damage to natural enemies. Pesticides used in public health programs must be demonstrated to be safe for inhabitants and domestic animals in the treated areas, as well as for personnel applying them; and
- Their use must consider the need to prevent the development of resistance in pests.

The Bank requires that any pesticides it finances be manufactured, packaged, labeled, handled, stored, disposed of, and applied according to standards acceptable to the Bank. The Bank does not finance formulated products that fall in WHO classes IA and IB, or formulations of products in Class II, if (a) the country lacks restrictions on their distribution and use; or (b) they are likely to be used by, or be accessible to, lay personnel, farmers, or others without training, equipment, and facilities to handle, store, and apply these products properly.

#### **4.4 Physical Cultural Resource (OP/BP 4.11)**

While the project will take all precautions to eliminate all possible impacts on any physical cultural resources, the new infrastructure and improvements to existing infrastructure could always bring about some risks during works and therefore, it is prudent to trigger this policy. This policy addresses physical cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial or national level, or within the international community.

The policy requires the projects to avoid or mitigate adverse impacts on physical cultural resources. The impacts on physical cultural resources resulting from project activities, including mitigating measures,

---

<sup>1</sup><http://documents.worldbank.org/curated/en/130431468335432903/pdf/SFG2038-EA-P156019-Box396247B-PUBLIC-Disclosed-4-21-2016.pdf>

may not contravene either the country's national legislation, or its obligations under relevant international environmental treaties and agreements.

***Physical Cultural Resources within Environmental Assessment.*** The project proponent addresses impacts on physical cultural resources in projects proposed for Bank financing, as an integral part of the EA process. The steps elaborated below follow the EA sequence of: screening; developing TORs; collecting baseline data; impact assessment; and formulating mitigating measures and a management plan.

The following projects are classified during the environmental screening process as Category A or B, and are subject to the provisions of this policy:

- any project involving significant excavations, demolition, movement of earth, flooding, or other environmental changes; and
- any project located in, or in the vicinity of, a physical cultural resources site recognized by the borrower.

Projects specifically designed to support the management or conservation of physical cultural resources are individually reviewed.

To develop the TORs for the EA, the project proponent, in consultation with the Bank, relevant experts, and relevant project-affected groups, identifies the likely physical cultural resources issues, if any, to be considered by the EA. The TORs normally specify that physical cultural resources be included in the baseline data collection phase of the EA. The project proponent identifies physical cultural resources likely to be affected by the project and assesses the project's potential impacts on these resources as an integral part of the EA process, in accordance with the Bank's EA requirements. When the project is likely to have adverse impacts on physical cultural resources, the project proponent identifies appropriate measures for avoiding or mitigating these impacts as part of the EA process. These measures may range from full site protection to selective mitigation, including salvage and documentation, in cases where a portion or all of the physical cultural resources may be lost.

As an integral part of the EA process, the project proponent develops a physical cultural resources management plan that includes measures for avoiding or mitigating any adverse impacts on physical cultural resources, provisions for managing chance finds, any necessary measures for strengthening institutional capacity, and a monitoring system to track the progress of these activities. The physical cultural resources management plan is consistent with the country's overall policy framework and national legislation and takes into account institutional capabilities with regard to physical cultural resources. The Bank reviews, and discusses with the project proponent, the findings and recommendations related to the physical cultural resources aspects of the EA, and determines whether they provide an adequate basis for processing the project for Bank financing.

As part of the public consultations required in the EA process, the consultative process for the physical cultural resources component normally includes relevant project-affected groups, concerned government authorities, and relevant nongovernmental organizations in documenting the presence and significance of physical cultural resources, assessing potential impacts, and exploring avoidance and mitigation options.

The findings of the physical cultural resources component of the EA are disclosed as part of, and in the same manner as, the EA report. Exceptions to such disclosure would be considered when the borrower,

in consultation with the Bank and persons with relevant expertise, determines that disclosure would compromise or jeopardize the safety or integrity of the physical cultural resources involved or would endanger the source of information about the physical cultural resources. In such cases, sensitive information relating to these particular aspects may be omitted from the EA report.

#### **4.5 Forests (OP/BP 4.36)**

Similar to OP 4.11, while all precautionary actions will be taken to avoid any negative impacts to forests, it is anticipated based on current practices in the country, physical interventions may bring about impacts on the health and quality of forests due to activities such as construction material extraction. While, the World Bank-financed projects explicitly prohibits such activities particularly in protected areas, the public-sector projects still carry out such activities. Therefore, this policy is triggered.

The Bank does not finance projects that, in its opinion, would involve significant conversion or degradation of critical forest areas or related critical natural habitats. If a project involves the significant conversion or degradation of natural forests or related natural habitats that the Bank determines are not critical, and the Bank determines that there are no feasible alternatives to the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs, the Bank may finance the project if it incorporates appropriate mitigation measures. The Bank also does not finance projects that contravene applicable international environmental agreements. In accordance with OP/BP 4.01, *Environmental Assessment*, the EA for project interventions should address the potential impact of the project on forests and/or the rights and welfare of local communities where applicable.

#### **4.6 Safety of Dams (OP/BP 4.37)**

**Tank cascade system.** The dry zone minor irrigation clusters of Sri Lanka were widely considered as one of the unique water conveying and management systems among the ancient civilizations of the world. This is now known as 'Tank Cascade Systems' and has been known to impact the irrigation systems in Sri Lanka since 3<sup>rd</sup> century BC. The island of Sri Lanka is characterized by two contrasting climatic zones known as the "wet zone" and the "dry zone". An intermediate zone is also recognized between these zones. Limited water availability and high ambient temperatures are characteristic of the dry zone where the monsoon rains are confined to two or three months of the year with a bimodal annual distribution.

Intermittent water flows are common in the dry zone lowland areas which cover nearly two thirds of the island. Since water is a scarce resource in the dry zone of Sri Lanka, drainage from the highlands towards the dry lowlands has been harnessed by tanks to irrigate extensive paddy fields by ancient communities. The tanks and related water conveying structures were particularly developed in the dry and intermediate climate zones of Sri Lanka where average annual rainfall varies from 900 to 1800 mm. More than 12,000 operational tanks and reservoirs have been identified within these zones, and a similar number still remains abandoned. A tank cascade system is defined as a connected series of tanks organized within minor or meso-catchments of the dry zone landscape. The tanks in these meso-catchments served to store, convey and utilize water from ephemeral rivulets. It has been identified meso-catchments within the cascade system as a small unit in the toposequence with an average area of 21 km<sup>2</sup> and ranging from 13 to 26 km<sup>2</sup>. The dry and intermediate lowlands of Sri Lanka are

characterized by a rolling topography surrounding the central mountainous highlands. Surface streams from central mountain regions slowly meander through the dry zone lowlands to the Indian Ocean. The lowland plain, where TCSs were mainly constructed, has an average relief of 100m above mean sea level. The geology and the geological structure of the dry zone are also factors that govern the tank distribution. Most tanks were constructed in this Precambrian terrain, and in many cases, rock exposures have been used as their embankments. However, the tank beds are located on alluvial deposits and on weathered overburden of varying thickness.

This policy is triggered as there may be support to small dams and conveyance systems of the tank cascade system. The World Bank's safeguard policy on Safety of Dams is based on the principle that, for the life of a dam, the owner (in this case the GOSL) is responsible for ensuring that appropriate measures are taken and sufficient resources are provided for the safety of the dam, irrespective of its funding sources or construction status. Because there are serious consequences if a dam does not function properly or fails the Bank is concerned about the safety of a new dam it finances and existing dams on which a Bank financed project is directly dependent, this policy requires that the dam upgrading be designed and its civil works be supervised by experienced and competent professionals. It also requires that the project proponent adopts and implements certain dam safety measures for the design, bid tendering, construction, operation and maintenance of the dam and associated works.

For large dams (which are normally 15 meters or greater) and dams below that height but are considered to be complex from a design and management point of view, this policy requires that investigations, designs, construction and operation of the dam be reviewed by an independent panel of experts. The panel should also review detailed preparation and implementation plans, construction supervision plans, quality assurance plans, operations and monitoring plans and an emergency preparedness plan. The panel's inputs will be required for prequalification of bidders and during procurement as well as for periodic safety inspections after the completion of the civil works.

The Panel will consist of three or more experts, appointed by Government of Sri Lanka and acceptable to the World Bank (if Bank is financing), with expertise in the various technical fields relevant to the safety aspects of the particular dams. The primary purpose of the panel is to review and advise the implementing agency of GOSL on matters relative to dam safety and other critical aspects of the dam, its appurtenant structures, the catchment areas, the area surrounding the reservoir and downstream areas. The Panel should also review and evaluate the implementing agency's operation and maintenance procedures and recommend improvements if necessary.

#### **4.7 Involuntary Resettlement (OP/BP 4.12)**

Involuntary resettlement may cause severe long-term hardship, impoverishment, and environmental damage unless appropriate measures are carefully planned and carried out. For these reasons, the overall objectives of the Bank's policy on involuntary resettlement are the following:

- Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs;
- Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits. Displaced persons<sup>3</sup> should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs; and

- Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

This policy covers direct economic and social impacts that both result from Bank-assisted investment projects, and are caused by

(a) the involuntary taking of land resulting in

- relocation or loss of shelter;
- loss of assets or access to assets; or
- loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or

(b) the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons.

This policy applies to all components of the project that result in involuntary resettlement, regardless of the source of financing. It also applies to other activities resulting in involuntary resettlement, that in the judgment of the Bank, are

- directly and significantly related to the Bank-assisted project,
- necessary to achieve its objectives as set forth in the project documents; and carried
- out, or planned to be carried out, contemporaneously with the project.

Please refer to Project's Resettlement Policy Framework for further details.

#### **4.8 The World Bank Group's Environmental, Health and Safety Guidelines**

The World Bank Group's Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice. The EHS Guidelines are applied as required by their respective policies and standards. These industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors.

The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them. The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment in which site-specific variables, such as host country context, assimilative capacity of the implementing entities defined as the exercise of professional skill, diligence, prudence and foresight that would be reasonably expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of financial and technical feasibility. Environment, and other project factors, are taken into account. The applicability of specific technical recommendations should be based on the professional opinion of qualified and experienced persons. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures than



those provided in these EHS Guidelines are appropriate, in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects will be required to achieve whichever is more stringent. As the EHS guidelines are more stringent to the measures present in Country, the EHS guidelines should be followed where applicable and links provides the applicable guidelines:

□ **General EHS Guidelines:**

<http://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES> □

EHS Guidelines for annual crop production:

[http://www.ifc.org/wps/wcm/connect/c6f002804c3c4596bb44bfd8bd2c3114/Annual+Crop+Production+EHS+Guidelines\\_2016+FINAL.pdf?MOD=AJPERES](http://www.ifc.org/wps/wcm/connect/c6f002804c3c4596bb44bfd8bd2c3114/Annual+Crop+Production+EHS+Guidelines_2016+FINAL.pdf?MOD=AJPERES) □

EHS Guidelines for perennial crop production:

[http://www.ifc.org/wps/wcm/connect/ef0d4b804c3c5ad9bcb9bed8bd2c3114/English\\_2016\\_Perennial+Crop+Production\\_EHS.pdf?MOD=AJPERES](http://www.ifc.org/wps/wcm/connect/ef0d4b804c3c5ad9bcb9bed8bd2c3114/English_2016_Perennial+Crop+Production_EHS.pdf?MOD=AJPERES)

# Chapter 5: Generic assessment of environmental issues and mitigation measures

## 6.1 Overview

The project is classified as environmental category B, and the project is expected to bring positive environmental benefits to the project areas with the adoption of climate-smart irrigated agriculture by introducing and expanding modern technology that promotes sustainable practice and applications that help improve current cropping patterns and farming methods, increasing efficiency in the management of water resources, protecting agriculture soils, and rolling out integrated pest management. However, there remain risks associated with implementation of project activities, given the uncertainty regarding the exact locations of activities to be carried out under the project and project interventions that will involve physical interventions that could bring about adverse impacts to the environment, such as those identified in Component 2.

This EAMF has been designed to achieve sound environmental practices as part of the investments that will be supported under the project. The EAMF provides the mechanism to allow program implementation by screening out or enhancing acceptability of sub-project proposals on the basis of environmental criteria. By a simple process of elimination, the first step in the screening process is to identify subproject activities not suitable for funding. All processes described in the EAMF can be adjusted based on implementation experience. The EAMF will be a living document and will be reviewed and updated periodically as needed.

It is recommended that the following types of subprojects are not financed and therefore should be considered as a "Negative List":

- Activities that involve significant conversion or degradation of critical natural habitats such as protected areas, natural wetlands, forest catchments, etc.
- Activities that could lead to invasion or spread of invasive weeds and feral animals or the use of toxic chemicals such as intensive use of pesticides.
- Activities that could dangerously lead to the exposure of sensitive/critical/vulnerable habitats. Activities that would increase human-wildlife conflict – especially human-elephant conflict.
- Construction of large new infrastructure within or directly adjacent (in buffer zones) to protected areas.
- Illegal activities as defined specifically under the Forest Ordinance and Fauna and Flora Protection Ordinance.
- Extraction of material such as gravel, sand, metal, etc. from protected areas.

## 6.2 Component specific impacts

The following section of the framework tries to identify possible environmental impacts that could arise in each component and how best they could be assessed and addressed during project implementation.

### Component 1: Promote Infrastructure Planning, Development and Management for Climate-Smart Agriculture

Sub-component	Potential activities	Environmental impacts	Mitigation measures
---------------	----------------------	-----------------------	---------------------

Sub-component 1.1: Development of Climate-Smart Hot-Spot Area Development Plans	Support the preparation of investment plans to develop and manage climate smart agriculture and irrigation systems	Inadequate integration of environmental aspects into the planning process	Undertake Strategic Environmental and Social Assessments (SESAs) for each HSAD PLAN assess the impacts and integrate environmental consideration into the plans
Sub-component 1.2: Rehabilitation, Modernization and Development of Infrastructure for Climate-Resilience	Support (re-)design, rehabilitation, modernization, construction, and O&M of a range of water infrastructure including (a) minor irrigation water bodies (tanks), water-harvesting structures, and inflow and distribution channels; (b) drainage and flood control systems; (c) water harvesting structures upstream from the tanks to enhance water infiltration and storage, to enhance water storage, delivery and management, given different climate-based scenarios; and (d) design, construction /rehabilitation, and O&M of rural roads needed to access minor irrigation infrastructure	Planning phase impacts including designs that may inundate protected areas, fragment important wildlife and forest habitats, etc. Land preparation and construction phase impacts due to poor land management and construction practices Operation stage impacts due to poor O&M of water infrastructure	Undertake SESAs and intervention/site-specific EAs ensuring such impacts and suitable mitigation measures are identified Develop EMPs that will address impacts during land preparation, construction and operations phases
Sub-component 1.3: Capacity Enhancement and Coordination to Plan and Manage Climate-resilient Infrastructure	Support to enhance capacities of key government and non- government actors involved, and to strengthen the institutional framework necessary to support and coordinate the various stakeholders across different agencies, in order to develop and deliver the HSAD PLAN process	Non-inclusion of environmental sustainability in the capacity enhancement activities	Training and knowledge sharing plan for the key government and non-government actors involved

**Component 2: Promote Climate-Smart Agriculture Production Systems and Value-Chains**

Sub-component 2.1: Building Individual and Institutional Capacity	Finance: (i) strengthening farmer community institutions (farmer organizations (FOs), and producer groups (PGs)); and (ii) strengthening the capacity of GND level officials to deliver targeted climate resilience agricultural services.	Absence of linkages to environmental agencies to integrate environmental sustainability aspects in the functionality of farmer and GND institutions Poor agriculture production practices increasing use of	Create linkages to institutions such as Forest Department, Department of Wildlife Conservation, etc. during the HSAD PLAN process.
Sub-component 2.2: Development and financing of	Develop the project approach to promote climate smart agriculture, covering production		Adoption of the pest management plan during production and

Business Plans (BPs)	practices (soil, water, and crop choice & management, etc.) and post-crop-harvest management (storage, value addition/processing, packaging, etc.	chemicals, sedimentation, run-off tonaturalhabitatsand waterways Poor post crop harvest management practices increasing pests, disease-spread	post-harvest management Training of farmers the use of integrated pest management Adoption of best practices of land and water management on farmlands
Sub-component 2.3: Development of critical market infrastructure	Enhance producers' profitability and incentivize the adoption of climate-smart practices and technologies by providing finance forPGstoconstruct/rehabilitate infrastructure for agri-commodity storage, processing, and marketing, including the construction and/or upgrading of Common Service Centers (CSCs) and wholesale and periodic rural markets	Poor siting of market infrastructure Design and construction phase impacts Operation phase impacts	Undertake site-specific EAs ensuring such siting related impacts and suitable mitigation measures are identified Develop EMPs that will address impacts during design, land preparation, and construction Best practice guides developed to be used during operations phase

### 6.3 Generic environmental issues and mitigation measure

#### 5.3.1 Impacts on soil at construction and material extraction sites

Impact description	Duration of the impact	Level of impact
Loss of productive top soil due to site preparation work	Long-term	Moderate
Soil erosion caused by clearing and grubbing operations which removes the vegetative cover in the immediate surroundings	Long-term	High
Soilerosioncausedbyminingandquarryingoperations	Long-term	Moderate
Contamination of soil by heavy metals and chemicals discharged by construction vehicles and from material storage sites	Short-term	High
Erosion of uncovered temporary stock piles and soil dumps	Short-term	Low

#### 5.3.2 Impacts on surface and ground water sources occur due to following activities

Impact description	Duration of the impact	Level of impact
Siltation of waterways due to modifications to surface water flow and drainage patterns	Long-term	Moderate
Degradation of surface water quality due to equipment and material piling on the site	Short-term	Low
Degradation of water quality due to waste water from worker camps	Short-term	Moderate

Degradation of water quality in water bodies in the vicinity of quarry and borrow sites	Short-term	Moderate
Reduction in groundwater recharge due to drainage and excavation, especially in dry areas	Long-term	High

### 5.3.3 Impacts on ambient air quality and noise within construction sites, material extraction sites and yards

Impact description	Duration of the impact	Level of impact
Operation of construction vehicles and plants (AC plant and concrete batching plants) that emit obnoxious gases	Short-term	Moderate
Exposure of soil surface due to excavation, clearing of surface vegetation which generates dust	Short-term	Moderate
Mining operations of metal and gravel for construction material will emit dust and other particulate matter	Short-term	Moderate
Improper storage of chemicals that could emit fumes of stored chemicals	Short-term	High
Increased noise nuisance and vibration issues to public living close to construction areas and quarries	Short-term	Moderate

### 5.3.4 Impacts on fauna and flora and their habitats

Impact description	Duration of the impact	Level of impact
Clearing of vegetation for construction activities may lead to disturbance to natural habitats (wetlands, forest areas, lagoons, etc.)	Long-term	High
Clearing of surface vegetation in quarry sites and burrow sites may lead to the loss of land/ natural habitats	Long-term	High
Loss of important fauna and flora due to construction works	Long-term	Moderate
Disturbance to animal migration routes and patterns	Long-term	High
Changes to aquatic ecosystems due to siltation of waterways, discharge of agriculture chemicals, changes to speed and volume of water flow	Long-term	High
Contamination of biota by emissions to air, effluents in water and soil during construction and material extraction works	Short-term	Moderate
Loss of standing crops, fruit trees and commercially valuable trees due to construction works close to home gardens and farmlands	Long-term	Moderate

### 5.3.5 Social Impacts during Construction

Impact description	Duration of the impact	Level of impact
Occupational health and safety to workers	Short-term	Moderate

Disturbances to communities in areas where physical interventions will take place	Short-term	Moderate
Loss of livelihood		
Blockage of access to public amenities, homes, etc. during construction period	Short-term	Moderate
Impacts to communities due to presence of outside labor gangs	Short-term	Low

*Generic EMP for Construction Project is given in Annex A7.2.*

## **Chapter 6: Environmental Management Framework**

### **6.1 Strategic Environmental and Social Assessment**

It has been recommended that SESAs should be conducted for the HSAs to ensure the CS... Will take the environmental and social sustainability aspects integrated into the planning process. The terms of reference to conduct a SESA is provided in Annex 11.

In areas where SESAs or Regional Environmental Assessments (REAs) are already existing that could be integrated into the HAS planning process, only environmental screening of sub-project proposals under Component 2 will be adequate.

### **6.2 Environmental screening of sub-project proposals under Component 2**

Environmental screening is counted to be a useful tool in identifying environmental safeguard issues in large investment programs consisting of many sub-projects. As such, all sub-projects under Component 2 of the CSIAP (excepting those that obviously are environmentally benign or low impact or those that have been screened through SESAs) will be subjected to an environmental screening using the form provided in Annex 4 and if dams and related structures are involved, also to be screened using the guidelines in Annex 5.

The main objective of Environmental Screening of sub-projects will be to (i) determine the anticipated environmental impacts, risks and opportunities of the sub-project; and (ii) determine if the anticipated impacts and public concern warrant further environmental analysis, and if so to recommend the appropriate type and extent of Environmental Assessment needed. Screening should go hand in hand with sub-project planning/concept development. This way environmental opportunities and risks can be appropriately and easily integrated into subsequent design stages, rather than being brought in at the last minute. The environmental screening report should be prepared by an environmental expert/s with field visits and available data and information. Once the report is ready it will be made available to the project implementing agency to take necessary actions particularly in relation to the recommendation given in thereport.

#### **6.2.1 Screening Method**

Preparation of the screening reports will be conducted in four distinct stages, namely (i) field visits, data collection and stakeholder consultation; (ii) data analysis and interpretation; (iii) impact identification; and (iv) filling the screening including recommendations for next steps. The methodologies for each of these steps are explained briefly below. The proposed screening report format is given in Annex 4.

##### **6.2.1.1 Data collection and stakeholder consultations**

Data will be primarily collected through field visits, discussion with stakeholder agencies and known sources of literature. In addition, supportive tools such as GIS based mapping using GPS coordinates covering the sub project sites, where ever possible is encouraged.

Literature Survey will broadly cover the following aspects and attributes necessary for environmental screening:

- Project details, maps, other relevant documents including design details available with the implementing agencies
- Information/data on biodiversity, land use, soil, geology, hydrology, climate, socio economic profiles and environmental planning by other GOSL agencies

#### **6.2.1.2 Field Visits**

Each sub-project site will be visited by the environmental expert/s filling the screening form together with representatives from the design team to assess the existing environment (physical, biological and socio-economic environment) and gather information with regard to the proposed sites and scale of the proposed sub projects and any prevalent issues. During these visits rapid reconnaissance surveys will be conducted in order to record the faunal and floral diversity, where necessary, to verify and support information gathered through the literature survey.

#### **6.2.1.3 Focus Group Discussions/Meetings**

Focus group discussions will be carried out with other stakeholder agencies, local authorities and community (both beneficiaries and project affected) to discuss pertinent issues such as the proposed investment, its design and temporary and long-term impacts. The participants' views and opinions and any on-site decisions need to be recorded.

#### **6.2.1.4 Data Analysis, Interpretation and impacts identification**

Data collected from field visits and stakeholder discussions will be analyzed by the expert and discussed with the technical team of the project proponent for feedback. Any design changes should be suggested and recorded.

