

Environmental Management Plan
Upgrading of Inamaluwa Field Training Centre

ECO-SYSTEM CONSERVATION AND MANAGEMENT PROJECT - (ESCMP)

BATTARAMULLA

Environmental Management Plan

Upgrading of Inamaluwa Field Training Centre

1. Introduction

1.1 Project Background

The Inamaluwa Field Training Institute (IFTI) is functioned as a field training unit of Sri Lanka Forestry Institute (SLFI). The Forest Department has submitted a proposal to ESCAMP to upgrade the quality of infrastructure and training facilities for FD officials in existing Inamaluwa field training institute. Accordingly, a number of buildings and other infrastructure facilities will be developed to improve the services and skills of forest officers. This project will implement with the focus of strengthening the institutional capacity within the FD under 3C project component.

1.2 Objective of Environmental Management Plan

The main focus of the EMP is to study the possible environmental impacts due to the proposed project in Inamaluwa Field Training Institute. This study also will come up with possible alternatives to reduce adverse environmental impacts due to the proposed development activities. The EMP has been developed based on the environmental safeguard policies of the WB (OP/BP 4.01, OP/BP4.02 etc.)¹ and the environmental legislation of the Government of Sri Lanka.

2. Project Description

2.1 Location

The Inamaluwa field Training Institute (IFTI) located in Inamaluwa between Dambulla and Habarana.

2.2 The Project

The field training centre at Innamaluwa uses for the practical classes of the regular forestry training programs. Further, the in-service and short term training courses for both FD and other agencies

¹ Other key Bank statements that relate to the environment include OP/BP 4.02, Environmental Action Plans; OP/BP 4.04, Natural Habitats; OP 4.07, Water Resources Management; OP 4.09, Pest Management; OP/BP 4.10, Indigenous Peoples; OP/BP 4.11, Physical Cultural Resources; OP/BP 4.12, Involuntary Resettlement; OP/BP 4.36, Forests; and OP/BP 10.00, Investment Project Financing.

work in forestry related programs in the intermediate and dry zones are also conducted in this centre. The existing buildings at IFTI are deteriorated as they were built some time back on temporary basis due to the financial limitations. Therefore, the IFTI has to be renovated and improved to conduct the training programs effectively. Training materials, curriculum and teaching methods will be upgraded by SLFI to improve the teaching and learning effectiveness.

3. Detailed Project Activities with Possible Impacts to Fauna and Flora:

3.1. Assessment of Flora

There are 15 proposed construction activities to be carried out at IFTI. Following plant communities that will be affected by the construction work have been identified and listed below.

Table 1 - Construction of Lecture Hall, Laboratory & Office [Block 1]

Land use / ecological significance	Potential tree species affected in the area (>10 cm dbh)		
	Construction area		
Existing buildings & bare land with isolated trees	Species	Number of Plants	Conservation Status
	<i>Filicium decipiens</i>	3	LC
	<i>Cassia fistula</i>	2	
	<i>Pterospermum suberifolium</i>	2	LC
	<i>Tectona grandis</i>	6	LC

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern

Table 2 - Construction of Three accommodation units & kitchen [Block 2, 3 & 4]

Land use / ecological significance	Potential tree species affected in the area (>10 cm dbh)		
	Construction area		
Existing buildings & bare land with isolated trees	Species	Number of Plants	Conservation Status
	<i>Azadirachta indica</i>	8	
	<i>Bauhinia racemosa</i>	7	LC

<i>Cassia fistula</i>	4	
<i>Vitex altissima</i>	4	LC
<i>Zyzygium assimile</i>	3	LC / E
<i>Chloroxylon swietenia</i>	2	VU
<i>Tectona grandis</i>	3	LC
<i>Acacia Spp.</i>	3	
<i>Anacardium occidentale</i>	2	LC
<i>Grewia Spp.</i>	1	LC
<i>Bridelia retusa</i>	2	LC
<i>Zizyphus napeca</i>	3	LC
<i>Margaritaria indica</i>	2	VU
<i>Zyzygium assimile</i>	2	LC
<i>Tephrosia purpurea</i>	6	LC
<i>Nothopegia beddomei</i>	3	LC
<i>Carissa spinarum</i>	1	LC
<i>Manilkara hexandra</i>	2	VU
<i>Camptosperma zeylanica</i>	1	LC
<i>Syzygium cumini</i>	1	LC