#### **6.2.1.5 Filling screening reports**

The screening report will be filled with details on the proposed project intervention, physical/ecological baseline conditions of the site, assessment of potential impacts, feedback from community/public/visitor consultations and recommendations for the type of environmental assessment required. If the findings confirm that anticipated impacts are not significant enough for a stand-alone EA and that an EMP or adoption of environmental code of practice (ECOP) would suffice to mitigate the likely impacts, the screening exercise would be completed with the preparation of a site-specific EMP. If the likely impacts are significant and would require further environmental analysis, the screening report would recommend the appropriate assessment type for the implementation agency to carry out before designs are finalized. A description of the commonly used environmental management tools are given below.

*Annex 3 provides guidelines for EMP preparation and Guidelines presented in Annex 7 should be used in looking at operational impacts and their management, during the operational phases of the proposed Agro Tech Parks.*



## **6.3 Description of further Environmental Assessment and Management Instruments**

The following environmental tools will be relevant for physical interventions to be implemented under Component 2. The screening will identify as per the nature of the proposals/sub-projects which of these environmental management tools will need to be undertaken accordingly.

### **6.3.1 Environmental Assessment (EA)**

EAs can come in the forms of Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA). These are effective tools for evaluating the environmental risks and opportunities of project proposals and improving the quality of outcomes. Ideally the EIA/IEE should be carried out at the end of the preliminary design phase so that the impacts of each planned activity can be evaluated and alternatives can be worked out for activities that have major impacts. The outcomes of the EIA/IEE should then be used to finalize the project design which should ensure that the impacts of the given project are minimal. The importance of this management tool as means of foreseeing potential environmental impacts caused by proposed projects and its use in making projects more suitable to the environment has been highly effective. Since its introduction in 1969 in the US, many countries and international organizations have accepted EIA as an important planning and environmental management tool.

As a decision-making tool, EA has its strengths and weaknesses. It plays a crucial role at the project level decision making. However, in the entire development process application of EA as a tool to bring in environmental sustainability comes fairly at a late stage. At this point, it may be too late to change certain policy decisions and the choices are limited. With SESA (discussed earlier in this section), environmental decisions can be moved further upstream where better alternatives to environmentally unsustainable policies and programs can be sought at a broader strategic level.

If a specific subproject requires as EA, the first step will be to assess, if it requires to (i) follow national processes as per the NEA and other related EIA regulations, (ii) follow the World Bank safeguard process; or (iii) both the national and World Bank processes. Based on the screening information, the environmental safeguard specialist of the project need to guide the implementing agency to undertake next steps as briefly listed below:

- Falls within the prescribed lists of the EIA regulation in Sri Lanka – Submit the completed Basic Information Questionnaire (BIQ) together with the screening report to the Project Approving Agency (PAA) such as the Central Environmental Authority (CEA)
- Does not fall within country EIA regulations, but an EA is required based on the World Bank environmental safeguard polices – Share the proposed ToR for the EA for clearance

(See Annex 1-2 for the description of major steps of the environmental assessment process with responsibilities and timeframes).

The best time for a project proponent to submit the preliminary information on the proposed project is as soon as the project concept is finalized and the location of the project is decided.

### **6.3.2 Environmental Management Plan (EMP)**

Certain activities will have explicit impacts on the natural environment and thus require a specific plan to institute and monitor mitigation measures and take desired actions as timely as possible. An Environmental Management Plan (EMP) must be kept as simple as possible, clearly describing adverse impacts and mitigation actions that are easy to implement. The scale of the subproject will determine the complexity of the EMP. A small-scale subproject's EMP can be elaborated in a few paragraphs or in tabular format, keeping it as simple as possible with concrete mitigation actions, timelines and responsible persons.

The basic elements of an EMP are;

- a. A description of all possible significant adverse impacts that are likely to arise due to the project that the EMP is intending to deal with;
- b. A description of planned mitigation measures, and how and when they will be implemented;
- c. A program for monitoring with measurable indicators that will allow to determine the effectiveness of the mitigation actions
- d. A description of who will be responsible for implementing the EMP
- e. A cost estimate and source of funds

*(Refer Annex 3 for guidelines for developing EMPs)*

It is essential to involve local communities during the development of the EMP since they are likely to be the most affected parties due to the proposed development. Further, most of the local knowledge is important in identifying, designing and planning the implementation. In addition, the success of the implementation of the EMP will depend on community support and action.

The PAA will request the project proponent to prepare an Environmental Management Plan (EMP), to address any potential environmental and social issues as well as incorporate the PAA/CEA's approval conditions. Ideally, all EIAs and IEEs which identifies adverse environmental impacts should prepare an EMP as part of the report.

In World Bank funded projects, a standalone EMP is only considered appropriate in situations where a detailed environmental analysis is not required.

As the nature of the physical interventions identified under the ASMP are of medium scale, it will be Mandatory that all proposals/ physical interventions implemented will require an EMP to mitigate subproject specific impacts identified during the screening exercise. EMPs are to be prepared at the stage of project design and included in bidding documents, to be costed for accordingly, and will be part and parcel of contract documents. Activities outlines in the EMPs will be implemented by the respective contractors implementing the subproject and monitored accordingly by the project implementing agency.

***A set of Generic EMPs and guidelines to facilitate sound EMP preparation for all subprojects during the implementation stage are presented in Annex 6, 7 and 8.***

#### **6.3.2.1 Environmental Monitoring within EMPs**

Monitoring is the continuous and systematic collection of data in order to assess whether the environmental objectives of the project have been achieved. Good practice demands that procedures for monitoring the environmental performance of proposed projects are incorporated in all relevant

environmental management instruments. Monitoring provides information on the occurrence of impacts. It helps identify how well mitigation measures are working, and where better mitigation may be needed. Each respective safeguard instrument prepared will require a monitoring program to be included for the respective activities. The monitoring plan should identify what information will be collected, how, where and how often. It should also indicate at what level of effect there will be a need for further mitigation. How environmental impacts are monitored is discussed below.

- Responsibilities in terms of the people, groups, or organizations that will carry out the monitoring activities be defined, as well as to whom they report amongst others. In some instances, there may be a need to train people to carry out these responsibilities, and to provide them with equipment and supplies;
- Implementation Schedule, covers the timing, frequency and duration of monitoring are specified in an implementation schedule, and linked to the overall subproject schedule;
- Cost Estimates and Source of resources for monitoring need to be specified in the monitoring plan;
- Monitoring methods need to be as simple as possible, consistent with collecting useful information, so that the sub project implementer can apply them.
- The data collected during monitoring is analyzed with the aim of:
  - Assessing any changes in baseline conditions;
  - Assessing whether recommended mitigation measures have been successfully implemented;
  - Determining reasons for unsuccessful mitigation;
  - Developing and recommending alternative mitigation measures or plans to replace unsatisfactory ones; and
  - Identifying and explaining trends in environment improvement or degradation.

## **6.4 Other important actions such as clearances and procedures to follow**

### **6.4.1 Procedure to obtain the Environment Protection License**

Environmental Protection License (EPL) procedure implemented under the NEA plays a major role in environment protection by having the diverse sectors of industry to comply and adopt pollution control methodologies.

EPLs are required for activities that could harm the environment through the release of pollutants. EPLs aim to prevent or minimize the release of environmentally harmful waste and pollution, in compliance with the national discharge and emissions standards. EPLs require the industry or activity to take adequate measures to control water, air, noise and other pollutants and to dispose of wastes so as to minimize environmental impacts. In most cases applicants will have to take appropriate measures to abate the pollution if these discharges and emissions exceed the stipulated environmental standards having assessed the level of pollution of the industry in question.

Approval will be given only after the CEA is satisfied with the methodologies adopted by the applicant that are in compliance with the NEA and its regulations. If approved, the EPL will be issued by the CEA or by a delegated authority for a designated period of time.

EPLs are given according to three categories as specified in the Gazette namely Parts A, B and C depending on the level of pollution. The sectors that fall in to Parts A and B are granted for a period of one year and renewal be made annually by the CEA. Those that fall into Category C are granted for a period of three years and are granted by the local authority where the industry/activity is located. EPLs may then be renewed at least one month prior to its expiry and need revalidation in case any anticipated changes or alterations are carried out to the activities that were originally approved. All activities, that fall under the agriculture and agro-processing sectors that require EPLs are presented in Annex 3.

In the case of new industries, the applicant needs to obtain an Environmental Clearance to initiate the project and commission before the EPL is obtained. Once commissioned the applicant could then request for the EPL. The environmental clearance can be obtained from the CEA or the local authority concerned depending on the category that the project falls into under the stipulated legislature.

It is expected that under the project, EPLs will be needed to for material extraction (such as sand and metal) or to set up large-scale agri-businesses.

#### **6.4.2 Confirming to the Safety of Dams Policy**

Since 2008 to date, the GOSL has been implementing a national dam safety program, with financial assistance from the World Bank through the Dam Safety and Water Resources Planning Project (DSWRPP). During the preparation of the DSWRPP, the GOSL employed international consultants and local experts to assess the safety risks of all major dams of the country. Based on this assessment, a total of thirty-two (32) major dams identified with high and moderate safety risks were selected for intensive safety remedial interventions under the DSWRPP. The GOSL has added thirty (30) more dams to the program for safety improvement interventions with the additional financing approved in 2014. Under the DSWRPP, the GOSL has engaged international consultants and local experts acceptable to the Bank to: carry out full level dam safety inspections and geotechnical and hydrological studies; design safety assurance and remedial works; install dam safety monitoring instrumentation; supervise the execution of civil and electromechanical safety assurance works; and prepare detailed operation and maintenance manuals for the dams included in the project. In addition, the designs and execution of the civil and electromechanical works and instrumentation are being carried out under the guidance and supervision of an independent dam safety review panel with a ToR approved by the Bank. This panel consists of technical professionals from related engineering disciplines and has been endorsed by the Bank. The records of the technical inspections and investigations, hydrological studies, detailed designs of dam safety remedial works, construction drawings, and O&M manuals are available with the concerned dam owner implementing agencies, the Irrigation Department and the Mahaweli Authority of Sri Lanka. In addition, projects financed by the GOSL and other donor agencies have conducted rehabilitation work on medium-small scale dams across the country, predominantly in the Northern and Eastern Provinces, over the last decade.

Given that there is an ongoing and effective dam safety program targeting all large to medium scale Dam's, upstream of small irrigation structures and smaller dams along the cascading system, it can be

established that full-level inspections, dam safety assessments, and safety remedial measures have already been conducted and details are documented by the GOSL satisfactorily to the Bank, the provisions of OP/BP4.37 on Dam Safety has been complied with.

All irrigation sector project interventions need to complete the screening form presented in Annex 5, in addition to the Environmental Screening. This step will be completed for the verification of dam safety status of upstream medium-large scale dams that are hydrologically connected to the respective tank/ scheme, if any and outline the follow up actions. The Environmental Officer, will need to collaborate with field offices (Provincial or District) belonging to the Irrigation Department/Mahaweli Authority.

Post the screening, in the presence of such upstream hydrologically connected dams, which have not been rehabilitated or strengthened and thus have Dam Safety implications, the following steps need to be taken.

- (a) an inspection and evaluation of the safety status of the existing dam, its appurtenances, and its performance history;
- (b) a review and evaluation of the mandated dam owner's operation and maintenance procedures, and
- (c) preparation of a written report of findings and recommendations for any remedial work or safety related measures necessary to upgrade the existing dam to an acceptable standard of safety.

Necessary additional dam safety measures or remedial work may be financed under the proposed project. When substantial remedial work is needed, these will be undertaken using the following procedures.

- (a) A competent professional will be hired to design and supervise the work
- (b) Due to the size of the Dams under the projects context are less than 5m, competent professional will be hired to design and supervise the work which can be conducted as per generic dam safety measures designed by qualified engineers.

## **6.5 Environmental Monitoring**

### **6.5.1 Environmental Compliance Monitoring**

Supervision of the EMPs, along with other aspects of the project, will cover monitoring, evaluative review and reporting in order to achieve, among others, the following objectives:

- determine whether the project is being carried out in conformity with environmental and social safeguards and legal agreements;
- identify issues as they arise during implementation and recommend means to resolve them;
- recommend changes in project concept/design, as appropriate, as the project evolves or circumstances change; and identify the key risks to project sustainability and recommend appropriate risk management strategies to the Proponent.

An appropriate environmental supervision plan will be developed aiming to ensure the successful implementation of the EMPs across the project.

Quarterly, the PMU will collaborate with project implementing agencies in the field and, will monitor the implementation of the respective environment mitigation measures outlined for both Component 1 and 2. The PMU will have responsibility of carrying out this monitoring by regularly visiting the project sites, and pursuing the corrective measures as required.

Compliance monitoring comprises on-site inspection of construction activities to verify that measures identified in the EMPs are included in the clauses for contractors are being implemented. This type of monitoring is similar to the normal technical supervision tasks ensuring that the Contractor is achieving the required standards and quality of work.

A standard Environmental Compliance Monitoring Checklist for Project Activities is presented in Annex9.

## **6.5.2 Environment Audits**

Most of the development projects in Sri Lanka follow EAMFs and develop EMP's that are not implemented ardently at the end which will render the entire process an exercise in futility. Therefore, monitoring of the project during the construction and implementation phase is a must to ensure environmental compliance of a project. This could be achieved through regular environmental audits.

The purpose of the environmental audit is to

- Collect, analyze and interpret monitoring results to detect changes related to implementation and operation of specific activities
- To verify the monitoring parameters are in compliance with national set standards
- To compare the predicted impacts with actual impacts and evaluate the accuracy of predictions
- To evaluate the effectiveness of implementation of the EMP
- To identify shortcomings in the EMP if any and incorporate it into the EMP if deemed necessary
- To identify and report if there is non-compliance with the EMP

The auditors must first develop a structured questionnaire based on the EMP for the purpose of conducting the audit. Then during the site visit data can be collected using this questionnaire through interview surveys of officers responsible for implementation of the EMP and site records, logs etc., The audits can be carried out at regular intervals or on *ad hoc* basis or when mitigation is not carried out as defined by the EMP leading to public concern.

Expected outcomes of the Environment Audit are

- Ensure that EMPs are implemented properly
- Ensure that the mitigation measures are effectively minimizing the identified impacts as well as identify new impacts that may have been excluded in the EMP that require mitigation. Then make necessary adaptive changes to the EMP to ensure that the all significant impacts are effectively mitigated.

- Identify noncompliance with EMP if any and provide recommendations as to how to deal with such non-compliance

An environmental audit for CSIAP will be conducted, twice during the project implementation period. Once prior to the project Mid Term Review and year from the project stipulated closing date. The audit will entail to cover all activities outlined in the EAMF. review a sample of (i) the screening forms prepared by each project implementing agency (ii) standalone environmental assessments/management plans (iii) application of the NEA and its clearance procedures followed by the project, as the case be, and based on site visits ensure conformity with conditions, guidelines and comments stipulated in these and other related documents. The audit will not only capture the compliance status of a detailed Terms of Reference (TOR) for the Environmental Audit is presented in Annex 10.

## **6.6 Stakeholder Consultation and Information Disclosure**

For all types of environmental analyses conducted under CSIAP (including screening), communities in the project sites should be consulted within a structured and culturally appropriate manner. Further, environmental assessment documentation and EMPs should be made available to the public (in accordance with the World Bank's policy on Access to Information) by the PMU prior to tendering of works contracts through the website of the project and notices through media, as appropriate. These should be made available in local languages relevant to the area. This EAMF would also be disclosed to the public via the website of the project executing ministry and through World Bank's Infoshop.

The process of consultation should be documented and account taken of the results of consultation, including any actions agreed resulting from the consultation. Public disclosure of the relevant safeguards documentation will be a pre-requisite for tendering civil works contracts. The contract documents for each contract package will mandatorily include the relevant environmental mitigation provisions stipulated in the EMPs (which would have community concerns reflected, if any) for the given sub-projects.

Given below is a brief framework for planning consultation under the CISAP. It has to be noted that only the appropriate consultation method will be applied to sub-projects during implementation and the responsibility of consultation lie primarily with the project implementing agencies.

### **6.6.1 Objectives of stakeholder consultations**

The prime objectives of stakeholder consultation are;

- Provide the stakeholders an opportunity to inform and influence the decision-making process.
- Partner with the stakeholders so as to make the project widely accepted and to lower the potential impacts

### **6.6.2 Elements of Effective Stakeholder Consultations**

Some of the most concerned elements of effective consultations are as follows;  well targeted

- early enough so as to make sure to get the stakeholder views adequately reflected in the project decisions
- transparent – provide all the information without hiding anything
- make the consultation process very simple and understandable so that clear answers and comments can be obtained
- ensure gender equity documentation of
- consultation
- based on the principle of "Two way Process"
- focus the consultation on Risks, impacts, mitigation measures and opportunities.

### **6.6.3 Suggested Consultation Methods**

Participatory workshops, focus group meetings and face to face and informal individual interviews are the three most commonly adopted methods of stakeholder consultations and a mix of these can be employed under ASMP, as determined by the requirement.

#### **6.6.3.1 Participatory workshops**

Participatory workshops are effective when a large number of stakeholders with different interests and specializations get involved. Conducting effective participatory consultation workshops should consist of following elements;

- (ii) Orient the workshop towards a clear destination. In this connection it is necessary for the evaluator to present a very good project brief and the purpose of the consultation.
- (iii) The evaluator should be able to build bridges and consensus among stakeholders.
- (iv) Divide the participants into sub groups to represent adequate mixture of different interest groups and allow the sub groups to brainstorm among the group members and submit their views and comments as those of not individuals but of the sub groups.

This method is recommended for technical assistance sub-projects such the formulation of strategic landscapes plans where mostly conservation agencies, local planning bodies, NGOs and communities would get involved.

#### **6.6.3.2 Focus groups discussions**

The focus group consultation meetings are relevant when the stakeholders have similar interest thus their objectives are focused towards one common objective. This kind of consultation meetings are recommended for projects that serve common interests such as provision of basic services in the agriculture development.

#### **6.6.3.3 Stakeholder group meetings**

Stakeholder consultations are extremely useful in creating the right kind of understanding about the project among those it will likely affect or interest, and to learn how these external parties view the project and its attendant risks, impacts, opportunities and mitigation measures.

#### **6.6.3.4 Individual - face to face interviews**

When the stakeholders are not large in number and represent specialized areas of interest face to face interviews which are informal are very effective. This system is very flexible, permits in depth discussions to understand the issues and is low cost. However individual stakeholder consultations should be well planned as if not it may lead to "heavy focus on individual issues and interest". This method is recommended for the



kind of consultation envisaged as part of sub-project screening as the sub-projects under CSIAP are relatively small in size, potential impacts are very specific, and stakeholders are small in numbers.

The stakeholder consultation process should be continuous. However, since practical difficulties exist for continued consultation, at least consultation needs to be carried out at three stages; project preparatory / design stage, project implementation stage and project end stage so as to make sure that stakeholder concerns, interest, comments are adequately built into the whole project management process.

# Chapter 7: Institutional Arrangement for Implementation of the project

## 7.1 Overall project arrangements

The key design features incorporated in the institutional and implementation model include: *multi-stakeholder approach* - different stakeholders involved in the field of climate resilient irrigation and agriculture are expected to contribute to project implementation from national to sub-national levels; *coordinated approach* - stakeholders are expected to share knowledge and resources in collaborative manner at each level; *citizen engagement* - local small holder farmers, medium sized agribusiness owners, common interest groups, producer organizations, individual entrepreneurs and their customers will be involved in the planning & implementation of project activities, along with government counterparts, NGOs, academia and private sector; *consistency with the National Poverty Alleviation Programme* – since the project will also work with the People’s Company of the Grama Shakthi Programme implemented at GND) level; *Use of existing government staff* – except a few of the full-time key professionals to be recruited from the open market, the rest of the staff will be from existing government cadres and work on part-time basis at both national and provincial levels; and *gender equality*- the project design and approach will take into account the gender dimension and ensure that the project provides equal opportunities for women to participate in the project cycle.

The project is fully integrated in the GOSL administration and the implementation is designed to capitalize on existing government agencies at national, provincial, district, divisional and village levels. A Project Management Unit (PMU) will be established under Ministry of Agriculture, whereas Deputy Project Director’s Offices (DPD Offices) will be established under the Ministries of Irrigation & Water Resources Management and Ministry of Provincial Councils and Local Government. At provincial level, there will be Provincial Project Management Units (PPMU), one for each Province to implement the project. In addition, a District Unit of the PPMU will be established under the District Secretary at district level to coordinate all agencies operating at district level. At Divisional level, there will be a Divisional Unit of the PPMU headed by the Divisional Secretary to facilitate the PPMU to implement the Project effectively. The community based organizations such as Farmer Organizations, Producer Groups, Community Centers and Grama Shakthi People’s Company operating in the Grama Niladari Division level are the institutions that will involve actively in the project with the beneficiary farmers at community level. The day-to-day management and operation of the project is the responsibility of the Project Management Unit (PMU), headed by a Project Director appointed by MOA and assisted by a Water Resources Development Specialist appointed by MIWRM. Given the transformative nature of the project, institutional coordination across the relevant sectors is emerging as a critical task for the PMU in developing an effective project implementation mechanism to achieve convergence with other programs.

Overall project implementation is the responsibility of the Ministry of Agriculture, MOA. Since, the institutional capacity of MOA is limited and special skills are required to implement the complex project activities, the project will draw expertise from MIWRM, DOA, DAD & ID as well and also acquire outside expertise, including consulting services. The project will give attention to institutional coordination across departments, agencies and strategic partners involved in the implementation of project activities. Overall project oversight is the responsibility of the National Project Steering Committee (NPSC), established in the Ministry of National Policies and Economic Affairs (MNPEA) and chaired by its

Secretary. The main responsibility of the NPSC is to provide strategic guidance for the implementation of the project and to act as the interface between the central and provincial institutions. The NPSC also approves the annual work program and budget for the project, endorses the working arrangements with strategic partners, and is briefed by the Bank (and the Project Director) on the outcomes of implementation support and review missions carried out with the Bank team at least biannually. The PMU is responsible for ensuring that: (i) all project activities are planned, financed and implemented as per the project annual work program and budget, (ii) project implementation is in line with operational guidelines of the Project Implementation Plan (PIP), (iii) project procurement and financial management activities are carried out in timely manner as per the World Bank's Procurement for IPF Borrowers (2016), the project fiduciary manuals and the procurement plan, and (iv) social and environmental safeguards applicable to the project are fully complied with. The PMU is also responsible for monitoring project activities, preparing the quarterly and annual project progress reports, and ensuring that all reports (including financial reports) are submitted to the Bank in timely manner.

## **7.2 Implementation of Safeguards**

### **7.2.1 Safeguard responsibilities of PMU and PPMUs**

The PMU and PPMUs main role will be to ensure operational compliance as per the World Bank safeguard operational policies as defined in the Project Appraisal Document, Financing Agreement and EAMF and Government policies as applicable. The PMU and PPMUs will assign or recruit qualified environmental safeguard specialist at the PMU level and environmental officers at the PPMU level to be responsible for environmental safeguards related to the CSIAP investments. They will also recruit specialized consultants necessary for specific technical assistance and to undertake SESAs and EAs as part of the implementation of activities. The environmental safeguard specialist of the PMU will liaise closely with PPMUs environmental officers and also ensure overall coordination of all Project entities to ensure necessary data and information are shared and collated for reporting to National Project Steering Committee and the World Bank. All project financed training on safeguards will be organized jointly for PMU, PPMUs and other institutions involved in the implementation of the project and will be organized by the PMU.

### **7.2.2 Arrangements for implementation of the EAMF**

Due to the lack of staff with prior technical experience working in Environmental Safeguards, the PMU and PPMUs need to second/hire an environmental safeguard specialist and environmental officers to focus on the tasks and responsibilities outlined in the EAMF.

#### **7.2.3.1 Responsibilities of the Environmental Safeguard Specialist at the PMU**

- Responsible for the implementation of all steps presented under the Chapter 6 above including environmental clearances for activities implemented under the MOA, DOA and DAD
- Key person to liaise with the NPSC and the World Bank
- Develop templates and formats to be used for safeguard activities with the support of DPMU specialists
- Undertake screening of sub-projects and prepare EMPs
- Preparation of ToRs for SESAs (in coordination with the Social safeguard specialist) and EAs
- Undertake field level safeguard monitoring of MOA, DOA and DAD activities

- Responsible for consolidating of environmental safeguard monitoring and reporting on compliance of due diligence mechanisms set forth the EAMF for all project entities (including those outside the MoA)
- Responsible for the preparation of quarterly consolidated compliance summaries and formally communicating to the World Bank on environmental safeguards matters
- Organizing and delivering (in some cases) training for all project and department staff

### **7.2.3.2 Responsibilities of the Environmental Officers at the PPMU**

- Responsible for the implementation of all steps presented under the Chapter 6 above including environmental clearances for activities implemented under the respective PPMU and any other institutions under it.
- Undertake screening of sub-projects and prepare EMPs
- Preparation of ToRs for SESAs (in coordination with the Social safeguard specialist) and EAs
- Coordinate closely with the PMU environmental safeguard specialist to ensure timely reporting on compliance and organizing safeguard training as needed
- Support the PMU environmental safeguard specialist to develop templates and formats to be used for safeguard activities and organize trainings
- Undertake field level safeguard monitoring of PPMU and related agencies activities
- Responsible for the preparation of quarterly compliance summaries and formally communicating to the PMU environmental safeguard specialist for consolidating and reporting
- Deliver training to project staff

## **7.3 Institutional capacity building for safeguard management**

Sri Lanka's environmental clearance process has been in place for almost three decades and most of the experience and knowledge of EIAs were built by the CEA and other PPAs. As many of the investments managed by the ministries and other institutions identified to participate under the project do not require to go through national environmental regulations, the capacity to manage environmental safeguards within these institutions is very low. However, some institutions such as Irrigation Department has been involved in projects that required adherence to national environmental regulations and/or donor policies on environmental management. In addition, post EA monitoring is the weakest aspect in the Sri Lankan EIA cycle. The project will thus place strong emphasis on environmental due diligence mechanisms within the sector and post clearance monitoring and will provide training necessary within the implementing agencies to strengthen their capacity. As per the capacity assessment the project implementing agencies relation to the implementation of environmental safeguards, MOA only recently been exposed to a World Bank financed project and ID has experience through Dam Safety and Water Resources Planning Project and Climate Resilience Improvement Project. In addition, some of the provincial councils (such as the Northern and Eastern) have been involved in World Bank financed operations, the capacity built no longer remains due to temporary nature of staff that were trained for safeguard implementation. MOA and DOA have sufficient capacity and technical for the implementation of sustainable agricultural practices such as pest management via integrated pest management, they implement national programs of similar nature on regular basis.

A comprehensive capacity building program on the EAMF and environmental management within the sector, will be built in to the implementation modality to provide the client with the required capacity building and technical assistance and guidance to implement the project EAMF. The capacity building

instruments are envisioned to be included as a part of the Technical Assistance being provided via the project. The trainings under CSIAP should be jointly carried out the World Bank financed Agriculture Sector Modernizations Project as much as possible.

## **Annex 1: Environmental Assessment and impact mitigation under the national legislation**

The importance of the Environmental Impact Assessment as an effective tool for the purpose of integrating environmental considerations with development planning is highly recognized in Sri Lanka. The application of this technique is considered as a means of ensuring that the likely effects of new development projects on the environment are fully understood and taken into account before development is allowed to proceed. The importance of this management tool to foresee potential environmental impacts and problems caused by proposed projects and its use as a mean to make project more suitable to the environment are highly appreciated. The Environmental Impact Assessment (EIA) unit of the Central Environmental Authority (CEA) is involved in the implementation of the EIA procedure under the National Environmental Act.

### **Environmental Impact Assessment (EIA)**

Realizing the need for integrating environment, economic and social considerations with the planning and decision-making process in a more formal manner, the Government of Sri Lanka decided to introduce Environmental Impact Assessment for development projects. The importance of the Environmental Impact Assessment as an effective tool for the purpose of integrating environmental considerations with development planning is highly recognized in Sri Lanka.

The Environmental Impact Assessment (EIA) unit of the Central Environmental Authority (CEA) is involved in the implementation of the EIA procedure under the National Environmental Act. Administration of the EIA process, co-ordination between Project Approving Agencies (PAA's) that have been appointed for this purpose, preparation of manuals and guidelines on EIA and maintenance of a data base on EIA is done by the CEA.

### **EIA under the National Environmental Act (NEA)**

EIA was mandated island wide by the 1988 amendments to the National Environmental Act. Part IV C of the Amendment Act No. 56 of 1988 mandated that CEA require “prescribed” development project proposals to be subjected to Environmental Impact Assessment, where adverse and beneficial impacts of the proposed projects on the environment would be identified together with measures to minimize such adverse impacts.

The procedure stipulated in the Act for the approval of projects provides for the submission of two types of reports Initial Environmental Examination (IEE) report and Environmental Impact Assessment (EIA) report. If the environmental impacts of the project are not very significant then the project proponent may be asked to do an Initial Environmental Examination (IEE), which is a relatively short and simple study. However, if the potential impacts appear to be more significant, the project proponent may be asked to do an Environmental Impact Assessment (EIA) which is a more detailed and comprehensive study of environmental impacts. Such reports are required in respect of “prescribed projects” included in a Schedule in an Order published by the Minister of Environment in terms of section 23 Z of the act in the Gazette Extra Ordinary No. 772/22 dated 24th June 1993 (ANNEX II). Once an EIA report is submitted NEA provides for a public inspection and comment on the report during a mandatory period of 30 days. A public hearing may be held to provide an opportunity to any member of the public (who has submitted his comments) to be heard in support of his comments if the PAA

considers it to be in the public interest to do so. A decision whether to approve the project has to be arrived at thereafter. IEE reports have been exempted from this requirement. However, an Initial Environmental Examination report shall be deemed to be a public document for the purposes of sections 74 and 76 of the Evidence Ordinance (Chapter 21) and shall be open for inspection by the public.

The EIA process is implemented through designated Project Approving Agencies (PAAs) specified under Section 23 Y of the NEA. At present 23 state agencies, including Ceylon Tourist Board have been specified by the Minister as contained in Gazette Extra Ordinary No. 859/14 dated 23<sup>rd</sup> February 1995 and Gazette Extra Ordinary No. 1373/6 of 29<sup>th</sup> December 2004. The National Environmental Act stipulates that all “prescribed projects” must receive approval from the appropriate project approving agencies (PAAs), which must be those that are “concerned with or connected with such prescribed projects”. A PAA, which is also the project proponent, is disqualified from acting as the PAA for the project by NEA-EIA Regulation 2(1) of June 1993. When the PAA is also the project proponent, the CEA is required to designate an appropriate PAA. Again in cases where there are more than one PAA is involved, the CEA must determine the appropriate PAA. In the event of doubt or difficulty in identifying the appropriate PAA, it has been practice for the CEA to take on the role of PAA.

### **Prescribed projects**

Prescribed projects are listed in two groups in Schedule included in the first ministerial order of June 24, 1993. Part I of the Schedule includes 31 projects and undertakings if located wholly or partly outside the Coastal Zone. The projects in this group irrespective of size if located wholly or partly within the coastal zone must undergo the approval process that is laid down in the Coast Conservation Act. In other words only those projects located totally outside the Coastal Zone will be subject to the approval process laid down in the NEA.

Item 19 in this list of 31 projects and undertakings is described as the “Development of Industrial Estates and Parks exceeding an area of 10 hectares”. Once an industrial estate or industrial park is approved under Part IV VC of the NEA, any individual project or undertaking located in it, even though prescribed, will be exempted from the approval process. Projects and undertakings, which are listed as Items 20 to 30, belong to the category of high polluting industries. They will be required to go through the EIA process only if they are located outside an approved industrial estate or industrial park.

Implementation of projects in environmentally sensitive areas that are listed in Part III of the Schedule is not prohibited, but regardless of their magnitude such projects and undertakings must go through the approval process. This itself acts as a disincentive to project proponents. Similarly, even though Part I of the Order exempts projects and undertakings proposed to be established within the Coastal Zone from the approval process set out in Part IV C of the NEA, the law requires that such projects must be subject to the NEA approval process if they are located in environmentally sensitive areas of the Coastal Zone. In short, the EIA process set out in the Coast Conservation Act applies to projects prescribed under the NEA only when they are located wholly within the Coastal Zone but not in any environmentally sensitive area therein.

Part II of the Schedule of prescribed projects includes Item 32 industries (Items 33 to 52). Item 32 is described as “All projects and undertakings listed in Part I irrespective of their magnitudes and irrespective of whether they are located in the coastal zone or not, if located wholly or partly within the

areas specified in Part III of the Schedule”. The industries included as Items 33 to 52 are not described by magnitude and are subject to the approval process only if located within the environmental sensitive areas mentioned in Part III of the Schedule.

### **Operational Procedure for EIA/IEE**

The Basic Information Questionnaire (BIQ) form prepared by the CEA (**Annex 2**) has to be filled by the project proponent and submitted to the CEA. On examination of the BIQ, the CEA decides on the need for an EIA/IEE. If it is determined that an EIA/IEE is required, the CEA will decide a suitable Project Approving Agency (PAA).

The PAA in turn will appoint a technical committee (TC) to scope the project based on the preliminary information. If the PAA determines that the project would have no long-term adverse environmental impacts, an initial environmental examination (IEE) would be considered adequate. The project proponent must submit a detailed IEE for review and approval by the PAA. The IEE should identify potential environmental and social issues and the possible remedial actions. Upon reviewing the IEE, if the TC identifies any substantial environmental issues that may arise as a result of the proposed project, the proponent will be advised to undertake a detailed EIA and issue the Terms of Reference (TOR) for the EIA. In developing the TOR, the PAA will also consider the views of other state agencies and the public. If the PAA decided that no further environmental analysis is needed, the process ends with approval/rejection of the IEE.

If an EIA is a necessity, then the project proponent must conduct the EIA according to the TOR issued, prepare the report in all three languages and submit it to the PAA. The PAA will then declare open the EIA report for a period of 30 days for public comments and the comments received will be conveyed to the proponent. The project proponent can then prepare a response to the public comments and submit it to the PAA. The TC will then evaluate the report with respect to adherence to the TOR, quality of the report contents and adequacy of the responses to public comments.

Based on the recommendations of the TC, the PAA in concurrence with CEA would either grant approval for the implementation of the proposed project subject to specific conditions or refuse approval for implementation of the project, giving reasons for doing so. The PAA will also specify a period within which the approved project should be completed. If the project proponent is unable to complete the project within the specified period, written permission for an extension must be obtained from the PAA, 30 days prior to the expiration of the approved completion date.

### **EIA in the Coast Conservation Act**

The Coast Conservation Act No. 57 of 1981 together with the Coast Conservation (Amendment) Act, No. 64 of 1988 governs the Coastal Zone. This Zone comprises mainly “the area lying within a limit of three hundred meters landwards of the Mean High Water line and a limit of two kilometers seawards of the Mean Low Water line”. The EIA process is part of the permit procedure mandated in Part II of the Coast Conservation Act (CCA) for the approval of prescribed development projects and undertakings within the Coastal Zone. The Act states that the Minister in charge of the subject of Coast Conservation “may, having regard to the effect of those development activities on the long term stability, productivity and environmental quality of the Coastal Zone, prescribe the categories of development activity, which may be engaged in within the Coastal Zone without a permit”. Such activity should not however include any development activity already prescribed under the NEA.



Section 16 of the Coast Conservation Act (CCA) confers on the Director of Coast Conservation the discretion to request a developer applying for a permit (to engage in a development activity within the Coastal Zone) to furnish an Environmental Impact Assessment relating to the proposed development activity. The CCA does not however specify how and when this discretion should be exercised. The Coast Conservation Department (CCD) interprets this provision as requiring an EIA when the impacts of the project are likely to be significant. The application from for a permit includes several questions, the answers to which would help determine whether the development activity is likely to have significant impacts on the environment.

The Act requires the Director of Coast Conservation, on receiving an EIA Report, to make it available for public inspection and to entertain comments on it. The Act also requires the Director of Coast Conservation to refer the EIA report to the Coast Conservation Advisory Council for comment. The Council is an inter-department, inter-disciplinary advisory body. The Director of Coast Conservation may decide to.

- 1) Grant approval for the implementation of the proposed project subject to specified conditions, Or
- 2) Refuse approval for the implementation of the project, giving reasons for doing so.

Part I of the Schedule (annex II) containing the list of projects prescribed under the NEA states that the CCA applies in the case of those projects, which lie wholly within the Coastal Zone. This indicates that the NEA expects the Coast Conservation Dept. to consider these projects as prescribed and that an Environmental Impact Assessment is required albeit under the provisions of the CCA.

In practice however, the Coast Conservation Department is guided by their own rules and regulations in determining whether any of the prescribed projects under the NEA require an Environmental Impact Assessment.

Certain parts of the Coastal Zone, which are considered environmentally sensitive and declared as “no- build” areas automatically, rule out the need to consider development projects in such areas. Similarly, development projects proposed for location in environmentally sensitive areas within the Coastal Zone are required to be submitted to the approval process specified in the NEA. Many of these environmentally sensitive areas have already been identified and listed by the Coast Conservation Department as “set-back” areas comprising reservation areas and restricted areas in which development activities are prohibited or significantly restricted.

CCD Planning Division officers submit their recommendations regarding proposed development projects to the Planning Committee of the Coast Conservation Department. The three technical divisions of the Coast Conservation Department recommend the issue of a permit with or without an EIA. Where an EIA is recommended, scoping sessions are convened with representatives of concerned state agencies to determine the Terms of Reference for the EIA.

The long title of the Coast Conservation Act states that the Act is established to regulate and control development activities within the Coastal Zone. Therefore, the Coast Conservation Department is the final authority in determining whether to permit a development activity in terms of the CCA, even though such activity may be required go through the approval process laid down in the NEA.

CCD Planning Division officers submit their recommendations regarding proposed development projects to the Planning Committee of the Coast Conservation Department. The three technical divisions of the Coast Conservation Department recommend the issue of a permit with or without an EIA. Where an EIA is recommended, scoping sessions are convened with representatives of concerned state agencies to determine the Terms of Reference for the EIA.

The long title of the Coast Conservation Act states that the Act is established to regulate and control development activities within the Coastal Zone. Therefore, the Coast Conservation Department is the final authority in determining whether to permit a development activity in terms of the CCA, even though such activity may be required go through the approval process laid down in the NEA.

### **EIA in the Fauna and Flora (Protection) Ordinance**

The Fauna and Flora (Protection) Ordinance No. 2 of 1937, as amended by the Fauna and Flora (Amendment) Act No. 49 of 1993, requires that any development activity of any description whatsoever proposed to be established within one mile of the boundary of any National Reserve, should receive the prior written approval of the Director of Wildlife Conservation. The Ordinance as amended mandates that the project proponent should furnish an IEE or EIA report in terms of the National Environmental Act. The information that a project proponent applying for permission to establish a development project within one mile of any National Reserve has to submit is much more comprehensive than the information required for the approval process stipulated under the NEA. This is because every development project or activity to be established within one mile of any National Reserve is subject to the approval process of the Department of Wild Life Conservation regardless of its magnitude or category. Success in the implementation of this requirement will be tested to the extent that the term “development activity” is not defined in the Act. This procedure could also discourage any development activity however environmentally compatible it is, proposed to be established within any environmentally sensitive area.

### **EIA in the Provincial Administration**

The Provincial Level environmental protection and management is introduced in Sri Lanka through the 13th amendments to the constitution certified in November 1987, which specifies three lists, the Reserved list, the Provincial Council list, and the Concurrent list. Provincial Councils have the exclusive right to legislate through statues on matters specified in the provincial Council list. The subject of environmental protection is placed in the Concurrent list as well as on the Provincial Council list. Provincial councils and Parliament can both legislate on matters on the Concurrent list provides it is done in consultation with each other. Only the North Western Provincial Council (NWPC) enacted legislation on environmental protection by Statute No. 12 of 1990. The National Environmental Act remains suspended and in operative within the North Western Province with effect from 10th January 1991.

**TableA1 Operational Framework for Implementation of EIA under national regulations**

Activity	Agency	Duration
<p><b>Submitting Preliminary information</b> - A project proponent is required to provide the CEA with preliminary information on the proposed project, in order for the EIA process to be initiated. The best time for a project proponent to submit the preliminary information on the proposed project is as soon as the project concept is finalized and the location of the project is decided. The Basic Information Questionnaire (BIQ) form prepared by the CEA can be used for this purpose (Annex 2). When a prescribed project is referred to CEA, the CEA will decide a suitable Project Approving Agency (PAA).</p>	CEA	2 months
<p><b>Environmental Scoping</b> - Then the PAA will carry out scoping and Terms of Reference (ToR) for the EIA/IEE will be issued to the project proponent</p>	PAA	2 month
<p><b>EIA/ IEE report preparation</b></p>	Proponent	3 months
<p><b>Public participation and evaluation</b> - On receipt of an EIA report, it will be subjected to an adequacy check in order to ensure that the ToR issued by the PAA has been met. It will then be open for public inspection / comments for a period of 30 working days. If there are any public comments on the EIA report, they will be sent to the project proponent for response. Subsequent to the public commenting period the PAA will appoint a Technical Evaluation Committee (TEC) to evaluate the EIA report and make its recommendations. IEE reports are not required to be opened for public comments and are thus subjected to technical evaluation only.</p>	PAA	3 months
<p><b>Decision making</b> - Based on the recommendation of the TEC, the PAA makes it's decision on whether to grant approval for a project. If the PAA is not the CEA, it should obtain the concurrence of the CEA prior to granting approval</p>	PAA	2 months

Generally, the approval is valid for 3 years. If the Project Proponent does not commence work within 3 years of the decision, renewal of the approval from the PAA is necessary. The validity period is usually stated in the letter of approval.

## Annex 2: Basic Information Questionnaire for the CEA

APPLICATION NO	
----------------	--



CENTRAL ENVIRONMENTAL AUTHORITY

### BASIC INFORMATION QUESTIONNAIRE

(Essential information to determine the environmental approval requirement of projects)

- 1 Name of the Project:
- 2 Name of the Developer:  
(Company/firm/individual)  
  
Postal Address:  
  
*Phone No:* *Fax No:*
- Contact person  
*Name Designation:*  
*Phone No:* *Fax No:*
- 3 Brief description of the project ( Use a separate sheet)  
Attach copy (ies) of pre-feasibility / feasibility study report (s) if available
- 4 Scale / magnitude of the project:  
(eg. For a road project: Length of the trace; Tourist hotel: No. of rooms; Agriculture project: Extent of land, solid waste management projects : capacity per/day etc.)
- 5 Main objective(s) of the project:
- 6 Investment and Funding sources:
- 7 Location of the Project
  - i Pradeshiya Sabha: ii
  - Divisional Secretariat: iii
  - District
  - iv Provincial Council

*Provide a location map indicating the project site, access to the site, surrounding development and infrastructure within 500m of the site (1:50000 scale).*

8 Extent of the project area (in ha):  
A copy of the survey plan of the site

9 Does the project wholly or partly fall within any of the following areas?

Area	Y e s	N o	Unaware
100m from the boundaries of or within any area declared under the National Heritage Wilderness Act No 4 of 1988			
100m from the boundaries of or within any area declared under the Forest Ordinance (Chapter 451)			
Coastal zone as defined in the Coast Conservation Act No 57 of 1981			
Any erodible area declared under the Soil Conservation Act (Chapter 450)			
Any Flood Area declared under the Flood Protection Ordinance (Chapter 449)			
Any flood protection area declared under the Sri Lanka Land Reclamation and Development Corporation Act 15 of 1968 as amended by Act No 52 of 1982			
60 meters from the bank of a public stream as defined in the Crown Lands Ordinance (Chapter 454) and having width of more than 25 meters at any point of its course			
Any reservations beyond the full supply level of a reservoir			
Any archaeological reserve, ancient or protected monument as defined or declared under the Antiquities Ordinance (Chapter 188).			
Any area declared under the Botanic Gardens Ordinance (Chapter 446).			
Within 100 meters from the boundaries of, or within, any area declared as a Sanctuary under the Fauna and Flora Protection Ordinance (Chapter 469)			
100 meters from the high flood level contour of or within, a public lake as defined in the Crown Lands Ordinance (Chapter 454) including those declared under section 71 of the said Ordinance			

<i>Within a distance of one mile of the boundary of a National Reserve declared under the Fauna and Flora Protection Ordinance</i>			
--	--	--	--

10 Present ownership of the project site:

<b>State</b>	<b>Private</b>	<b>Other-specify</b>

If state owned, please submit a letter of consent of the release of land from the relevant state agency

11 Present land use:

12 Present land use : (Please tick the relevant cage/s)

<b>Land use Type</b>		<b>Land use Type</b>	
Paddy		Marsh / Mangrove	
Tea		Scrub / Forest	
Rubber		Grassland / Chena	
Coconut		Built-up area	
Other Plantations / Garden		Other (pl. specify)	

13 Does the site /project require any

	Yes	No	If yes give the extent (in ha)
Reclamation of land, wetlands			
Clearing of forest			
Felling of trees			

14 Does the project envisage any resettlement

Yes	No	If yes, give the number of families to be resettled

15 Does the project envisage laying of pipelines

Yes	No	If yes, give the length of the pipeline (km)

16 Does the project involve any tunneling activities

Yes	No

17 Proposed timing and schedule including phased development:

18 Applicable laws, regulations, standards and requirements covering the proposed project:

19 Clearances / permits obtained or should be obtained from relevant state agencies and / or local authorities. (*Attach required copies of the same*)

The above information is accurate and true to the best of my knowledge. I am aware that this information will be utilized in decision-making by the relevant state authorities.

.....  
**Date**

.....  
**Signature of Applicant**

### **Annex 3: Guidelines for Developing EMPs**

Having identified the potential impacts of the relevant sub-component, the next step of the EA process involves the identification and development of measures aimed at eliminating, offsetting and/or reducing impacts to levels that are environmentally acceptable during implementation and operation of the project (EMP). EMPs provide an essential link between the impacts predicted and mitigation measures specified within the EA and implementation and operation activities. World Bank guidelines state that detailed EMP's are essential elements for Category A projects, but for many Category B projects, a simple EMP alone will suffice. While there are no standard formats for EMPs, it is recognized that the format needs to fit the circumstances in which the EMP is being developed and the requirements, which it is, designed to meet. EMPs should be prepared after taking into account comments from the PAA and IDA as well as any clearance conditions. Annex C of OP 4.01 (see main report for annex C) of the World Bank safeguards outlines the important elements of the EMP and guides its preparation. Given below are the important elements that constitute an EMP.

#### *a. Identification of impacts and description of mitigation measures*

Firstly, Impacts arising out of the project activities need to be clearly identified. Secondly, feasible and cost-effective measures to minimize impacts to acceptable levels should be specified with reference to each impact identified. Further, it should provide details on the conditions under which the migratory measure should be implemented (ex; routine or in the event of contingencies) The EMP also should distinguish between type of solution proposed (structural& non-structural) and the phase in which it should become operable (design, construction and/or operational).

#### *b. Enhancement plans*

Positive impacts or opportunities arising out of the project need to be identified during the EA process. Some of these opportunities can be further developed to draw environmental and social benefits to the local area. The EMP should identify such opportunities and develop a plan to systematically harness any such benefit.