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern

Table 3 - Construction of Guest House [Block 5]

Land use / ecological significance	Potential tree species affected in the area (>10 cm dbh)		
	Construction area		
	Species	Number of Plants	Conservation Status
Existing buildings & bare land with isolated trees	<i>Azadirachta indica</i>	1	
	<i>Khaya senegalensis</i>	8	VU
	<i>Bauhinia racemosa</i>	1	LC
	<i>Grewia Spp.</i>	2	LC

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern

Table 4 - Construction of BFO Quarters [Block 6]

Land use / ecological significance	Potential tree species affected in the area (>10 cm dbh)		
	Construction area		
Existing buildings & bare land with isolated trees	Species	Number of Plants	Conservation Status
	<i>Terminalia arjuna</i>	2	LC
	<i>Bridelia retusa</i>	2	LC
	<i>Khaya senegalensis</i>	6	V U
	<i>Bauhinia racemosa</i>	2	LC
	<i>Chloroxylon swietenia</i>	1	VU
	<i>Schleichera oleosa</i>	1	LC
	<i>Berrya cordifolia</i>	1	LC
	<i>Anacardium occidentale</i>	2	LC
	<i>Azadirachta indica</i>	4	
	<i>Terminalia belerica</i>	1	LC
	<i>Pongamia pinnata</i>	2	LC
	<i>Memecylon arnottianum</i>	2	E
	<i>Grewia Spp.</i>	1	LC
	<i>Margaritaria indica</i>	1	VU
	<i>Zizyphus napeca</i>	3	LC
	<i>Cassia fistula</i>	3	
<i>Madhuca longifolia</i>	1	NT	

E - Endemic, EN - Endangered, VU - Vulnerable, NT - Near Threatened, LC - Least Concern

Table 5 - Construction of RFO Office [Block 7]

Land use / ecological significance	Potential tree species affected in the area (>10 cm dbh)		
	Construction area		
	Species	Number of Plants	Conservation Status

Existing buildings & bare land with isolated trees	<i>Tectona grandis</i>	35	LC
	<i>Filicium decipiens</i>	2	LC
	<i>Acacia Spp.</i>	1	

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern

Table 6 - Construction of Nursery Building [Block 8]

Land use / ecological significance	Potential tree species affected in the area (>10 cm dbh)		
	Construction area		
Existing buildings & bare land with isolated trees	Species	Number of Plants	Conservation Status
	[No trees found] <i>Panicum maximum*</i>	More than 25 bushes	Invasive

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern

Table 7 - Construction of Minor Staff Building [Block 9]

Land use / ecological significance	Potential tree species affected in the area (>10 cm dbh)		
	Construction area		
Existing buildings & bare land with isolated trees	Species	Number of Plants	Conservation Status
	<i>Azadirachta indica</i>	1	
	<i>Bauhinia racemosa</i>	2	LC
	<i>Anacardium occidentale</i>	2	LC
	<i>Albizea lebbek</i>	2	NT

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern

Table 8 - Construction of Entrance Gate & Security Hut

Land use / ecological significance	Potential tree species affected in the area (>10 cm dbh)		
	Construction area		
	Species	Number of Plants	Conservation Status

Existing buildings & bare land with isolated trees	<i>Mangifera indica</i>	1	LC

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern

Table 9 - Construction of Service Building, Solar Farm & River Inlet [Block 11, 12, & 13]

Land use / ecological significance	Potential tree species affected in the area (>10 cm dbh)		
	Construction area		
Existing buildings & bare land with isolated trees	Species	Number of Plants	Conservation Status
		<i>Tectona grandis</i>	2

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern

Table 10 - Construction of Sewerage Treatment Unit [Block 14]

Land use / ecological significance	Potential tree species affected in the area (>10 cm dbh)		
	Construction area		
Existing buildings & bare land with isolated trees	Species	Number of Plants	Conservation Status
		<i>Tectona grandis</i>	12

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern

Table 11 - Construction of Grass Area [Block 15]

Land use / ecological significance	Potential tree species affected in the area (>10 cm dbh)		
	Construction area		