#### *c. Monitoring program*

In order to ensure that the proposed mitigatory measures have the intended results and complies with national standards and donor requirements, an environmental performance monitoring program should be included in the EMP. The monitoring program should give details of the following;

- Monitoring indicators to be measured for evaluating the performance of each mitigatory measure (for example national standards, engineering structures, extent of area replanted, etc.)
- Monitoring mechanisms and methodologies
- Monitoring frequency
- Monitoring locations

#### *d. Institutional arrangements*

Institutions/parties responsible for implementing mitigatory measures and for monitoring their performance should be clearly identified. Where necessary, mechanisms for institutional coordination should



be identified as often monitoring tends to involve more than one institution.

*e. Implementing schedules*

Timing, frequency and duration of mitigation measures with links to overall implementation schedule of the project should be specified.

*f. Reporting procedures*

Feedback mechanisms to inform the relevant parties on the progress and effectiveness of the mitigatory measures and monitoring itself should be specified. Guidelines on the type of information wanted and the presentation of feedback information should also be highlighted.

*g. Cost estimates and sources of funds*

Implementation of mitigatory measures mentioned in the EMP will involve an initial investment cost as well as recurrent costs. The EMP should include cost estimates for each measure and also identify sources of funding.

*h. Contract clauses*

This is an important section of the EMP that would ensure recommendations carried in the EMP will be translated into action on the ground. Contract documents will need to be incorporated with clauses directly linked to the implementation of mitigatory measures. Mechanisms such as linking the payment schedules to implementation of the said clauses could be explored and implemented, as appropriate.

Consultation with affected people and NGOs in preparing the MP will be an integral part of all Category A projects and is recommended for Category B projects.

## **Annex 3: Environmental guidelines for agriculture and agro-processing sectors in Sri Lanka**

### **Agriculture**

#### ***Paddy cultivation***

Sri Lanka being predominantly an agriculture based country, its economy had been built around agriculture and plantation for centuries. Rice is the main source of food and hence a large land area is allocated for its cultivation in almost all parts of the country amounting to 708,000 hectares. In the dry zone areas, paddy cultivation generally depends on rain water or irrigated water. From the ancient times kings who ruled the country focused on irrigated water for the water stressed dry zone through a chain of cascading man-made tanks and irrigated channels. It was the duty of the King to provide irrigated water to the paddy cultivation. Hence the “*wewa& dagaba*” concept came into being from ancient times.

In contrast, in the wet zone, paddy cultivation mainly depends upon the monsoonal rain. Sri Lanka being a tropical island located close proximity to the Bay of Bengal is subjected to tropical cyclones and heavy monsoonal rains. The island gets its rain mainly from the south-west monsoons from mid-May to October and north-east monsoons from December to March while the two intermonsoonal periods lie in between. Paddy is cultivated in two seasons, *Yala* and *Maha* which is synonymous with the two monsoonal rain periods, where *Maha* season is during the north-east monsoons while the *Yala* is during the south-west monsoon period.

During the *Maha* season of 2010/11, a total of 525.017 hectares have been harvested and obtained a yield of 1,993,014 MT. Paddy cultivation is quite demanding when comes to obtaining a high yield. A fair amount of research is taken place and novel varieties that yield bumper harvest have been invented. Seed paddy of these varieties are distributed among the farmers with the view to obtain a high yield.

#### ***Cultivation of other crops***

Other plantation crops such as tea and rubber play a major role in terms of foreign exchange earnings to the country. A variety of non-export crops are grown in various climatic zones for the export market and local consumption. Depending on the climate and soil condition prevailing in the zone, the vegetable varieties and root crops are being grown. Hence agricultural crops fall into "up country" and "low country" varieties. All crop varieties are distributed by a transporting mechanism and the produce is distributed to all parts of the country making it available for consumers scattered in the country.

#### ***Production Process of paddy***

Paddy cultivation has been mechanized in many parts of the island in recent years as with the use of tractors to plough fields as against the use of buffalo. Similarly, manual labor for sowing seeds or planting the paddy and harvesting has been replaced largely with mechanized technology such as combine harvesters.

In the ploughing process paddy stalk is buried in the soil as a conditioner and at the same time it nourishes the soil. The Government has carried out awareness campaigns to discourage burning of the paddy stalk and the paddy husk but to use as a soil conditioner. After sowing seed paddy or by planting the seed sprout, it is allowed to grow. From time to time weedicides, pesticides and chemical fertilizer are applied on demand, during the period of growth up until harvesting.

Once harvested, sheaves of paddy are subjected to the separation process of paddy from the shaft where it is

done traditionally by getting buffaloes to trample. This process is gradually mechanizing using motored paddy separators. This is an *in-situ* process. Collected paddy is then either stored or milled to produce rice.

### ***Production Process of other crops***

In commercial agriculture, many crops are now being grown using the latest technology such as ploy tunneling, carefully using the limited land and water resources available. Hence top soil degradation is taken care of. Those that don't use the modern technology still use the traditional farming methods. The Chena cultivation is one such method and is still being practiced in rural areas despite limited land availability in a scale less intense than it was carried out many decades ago. However, use of agro fertilizer and chemical pest control methods are employed widely. Under the Control of Pesticides Act, use of harmful or phased out chemical fertilizer and pesticides have been banned and they are no longer available in the market.

Crops that are processed for value addition are categorized under agro processing. This includes processed tea, coconut processing industries, paddy milling etc. As per current practices, vegetables and pulses have little value addition as they are consumed directly by the locals while fruits are used in both making jams, chutneys & beverages for the local and foreign markets & consumed directly.

### ***Polluting Processes (point source)***

In cultivation key polluting steps, although limited, takes place mainly in the cultivating and post harvesting phases.

- Land preparation for cultivation
- Use of fertilizer and pesticides and weedicides
- Harvesting
- Post-harvest storage and transportation

### ***Summary of Key Environmental issues***

**Solid waste** - During the post-harvest phase a large amount of solid organic waste is generated and is generally used as fodder for cattle or organic manure for the next season, thereby encouraging the use of organic farming while discouraging the use of chemical fertilizer.

**Wastewater** – Over application of chemical fertilizer and pesticides/weedicides causes soil and ground/surface water pollution. Farmers are warned and advised by the district agrarian officers of its harmful effects to the environment and public health. However, as a signatory to the Rotterdam Convention, Sri Lanka does not use any hazardous chemical mentioned in the Convention.

### ***Recommended pollution prevention and control technologies***

In cultivation, it is always best practices that need to be employed general recommendations cannot be employed in cultivation as it varies and depend upon the soil type, area of cultivation i.e. dry zone or wet zone and topography, crop type and the specific agriculture sector. This is why site specific Environmental Management Planning plays a key role. However, careful and minimal use of chemical fertilizer and pesticides/weedicides through good practices such as Integrated Pest Management and Integrated Plant nutrition Management etc that facilitate sustainable agricultural development should be essentially promoted. At the same time careful soil management needs to be taken care of to prevent soil erosion and top soil degradation.

Among other best practices would be organic cultivation. Although in commercial agriculture it may seem an uneconomical task it would certainly be an initiative and be a new avenue for small to medium farmers.

### ***Sector specific environmental guidelines for further reading***

Central Environmental Authority. (1997) Environmental Guidelines for Agriculture Sector Projects in Sri Lanka

## **Agro Processing**

### ***Rice Mills***

*Description of the industry.* The staple diet in the South Asian region consists of rice and preparations from rice flour. From paddy cultivation to harvesting and all other operations pertaining to paddy cultivation takes place in all regions in Sri Lanka. In the milling process, the hard husk of the rice grain is removed mechanically to obtain the edible seed of rice. Most milling of paddy for commercial purposes are done in registered mills in a large scale while small scale operations also take place for individual or personal consumption. Most rice mills of commercial operation are private sector owned and operated by the rice traders. Generally, they purchase harvested paddy from growers and milled and sold as rice to the market maintaining adequate stocks of rice in the market and paddy in the stores.

Thus, real value addition takes place at this milling operation. Rice mills whether they operate the dry process or wet process, need to obtain EPL for their operation.

### ***Production process***

Depending on the type of rice required, paddy is par-boiled prior to milling or milled without parboiling. These two operations are known as wet and dry process respectively.

In the milling process, be it wet or dry a pre-cleaning takes place where the impurities are removed in the first instance. If paddy is milled using the dry method, paddy is dried before milling. Then is subjected to the de-husking process and thereafter rice is polished using vertical cone polishers.

In contrary, in the wet process, paddy is first cleaned to remove any impurities. Then it is soaked in water, drained and boiled. Once boiling is done, paddy is dried and de-husked. Finally, it is polished to obtain the final product.

***Polluting process (point sources).***

In rice milling industry the main polluting sources are

- Pre-cleaning process
- Soaking process & draining
- Boiling process
- De-husking

***Summary of key environmental issues***

According to the level of pollution, rice mills have been categorized under the E2 in terms of pollution level of the ERMF.

*Solid Waste* - In the pre-cleaning process any remnants of straw or dried plant debris may be removed as solid waste. It is estimated that nearly 200Kg of husk is generated for a ton of paddy milled. Along with the husk, rice bran is also removed and is discarded as dust. Husk is the main solid waste that is generated in the paddy mills. Particulate matter and dust is generated in the process.

Husk is used as a source of fuel for furnaces in the mill. Partially it is used as poultry feed as it contains rice bran and also used to produce bricks. Unutilized husk is burnt in open which causes air pollution. Fly ash causes a nuisance if not disposed of properly. Mostly the unused excess husk is burnt in heaps. At times these heaps are dumped in open ground which takes years to decompose. Thus, land becomes non-arable. At the same time if it gets into a water body, it becomes polluted and silted leading to eutrophication.

*Wastewater* - Water used for soaking paddy is discarded as waste water. As this wastewater contains high levels of BOD, discharging to the vicinity is quite detrimental to the environment. Nutrients in the wastewater may promote algal growth leading to eutrophication in the water body where the waste is discharged. If hot water is discharged, it can bring about adverse effects to the fauna and flora in soil or the water body.

*Air Pollution* – In the milling process, although Air Pollution is not a significant element, in-door air pollution can be associated with particulate matter and dust in the air. This will cause allergic reactions in workers.

***Recommended pollution prevention methods Solid waste***

General solid waste disposal methods include composting if the matter is of organic origin, sanitary land fill, or incineration. In the case of solid waste generated from the paddy mills, it can be considered to be of organic origin. Hence this can be composted in site or at a different location. Discarding paddy husk is a raw material for making bricks where it is used extensively by the brick makers and is used as a fuel for furnaces in the mill itself or for other industries. Any excess paddy husk that needs to be discarded

should be burnt in a properly constructed incinerator and fly ash should be disposed of in a proper manner ensuring no solid waste gets into any water body.

*Waste water* - Disposal of wastewater needs to comply with the industrial wastewater discharging standards gazetted by the Central Environmental Authority.

After a pre-treatment of screening, the wastewater can be anaerobically treated in an anaerobic digester followed by aerobic treatment in an oxidation ditch or aerated pond or activated sludge system depending on the BOD level that needs to be reduced. Treated clarified effluent is then channeled through a sand bed to remove any suspended particles.

*Air Pollution* -Particulate matter and dust that is generated needs to be taken care of. The wet scrubbers, cyclonic particle collectors or even exhausts with dust bags can be installed to prevent any particulate matter being sent out of premises. These dust traps need to be cleaned or replaced periodically for efficiency.

### ***Grinding Mills***

Description of the industry. Commercial grinding mills came into operation with the open economy and changes in lifestyle where more and more females being employed and seeking convenience in preparation of food. Life has made convenient by having access to easy- to-prepare food formulations such as *Dosa* mixtures, sting-hopper mixtures, hopper mixtures and spices & condiments etc.

All grinding mills need to obtain EPL for their operation.

*Production process.* In the production process, whatever the item being ground, is first washed and destoned. Raw materials are dried to reduce the moisture content to the level where it can be ground mechanically and sieved to remove any hard-solid particles. Finally, they are mixed with other ingredients if formulations or mixtures are to be prepared or packed mechanically.

Adequate care should be taken in all steps to avoid contamination from chemical and biological substances as food products can be vehicles for food borne diseases. Maintenance of hygienic conditions is top priority in handling food preparations.

*Polluting process – (point sources)*

- Washing and de-stoning process
- Drying and roasting process
- Grinding process
- Packing

### ***Summary of key environmental issues***

Grinding mills have been categorized into E2 in terms of pollution level of the ERMF as per its level of pollution.

*Solid waste* - It is quite unlikely that any of the raw materials will become waste matter except in an unlikely event where the raw materials are of poor quality and become inedible. In the grinding process certain solid matter may remain to be disposed of. Fine particulate matter can become air borne causing an occupational health hazard.

*Wastewater* – During washing of raw material certain particulate matter or debris may be washed away. This washing may be high in BOD and COD content and may include suspended solid particles.

*Air emissions* - As far as air emissions are concerned, particulate matter if becomes air borne may cause an occupational hazard and perhaps be a pollutant. Dust particles are generated in the grinding process and at the packing process. Certain condiments when grinding may emit aromatic compounds which are not affecting the environment or health. Certain respiratory issues can create an impact to the workforce if proper and adequate preventive measures are not taken.

In commercial scale operations, drying is done using steam and hence boilers can generate air emissions due to the use of fuel.

*Noise/ vibration* – As grinding operation is done mechanically, the noise and vibration are generated. This becomes an annoyance in long term operations causing sever distress to the workers and may even cause impairment to hearing. Measures need to be taken to prevent any such damage from occurring.

#### ***Recommended pollution prevention and control technologies Solid waste***

Dust and particulate matter are the main concerns in the grinding mill operation in terms of solid waste and is discussed under air pollution.

To prevent occupational health hazards, workers should be given face masks.

*Wastewater* -Wastewater generated during the washing process may contain a high BOD and COD levels. The washings are of organic origin and hence after initial screening to remove any suspended solids, it can be treated anaerobically to reduce the BOD and COD levels followed by aerobic treatment. However, in highly urbanized areas, as the limiting factor is land, a chemical treatment method may be employed to settle the suspended and dissolved solids followed by a clarification process

*Air pollution* - Wet scrubbing methods can be used to trap the aromatic organic pollutants while dust traps/ bags or cyclonic separators are employed to collect air borne particulate matter.

*Noise/ vibration*- As most of the small-scale operating mills is located amongst commercial buildings or homes noise and vibration can be an annoyance to the inhabitants. In larger scale commercial operations, the factories can adopt proper enclosure with sound proof insulation material or isolate the machines that generate noise.

But in the ones, that are located in urban areas can employ simpler technologies such as use of insulation material to the walls. Proper servicing of machinery, lubrication of moving parts and replacement of worn out parts will minimize noise and vibration.

Improper mounting of equipment tends to give out vibration much more than those that are properly mounted. Adequate care must be taken to install equipment in the first place.

Waste type	Migratory/ Abatement Measure
<b>Solid Waste</b>	
Polythene	Recycle; no open burning
Cardboard/ paper	Recycle; no open burning
Paddy hull/ husk	Use as a raw material for brick making or as animal feed or incinerate
Fly ash	Bury
<b>Liquid Waste</b>	
Suspended solids	Use screening mesh(Pre-treatment)
Clarified liquid waste	Anaerobic treatment followed by Aerobic treatment. Clarification in a sand bed.
<b>Gaseous Waste</b>	
Suspended particulate matter	Use dust traps
Air emissions from stove/ boiler rooms	Minimum chimney stack height to be 30 feet
<b>Noise/Vibration</b>	
Machines in operation	Enclose in a room
Vibration	Proper mounting of machinery

### **Regulatory obligations**

Description	EPL Category
Rice mills having wet process and having a production capacity of 5,000 kg or more per day	A
Rice mills having wet process with a production capacity of more than 1,000 kg per day	B
Rice mills having a dry process	C
Grinding mills having production capacity of more than 1,000 kg per month	B
Grinding mills having production capacity of less than 1,000 kg per month	C

### **Sector specific environmental guidelines for further reading**

- Environmental Resources Management Lanka (Pvt.) Ltd. (2001). *Pollution Control Guideline No. 1- Paddy Mills*, Central Environmental Authority.
- Environmental Resources Management Lanka (Pvt.) Ltd. (2001). *Pollution Control Guideline No. 7- Grinding Mills*, Central Environmental Authority.



## Annex 4: Suggested Format for the Environmental Screening Form for Subprojects

Title of sub-project:

No	Item	Details			
<b>INTRODUCTION</b>					
1	Name of the Site				
2	Province				
3	District				
4	Divisional Secretary Division (s)				
5	Local Authority				
6	Grama Niladari Division (s)				
7	Brief description of the project (Be as brief as possible, confining to main elements only, provide a 1:10,000 scaled site map inclusive of area within 500m radius from the project site)				
8	Does the site /project require any;	<b>Yes</b>	<b>No</b>	If yes give the extent (in ha)	
	Reclamation of land, wetlands				
	Clearing of forest				
	Felling of trees				
9	Distance from Coast line				
10	Minimum land area required for the proposed development (based on urban guidelines) (ha)				
11	Available total land area within the identified location (ha)				
12	Expected construction period				
13	Responsible contact person with contact Information				
14	Present Land Ownership	State	Private	Other (specify)	
15	Total Cost of the Project				
16	Anticipated Date of Completion				
<b>DESCRIPTION OF THE ENVIRONMENT</b>					
<b>PHYSICAL</b>					
17	Topography & Landforms (map)	Attach an extract from relevant 1: 50,000 topographic sheet/ if detailed maps are available provide them			
18	Relief (difference in elevation)	Low <20m	Medium 20-40m	High 40-60	>60m
19	Slope	Low <30%	Medium 30-40 %	High 40-60 %	Very High > 60%
20	Position on Slope	Bottom	Mid-slope	Upper-slope	
21	Soil type				
22	Depth of top soil	Shallow	Moderate	Deep	

		< 20cm	20 – 100 cm	>100cm			
23	Soil Erosion	Low	Medium	High			
24	Climate	Wet Zone	Intermediate Zone	Dry Zone/ Semi Arid Zone			
25	Annual dry period						
26	Source of fresh Surface Water	Spring/canal	Tank/Reservoir	Perennial Stream	Seasonal Stream	N o n e	
28	Surface Water Use	Domestic	Washing/Bathing	Irrigation		Animal use	
29	Surface Water Quality	Poor		Moderate		Good	
30	Ground Water Availability	Dug Well	Tube Well	Other (specify)			
31	Ground Water Use	Domestic	Washing/Bathing	Irrigation	Animal use		
32	Ground Water Quality	Poor		Moderate		Good	
33	Incidence of Natural Disasters	Floods	Prolonged droughts	Cyclones/tidal waves		Other	
34	Geological Hazards	Landslides	Rock falls	Subsidence		Other	
<b>ECOLOGICAL</b>							
35	Habitat Types in the Project Site (indicate the % of each habitat type)	Natural forest	Degraded forest	Natural scrubland	Degraded scrubland	Riverine forest	
		Grassland	Abandoned agricultural land	Marsh	Lagoon	Estuary	
		Coastal scrub	Mangrove	Salt marsh	Home-gardens	Other (list)	
36	Habitat types within 500m radius from the site periphery (indicate the % of each habitat type)	Natural forest	Degraded forest	Natural scrubland	Degraded scrubland	Riverine forest	
		Grassland	Abandoned agricultural land	Marsh	Lagoon	Estuary	
		Coastal scrub	Mangrove	Salt marsh	Home-gardens	Other (list)	
37	Are there any environmentally and culturally sensitive areas within 250m?	Protected Areas	Migratory pathways of animals	Archeological sites	Wetlands	Mangroves strands	
38	<b>Screening Questions</b>	<b>Yes</b>	<b>No</b>	<b>Scale of Impact</b>			<b>Remarks</b>
				<b>H</b>	<b>M</b>	<b>L</b>	

<b>A</b>	Siting of the activity						
f.	Are there any environmentally and culturally sensitive areas within the project site and 500 meters from the project boundary?						
g.	Protected Areas / Forest Reserve						
h.	Migratory pathways of animals						
i.	Archeological sites						
j.	Wetlands						
k.	Mangroves strands						
l.	Estuarine						
m.	Bufferzone of PAs/FRs						
n.	Special area for protecting biodiversity						
o.	Are there any plants (endemic and threatened species) of conservation importance within the project site and 500 meters from the project boundary?						
p.	Are there any animals (endemic and threatened species) of conservation importance within the project site and 500 meters from the project boundary?						
<b>B</b>	<b>Potential Environmental Impacts</b>						
	<b>Will the activity / sub-project Cause</b>						
<input type="checkbox"/>	Land disturbance or site clearance?						
<input type="checkbox"/>	Negative effects on rare (vulnerable), threatened or endangered species of flora or fauna or their habitat?						
<input type="checkbox"/>	Negative effects on designated wetlands?						

<input type="checkbox"/>	Spread of invasive plants or animals?						
<input type="checkbox"/>	Negative effects on wildlife habitat, populations, corridors or movement?						
<input type="checkbox"/>	Destruction of trees and vegetation?						
<input type="checkbox"/>	Impact on fish migration and navigation?						

<input type="checkbox"/>	Obstruction of natural connection between river and wetlands inside project area or natural drainage system?						
<input type="checkbox"/>	Water logging due to inadequate drainage?						
<input type="checkbox"/>	Insufficient drainage leading to salinity intrusion?						
<input type="checkbox"/>	Negative effects on surface water quality, quantities or flow?						
<input type="checkbox"/>	Negative effects on groundwater quality, quantity or movement?						
<input type="checkbox"/>	Increased demand of water requirements leading to reduction of water supply for competing uses?						
<input type="checkbox"/>	Increase probability of spread of diseases and parasites?						
<input type="checkbox"/>	Significant sedimentation or soil erosion or shoreline or riverbank erosion on or off site?						
<input type="checkbox"/>	Noss of existing buildings, property, economic livelihood?						
<input type="checkbox"/>	Negative impact on soil stability and compactness?						
<input type="checkbox"/>	Impacts on sustainability of associated construction waste disposal?						
<input type="checkbox"/>	Changes to the land due to material extraction?						
<input type="checkbox"/>	Traffic disturbances due to construction material transport and wastes?						

<input type="checkbox"/>	Increased noise due to transportation of equipment and construction materials?						
<input type="checkbox"/>	Increased noise due to day-to-day construction activities?						
<input type="checkbox"/>	Increased wind-blown dust from material (e.g. fine aggregate) storage areas?						
<input type="checkbox"/>	Degradation or disturbance of historical or culturally important sites?						
<input type="checkbox"/>	Health and safety issues?						

**Will the activity / sub-project require**

<input type="checkbox"/>	Setting up of ancillary production facilities?						
<input type="checkbox"/>	Significant demands on utilities and services?						
<input type="checkbox"/>	accommodation or service amenities to support the workforce during construction						

Note: Please add any other screening questions relevant to the proposed activity / sub-project. Also provide additional explanation of the responses and/or positive impacts in the remarks column.

**CONTACT DETAILS OF OFFICIALS AND RECOMMENDATIONS**

39	Name of the officer completed the form (From the Developer)	
40	Designation and contact Information	
41	List of team members	
42	Overall observation and recommendation	
43	Signature and date	

**FINAL OBSERVATIONS & RECOMMENDATIONS**

(a)	Does this site require an Initial Environmental Examination/Environmental Impact Assessment (IEE/EIA) or any other Environmental Assessments (EA) under the national regulations and please state the reasons?	
-----	--	--

(b)	Although national regulations may not require IEE/EIA at this Site, are there environmental issues which need to be addressed through further environmental investigations and/or EA based on the guidance provided in EAMF? If the answer is “Yes” briefly describe the issues and type of investigations that need to be undertaken.	
(c)	Will this site be abandoned based on the current observations? If yes, please state the reasons.	
(d)	Does the proposed site meet the national urban planning requirements (only applicable for activities outside PAs)? If the answer is “No”, what needs to be done to meet these requirements; if the answer is “Yes”, has the project site obtained the necessary approvals?	
(e)	In addition to the above issues, please indicate any additional observations, recommendations if any	

Name and Contact Information of the officer who made the final observations and recommendations (PMU)
Signature and Date

## Annex 5: Dam Safety Screening and Next Steps for Irrigation Subprojects

### Form: Verification of the Status of Dam Safety of Up-Stream Hydrologic Connections

*The following exercise will require collaboration with field offices (Provincial or District) belonging to the Irrigation Department/Mahaweli Authority.*

Verification and Documentation Form	
1	Name of Subproject
2	Name of Irrigation Scheme/Tank
3	Description of Irrigation Scheme/Tank (For tanks, provide the bund height and capacity for schemes indicate the length and size of the scheme and command area)
4	The irrigation structure/scheme is connected to/downstream of a medium-large scale dam
	Yes
	No
5	If Yes, provide the name of the dam and bund height
	Has the dam mentioned in question 5 undergone any form of rehabilitation
	Yes (Indicate the date of the last rehabilitation exercise)
	No
6	Is the dam covered under the Dam Safety and Water Resources Planning Project (DSWRPP) or any other project
	Yes
	No
7	If Yes please indicate when the rehabilitation work was completed/ will be completed under the said project
8	If No, a site verification of the dam should be conducted, in collaboration with the Irrigation/Mahaweli officers, the existing conditions of the dam in terms of operations and safety need to be recorded and shared with the World Bank's environmental specialist for technical recommendations on further actions using the procedures mentioned below.

As per the above screening, in the presence of such upstream hydrologically connected dams, which have not been rehabilitated or strengthened and thus have Dam Safety implications, the following steps need to be taken:

- (a) an inspection and evaluation of the safety status of the existing dam, its appurtenances, and its performance history;
- (b) a review and evaluation of the mandated dam owners operation and maintenance procedures, and
- (c) preparation of a written report of findings and recommendations for any remedial work or safety-related measures necessary to upgrade the existing dam to an acceptable standard of safety.

Necessary additional dam safety measures or remedial work may be financed under the proposed project. When substantial remedial work is needed, these will be undertaken using the following procedures.

- (a) A competent professional will be hired to design and supervise the work which can be conducted as per generic dam safety measures designed by qualified engineers.

Name and Contact Information of the officer from the Irrigation Department/Mahaweli Authority Consulted. (Please provide the Name of the field office)
Signature and Date

Name and Contact Information of the officer who made the final observations and recommendations (PMU)
Signature and Date



## **Annex 6: Guidelines for Health and Safety of Workers, Communities and Visitors**

Health and safety of workers and the public should be designed into constructions, before and during and after the building phase. It is cheaper and easier to control risks in construction to workers as well as the public before work starts on site by proper planning, training, site induction, worker consultation and incorporating strict safety procedures in construction plans. The proposed project interventions will mostly involve small to medium scale construction sites. As such, extreme dangers posed by working in environments such as great heights, deep water and involving dangerous chemicals and radioactive material will not be present. Potential dangers associated with CSIAP sites will include falling from moderate heights, vehicle accidents, falling into trenches, drowning, breathing dust and other air pollutants, back aches caused by handling heavy material, wildlife attacks, etc. and can be mitigated with following safety guidelines.

EA/EMP for each site should mandatorily include a risk assessment as to what are the hazards involved in the work site, who might be harmed and how seriously, how likely this harm might happen and what actions are required to eliminate or reduce the risk and incorporate such measures in the EMP and clearly set out in the tender documents. All sub-projects must observe health and safety regulations, hence during implementation it is important to check if these control measures are put in place and are meeting the legal requirement.

Further guidance can be found in the World Bank Group General EHS Guidelines. The following measures have been developed to fit the country context based on the General EHS Guidelines.

### ***Training***

- Ensure constructors carry out suitable training programs on occupational health and safety for workers prior to commencement of construction, especially with regard to working in wild territory.
- Ensure only experienced and well-trained workers are used for the handling of machinery, equipment and material processing plants
- Ensure all persons, including managers, are trained and able to carry out their work without risk to the safety or health of themselves, other workers or the public

### ***Personal Protective Equipment***

- Ensure appropriate safety equipment, tools and protective clothing are provided to workers and that safe working methods are applied. A safety inspection checklist should be prepared taking into consideration what the workers are supposed to be wearing and monitored.
- Any person who works or operates in an area where there is a risk of flying objects, such as splinters, should wear safety goggles at all time. These should be securely fitted to the face. Welders should protect the entire face from hot sparks and bright rays by using a welding mask.
- Any person exposed to high levels of dust or hazardous gases (when working in tunnels) should wear respiratory protection in the form of disposal masks or respiratory masks which fit more snugly around the nose and mouth.
- Any person working in an area where there is the risk of being struck on the head by a falling or flying object should wear a hard hat at all times. These should be well maintained in order to be fully effective, and any helmets or hard hats that are damaged or cracked should immediately be replaced.

- All workers will be required to wear shoes or strong boots to prevent sharp objects from penetrating or crushing the foot. Those working in muddy conditions and in canals with polluted water should avoid hand/foot contact with water and should never wear slippers.
- Road workers should wear reflective vests to avoid being hit by moving vehicular traffic.

### ***Site Delineation and Warning Signs***

- Ensure delineation devices such as cones, lights, tubular markers, orange and white strips and barricades are erected to inform about work zones.
- Ensure all digging and installing work items that are not accomplished are isolated and warned of by signposts and flash lamps in nighttime (for those sites outside PAs).
- Ensure dangerous warning signs are raised to inform public of particular dangers and to keep the public away from such hazards, such as warning for bathing when working on river sites and irrigation works.
- Ensure rehabilitation of trenches progressively once work is completed.
- The safety inspection checklist must look to see that the delineation devices are used, whether they are appropriately positioned, if they are easily identifiable and whether they are reflective.

### ***Equipment safety***

- Work zone workers use tools, equipment and machinery that could be dangerous if used incorrectly or if the equipment malfunctions. Inspections must be carried out to test the equipment before it is used, so that worker safety can be secured. Inspections should look for evidence of wear and tear, frays, missing parts and mechanical or electrical problems.

### ***Material management***

- Ensure easily flammable materials are not be stored in construction site and that they are transported out of project site

### ***Emergency Procedures***

- Ensure an emergency aid service is in place in the work zone.
- Ensure all site staff is properly briefed as to what to do in the event of an emergency, such as who to notify and where to assemble for a head count. This information must be conveyed to employees by the site manager on the first occasion a worker visits the site.

### ***Construction camps***

- Ensure installation of adequate construction camps and sanitation facilities for construction workers to control of transmission of infectious diseases.
- Ensure that adequate warning is provided on issues of poaching and wildlife attacks

### ***Information management***

- Develop and establish contractor's own procedure for receiving, documenting and addressing complaints that is easily accessible, culturally appropriate and understandable to affected communities.
- Provide advance notice to local communities by way of information boards about the schedule of construction activities.

### ***Worker consultation***

- Consulting the workforce on health and safety measures is not only a legal requirement, it is an effective way to ensure that workers are committed to health and safety procedures and improvements. Employees should be consulted on health and safety measures and before the introduction of new technology or products.

## **Annex 7: Generic EMPs and Environment Codes for some of the proposed investments**

### **A7.1 Environmental Conditions to be Included in Contracts for Gravel Road Rehabilitation**

The following environmental conditions should be followed, by the contractor, during rehabilitation of gravel roads within agricultural areas.

#### ***Material Sourcing***

- Construction material such as sand, aggregates and other quarry material should only be sourced from licensed sources.
- All burrow and/or quarry material may only be sourced from sources that hold a valid mining license from the GSMB.
- The contractor is required to maintain updated copies of all necessary licenses and environmental clearances for all burrow and quarry material they are sourcing.
- Sourcing of any material from within any Protected Areas/Sanctuaries, tank beds and/or designated natural areas are strictly prohibited.
- The will need to maintain the numbers and relevant details, including dates licenses were issues and expiration dates, of all relevant licenses and report of their status accordingly.

#### ***Transport of Construction Material***

- All material should be transported in fully covered trucks. Overloading of vehicles with materials should be controlled and done in a manner to suit the trucks capacity.

#### ***On-site and Offsite Storage of construction materials***

- Sites for storage of construction materials should be identified, without affecting the local communities, traffic and other common utilities that will lead to access issues.
- All construction material should be stored in a site approved by the engineer.
- All earth material, sand and/or metal should be stored in a contained manner at all times to avoid dust and runoff due to rain.
- Plastic sheeting (of about 6 mm minimum thickness) can be used and held in place with weights, such as old tires or cinder blocks, with the edges of the sheeting buried, or by the use of other anchoring systems.

#### ***Management of Dust***

- All construction material should be stored and transported as per the recommendations provided above (Point 3), where the measures stipulated will ensure dust levels are mitigated.
- Water sprinkling should be carried out in the work and fill areas and the access road if dust stir is observed. Water sprinkling should be done more frequently on days that are dry and windy (at least four time's day) as the levels of dust can be elevated during dry periods.
- Dust masks should be provided to the laborers for the use at required times.

#### ***5. Control of Spread of Invasive Species***

- There is a possibility of introducing / spreading of invasive species during material transportation and disposing cleared vegetation from one site to another, thus the following measures are to be undertaken.
- Close monitoring of transportation, storage of borrowing material for the spread of any invasive species must be done.

- Vehicles should be covered during transportation of cleared vegetation to and from the construction site.
- Borrow material to be brought from properly identified borrow pits and quarry sites, the sites should be inspected in order to ensure that no invasive plant species are being carried with the borrow material.
- Washing the vehicles should be conducted periodically to prevent carrying any invasive species
- The construction site should be inspected periodically to ensure that no invasive species are establishing themselves at the site.

***Water for work purposes and dust management***

- The contractor should arrange adequate supply of water for the project purpose throughout the construction period from a source agreed upon with the engineer.
- Water may not be obtained for project purposes, including for labor camps, from public or community water supply schemes without a prior approval from the relevant authority.
- Extraction of water from ground water or surface water bodies without the permission from
- Engineer and the relevant authority
- Permission for the extraction of water should be obtained prior to the commencement of the project, from the relevant authority.

**A7.2 General Mitigation Measures to be Included in the EMP for All Construction Projects**

***Pre-Construction Impact Mitigation***

*Utility Relocation*

- Identify the common utilities to be affected such as: telephone cables, electric cables, electric poles, water pipelines, public water taps, etc.
- Affected utilities shall be relocated with prior approval of the concerned agencies before construction starts.
- Ensure community consensus and minimum impact to common utilities like telephone cable, electric cables, electric poles, water taps and etc., Proper clearance to be obtained from the concerned authorities and sent to the PMU before commencement of works.

*Tree Removal*

- Attempt to save the trees by changing the alignment of the designs
- Provide adequate protection to the trees to be retained with tree guards (e.g. Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars) as required.
- Identify the number of trees that will be affected with girth size & species type
- Trees shall be removed from the construction sites before commencement of construction with prior permission from the concerned department.
- Compensatory plantation by way of Re-plantation of at least twice the number of trees cut should be carried out in the project area.

*Construction of labor camps*

- The location, layout and basic facility provision of labor camp must be submitted to Engineer prior to their construction.  
The construction will commence only upon the written approval of the Engineer.

- The contractor shall maintain necessary living accommodation and ancillary facilities in functional and hygienic manner and as approved by the Engineer.
- All temporary accommodation must be constructed and maintained in such a fashion that uncontaminated water is available for drinking, cooking and washing. The sewage system for the camp must be planned and implemented with concurrence from the Local Public Health Officer (PHI)
- Adequate health care is to be provided for the work force. The layout of the construction camp and details of the facilities provided should be prepared and shall be approved by the engineer.
- Labor camp sites after use should be cleared and the site should be reinstated to previous condition at the close of the construction work.

*Planning of temporary Traffic arrangements*

- Temporary diversion will be provided with the approval of the engineer. Detailed traffic control plans will be prepared and submitted to the engineers for approval, one week prior to commencement of works.
- The traffic control plans shall contain details of temporary diversion, details of arrangements for construction under traffic, details of traffic arrangement after cessation of work each day, Signage, safety measures for transport of hazardous materials and arrangement of flagmen.

***Site Management and Mitigation of Impacts during Construction Phase***

*Information Disclosure among Stakeholders*

- Discussions should be conducted with the residents who reside around the immediate vicinity of the construction site; provide them with information on the project activities muster their views for possible impact mitigation as this will also ensure a good rapport and less complains. This should be done immediately once the contractor is mobilized.
- A copy of the EMP should be available at all times at the project supervision office on site.

*Material Sourcing*

- Significant impact on geological resources is anticipated at quarry sites and borrow areas the PIA shall ask contractors to ensure that sand, aggregates and other quarry material is sourced from licensed sources.
- It is recommended that all burrow and/or quarry material should be sourced from licensed sources. The contractor is required to maintain the necessary licenses and environmental clearances for all burrow and quarry material they are sourcing to obtain soil, fine aggregate and coarse aggregate.
- Sourcing of any material from any protected areas and/or designated natural areas are strictly prohibited.
- The Project Supervision Engineer will require maintaining the numbers and relevant details of all necessary licenses etc. and report of their status accordingly.

*Transport and Storage of construction materials*

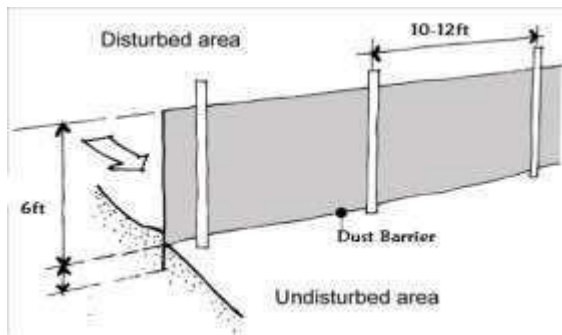
- Sites for storage of construction materials should be identified, without affecting the traffic and other common utilities that will lead to access issues as the compound is operational.
- All material should be transported in fully covered trucks. Overloading of vehicles with materials should be controlled and done in a manner to suit the trucks capacity.
- Construction material such as cement, sand and metal should be stored in closed structures or in a contained manner.

## Dust

- All construction materials such as sand, metal, lime, bricks etc. should be transported under cover to the site and stored under cover at the site. Plastic sheeting (of about 6 mm minimum thickness) can be used and held in place with weights, such as old tires or cinder blocks, with the edges of the sheeting buried, or by the use of other anchoring systems. This will minimize the levels of airborne dust



- Mud patches caused by material transporting vehicles in the access road should be immediately cleaned
- Continual water sprinkling should be carried out in the work and fill areas and the access road if dust stir is observed. Water sprinkling should be done more frequently on days that are dry and windy (at least four times a day) as the levels of dust can be elevated during dry periods.
- Dust barriers should be used during all construction activities, especially in areas along roads with heavy traffic, commercial and residential areas.
- The height of barriers should be 6ft at minimum. Material such as Amano roofing sheets, fine mesh geotextiles are recommended material to be used for setting up dust barriers
- Dust masks should be provided to the laborers for the use at required times.



### *Noise*

- Noise generating work should be limited to day time (6:00AM to 6:00PM). Other type of construction work which will not disturb the environment by noise or vibration could be carried out during the night time. No work that generates excessive noise should be carried out during night hours (from 6:00PM to 6:00AM on the following day).
- Even during day time use of the access road should be minimized during departure times (7:00AM to 8:30AM), school time (1:00PM-2:00PM) and arrival times (After 4:30PM -6:00PM). This will not only reduce noise levels but also help mitigate congestion issues in the area due to the construction activities.
- All equipment and machinery should be operated at noise levels that do not exceed the permissible level of 75 dB (during construction) for the day time. For all construction activities undertaken during the night time, it is necessary to maintain the noise level at below 50 dB as per the Central Environmental Authority (CEA) noise control regulations
- All equipment should be in good serviced condition. Regular maintenance of all construction vehicles and machinery to meet noise control regulations stipulated by the CEA in 1996 (Gazette Extra Ordinary, No 924/12) must be conducted for vehicles/machinery that will be used in construction on site and for transport.
- Ideally noise generating work should not be carried out during public holidays and religious days. Special care
- should be taken if there are religious establishments nearby.
- Labor gangs should be warned to work with minimum noise. Strict labor supervision should be undertaken in this respect. Number of night time resident laborers should be minimized.
- Temporary sound barriers also should be erected around buildings or premises as appropriate to shield residents if there are complaints from them.

### *Vehicular noise pollution at residential / sensitive receptors*

- Idling of temporary trucks or other equipment should not be permitted during periods of loading / unloading or when they are not in active use. The practice must be ensured especially near residential / commercial / sensitive areas.
- Stationary construction equipment will be kept at least 500m away from sensitive receptors, where possible. These include hospitals, schools, places of worship and households.
- All possible and practical measures to control noise emissions during drilling shall be employed.

### *Noise from vehicles, machinery and equipment*

- Contractor shall submit the list of high noise/vibration generating machinery & equipment to the PIA for approval.
- Servicing of all construction vehicles and machinery must be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced.
- Maintenance of vehicles, equipment and machinery shall be regular and up to the satisfaction of the Engineer to keep noise levels at the minimum.
- Removal and Disposal of construction debris and excavated materials
- During site clearance activities, demolition and debris removal must be carried out swiftly and in well-planned manner. Possibly debris removal can be carried out during non-peak hours to avoid traffic at the site.
- The contractor shall identify the sites for debris disposal and should be finalized prior to start of the earthworks; Spoil and other disposal materials should only be dumped at sites for which prior



approval from relevant authorities such as the LA have been obtained. Taking into account the following

- The dumping does not impact natural drainage courses
  - No endangered / rare flora is impacted by such dumping
  - Should be located in nonresidential areas located in the downwind side oLocated at least 100m from the designated forest land.
  - Avoid disposal on productive land.
  - Should be located with the consensus of the local community, in consultation with the engineer and shall be approved by the highways department
- Minimize the construction debris by balancing the cut and fill requirements.
  - The contractor should avoid any spillage of spoil when transporting such materials to the approved material dumping sites.

#### *Protection of top soil*

- The top soil to be protected and compacted after completion of pipe laying activities.
- The contractor should attempt to reuse the cut material from earthworks for project activities where possible

#### *Pollution from Fuel and Lubricants*

- The contractor shall ensure that all construction vehicle parking location, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites shall be located away from rivers and irrigationcanal/ponds.
- Contractor shall ensure that all vehicle/machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground.
- Contractor shall arrange for collection, storing and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to Engineer) and approved by the Engineer. All spills and collected petroleum products will be disposed off in accordance with standards set by the CEA/MoE.
- Engineer will certify that all arrangements comply with the guidelines of CEA/MoE or any other relevant laws.

#### *Public and Worker Safety*

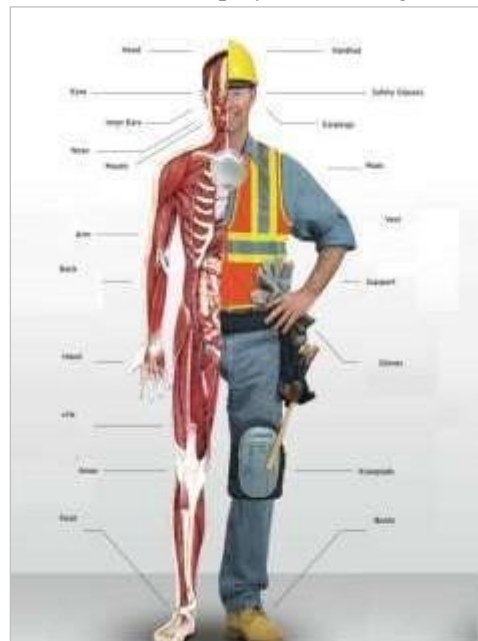
- The construction site should be barricaded at all time in a day with adequate marking, safety tape, flags, reflectors etc. for safety of individuals using the compound on a daily basis. ( Items such as parking cones, lights, tubular markers, orange and white strips and barricades of a luminous nature for night visibility)
- The construction site should be clearly demarcated by the above means and restriction of access to public to the site will help the safety of public.
- Safety signboards should be displayed at all necessary locations.
- The contractor should obtain a Third-party insurance to compensate any damages, injuries caused to the public or laborers during the construction period.
- All construction vehicles should be operated by experienced and trained operators under supervision.
- Basic onsite safety training should be conducted for all laborers during the EMP training prior to the start of the construction activities.

- ❑ All digging and installation work should be completed in one go, if this task is not accomplished the area should be isolated using luminous safety tape and barricading structures surrounding the whole area.
- ❑ Trenches should be progressively rehabilitated once work is completed.
- ❑ Material loading and unloading should be done in an area, well away from traffic and barricaded Construction
- ❑ wastes should be removed within 24 hours from the site to ensure public safety.



*Safety Gear for Labors*

- ❑ Protective footwear and protective goggles should be provided to all workers employed on mixing of materials like cement, concrete etc.
- ❑ Welder's protective eye-shields shall be provided to workers who are engaged in welding works.
- ❑ Earplugs shall be provided to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation.
- ❑ The contractor shall supply all necessary safety appliances such as safety goggles, helmets, safety belts, ear plugs, mask etc. to workers and staffs.
- ❑ In addition, the contractor shall be maintained in stock at the site office, gloves, ear muffs, goggles, dust masks, safety harness and any other equipment considered necessary.



- A safety inspection checklist should be prepared taking into consideration what the workers are supposed to be wearing and monitored on a monthly basis and recorded.

#### *Prevention of accidents*

- Prevention of accidents involving human beings, animals or vehicles falling or accidents due to open trenches/manholes during construction period. This needs to be ensured with proper barricading, signage boards and lighting etc.
- A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances should be available at the site office at all times
- Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital should also be insured.
- Names and contact information for emergency services such as Ambulance services, hospitals, police and the fire brigade should be prepared as a sign board and displayed at the work site.



#### *Presence of Outside Labor in a Residential Area*

- Strict labor supervision should be undertaken. There should be labor awareness programs to educate the laborers about their general behavior while at work as well as their own safety.

#### *Operation of labor camps*

- The Contractor shall construct and maintain all labor accommodation in such a fashion that uncontaminated water is available for drinking, cooking and washing.
- Supply of sufficient quantity of potable water (as per IS) in every workplace/labor camp site at suitable and easily accessible places and regular maintenance of such facilities.
- The sewage system for the camp are designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take place. Ensure adequate water supply is to be provided in all toilets and urinals.
- The contractor shall provide garbage bins in the camps and ensure that these are regularly emptied and disposed of in a hygienic manner

#### *Surface Drainage and Possible Water Stagnation*

- Provide storm water drain system in the premises which will discharge water to the improved roadside storm water drain.
- Carry out overall storm water management in the premises during construction using temporary ditches, sand bag barriers etc.
- Temporary flooding due to excavation.
- Proper drainage arrangements to be made, to avoid the overflowing of existing drains due to excavation during the laying of pipes, cutting activities.