Existing buildings & bare land with isolated trees	Species	Number of Plants	Conservation Status
	<i>Tectona grandis</i>	13	LC
	<i>Khaya senegalensis</i>	2	VU
	<i>Schleichera oleosa</i>	3	LC
	<i>Bridelia retusa</i>	2	LC
	<i>Manilkara hexandra</i>	6	VU
	<i>Vitex altissima</i>	2	NT
	<i>Cassia fistula</i>	1	
	<i>Margaritaria indica</i>	1	VU
	<i>Grewia Spp.</i>	1	LC
<i>Acacia Spp.</i>	1		

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern

Table 12 - Construction of Parking Area [Block 16]

Land use / ecological significance	Potential tree species affected in the area (>10 cm dbh)		
	Construction area		
Existing buildings & bare land with isolated trees	Species	Number of Plants	Conservation Status
	<i>Cassia fistula</i>	3	
	<i>Tectona grandis</i>	6	LC
	<i>Khaya senegalensis</i>	9	
	<i>Lannea coromandelica</i>	1	LC

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern

Table 13 - Construction of Landscaping Area [Block 17]

Land use / ecological significance	Potential tree species affected in the area (>10 cm dbh)		
	Construction area		

Existing buildings & bare land with isolated trees	Species	Number of Plants	Conservation Status
	<i>Tectona grandis</i>	6	LC

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern

Table 14 - Construction of Pond [Block 18]

Land use / ecological significance	Potential tree species affected in the area (>10 cm dbh)		
	Construction area		
Existing buildings & bare land with isolated trees	Species	Number of Plants	Conservation Status
		[No trees found] <i>Panicum maximum</i>	More than 100 bushes

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern

Table 15 - Construction of Boat Yard & Timber Deck [Block 19] [No trees found]

Land use / ecological significance	Potential tree species affected in the area (>10 cm dbh)			
	Construction area			
Existing buildings & bare land with isolated trees	Species	Number of Plants	Conservation Status	
		<i>Panicum maximum</i>	bushes	Invasive
		<i>Typha angustifolia</i>	bushes	Invasive

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC – Least Concern

3.2. Assessment of Fauna

The study area is extent up to xx ha and located in dry zone of Sri Lanka included agro climatic zone DL1. Rainfall range from 1250-1500mm annually. This area is dominated by dry mixed evergreen forests. The climate pattern and distribution of natural vegetation, shape the abundance and distribution of animals. Almost all common dry zone fauna species can be seen in this area.

3.2.1. Description of the habitat

The major vegetation type observed within the area was disturbed dry mixed forests. The majority of dominant trees were introduced trees for timber , such as *Khaya senegalensis*, *Filicium decipiens*,

Tectona grandis and *Acacia* spp. other than those some dominant native trees were also observed namely, *Chloroxylon swietenia*, *Syzygium cumini*, *Manilkara hexandra*, *Madhuca longifolia*, *Terminalia arjuna*, *Vitex altissima*, *Bauhinia racemose*, *Bridelia retusa* and *Schleichera oleosa*. Ground layer with scrubs was observed in some areas and in disturbed areas ground layer was invaded by *Panicum maximum*. The ground layer covered by leaf litters, provide good habitats for creeping animals such as reptiles and amphibians.