#### *Tree Protection during Construction Phase*

- Giving due protection to the trees that fall in the shoulders /corridor of impact shall be the prime focus during Construction/post construction
- Masonry tree guards, Low level RCC tree guards, Circular Iron Tree Guard with Bars, use of plate compactors near trees may also be considered where necessary

#### *Tree Re-Planting*

- Re-plantation of at least twice (1:2) the number of trees cut should be carried out along the project road. Since the major portion of the project road may pass through open lands, planting of trees along the entire stretch of the road is recommended as an enhancement measure.
- Growth and survival of trees planted shall be ensured and monitoring done at least for a period of 3 years. Survival status shall be reported on monthly basis to Engineer in charge.
- Clearing/Closure of Construction Site/Labor Camps
- Contractor to prepare site restoration plans for approval by the engineer. The plan is to be implemented by the contractor prior to demobilization.
- On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the engineer.

#### **Procedures for Dealing with Chance Finds**

##### *Flora and Chance found Fauna*

- The contractor will take reasonable precaution to prevent workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal.
- If any wild animal is found near the construction site at any point of time, the contractor will immediately upon discovery thereof acquaint the Engineer and carry out the Engineer's instructions for dealing with the same.
- The Engineer will report to the nearby Forest Department /Department of Wild Life Conservation (range office or divisional office) and will take appropriate steps/ measures, if required in consultation with the forest officials.

##### *Chance Found Archaeological Property*

- All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation.
- The contractor will take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing. He will, immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out the instructions for dealing with the same, waiting which all work shall be stopped.
- The Engineer will seek direction from the Archaeological Department of Sri Lanka and inform the project environmental safeguard specialist to follow the Chance Find Procedures set forth.

### A7.3 Generic Environmental Management Plan (EMP) for Rehabilitation of C Grade Roads

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
<b>PRE-CONSTRUCTION AND SITE PREPERATION</b>					
<b>1.</b>	<b>Tree Removal</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> The contractor shall make every effort to avoid removal and/or destruction of trees, including those of religious, cultural and aesthetic significance.</li> <li><input type="checkbox"/> If such action is unavoidable the Engineer shall be informed in advance to verify and report on the technical justification for the trees that will be required to be removed.</li> <li><input type="checkbox"/> The following steps are to be followed if trees are identified for removal during the rehabilitation of the road.               <ul style="list-style-type: none"> <li>o Identify and document the number of trees that will be affected with girth size &amp; species type</li> <li>o Trees shall be removed from the construction sites before commencement of construction with prior permission from the concerned department (LA).</li> <li>o Compensatory plantation by way of Re-plantation of at least twice the number of trees cut should be carried out in the project area.</li> <li>o The contractor shall adhere to the guidelines and recommendations made by the Central Environmental Authority, if any with regard to felling of trees and removal of vegetation.                   <ul style="list-style-type: none"> <li>o Removed trees of economic value must be handed over to the Timber Corporation.</li> </ul> </li> </ul> </li> </ul>	Engineering Cost	Contractor	PMU/MoA
<b>2.</b>	<b>Labor and Labor Camps</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> The contractor should give priority to hiring labor from the surrounding areas to avoid the need for labor camps.</li> <li><input type="checkbox"/> The location, layout and basic facility provision of the labor camp must be submitted to Engineer of the relevant managing department prior to their construction.</li> <li><input type="checkbox"/> The construction will commence only upon the written approval of the Engineer.</li> <li><input type="checkbox"/> The contractor shall maintain necessary living accommodation and ancillary facilities in a functional and hygienic manner and as approved by the Engineer.</li> <li><input type="checkbox"/> All temporary accommodation must be constructed and maintained in such a fashion that uncontaminated water is available for drinking, cooking and washing.</li> </ul>	Engineering Cost	Contractor	PMU/MoA

		<ul style="list-style-type: none"> <li><input type="checkbox"/> The sewage system for the camp must be planned and implemented with concurrence from the Local Public Health Officer (PHI)</li> <li><input type="checkbox"/> Adequate health care is to be provided for the work force.</li> <li><input type="checkbox"/> Labor campsites after use should be cleared and the site should be reinstated to previous condition at the close of the construction work.</li> </ul>			
3.	<b>Material Sourcing</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> The contractor is required to ensure that sand, aggregates and other quarry material is sourced from licensed sources.</li> <li><input type="checkbox"/> The contractor is required to maintain the necessary licenses and environmental clearances for all burrow and quarry material they are sourcing –including soil , fine aggregate and coarse aggregate.</li> <li><input type="checkbox"/> Sourcing of any material from protected areas and/or designated natural areas, including tank beds, are strictly prohibited.</li> <li><input type="checkbox"/> If the contractor uses a non-commercial burrow/quarry sites, the sites should be remediated accordingly once material sourcing has been completed.</li> </ul> <p>The contractor should submit in writing all the relevant numbers and relevant details of all pre-requisite licenses etc. and report of their status accordingly.</p>	Engineering Cost	Contractor	PMU/MoA
4.	<b>Water for Construction activities</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> The contractor should arrange adequate supply of water for the project purpose throughout the construction period from a source agreed upon with the engineer. Water may not be obtained for project purposes, including for labor camps, from public or community water supply schemes without a prior approval from the relevant authority.</li> <li><input type="checkbox"/> Extraction of water from ground water or surface water bodies without the permission from Engineer and the relevant authority</li> <li><input type="checkbox"/> Permission for the extraction of water should be obtained prior to the commencement of the project, from the relevant authority.</li> </ul>			PMU/MoA
5.	<b>Work Site for construction materials</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> The contractor should identify an area to store construction materials and equipment at a site which should be approved by the engineer.</li> <li><input type="checkbox"/> Storage yards cannot be located in community areas, such as playgrounds, close to water ways, cause access issues to locals or forested areas that require clearing.</li> <li><input type="checkbox"/> Parking, repairing vehicles, machinery and equipment shall be done stationed only at the work site and/or in any other designated areas by the engineer. The contractor should provide instruction and advice should be given to drivers and operators (both company owned and hired) to park vehicles and store equipment at the work site or designated areas by the engineer.</li> </ul>			PMU/MoA

6.	<b>Information Disclosure among Stakeholders</b>	<input type="checkbox"/> Discussions should be conducted with the residents who reside along the corridor of the road; Residents have to be briefed of the project, purpose and design and outcomes via a documented community consultation session <ul style="list-style-type: none"> <li>○ This should be done immediately once the contractor is mobilized.</li> <li>○ The contractor should take note of all impacts, especially <input type="checkbox"/> access issues and safety hazards that will be of concern to the residents and take necessary measures as stipulated in the EMP to mitigate them. The contractor will maintain a log of any grievances/complaints and actions taken to resolve them.</li> </ul> <input type="checkbox"/> A copy of the EMP should be available at all times at the project supervision office on site.	Engineering Cost	Contractor/ PIA	PMU/MoA
<b>CONSTRUCTION PHASE</b>					
7.	<b>Clearing of roads and Removal and Disposal of construction debris excavate materials</b>	<input type="checkbox"/> During site clearance activities, removal of vegetation and debris must be carried out swiftly and in well-planned manner. <input type="checkbox"/> The contractor shall identify the sites for disposal of material cleared. <input type="checkbox"/> Plants, shrubs and other vegetation cleared should not be burned on site. Spoil and other disposal materials should only be dumped at sites for which prior approval from relevant authorities such as the LA have been obtained. Taking into account the following <ul style="list-style-type: none"> <li><input type="checkbox"/> The dumping does not impact natural drainage courses <input type="checkbox"/> No endangered/ rare flora is impacted by such dumping</li> <li><input type="checkbox"/> Should be located in nonresidential areas located in the downwind side <input type="checkbox"/> Located at least 100m from the designated forest land.</li> <li><input type="checkbox"/> Avoid disposal on productive land.</li> <li><input type="checkbox"/> should be located with the consensus of the local community , in consultation with the engineer and shall be approved by the highways department</li> </ul> <input type="checkbox"/> Minimize the construction debris by balancing the cut and fill	Engineering Cost	Contractor	PMU/MoA

		<p>requirements.</p> <p>The contractor should avoid any spillage of spoil when transporting such materials to the approved material dumping sites.</p>			
<b>8.</b>	<b>Protection of top soil</b>	<input type="checkbox"/> Top soil of the agricultural areas and any other productive areas where it has to be removed for the purpose of this project shall be stripped to a specified depth	Engineering Cost	Contractor	PMU/MoA
		<p>of 150mm and stored in stockpiles of height not exceeding 2m, as directed by the engineer.</p> <input type="checkbox"/> If the contractor is in any doubt on whether to conserve the topsoil or not for any given area he shall obtain the direction from the engineer in writing <input type="checkbox"/> Removed top soil could be used as a productive soil when replanting trees and during turfing. <input type="checkbox"/> Stockpiled topsoil must be returned to cover the areas where the topsoil has been removed due to project activities. Residual topsoil must be distributed on adjoining/proximate barren areas as identified by the engineer in a layer of thickness of 75mm – 150mm.			



		<ul style="list-style-type: none"> <li><input type="checkbox"/> Topsoil thus stockpiled for reuse shall not be surcharged or overburdened.</li> <li><input type="checkbox"/> As far as possible multiple handling of topsoil stockpiles should be kept to a minimum.</li> </ul>			
<b>9.</b>	<b>Protection of Ground Cover and Vegetation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Construction vehicle, machinery and equipment shall be used and stationed only in the areas of work and in any other area designated/ approved by the engineer. Entry and exit of construction vehicles and machinery should be restricted to particular points as directed by the <input type="checkbox"/> engineer</li> <li>Contractor should provide necessary instructions to drivers, operators and other construction workers not to destroy ground vegetation cover unnecessarily.</li> </ul>	Engineering Cost	Contractor	PMU/MoA
<b>10.</b>	<b>Transport and Storage of construction materials</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> All material should be transported in fully covered trucks. Overloading of vehicles with materials should be controlled and done in a manner to suit the truck capacity.</li> <li><input type="checkbox"/> Construction material such as cement, sand and metal should be stored in closed structures or in a contained manner as per those specified under mitigatory measures to</li> <li><input type="checkbox"/> All construction materials such as sand, metal, lime, bricks etc. should be transported under cover to the site and stored under cover at the sight. Plastic sheeting (of about 6 mm minimum thickness) can be used and held in place with weights, such as old tires or cinder blocks, with the edges of the sheeting buried, or by the use of other anchoring systems.</li> </ul>	Engineering Cost	Contractor	PMU/MoA
<b>11.</b>	<b>Emission of Dust</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> In order to minimize the levels of airborne dust all construction material/debris should be stored as per the instructions provided above.</li> <li><input type="checkbox"/> Mud patches caused by material transporting vehicles in the access road should be immediately cleaned</li> <li><input type="checkbox"/> Continual water sprinkling should be carried out in the work and fill areas and the access road if dust stir is observed. Water sprinkling should be done more frequently on days that are dry and windy (at least four time's day) as the levels of dust can be elevated during dry periods. Dust masks should be provided to the laborers for the use at required times.</li> </ul>	Engineering Cost	Contractor	PMU/MoA

10	<b>Burrowing of Earth and Self Management of Operated Burrow Sites</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> In the event the contractor will use a self-operated burrow site <ul style="list-style-type: none"> <li>o Contractor shall comply with the environmental requirements/guidelines issued by the CEA and the respective local authorities with respect of locating burrow areas and with regard to all operations related to excavation and transportation of earth from such sites.</li> <li>o Contractor can also find suitable soil materials from currently operated licensed burrow pits in the surrounding area, subject to approval of the engineer</li> <li>o No burrow-sites be used (current approved) or newly established within areas protected under FFPO and FO</li> <li>o Burrow areas shall not be opened without having a valid mining license from the GSMB. The location, depth of excavation and the extent of the pit or open cut area shall be as approved by the engineer. oAll burrow pits/areas should be rehabilitated at the end of their use by the contractor in accordance with the requirements/guidelines issued by the CEA and the respective local authority.</li> <li>o Establishment of burrow pits/areas and its operational activities shall not cause any adverse impact to the near-by properties. Also shall not be a danger of health hazard to the people.</li> <li>o Contractor shall take all steps necessary to ensure the stability of slopes including those related to temporary works and burrow pits.</li> </ul> </li> </ul>	Engineering Cost	Contractor	PMU/MoA
11.	<b>Quarry Operations and Management of Self Operated Quarry Sites</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> In the event the contractor manages a self-owned existing quarry sites available in the project area</li> <li><input type="checkbox"/> The should be approved by GSMB with valid EPL and Industrial Mining Licenses;</li> <li><input type="checkbox"/> Prior approval should be obtained from GSMB, CEA and local authorities such as Pradeshiya Sabha.</li> <li><input type="checkbox"/> Selected quarry sites should have proper safety measures such as warnings, safety nets etc., and third party insurance cover to protect external parties that may be affected due to blasting.</li> <li><input type="checkbox"/> Quarry sites should not be established within protected sites identified under the FFPO and FO</li> <li><input type="checkbox"/> It is recommended not to seek material from quarries that have ongoing disputes with community.</li> </ul> <p>The maintenance and rehabilitation of the access roads in the event of damage by the contractors operations shall be a responsibility of the contractor.</p>	Engineering Cost	Contractor	PMU/MoA

		Copies of all relevant licenses should be maintained by the contractor for review and documentation by the engineer			
12.	<b>Control of Sedimentation and Soil Erosion</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Debris material shall be disposed in such a manner that existing drainage paths are not blocked.</li> <li><input type="checkbox"/> Drainage paths associated with irrigation structures should be improved / erected to drain rain water properly.</li> <li><input type="checkbox"/> Silt traps will be constructed to avoid siltation into the water ways. where necessary along the road corridor.</li> </ul>	Engineering Cost	Contractor	PMU/MoA
		<ul style="list-style-type: none"> <li><input type="checkbox"/> To avoid siltation, drainage paths should not be directed to waterways and irrigation canals and they should be separated from such water bodies</li> <li><input type="checkbox"/> In Hilly terrain and areas with slopes of Embankment slopes, slopes of cuts, etc. shall not be unduly exposed to erosive forces. <ul style="list-style-type: none"> <li><input type="checkbox"/> These exposed slopes shall be graded and covered by grass or other suitable materials per the specifications.</li> <li><input type="checkbox"/> During the rainy season open cuts/slopes should be covered with fixed polythene sheeting to avoid excessive erosion.</li> </ul> </li> <li><input type="checkbox"/> All fills, back fills and slopes should be compacted immediately to reach the specified degree of compaction and establishment of proper mulch.</li> <li><input type="checkbox"/> Work that lead to heavy erosion shall be avoided during the raining season. If such activities need to be continued during rainy season prior approval must be obtained from the Engineer by submitting a proposal on actions that will be undertaken by the contractor to prevent erosion.</li> </ul>			

		<ul style="list-style-type: none"> <li><input type="checkbox"/> The work, permanent or temporary shall consist of measures as per design or as directed by the engineer to control soil erosion, sedimentation and water pollution to the satisfaction of the engineer. <ul style="list-style-type: none"> <li><input type="checkbox"/> Typical measures include the use of berms, dikes sediment basins, fiber mats, mulches, grasses, slope drains and other devices.</li> <li><input type="checkbox"/> All sedimentation and pollution control works and maintenance thereof are deemed, as incidental to the earthwork or other items of work and no separate payment will be made for their implementation.</li> </ul> </li> </ul>			
12.	Noise from vehicles, machinery and equipment	<ul style="list-style-type: none"> <li><input type="checkbox"/> Noise generating work should be limited to day time (6:00AM to 6:00PM). No work that generates excessive noise should be carried out during night hours where in close proximity to sensitive receptors (temples, schools, hospitals) and residential areas (from 6:00PM to 6:00AM on the following day).</li> <li><input type="checkbox"/> All equipment and machinery should be operated at noise levels that do not exceed the permissible level of 75 dB (during construction) for the day time. For all construction activities undertaken during the night time, it is necessary to maintain the noise level at below 50 dB as per the Central Environmental Authority (CEA) noise control regulations</li> </ul> <p>All equipment should be in good serviced condition. Regular maintenance of all construction vehicles and machinery to meet noise control regulations stipulated by the CEA in 1996 (Gazette Extra Ordinary, No 924/12) must be conducted for vehicles/machinery that will be used in construction on site and for transport. Ideally noise generating work should not be carried out during public holidays and religious days. Special care should be taken as there is a temple nearby. Labor gangs should be warned to work with minimum noise. Strict labor supervision should be undertaken in this respect. Number of night time resident laborers should be minimized.</p>	Engineering Cost	Contractor	PMU/MoA
13.	Vehicular noise pollution at residential / sensitive receptors	<ul style="list-style-type: none"> <li><input type="checkbox"/> Idling of temporary trucks or other equipment should not be permitted during periods of loading/unloading or when they are not in active use.</li> <li><input type="checkbox"/> The practice must be ensured especially near residential/commercial/sensitive areas.</li> </ul>	Engineering Cost	Contractor	PMU/MoA
		<ul style="list-style-type: none"> <li><input type="checkbox"/> Stationary construction equipment will be kept at least 500m away from sensitive receptors, where possible. These include places of worship and households.</li> <li><input type="checkbox"/> All possible and practical measures to control noise emissions during drilling shall be employed.</li> <li><input type="checkbox"/> Contractor shall submit the list of high noise/vibration generating</li> </ul>			

		<p>machinery &amp; equipment to the engineer for approval.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Servicing of all construction vehicles and machinery must be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced.</li> <li><input type="checkbox"/> Maintenance of vehicles, equipment and machinery shall be regular and up to the satisfaction of the Engineer to keep noise levels at the minimum.</li> </ul>			
<b>14.</b>	<b>Pollution of Soil and Water via Fuel and Lubricants</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> The contractor shall ensure that all construction vehicle parking locations, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites shall be located away from rivers, at least 200m away, and irrigation canal/ponds.</li> <li><input type="checkbox"/> Contractor shall ensure that all vehicle/machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground.</li> </ul> <p>Contractor shall arrange for collection, storing and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to Engineer) and approved by the Engineer. All spills and collected petroleum products will be disposed of in accordance with standards set by the CEA/MoE.</p> <p>Engineer will certify that all arrangements comply with the guidelines of CEA/MoE or any other relevant laws.</p>	Engineering Cost	Contractor	PMU/MoA

15.	<b>Public Safety</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> At all times, the Contractor shall provide safe and convenient passage for vehicles, pedestrians and livestock.</li> <li><input type="checkbox"/> Work that affects the use of existing accesses shall not be undertaken without providing adequate provisions to the prior satisfaction of the <input type="checkbox"/> Engineer. The construction corridor should be barricaded at all time in a day with adequate marking, safety tape, flags, reflectors etc. for safety of individuals using the site daily basis. ( Items such as parking cones, lights, tubular markers, orange and white strips and barricades of a luminous nature for night visibility shall be procured where deemed necessary) Safety signboards should be displayed at all necessary locations.</li> <li><input type="checkbox"/> The contractor should obtain a Third party insurance to compensate any damages, injuries caused to the public or laborers during the construction period. All construction vehicles should be operated by experienced and trained operators under supervision. Basic onsite safety training should be conducted for all laborers during the EMP training prior to the start of the construction activities. All digging and installation work should be completed in one go, if this task is not accomplished the area should be isolated using luminous safety tape and barricading structures surrounding the whole area. Trenches should be progressively rehabilitated once work is completed.</li> </ul>	Engineering Cost	Contractor	PMU/MoA
		<ul style="list-style-type: none"> <li><input type="checkbox"/> Material loading and unloading should be done in an area, well away from traffic and barricaded</li> <li><input type="checkbox"/> Construction wastes should be removed within 24 hours from the site to ensure public safety.</li> </ul>			

16.	<b>Safety of Workers</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Contractor shall comply with the requirements for safety of the workers as per the ILO Convention No. 62 and Safety &amp; Health Regulations of the Factory Ordinance of Sri Lanka to the extent that</li> <li><input type="checkbox"/> those are applicable to this contract.</li> <li><input type="checkbox"/> The contractor shall supply all necessary safety measures at site.</li> </ul> <p>Protective footwear and protective goggles should be provided to all <input type="checkbox"/> workers employed on mixing of materials like cement, concrete etc.</p> <p>Welder's protective eye-shields shall be provided to workers who are engaged in welding works.</p> <p>Earplugs shall be provided to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation. The contractor shall supply all necessary safety appliances such as safety goggles, helmets, safety belts, ear plugs, mask etc. to workers and staffs. In addition, the contractor shall maintained in stock at the site office, gloves, ear muffs, goggles, dust masks, safety harness and any other equipment considered necessary.</p> <p>A safety inspection checklist should be prepared taking into consideration what the workers are supposed to be wearing and monitored on a monthly basis and recorded.</p>	Engineering Cost	Contractor	PMU/MoA
17.	<b>Prevention of accidents</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Prevention of accidents involving human beings, animals or vehicles falling or accidents due to open trenches/manholes during construction period. This needs to be ensured with proper barricading, signage boards and lighting etc.</li> <li><input type="checkbox"/> A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances should be available at the site office at all times</li> <li><input type="checkbox"/> Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital should also be insured.</li> </ul> <p>Names and contact information for emergency services such as Ambulance services, hospitals, police and the fire brigade should be prepared as a sign board and displayed at the work site.</p>	Engineering Cost	Contractor	PMU/MoA
18.	<b>Operation of labor camps</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> The Contractor shall construct and maintain all labor accommodation in such a fashion that uncontaminated water is available for drinking, cooking and washing.</li> <li><input type="checkbox"/> Supply of sufficient quantity of potable water (as per IS) in every workplace/labor camp site at suitable and easily accessible places and regular maintenance of such facilities.</li> <li><input type="checkbox"/> The sewage system for the camp are designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take place. Ensure adequate water supply is to be provided in all toilets and urinals.</li> </ul>	Engineering Cost	Contractor	PMU/MoA

		<input type="checkbox"/> The contractor shall provide garbage bins in the camps and ensure that these are regularly emptied and disposed of in a hygienic manner			
<b>19.</b>	<b>Traffic Management</b>	<input type="checkbox"/> Contractor shall develop a traffic management plan to minimize inconvenience to road users as well as prevent road accidents and implement it. Road signs and trained flagmen should be used to divert traffic as per the <input type="checkbox"/> required traffic management measures. <input type="checkbox"/> Clear instructions should be given if detours are used. Also any pits should be enclosed to prevent pedestrians or vehicles falling <input type="checkbox"/> into them Improvement of the road surface and width will result in an increase of both the number of vehicles and the vehicle operating speeds. Therefore, after the construction is completed the contractor should erect relevant road signs and road markings to guide the drivers to ensure the safety of the vehicles and pedestrians			PMU/MoA
<b>20.</b>	<b>Loss of Access due t construction</b>	<input type="checkbox"/> Temporary access will be provided when permanent access is blocked for construction. <input type="checkbox"/> When construction work is in progress in one side, the other side will be opened for traffic & properly <input type="checkbox"/> At the end of each day, debris that blocked access path will be cleared away under the supervision of a supervisor.			PMU/MoA



21.	<b>Loss, Damage and disruption to Flora</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> All works shall be carried out in a manner that the destruction to the flora and their habitats is minimized.</li> <li><input type="checkbox"/> Trees and vegetation shall be felled / removed only if that impinges directly on the permanent works or necessary temporary works. In all such cases contractor shall take prior approval from the Engineer.</li> <li><input type="checkbox"/> Contractor shall make every effort to avoid removal and/or destruction of trees of religious, cultural and aesthetic significance.</li> <li><input type="checkbox"/> If such action is unavoidable the Engineer shall be informed in advance and carry out public consultation and report on the same should be submitted to the Engineer.</li> <li><input type="checkbox"/> Contractor shall adhere to the guidelines and recommendations made by the CEA, if any with regard to felling of trees and removal of vegetation. Removed trees of significant value must be handed over to the Timber Corporation. Documentation on the process should be shared with the engineer and maintained by the contractor.</li> <li><input type="checkbox"/> The contractor shall plant over 5 year old root-balled native trees suitable for the location as identified by the Engineer.</li> <li><input type="checkbox"/> The planting should take place in public land suitable for the purpose The contractor shall build hardy structures around the trees for protection. The contractor shall be responsible for ensuring the well-being of the trees/plants until the end of the contract</li> </ul>	Engineering Cost	Contractor	PMU/MoA
22.	<b>Loss, Damage and disruption to Fauna</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> All works shall be carried out in such a manner that the destruction or disruption to the fauna and their habitats is minimum.</li> <li><input type="checkbox"/> Construction workers shall be instructed to protect fauna including wild animals and aquatic life as well as their habitats. Hunting, poaching and unauthorized fishing by project workers is not allowed.</li> <li><input type="checkbox"/> No solid or liquid waste should be dumped into natural habitats.</li> </ul>	Engineering Cost	Contractor	PMU/MoA
23.	<b>Chance find procedures for PCRs and Archeological Property</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Presented in Annex 11</li> </ul>			PMU/MoA
24.	<b>Surface Drainage a Possible Water Stagnation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Provide storm water drain system in the premises which will discharge water to existing storm water drainage networks</li> <li><input type="checkbox"/> Carry out overall storm water management in the premises during construction using temporary ditches, sand bag barriers etc.</li> <li><input type="checkbox"/> Proper drainage arrangements to be made, to avoid the overflowing of existing drains due to cutting, excavation and other activities</li> </ul>	Engineering Cost	Contractor	PMU/MoA
<b>POST CONSTRUCTION</b>					

25.	Clearing/Closure of Construction Site/Labor Camps	<ul style="list-style-type: none"> <li><input type="checkbox"/> Contractor to prepare site restoration plans for approval by the engineer. The plan is to be implemented by the contractor prior to demobilization. This includes burrow sites and storage yards as well</li> <li><input type="checkbox"/> On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the entire satisfaction of the engineer.</li> </ul>	Engineering Cost	Contractor	PMU/MoA
26.	Environmental Enhancement/ Landscaping	<ul style="list-style-type: none"> <li><input type="checkbox"/> Landscape plantation, including turfing of shoulders, slopes, edge treatment of water bodies shall be taken up as per either detailed design or typical design guidelines given as part of the Bid Documents.</li> <li><input type="checkbox"/> The contractor also shall remove all debris, piles of unwanted earth, spoil material, away from the dam site and from other work places and disposed at locations designated or acceptable to the Engineer or as per the stipulated waste management criteria of this EMP.</li> </ul>	Engineering Cost	Contractor	PMU/MoA

## **A7.4 Environmental Conditions for the Construction of Dug Wells**

Since dug wells take water from the highest water table, they are extremely susceptible to those activities that take place in the immediate vicinity of the well. Hence, selection of the proper location is an important aspect in dug well construction, especially if the water in the well will be used for drinking purposes.

### ***Some basic rules to keep in mind before selecting a location for constructing a drinking water well.***

- Survey of any existing wells in the area should be made to find out water availability and quality in the general area (if geo-tech investigations are not done). Any unused DW should be noted and causes found out.
- Well site must be above the flood level of rivers, tanks or other low-lying areas that are prone to flood during rain
- Drinking water wells should not be built in paddy fields (pollution by agro-chemicals)
- Areas of peaty soil should be avoided for the well as these causes the water to have an unpleasant taste and smell.
- Distance to the nearest possible source of pollution must not be less than at least 15 meters in the direction of the ground water flow. Sources of pollution can be latrine pits, cattle sheds, drains, burial grounds, garbage disposal dumps, roads etc.

### ***Some tips for hand dug well-construction***

- Select technology suited for the ground condition of the area
- Do not embark on well construction during or immediately after a rainy season
- The first 2.5m of wall below ground level should compulsorily be water-sealed to avert surface water intrusion. The well should be protected with a head wall and an apron around it.
- The required depth of the dug well will depend on the soil and water table conditions. It is better to construct dug well in the dry season, with the objective of achieving about two meters of water in the DW upon completion. This procedure will ensure a sufficient depth of water to remain serviceable year-round.
- DW should be covered to protect it from outside contamination ensuring proper ventilation and sunlight. A wire mesh with a suitable mesh size to protect the water quality to be placed on the headwall is ideal. If a concrete cover is placed, then adequate measures should be taken to ensure aeration.

### ***Water Quality***

- Water quality in the new dug well should be tested prior to it being used. The first sample should be taken after the well has been cleaned after construction which will take a few days.
- Water should be tested for bacteriological and chemical properties (the National Water Supply and Drainage Board has a standard test for drinking water sources and can be tested in any of the NWSDB laboratories). The local PHI should be contacted in this regard.
- Chlorination should be carried out if presence of fecal coliform bacteria is determined.
- It is important not to over-chlorinate. Hence, this should be done by or under the supervision of the PHI.

- Ideally, the water quality of the well should be tested twice a year to ensure no contamination is taking place.

## **A7.5 Environmental Best Practices for Minor Tank Rehabilitation**

### ***Desilting***

- There are many aspects which need to be taken care of during desilting of canals and ponds.
- It will be highly critical and important to instruct the labour that, they should take care of the canal sides and the banks, so that they are not damaged. During desilting and disposal this should be supervised by the departmental entity to ensure intactness of structures.
- The protection of existing canal outlets needs to be ensured, so that its blockage is avoided. The water through outlets reaches the fields as usual however otherwise there may be serious resentment among the water users which may leads to law and order problem.
- Although the current activities are proposed to serve the farming community, still there will be certain short-term problems for the natives of that area, such as – blocking of the access and hindrances in villagers movement. Desilting activities in sensitive areas should be done manually as much as possible and concern should be made on ensuring uninterrupted access to village communities.

### ***Disposal of desilted matter***

- The disposal of desilted matter is a critical exercise, which if not done properly and as per disposal plan may lead to many environmental and socio-political problems. So the contractor has to ensure strict compliance in this regard. The departmental field officers need to prepare a Silt Disposal Plan which should be made available to contractor's representative well in advance. Such a plan should clearly spell the disposal sites with quantum of desilted matter to be disposed.
- Prior to preparation of Silt Disposal Plan, the consent of villagers for disposal of desilted matter onto their land is mandatory, so that there is no room for any confusion and conflict in this regard.
- There is another key aspect i.e. quality of desilted matter from minors It needs to be ensured whether it is fit for the farms or not. For this, the desilted matter needs to be tested and analyzed by the Mobile and Base Laboratories of the consultant.
- Various plants, bushes, shrubs etc. are likely to be damaged during transportation of desilted matter. Even the machinery/vehicles may also trample the floral species available on the canal banks. In addition to this, the labour movement may also damage the flora.
- The unplanned deposition of desilted matter on the canal banks lead to choking and destruction of flora present over there, thereby leading to temporary termination of their growth and if the desilted matter is not immediately disposed off to pre-decided disposal sites, it would cause killing of floral varieties buried under the desilted matter.
- The water-bodies (which are located in the vicinity of canal systems) such as – ponds, lakes, wetlands are prone to sedimentation, pollution and overall destruction due to illplanned Silt Disposal or inadequate adherence to a comprehensive plan. Water-bodies are lifeline for the villagers. These water-bodies are used by cattle for bathing and drinking etc. Such bodies also cater to a wide range of domestic needs of villagers and especially during lean period these water-bodies are vital for their survival.
- A provision to grow a vegetative cover on the disposal site after disposal is complete can be very helpful in further curbing adverse impacts of desilted matter in the vicinity. Such an activity has to be executed by the contractor under the supervision of the departmental field functionary.

- The silt from the canals mainly in branches and head reaches of distributaries contains pure sand. Such a desilted matter may reduce the fertility of the native soil and in addition to this, it may also change the current chemical composition of soil thereby leading to other problems related to compatibility, inhibited growth and reduced yield.
- If due care is not taken during disposal of the desilted matter placed on the banks after excavation, the banks and slopes would get damaged. This may also lead to weakening of banks. The awareness of labour in this regard will be quite critical in this regard.
- The contractor should carefully undertake this exercise and the departmental field functionary should supervise such activities, so that any damage to bunds and slopes can be avoided.

### ***Borrow Area Rehabilitation***

- The executing entities (contractor) borrow the area for soil digging for the purpose of construction or strengthening of structures/banks of the canals. It has been often found that, these entities rarely take environmental protection measures. Listed below are certain issues, which requires due consideration –
- In an event when the borrowed area is not compensated from environment viewpoint, it may causes soil degradation and removal of all floral and faunal species of that area, if any.
- Proper disposal of left over material after construction/other-maintenance-related activity has to be ensured, the patch of area borrowed should be appropriately compensated from environment point of view. Surplus excavated material should be used for construction in fill, or be disposed off at suitable places. These places of dumping should be provided with a vegetative cover
- Loss of vegetation may also leads to Soil erosion
- Stagnation of water leading to vector proliferation and thereby causing diseases related to mosquitoes or other biting flees etc.
- The loss of vegetation is another issue which needs to be dealt with, so that impact can be minimized in this aspect. The executing entities can be directed to ensure growth of vegetation in certain patch as a return for the destruction it has done to some other area in the name of “Borrow Area”.
- At this juncture, one needs to understand the significance of the ‘vegetative – cover’. The vegetative cover allows the native floral and faunal species to grow and propagate. It also hampers removal of top layer of earth i.e. soil (which is generally productive in nature) either by wind or rainfall/run-off water.
- Removal of vegetation and cutting of trees should be done judiciously and limited to minimum possible extent. It is advised that cutting of any such tree (if highly essential) should be done in consultation with the forest authorities.

### ***Drains***

- Under the rehabilitation work numbers of drainage systems are also to be rehabilitated including the earthwork.
- Silt cleared from the bed of a drain should be used to fill up holes and ruts on the inspection bank. This silt should not be thrown up in heaps in such a way as to interfere with the ingress of drainage.
- The silt should not be disposed on the inner slopes of the drain to safeguard its reentrance into the drains during rains, as this may potentially lead to choking or disruption of usual path of drain.
- Trees which grow on the inner slopes of drains should not be felled without taking required permission from the competent authority in the Forest Department. The compensatory plantation/afforestation should be ensured. The dead branches and rubbish that may have accumulated in the drains should also be cleared.

- Bunds should not be permitted in drains, as this may damage the drain and should be removed if found.
- All vegetative growth on distributaries and minors should be cleared from toe to toe of the outer slopes of the banks. Shrubs, large grass should be dug out by the roots. Stumps of trees that have been standing should be cut down to at least below the ground. Ant hills shall be dug out and leveled off.
- All vegetative growth on escapes and drains should be cleared from the outer edge of the riding bank to the inner edge of the opposite bank.
- Grass and jungle should never be allowed to grow on masonry works; it should be dug out by the roots and the masonry then plastered. Grass against masonry works should be scrapped off, as the masonry may get damaged in the process.
- No trees, jungle of any kind and tall grass should be allowed to grow within 10 meters of a masonry work.
- No big trees such as should be allowed within 25 meters of an important masonry works, as the roots of these trees may extend up to the joints and damage the masonry.
- When a tree is to be felled, a hollow should be dug around the base and the trunk cut through as low down as possible, the hollow should then be filled-up to cover the root.
- No grass or similar bushy plants be allowed at the internal section of canals and drains as they will severely hamper the pace of water flow.
- Shade-line trees should not be felled without special approval from concerned authorities.
- Pruning of trees if at all is necessary should not be carried out with axe. The branch should first be sawn about half through on the underside and then completely through from the top, so that the bank may not be torn off.

***Water quality***

- Irrigation works must be planned to be carried out during times of lowest flow
- Silt traps using sand bags should be used when desilting and bank and other structural maintenance work is carried out in order to protect downstream users

## **Annex 8. Chance find procedure for Physical Cultural Resources**

Contracts for civil works involving earth moving and excavation activities, especially in areas known to be sites of old civilizations and now returned to forest, should normally incorporate procedures for dealing with situations in which buried PCRs are unexpectedly exposed.

**Recognition of unknown PCRs** – This is the most difficult aspect to cover, especially if the contractor is not full-time accompanied by a specialist. **Upon discovery of such material** during project implementation work, the following should be carried out;

- Immediately stop construction activities.
- With the approval of the resident engineer delineate the discovered site area.
- Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remains, a night guard should be present until the responsible authority takes over.
- Through the Resident Engineer, notify the responsible authorities, the Department of Archaeology and local authorities within 24 hours.
- Submit a brief chance find report, within a specified time period, with date and time of discovery, location of discovery, description of finding, estimated weight and dimension of PCR and temporary protection implemented.
- Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out.
- An evaluation of the finding will be performed by the Department of Archaeology who may decide to either remove the PCR deemed to be of significance, further excavate within a specified distance of the discovery point and conserve on-site, and/or extend/reduce the areas demarcated by the contractor etc. This should ideally take place within about 7 days.
- Construction work could resume only when permission is given from the Department of Archaeology after the decision concerning the safeguard of the heritage is fully executed.

### Annex 9. Environmental Monitoring Checklist for Project Activities

**Title of project** :  
**Proponent** :  
**Contractor's Name** : **Monitoring Date** :  
**Monitor's Name &** :  
**Designation** :

<b>Issue</b>	<b>Proposed mitigation measures (<u>from the EMP</u>)</b>	<b>Implementing Responsibility</b>	<b>Compliance Yes/No</b>	<b>Reason for noncompliance</b>	<b>Follow up Action</b>

#### Photo-documentation of Issue Identified Above

<b>Issue # (from description above)</b>	<b>Date of photograph</b>	<b>Photograph depicting issue</b>



## **Annex 10. Terms of Reference for the Environmental Audit**

### **1. Introduction to the project**

To be filled

### **2. The Need for Environmental Assessment**

All sub-projects financed under the CSIAP are required to comply with World Bank Safeguard Operational Policies that have been riggered, in addition to conformity with the environmental legislation of GOSL. Thus, all sub-projects are required to conform to:

- a) the Environmental Assessment and Management Framework (EAMF) adopted by GOSL and cleared by the World Bank, and
- b) the terms of the Central Environmental Authority (CEA) or any other PAA as mandated by the National Environmental Act (NEA) of Sri Lanka, **where it is applicable**.

According to the EAMF, each sub-projects needs to be subjected to an environmental screening using the recommended template. Based on the screening information and concerns of the public the need to pursue further stand-alone assessments and if so the type of assessment is determined. All screening forms are filled by environmental officers supporting the Project implementation agencies and reviewed and cleared by the respective Project Management Units (PMU) and Deputy Project Management Unit (DPMU). For a sample proposals/ sub-projects with impacts are deemed as significant a prior review of the screening is carried out by the World Bank. When standalone assessments and management plans are considered necessary, the project proponent is responsible for carrying them out while the PMU reviews and clears them.

According to CEA procedures, all sub-project requiring NEA approval need to fill in a Basic Environmental Information Questionnaire (BEIQ). Upon reviewing the BEIQ, the CEA will determine whether no further environmental analysis is required or whether the proponent is required to prepare an Initial Environmental Examination (IEE) or an Environmental Impact Assessment (EIA).

### **3. Objectives**

The primary objective of this assignment is for the Consultant to carry out an environmental audit for CSIAP. The consultant will review the application of the EAMF to the CSIAP. In particular, the consultant will review a sample of (i) the screening forms prepared by the PMU and DPMUs (ii) standalone environmental assessments/management plans (iii) application of the NEA and its clearance procedures followed by the project, as the case be, and based on site visits ensure conformity with conditions, guidelines and comments stipulated in these and other related documents. The Consultant is expected to be familiar with the EAMF, the applicable safeguard policies of the WB, NEA and the approval procedure of the CEA.

### **4. Tasks of the Consultant**

- Obtain the required information from the sub-project proponent, PMUs, on the sub-project under implementation as well as under preparation under the ASMP. This may include, but not be limited

to, relevant plans, drawings, screening reports, social analysis, standalone EA/EMP (if it has been necessary), comments of the World Bank.

- Review the above documents, discuss with the sub-project proponent as well as the surrounding community and visit the location and environs of the sub-project.
- Check for conformity of the sub-project in relation to the guidelines, conditions and comments stipulated in the item above.
- Examine monitoring reports and whether standards, procedures and controls are in place to respond to safeguards requirements stipulated in EAMF.
- Examine significant new risks and propose remedial actions
- Highlight any deviations from the guidelines, conditions and comments stipulated in the aforesaid documents and assist the sub-project proponent to improve the safeguard documents incorporating the necessary mitigatory measures.
- Document any adverse environmental impacts that were not anticipated in the screening and follow up assessments that may have occurred during project construction and implementation.
- Examine procedures of corrective action if monitoring parameters are out of monitoring limits and if such incidents are actually reported, investigated and followed up

Document and submit the environmental audit report which should include (i) an Executive Summary, (ii) Overall audit opinion on the level of compliance, (iii) for each subproject reviewed (a) a description of the sub-project, (b) the list of documents reviewed and persons interviewed, (c) observations made at the site, (d) conformity and/or deviations to guidelines (CEA and EAMF), clearance conditions (World Bank and GOSL) and plans, (e) status of progress reporting and actions taken to address issues (f) actions need to be taken to respond to negative deviations, (g) new risks and recommendations to address the risks (mitigation actions), (h) any other relevant information to support the findings.

## **5. Application Procedure**

Qualified consultants may apply for the assignment listed above. Applications should be submitted using the format below:

- Title of assignment
- Name and address of the consultant/firm
- Name, designation and telephone number of contact person
- Brief consultant/company profile
- Key staff members of the firm (giving priority to assignment-specific staff; for each staff member provide name, position in the team, number of years in the firm, relevant qualifications and assignment-specific experience and proficiency in languages – read, write and speak)
- Relevant experience of the consultant/firm (Details of assignment specific tasks undertaken during the past 10 years with client references)

Expressions of interest should focus on aspects relevant to the particular assignment, and reach the PMU by [Date].

## Annex 11. Terms of Reference for the Strategic Environmental and Social Assessment

### A. BACKGROUND

This Terms of Reference (ToR) describes the scope of work for carrying out Strategic Environmental and Social Assessments (SESA) for the Anuradhapura Hot Spot Area (HSA). The map showing the HAS is provided in Annex 1.

As part of the project design, it has been agreed that SESAs will be prepared by the Government of Sri Lanka (GoSL) under the Climate Smart Irrigated Agriculture Project (CSIAP) in relation to the Hot Spot level investment plan for climate smart irrigated agriculture and related activities for selected HSAs. The CSIAP is a proposed project to be implemented jointly by the Ministry of Agriculture, Ministry of Irrigation and Water Resources Management, Ministry of Disaster Management, Min. of Local Government and Provincial Councils, and Ministry of Mahaweli Development and Environment and Min. of Public Administration and Home Affairs with funding support from the World Bank. The HSA planning is the responsibility of Ministry of Agriculture in coordination with the relevant Provincial team who will be responsible to prepare the Hot-Spot Development Plans. The objective of CSIAP is to improve climate resilience of farming communities and productivity of irrigated agriculture in 9 selected climatically vulnerable HSAs in Sri Lanka.

**Hot-Spot Area Development Model:** The HSA development model aims to enhance the resilience of specific climatic vulnerability in the HSAs and assist those who depend on it for their livelihoods. A critical aspect of such development is the flexible and adaptive management by local stakeholders of existing and improved irrigation water storage and delivery structures. All irrigation infrastructure rehabilitated or developed will be (re-)designed and (modernized) to account for likely climate change impacts, such as more frequent episodes of high intensity rainfall and flooding and/or drought. (See Annex 2 that provides more information on the project approach to irrigation water management.) While more reliable irrigation will help, farmers adapt better to rising climatic variability, converting agricultural output to improved incomes will also require more competitive agri-enterprises and upgraded infrastructure for agricultural trade so that producers and other value chain participants can access new markets and benefit from higher prices.

**Hot-Spot Area (HSA) Development Model:** The expected results of this novel model will be achieved by (1) *flexible and adaptive management of existing and improved irrigation water storage and delivery structures* to make irrigation more reliable in the face of rising climatic variability (including more frequent episodes of high intensity rainfall and flooding and/or drought); (2) *better agricultural inputs, techniques and practices that*, along with the additional water that will be available (eg., for live-saving protective irrigation during sudden dry spells in the middle of the cropping season) to help farmers to better stabilize crop yields given rising climatic variability – and reduce crop harvest losses; and (3) *better access new markets and higher prices, through marketing higher up the value chain, more competitive agri-enterprises and upgraded infrastructure for agricultural trade*, so that producers and other value chain participants can better stabilize and increase incomes from agricultural livelihoods.

The proposed project will be implemented in nine high poverty districts in five provinces in the dry zone and in climatically-vulnerable Hot-Spot Areas of the country, covering twenty sub-watersheds with a total project area of over 357,000 ha and a population of about one million. A Hot-Spot is a geographic area (~40,000 hectares on average) where farmers and farming livelihoods are highly exposed and vulnerable to increasing adverse climatic variability. Potential Hot-Spots areas were identified through a

rigorous, evidence-based analysis by the Department of Agrarian Development (DAD) of the Ministry of Agriculture (MOA), the World Food Program (WFP) and the International Water Management Institute (IWMI), using primary and secondary data on, *inter alia*, (i) drought impacts, including crop losses and expenditures on drinking water and relief supplies; (ii) current climate vulnerability based on income poverty, housing quality, source of drinking water, and participation in safety net programs; and (iii) future climate vulnerability up to 2030 based on an index of 42 indicators measuring exposure, sensitivity, and adaptive capacity. The administrative regions identified as vulnerable by the data analysis were placed on a river-basin map and contiguous areas (sub-watersheds) within these river basins, with a high concentration of vulnerability, were identified as Hot-Spots. This analysis by a Technical Working Group was approved at the National Project Steering Committee for final selection of project areas. All areas are paddy-dominant but with nascent diversification (~10% of area), all of which will be the focus of CSA techniques and practices which, if successful, should be more easily transferred to adjoining dry zone areas given their similarity in terms of topography, agricultural development and patterns of agrarian livelihoods.

Out of the four components of the project, Component 1 on promoting Infrastructure Planning, Development and Management for Climate-Smart Agriculture is being designed to implement adaptive and flexible plans in targeted HSAs to (a) develop rehabilitate and modernize, the critical infrastructure needed to ensure improved efficiency to irrigation water and to (b) better manage this infrastructure to ensure adequate water storage and delivery, so that for agricultural production especially on small and marginal farms (e.g., less than 1 hectare) is more resilient to the impacts of increased climatic variability climate change.

SESAs will be conducted parallel to the Sub-component 1.1 - Development of Climate-Smart Hot-Spot Area Development Plans. This sub-component will support the preparation of investment plans to develop and manage climate smart agriculture and irrigation systems, at the level of HSAs (~50,000 ha), watersheds within the HSAs (~5,000 ha) stand-alone irrigation systems and local administrative levels (GNDs). These nested climate smart hot spot areas development plans (HSAD PLAN ) will detail all activities and investments to be undertaken in these areas (including the de-silting, repair, rehabilitation, modernization and development of individual and chains of cascading tanks, and their inflow and drainage channels; protection and management of tank catchments; micro-irrigation and irrigation for rain-fed cultivation areas; vegetative cover and biomass (re)generation; and the demonstration of improved and appropriate seeds, inputs and cropping practices) and also clarify the roles and responsibilities of various government and non-government actors responsible for the implementation of these plans (including adaptive and flexible water management, based on anticipated or forecast rainfall, and the operations and maintenance (O&M) of each kind of infrastructure).