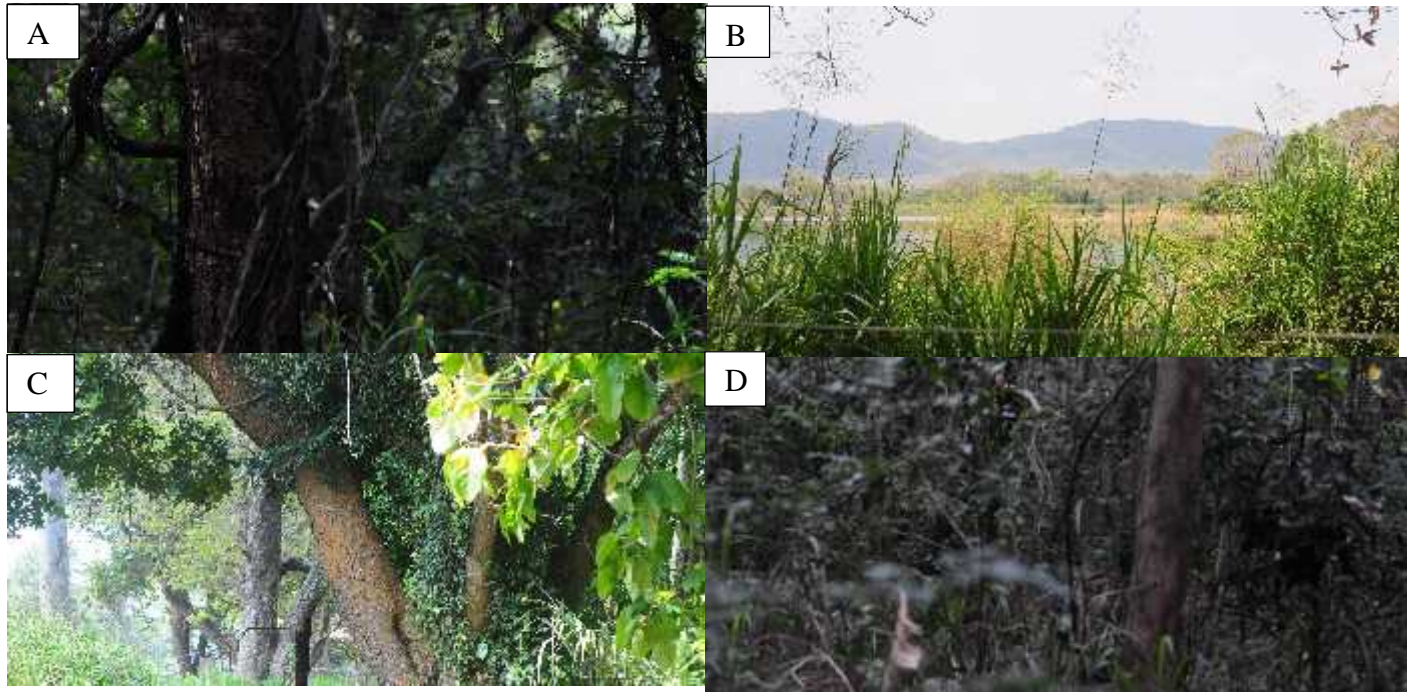


Figure 1: Type of habitats in study area, (A) dry mixed forest; (B) areas invade by invasive species e.g. *Panicum maximum*; (C) areas with large native trees; (D) understory with dense scrubs.

3.2.2. Fauna species identified within the study areas

The identified species were scattered through the study area. Altogether 06 taxonomic groups of fauna were observed during the observations. Significant of the habitat is critical for the several species such as *Hylarana gracilis*, *Eutropis tammanna*, *Lankaskincus fallax* and *Calotes caylonensis* as they were adapted into specific habitat type. Other species were least concern and adapted into disturbed condition. The adjacent water body (Keena wewa) provide aquatic habitats and comfortable living environment for many aquatic species. There were 58 animal species were observed during the observations. Among them 08 species were endemic and 01 species were included into red list criteria.

Table 16 - Identified Fauna Species

Common name	Scientific name	Conservation status
Butterflies		
1. Indian cupid	<i>Everes lacturnus</i>	LC
2. Blue Mormon	<i>Papilio polymnestor</i>	LC
3. Banded peacock	<i>Papilio crino</i>	LC
4. Common Mormon	<i>Papilio polytes</i>	LC
5. Crimson rose	<i>Pachliopta hector</i>	LC
6. Common rose	<i>Pachliopta aristolochiae</i>	LC
7. Lesser albatross	<i>Appias galene</i>	E/ LC
8. Lemon emigrant	<i>Catopsilia pomona</i>	LC
9. common crow	<i>Euploea core</i>	LC
10. Blue glassy tiger	<i>Ideopsis vulgaris</i>	LC
11. Common sailor	<i>Neptis hylas</i>	LC
12. Tiny grass blue	<i>Zizula hylax</i>	LC
13. Common leopard	<i>Phalanta phalantha</i>	LC
14. Common grass yellow	<i>Eurema hecabe</i>	LC
15. Psyche	<i>Leptosia nina</i>	LC
16. Medus brown	<i>Orsotriaena medus</i>	LC
17. White four ring	<i>Ypthima ceylonica</i>	LC
Reptiles		
1. Green garden lizard	<i>Calotes calotes</i>	LC
2. Common garden lizard	<i>Calotes versicolor</i>	LC
3. Painted-lipped lizard	<i>Calotes ceylonensis</i>	E / VU
4. Tammanna skink	<i>Eutropis tammanna</i>	E/ NE
5. The keeled Indianmabuya	<i>Eutropis carinata</i>	LC
6. Common Supple Skink	<i>Lankaskincus fallax</i>	E/ LC
7. Land monitor	<i>Varanus bengalensis</i>	LC
8. Common house gecko	<i>Hemidactylus frenatus</i>	LC
9. House gecko	<i>Hemidactylus brooki</i>	LC
10. Leschenault's leaf-toed gecko	<i>Hemidactylus leschenaultii</i>	LC