The Government will be putting a team together to carry out the preparation of the pilot HSAD plan. However, in order to support the investment decisions, planning and implementing the prioritized interventions in socially and environmentally sustainable manner, the HSAD plans must be complemented with SESAs in the context of managing climate smart agriculture and irrigation systems of the selected hot-spots.

The SESA is an integral part of HSAD plan, and therefore the Ministry of Agriculture is required to carry out the SESA for all 9 HSAs. However, this TOR is focused on the preparation of the SESA only for pilot HAS in Anuradhapura.

In addition to serving a more broad and strategic purposes for planning, and implementing of the HSAD plans, SESAs will screen the potential investments in the HAS and identify the needs to undertake any environmental assessments/ environmental management plans and/or social assessments/resettlement action plans for the investments that will be selected for financing under the project taking both national environmental regulatory and World Bank's safeguard requirements.

## **B. OBJECTIVES AND EXPECTED OUTCOMES OF THE ASSIGNMENT**

The overall objective of the SESAs will be to ensure that social and environmental concerns are appropriately and adequately integrated in the prioritization, investment decision, planning and implementation of structural and non-structural interventions for managing climate smart agriculture and irrigation systems proposed under the HSAD plans. It is anticipated that the findings and recommendations of the SESAs may also provide vital information required by the GoSL in putting in place policy and institutional mechanisms, as well as practices and guidelines within the existing legal framework to integrate environmental and social requirements in managing the HSAs.

The specific Objectives of the SESA will be to:

- Identify, assess and describe the likely significant effects on the environment of the hot spot and people living within the hot spot in implementing the HSAD Plan and the most important environmental and natural resource-related constraints bearing on the implementation of any related structural and non-structural interventions.
- Provide the GoSL agencies and development partners with relevant knowledge and information (both quantitative and qualitative) to assess the adequacy of environmental and social considerations and safeguard measures to be incorporated with the proposed interventions of the HSAD Plan . This information should help ensure that environmental and social concerns are appropriately integrated in the decision-making processes at the stages of conceptualizing, planning, implementing, and monitoring of the interventions.
- Assess the degree to which the existing policies, laws, regulations and the institutional capacity of the GoSL are applicable to addresses the environmental and social sustainability challenges related with developing climate smart agriculture and irrigation systems.
- Recommend at strategic level on how potential negative social and environmental effects can be minimized and how positive effects can be optimized. Particular focus will be given to the adequacy of institutional structure and capacities at the national and local levels, as well as of the regulatory framework, to address key environmental and social concerns associated with the proposed HSAD Plan .

The expected outcome would be an assessment of the baseline environmental and social circumstances and environmental and social issues associated with various development options of the HSAD Plan to allow for informed and transparent decision-making in identification and selection of investments to improve climate resilience of infrastructure, settlements and land stability within the selected HSA. The SESA will be also used to broadly examine, in an integrated manner, the linkages and cumulative and long-term impacts of potential scenarios related with the proposed interventions of the HSAD Plan on physical, biological, and other environmental and socio-economic aspects. Key safeguard issues, such as natural habitats, forests, pest management, physical cultural resources, dam safety and livelihood impacts should be broadly addressed as part of the SESA process. It would identify critical areas in each HSA that requires specific attention such as critical natural habitats, areas with physical cultural importance, areas of high human-elephant conflict, etc. It would also be used to inform the scope of activity/project-specific Environmental Impact Assessments (EIAs), Initial Environmental Examinations

(IEEs), Social Impact Assessments (SIA) and other safeguards instruments that will be necessary during the investment period.

## C. SCOPE OF WORK

The consultant will undertake the tasks described below for each of the ten basins.

**Task 1: Scoping Study.** The Consultant will undertake a comprehensive scoping exercise comprising the following activities:

- 1.1 *Overview of existing policy and institutional framework:* Identify and assess the existing institutional and policy setting under which the project operates, and identify how the SESA is linked with existing planning frameworks for national and regional, as well as the World Bank environmental and social management. Undertake preliminary assessment of policy, governance, financial and decision-making mechanisms in the HSA.
- 1.2 *Review information on project area:* Explore the existing knowledge base. Identify the major natural habitats/ecosystems to understand the broader ecological context of the basin including and not limited to issues such as human-elephant conflict, deforestation and forest degradation in the selected HSA. Identify the topography, land use/landcover, watersheds, sub-basins, ecosystems, populated areas, key occupations, key infrastructure, foundational activities of the local economy. Assess the social, environmental and natural resources context of the HSA. Review the resource base to understand the spatial context of the environmental and social and challenges and opportunities. This assessment should include a mapping and analysis of threats from the status quo.
- 1.3 *Determine appropriate multi-sectoral focus:* So as to ensure the SESA has a sufficiently broad technical focus, determine other sectors that may be affected through proposed HSAD Plan, including energy, water supply, transportation and natural resources management. This should include a realistic assessment of past problems with achieving effective multi-sectoral cooperation at HSA and administrative levels (e.g. Provincial, district levels, etc.). Assess other development partners that re financing activities related to the project and environmental and social assessments and systems in place and adequacy of it based on the national environmental and social requirements and the World Bank's safeguards requirements as defined in the Environment Assessment and Management Framework (EAMF) and Resettlement Policy Framework (RPF) applicable for the CSIAP.
- 1.4 *Identify and consult key stakeholders:* Provide an overview of the current stakeholders in the basin. Identify key stakeholders whose input is critical to project success (e.g. in various levels and sectors of government, farmers, indigenous people (IPs), private sector, academia, NGOs, etc.). Conduct discussions with representative stakeholders and reflect the outcomes of these discussions in the SESA findings and recommendations.
- 1.5 *Identify the environmental and social issues to be considered* in more detail during investment phase of the basin plans. Items to be considered include all issues falling within the scope of an environmental assessment and include, but are not limited to: (i) competition for land use and water, (ii) land use planning, (iii) protected areas, (iv) land (soil) and water management, (v) climate change, and (vi) human-elephant conflict. It is important that both the potential short term conflicts between environmental interests - as well as longer term benefits - are considered, as well as cumulative impacts due to project interventions and projected developments within the HSA.

- 1.6 *Identify appropriate institutional arrangements:* In association with the lead Ministry and Anuradhapura Provincial team, identify the optimal arrangements to oversee the implementation of further environmental and social assessments and mitigations measures during the implementation stage of the HSAD Plan. Such an arrangement may include setting up a task force of relevant agencies.
- 1.7 *Produce a draft scoping report:* Develop a draft scoping report. The Scoping report should discuss the issues raised during the scoping process, the issues to be addressed in the SESA, the issues that will not be addressed in the SESA and why, a list of participants in the scoping process, and the views of those participants should be included in the final scoping report post dissemination and consultation as per task 1.8.
- 1.8 *Disseminate and consult with key stakeholders:* Conduct consultation event (s) with key stakeholders to validate the findings. (The consultation and dissemination of the scoping report can be carried out as an integral part of the stakeholder consultative workshops that the Consultant for HSAD Plan is expected to carry out).

**Task 2: Participation and Consultation Plan.** The consultant will design a participation and consultation plan inclusive of the following:

- 2.1 *Design and implement a Participation and Consultation Plan:* The Consultant will design a participatory consultation plan that will include:
- Awareness raising seminar at the time of launching the SESA together with HSAD PLAN in key administrative town of the HSA. This can be coupled accordingly via coordination with the relevant authority and the team undertaking the HSAD PLAN . In these seminars, the Consultants in collaboration with the ministry and relevant authorities, World Bank, Central Environmental Authority (and other relevant regulatory agencies), will explain objectives, approach and expected outcome and how stakeholders will participate in the assessment.
  - Adequate awareness-raising, consultation and participation of key stakeholders in the development of the SESA. Such key stakeholders will be defined through Task 3, but are preliminarily expected to include NGOs, scientific experts, relevant agencies from all levels of the government, development partners, other industrial, commercial and labor interests as relevant and community representatives, including indigenous and vulnerable groups.
  - Regular dissemination events to update the Ministry, relevant authorities, key national agencies and potential development partners as to the progress of the SESA. *Note: The Consultant will have to ensure wide participation, and must keep records of all consultation held and comments received, as the outcome of these consultations will have important implications for the direction and focus of the SESA study. Consequently, a structured analysis of the available material will be needed to determine the key conclusions and areas of concern. The Consultants will have to ensure wide participation during consultations.*

**Task 3: Strategic Environmental and Social Assessment.** The consultant will prepare the SESA comprising the following tasks: (a) establish baseline conditions; (b) assess the legal and institutional framework; and (c) conduct a scenario analysis based on the HSA assessment.

3.1 *Establish Baseline Conditions:* The consultant will establish an environmental and social baseline needed for the SESA study, ensuring that it will be adequate to examine the key environmental and social aspects identified during the scoping phase and through the stakeholder consultations.

- The consultant shall identify and quantitatively describe the key physical, biological, cultural and socio-economic characteristics of the HSA.

- Describe, to the extent possible, the past trends in distribution, quantity and/or quality of the important environmental components, and how such trends might change with and without the HSAD PLAN.
- Describe key environmental and social issues of concern in the HSA (e.g., competing demands for water resources, tourism, pressures on protected areas and wildlife, biodiversity hotspots and other areas qualifying as Critical Natural Habitats (per OP 4.04), settlement expansion, potential conflicts between settled agriculture – especially irrigated agriculture and animals such as human elephant conflict).
- Assess which areas and types of land use will be more or less resilient to long-term climate changes. Identify the specific areas well-suited for achieving project objectives from an environmental and social perspective.
- Identify the primary environmental and social concerns for the HSAD Plan and monitoring the concerns.
- Identify a sub-set of core environmental and social indicators that need to be used for tracking environmental and social impacts associated with the implementation HSAD Pla. Using existing data, identify baseline levels for these indicators. Identify the required data layers for the assessment and data gaps. This may include, but is not limited to, information on: land use/landcover, erosion/siltation/landslides, mining (metal, sand, gravel, etc.), biodiversity including all areas supporting Critical Natural Habitats (per OP 4.04), water use, diseases (such as dengue, malaria, etc.), land tenure, existing and proposed projects on the water bodies such as water supply, hydropower, irrigation (other than CSIAP-financed irrigation).
- Understand the threats (e.g. pollution, surface and groundwater scarcity, etc.) and opportunities (e.g. improved service provision) in the areas of the HSA positively and negatively affected by the implementation of the HSAD Plan. Identify how best to monitor these trends and threats.

### 3.2 Assess Legal and Institutional Framework:

- Assess and describe the existing Sri Lankan legal and institutional framework pertaining to the implementation of development interventions in HSA from an environmental and social perspective. The following key questions must be addressed adequately.
  - Are existing related environmental and social regulations and policies sufficient to promote sustainable agriculture and irrigated systems?
  - Is the current institutional set up sufficient to ensure that the HSAD Plan meet its objectives without yielding negative environmental and social consequences?
  - Is the legal and institution set up adequate for the encouragement of the multi-sectoral planning and implementation necessary for climate smart irrigated agriculture systems in the HSA?
  - What improvements could be made to enhance successful implementation of the HSAD Plan from a legal, policy and institutional perspective?
  - What changes are necessary in order to manage the environmental and social impacts of the HSAD Plan?
  - What capacity building needs exist? How can/should they be addressed?
- Additionally, identify any World Bank environmental safeguard policies which are be applicable, and which types of project actions might trigger them.
- Assess the existing capacity of the relevant ministry and authorities and other potential agencies/teams responsible for the implementation of the HSAD Plan to ensure compliance with



the legal and policy framework for environmental and social management in the HSAD Plan implementation.

3.3 *Conduct Scenario Analysis of the Potential Environmental and Social Impacts (including no action) based on the HSA assessments:* It will be necessary to develop an Environmental and Social Due Diligence Framework (ESDDF) to guide the implementation of the HSAD Plan in socially and environmentally sustainable manner. The development of the ESDDF and associated monitoring system need to be informed by a closer look at alternative scenarios for development in the HSA. This will be based, for the purposes of this SESA, on a more detailed investment scenario analysis for key investments. It will be the responsibility of the consultant to detail the methodology for the scenario analysis, and the associated baseline database. The consultant will:

- Establish the scenario analysis framework to analyze environmental and social impacts over a 20-year timeframe in one pilot for each key investment. Identify key environmental, social, and economic indicators that can be used to compare alternative development/investment scenarios across the HSA.
- Working with the client, and on the input from other key stakeholders, the consultant will identify at least three development growth scenarios within a 20-year time frame (including the no project alternative, and based on possible investment outcomes) related to the area and activities.
- Analyze the scenarios based on impacts identified on the key environmental indicators identified during task3
- Develop a consequence table to summarize, visualize, and compare the impacts of the scenarios on the indicators.
- Assess potential impacts of the HSA development – biophysical and socioeconomic positive and negative, direct and indirect, and cumulative. Review the balance and mechanisms for achieving viable trade-offs between growth and environmental protection and community well-being. What are the key environmental considerations that should be taken into consideration to ensure that project development does not have unintended negative environmental and social consequences? For each scenario, what are specific measures that should be undertaken and/or policies that should be implemented to avoid, minimize, or mitigate identified negative impacts? What are specific measures that can enhance positive impacts?
  - Create a geodatabase with GIS maps (proposed at a scale of 1:150,000 or better) for key variables underlying the scenario analysis including the following, depending on the levels of data readily available in national databases. The other data may be obtained from sources such as topographic base maps, air photographs and satellite imagery, existing surveys, thematic maps and departmental records
    - Land Resources: - Climate, hydrology, geology, landforms, soils, forests, protected areas, Critical Natural Habitats and other important natural habitats.
    - Land Ownership/Use/Tenure - land use, land titling and administration, farming systems, commercial and village forestry, production levels and trends. Legal and traditional ownership and user rights for land, trees and grazing; forest reserves, national parks
    - Infrastructure - Transport, agriculture, irrigation systems, etc. important for the project.
    - Population - Numbers, demographic trends, location of settlements, gender, indigenous and ethnic groups, class structure, leadership.

- Key Ecosystem Services linked to various natural resources such as water sustainability, watershed management, climate change and ecosystem vulnerability as discussed by various studies
- Summarize how this database and scenario analysis can be extended to other areas under the HSAD plan .

*Note: All the geospatial data layers used and generated through the SESA must be handed over the Ministry of Agriculture in relevant GIS compatible formats (eg. ESRI Shapefile format for vector data; GeoTIFF for imagery etc.). The Ministry will facilitate access to any existing data layers where needed.*

**Task 4: Prepare an Environmental and Social Due Diligence Framework.** Develop an Environmental and Social Due Diligence Framework (ESDDF) outlining mandatory procedures to ensure HSA investments identify, assess and avoid, minimize and/or mitigate potential negative environmental and social impacts. The framework should meet all requirements for a Category B investment in accordance with OP 4.01. The ESDDF is intended for use by project implementing agencies and regulatory agencies when identifying priority investments from the HSAD Plan to be supported under the project. The ESDDF will:

- Include a typology of potential project investments with a screening process that identifies those investments requiring further environmental and social assessment and associated mitigation provisions.
- Contain specific environmental due diligence provisions necessary to avoid, minimize or mitigate subprojects with potential risks, and monitor their outcomes. This process will also include identification of institutional responsibilities, timing of actions, how these provisions will be monitored, and identify budget requirements. This framework will comply with international best practices and national/local legislation.
- Be developed from the implementers' perspective, emphasizing practicality and avoiding replicating generic background discussions about laws, regulations, and World Bank safeguard policies. Instead, the consultant will utilize summary tables to summarize key safeguard related regulations and their implication(s) for project implementation, including a clear concise reference table across all safeguards and Sri Lankan environmental and social regulations and mandates. Any gaps should be clearly identified with corresponding measures outlined to address these gaps
- Identify specific capacity building actions and activities to mitigate potential project impacts and enhance positive externalities. Such a capacity training program should be based on the specific basin investment plan delivery modalities. It will identify the mechanism for guiding the use of these tools and methods for enhancing the understanding and use of these provisions across the plan.
- Include a Monitoring and Evaluation process of project environmental and social issues, including key indicators, baseline values, ways of measurement and possible ways to enhance the use of these indicators. Proposed indicators should be assessed for their cost- effectiveness and utility. Such a framework should include a "Safeguard" verification process based on a sampling of projects under the plan.
- Identify knowledge gaps and, research areas that could improve investment sustainability and delivery of viable investments.

#### **D. APPROACH, OVERALL MANAGEMENT AND COORDINATION**

The Consultant shall report to the Project Director (PD) of CSIAP for the execution of the scope of services and deliver the outputs under the direct supervision of the designee of the PD. All required reports will be submitted to the PD and other appropriate GOSL authorities through the PD. The Consultant will

coordinate closely with the PD as well as with the relevant government agencies in executing all aspects of this work and in doing so, will engage in active knowledge transfer methods and procedures for the relevant activities' planning and design for key stakeholders to be agreed upon at the beginning of the contract. This function, while not necessarily involving formal training sessions, is considered an important element of the Consultant's work. In addition, the Consultant will engage in the following:

- *Documentation.* The Consultant will establish and maintain a comprehensive inventory of all relevant documents and data collected. Any confidential material provided to the consultants will be returned in an organized fashion to the Ministry of Agriculture at the end of the contract.
- *Personnel.* The Consultant must provide and maintain all key personnel proposed. Any changes are subject to approvals from the contracting authority.
- *Logistics.* The Consultant will be responsible for all their logistical need in-country including workspace, office support, communications and transportation. The proposed work involves significant interrelated activities and subcontracting and consistent coordination with the Ministry. As such, there will be a need for general project administration and technical coordination including:
  - Project Supervision
  - Regular Progress Meetings and Reporting
  - Contract Management
  - Subcontracting Plan and Management
  - Scheduling and Logistics
  - Report Oversight, Quality Control and Coordination

All deliverables shall be submitted in electronic form and in hardcopy (3 copies each deliverable) in English. All hardcopy documents shall be two sided printed to conserve paper. All deliverables will be considered draft upon initial receipt. Draft documents will be reviewed and accepted or comments will be provided within two weeks of receipt. The Consultant shall appropriately address concerns and provide final deliverables within two weeks of receiving comments unless a mutually-agreed upon arrangement stipulates otherwise. It is anticipated that the duration of this contract will be for 8 months. With two sets of deliverables spread across 4 month windows.

All reports will be reviewed by the environmental officer of the CSIAP PMU and a panel of experts appointed by the CSIAP and subject to World Bank clearance.

**E. COMPOSITION OF THE TEAM**

The Consultant will be required to identify KEY PERSONNEL and provide sufficient qualified personnel to ensure achievement of all objectives of these tasks. The following minimum Key Personnel will be required for the contract:

1. Team Leader preferably with at least 15 years of experience, hold graduate level qualifications of a Master's Degree at minimum, English language capacity and broad knowledge in environmental impact assessment and mitigation, long term impact planning and carrying capacity and/or limits of

acceptable change methodologies, and institutional strengthening. The Team Leader should have significant experience in undertaking environmental assessments, reporting, capacity building, and environmental advisory services. He/She should also have a good understanding on social impacts assessments and mitigation.

2. Social Impact Assessment Expert
3. Regional Development Planner, with at least 10 years of experience, hold graduate level qualifications of a Master's Degree at minimum having English language capacity and broad knowledge in regional and agricultural and irrigation development planning, mapping and spatial analysis skills.
4. The Consultant may combine specialists so long as the required expertise capabilities are met. In addition, the Consultant may need to solicit additional, short term local assistance from senior, mid- level and junior technical professionals with the following qualities, as needed:
  - Agricultural Specialist (with agriculture and irrigation systems development, crop production, crop protection)
  - Civil Engineer (with water resources, irrigation, hydrology, background)
  - Environmental Specialist (e.g. ecology, ecosystems management, wildlife management, forest restoration)
  - Social/Gender Development Specialists (e.g. community specialist, sociologist, resettlement)
  - Participatory Planning and Consultation specialist
  - Institutional specialist (especially district government agencies)
  - Computer aided design and Geographical Information System Expert

The Consultant may wish to propose alternative staffing configurations to ensure achievement of all objectives. The availability of each proposed staff person must be identified as well as whether they are full-time staff persons of the Consultants firm or subcontractors or consultants. It is expected that the Project Manager will be available throughout the duration of the contract to address all management and administrative matters.

## **G. Contents of the Technical Proposal**

To ensure that appropriate information addressing the scope of work is provided in the offer, the consultant is requested to follow the instructions below.

- Past Performance.** The Proposal must highlight (in no more than 8 pages, excluding project summary sheets in the annex) the Consultant's experiences that relate to the work described by the terms of reference – in Sri Lanka -- specifically to the tasks requested. Prior experience of carrying out similar assignments will be essential. This section may include the past performance of proposed subcontractors. The Consultant must include reference to specific agriculture, irrigation, water resource, natural resource management, and community development projects. Specifically, the Consultant must demonstrate its overall and proven track record acting as environmental and social technical consultants including policy analysis and strategic environmental assessments in the support of similar regional (in country) and national projects, including the names and descriptions of the specific project that the Consultant has worked on. An overview summary table of these experiences is required with sufficient details.
- Management and Implementation Plan.** The Consultant must submit a management and implementation plan (no more than 10 pages excluding graphics and figures). The management plan will include a description of the Consultant's proposed management structure for

implementing the work under the Contract; how it plans to ensure the quality of its performance in each activity; and its capability to quickly mobilize required experts to guide and execute the various assignments in this proposal. The implementation plan will contain a description of proposed activities and products for each task demonstrating a solid technical grasp of the requirements. The Consultant must identify Key Personnel in addition to the Project Manager and must provide a summary of specific experiences and times for performance with each task. The consultant will provide a proposed work plan showing all tasks, schedule of activities, deliverables and dates for drafts, reviews and revisions.

- Capabilities and Experience of Staff. The Consultant is expected to assemble and describe (no more than 10 pages excluding graphs and figures) a team with a mix of senior and mid-level specialists. The anticipated duration of the assignment will be approximately four months from notice to proceed. Knowledge of local conditions, social and cultural practices, and Sri Lanka laws and regulations will be essential to accomplish these tasks. Prior experience conducting SESA's, EIAs or sector based environmental assessments, social impact assessments and use of impact management tools, are required.
- The proposal must present a detailed time schedule/ work plan, presenting a timeline of all activities to be undertaken for completion of the task.

## H . OUTPUTS AND DELIVERABLES

The assignment will be completed over four (4) calendar months' period with deliverables submitted directly to the PMU as per the schedule of delivery shown in the table below. All payments are subject to clearance of the documents from the Client. The Final SESA Report should be prepared by the Consultant based on the comments of the Client on the drafts.

	<b>Deliverable</b>	<b>Time Line</b>
1	Inception Report with Scoping Study, Stakeholder Analysis and Participation and Consultation Plan	Within 1 month from the date of contract award
2	Draft Strategic Environmental Assessment Report	Within 3 Months from the date of contract award
3	Final Strategic Environmental Assessment Report	Within 4 Months from the date of contract award

## I.PAYMENT SCHEDULE

- 10% at the time of the signing of the contract
- 20% for the Inception Report in two stages as follows: 10% on submission of the Inception Report and 10% on acceptance of the Inception Report
- 30% for the Draft SESA Report in two stages as follows: 10% on submission of the Draft SESA Report and 20% on acceptance of the Draft SESA Report
- 40% for the Final SESA Report as follows: 10% on submission of the Final SEA Report together with all the data layers and the geodatabase of maps prepared and 30% on acceptance of the Final SESA Report