11. Termite hill gecko	<i>Hemidactylus triedrus</i>	LC
Amphibians		
1. Sri Lanka wood frog	<i>Hylarana gracilis</i>	E/LC
2. Common paddyfield frog	<i>Fejervarya limnocharis</i>	LC
3. Jerdon's bullfrog	<i>Hoplobatrachus crassus</i>	LC
Birds		
1. Brown headed barbet	<i>Megalaima zeylanica</i>	LC
2. House crow	<i>Corvus splendens</i>	LC
3. Golden fronted leaf bird	<i>Chloropsis aurifrons</i>	LC
4. Yellow billed babbler	<i>Turdoides affinis</i>	LC
5. Sri Lanka Jungle fowl	<i>Gallus lafayettii</i>	E/ LC
6. Indian Pea fowl	<i>Pavo cristatus</i>	LC
7. Black headed oriole	<i>Oriolus xanthornus</i>	LC
8. Great egret	<i>Ardea alba</i>	LC
9. Purple rumped sun bird	<i>Leptocoma zeylonica</i>	LC
10. Red vented bulbul	<i>Pycnonotus cafer</i>	LC
11. White browed bulbul	<i>Pycnonotus luteolus</i>	LC
12. White browded fantail	<i>Rhipidura aureola</i>	LC
13. White rumped munia	<i>Lonchura striata</i>	LC
14. Spotted dove	<i>Spilopelia chinensis</i>	LC
15. White-bellied drongo	<i>Dicrurus caerulescens</i>	LC
16. White-throated kingfisher	<i>Halcyon smyrnensis</i>	LC
17. Pale billed flowerpecker	<i>Dicaeum erythrorhynchos</i>	LC
18. Oriental Magpie Robin	<i>Copsychus saularis</i>	LC
19. Indian Robin	<i>Saxicoloides fulicatus</i>	LC
20. Rose-ringed parakeet	<i>Psittacula krameri</i>	LC
21. Common myna	<i>Acridotheres tristis</i>	LC

22. Common tailorbird	<i>Orthotomus sutorius</i>	LC
Mammals		
1. Palm squirrel	<i>Funambulus palmarum</i>	LC
2. Giant squirrel	<i>Ratufa macroura</i>	E/LC
3. Toque macaque	<i>Macaca sinica</i>	E/LC
4. Grey mongoose	<i>Herpestes edwardsi</i>	LC
5. House rat	<i>Rattus rattus</i>	LC
LC- Least concern; E-Endemic; VU- Vulnerable; NE-Not evaluated		

4. Potential Environmental Impacts of the Project and proposed mitigation

The potential environmental and other impacts of the proposed project indicated under two stages namely, pre-construction and construction stages. Proposed mitigation measures are also included in this document.

4.1. Pre-construction stage

Potential impact during pre-construction stage will be due to surveying and setting out of the buildings. To avoid damages to the ecologically and significant tree species, setting out surveys shall be carried out under strict supervision of the engineer and the environmental expert.

4.2. Impacts during construction stage:

4.2.1 Removal of vegetation

The impact on the forest vegetation of the project can be rated as minimal as most construction will be done in existing building locations. Therefore, less disturb could be observed in the proposed site. Number of tree species (>10dbh) that will be affected (removed) from the proposed construction sites is given in table below.

Table 17 - Trees in the Removal List

No.	Sci. Name	Con. Status	Number of Plants
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01	<i>Terminalia arjuna</i>	LC	02
02	<i>Bridelia retusa</i>	LC	06
03	<i>Khaya senegalensis</i>		25
04	<i>Bauhinia racemosa</i>	LC	12
05	<i>Chloroxylon swietenia</i>	VU	03
06	<i>Schleichera oleosa</i>	LC	04
07	<i>Berrya cordifolia</i>	LC	01
08	<i>Anacardium occidentale</i>	LC	06
09	<i>Azadirachta indica</i>		14
10	<i>Terminalia belerica</i>	LC	01
11	<i>Pongamia pinnata</i>	LC	02
12	<i>Memecylon arnottianum</i>	E	02
13	<i>Grewia Spp.</i>	LC	05
14	<i>Zizyphus napeca</i>	LC	06
15	<i>Cassia fistula</i>		13
16	<i>Madhuca longifolia</i>	NT	01
17	<i>Tectona grandis</i>	LC	81
18	<i>Filicium decipiens</i>	LC	05
19	<i>Manilkara hexandra</i>	VU	06
20	<i>Pterospermum suberifolium</i>	LC	02
21	<i>Acacia Spp.</i>		05
22	<i>Artocarpus heterophyllus</i>		01
23	<i>Lannea coromandelica</i>	LC	01

24	<i>Albizea lebbbeck</i>	NT	02
25	<i>Syzygium cumini</i>	LC	01
26	<i>Nothopegia beddomei</i>	LC	03
27	<i>Camptosperma zeylanica</i>	LC	01
28	<i>Tephrosia purpurea</i>	LC	06
29	<i>Zyzygium assimile Spp.</i>	LC / E	03
31	<i>Vitex altissima</i>	NT	06
31	<i>Margaritaria indica</i>	VU	04
32	<i>Carissa spinarum</i>	LC	01
33	<i>Mangifera indica</i>	LC	01

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC - least concern

During the study, 232 plants belong to 33 families were identified will have some impacts due to the construction of the new facilities. Among them, two species are endemic to Sri Lanka (*Memecylon arnottianum* & *Zyzygium assimile*) and three plant species are vulnerable (*Chloroxylon swietenia*, *Manilkara hexandra* & *Margaritaria indica*). Also, two species are near to extinct (*Madhuca longifolia* & *Vitex altissima*).

A sufficient area around the construction site is also required to be cleared for the facilitation of construction activities, which is usually around 3m. This area could be arranged with minimal damage to the flora. However, all the trees in that stretch of 3m around the construction site need not be removed. Selected valuable trees shall be conserved (in situ).

Also, it is recommended to replanting the following plants due to its high conservational value.

Table 18 - Recommended Trees for Re-planting

Species	Local Name	Conservation Status
<i>Chloroxylon swietenia</i>	Burutha	VU
<i>Memecylon arnottianum</i>	Kuuratiya	E

<i>Madhuca longifolia</i>	Mee	NT
<i>Manilkara hexandra</i>	Palu	VU
<i>Albizea lebbeck</i>	Maara	NT
<i>Zyzygium assimile</i>	Damba	E
<i>Vitex altissima</i>	Milla	NT
<i>Margaritaria indica</i>	Karawu	VU

E – Endemic, EN – Endangered, VU – Vulnerable, NT – Near Threatened, LC - least concern

4.2.2. Handling Fauna issues during the construction

1. According to the current species recorded during the observations, the majority of the species were common and adapted into disturbed conditions. However, *Eutropis tammanna*, *Lankaskincus fallax* and *Hylarana gracilis* are endemic species observed in the area. Those species are inhabit under leaf litters. Therefore during the constructions, disturbances on ground vegetation should be minimized.
2. *Calotes ceylonensis* is an arboreal and endemic species which is currently listed under IUCN vulnerable category. Generally this species is inhabit under shade of canopy on tree trunks. Therefore, disturbances on understory and canopy layer should be minimized.
3. The proposed pond should be improved by rich riparian habitat, which will be enhanced the habitats of amphibians and aid for their reproduction.

5. Demolition and Construction Waste:

5.1. Demolition Waste:

Substantial amount of demolition material consists of the debris will generate during the renovation and demolition of buildings in this site. These demolition waste contain bulky, heavy materials such as: Concrete, Wood (from buildings), Lime/sand/ Gypsum (of drywall), Metals, Bricks, Glass, Plastics, Salvaged building components (doors, windows, and plumbing fixtures) and Asbestos roofing and Ceiling sheets.

Trees, stumps, earth, and rock from clearing sites also contribute to the waste load.

These material shall be treated as valuable commodities and all efforts shall be made to recycle/reuse (depending on the quality requirements), thus minimising the waste disposal requirement and avoiding the need to mine and process virgin materials.

5.2. Asbestos waste:

All asbestos roofing sheets and ceiling sheets should be removed and replaced with acceptable roofing materials. As per the WB safeguards, asbestos cannot be used due to health hazards. Since asbestos products are harmful for human when they are removed, damaged, utmost care shall be placed during removal from the roofs of existing buildings and the sheets shall be properly stored until they are disposed². Proper PPE equipment (eg., disposable dust mask suitable for work with asbestos (Certified to EN149 or EN405 Protection Factor FFP3) shall be provided to all the workers involved in removal and stocking of asbestos sheets.

5.3. Construction Waste:

The generation of construction waste is un-avoidable; however, best practices applicable to building construction should be followed to minimize generation of waste. It will be beneficial for the contractor to minimize waste which will lead to reduce the requirement of raw material (Natural Resources) and also the reduction of waste disposal volumes and costs. Possibilities of recycling of waste material should be explored wherever possible and the remaining amounts could be used (based on the quality requirements) as fill material or disposed in a landfill.

Construction of the proposed buildings and related facilities would not generate hazardous or toxic waste and therefore do not create any potential hazard to human health due to contamination. If accidental spills do occur during construction of materials such as paints, solvents, bituminous material or any other hazardous or toxic constituents, the contractor should take appropriate measures to clean up such

² PI refer - <https://siteresources.worldbank.org/EXTPOPS/Resources/AsbestosGuidanceNoteFinal.pdf>

spills immediately and waste material should be disposed appropriately such as in a secure landfill. The contractor should take precautionary measures to minimize and control spoilage of material during storage and handling and during construction processes. There should be provisions for proper storage of construction materials to reduce the amount of waste caused by damage or exposure to elements.

5.4. Noise and Air Pollution

Noise levels around the construction site would temporarily increase. However, the generated noise is expected to be similar to construction noise from residential development. The noise levels generated should be limited to workday daylight hours for the duration of the work. High noise generating equipment should be discouraged, especially vibrating machines and earth compactors.

Pollutant emissions from construction equipment could generate minor effects to air quality in the area and immediate surrounding the construction activity. Fugitive dust particles could escape into the atmosphere during construction, transportation and subsequent storage and handling. Since the access road within the site has not been tarred, transportation of material along the gravel road could lead to produce excessive quantities of dust.

The contractor would be required to keep all equipment in good order to minimize air pollution and noise generation. Construction materials could be covered so as not to subject to erosion, especially fill material such as gravel and earth. Material transport vehicles while transporting materials should be covered so as not to cause any air-borne dust in the area. Since gravel and unpaved roads create air-borne dust, frequent watering the road surface is essential.

5.5. Removal of top soil

Top soil of the forested 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 of 150 mm and stored in stockpiles of height not exceeding 2m. Such stockpiled topsoil may

be returned to cover the areas including cut slopes 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.

5.6. Hydrology and Water Quality

Natural drainage patterns through the land area will be disturbed due to construction activities. Provision of proper drainage canals within the site is necessary to facilitate proper drainage, and culverts have to be constructed across the road / paths to drain the water into the low-lying area or the tank.

Disturbance to the soil, cutting & filling, and storage of construction material within the site could potentially contaminate the surface runoff, notably increasing the turbidity during construction. Erosion control practices should be implemented during construction to limit turbidity and silt transport off site. Safe handling of construction material would minimize the potential contamination of surface runoff and thereby prevent affecting the quality of the water bodies nearby. Further studies are recommended on the proposed pond (No.) as it might affect the run-off. Other than that no significant adverse impacts anticipated on hydrology and water quality in the area.

5.7. Operation of borrow sites

Contractor shall procure material only from borrow sites having approved license from GSMB or other relevant authorities. Borrow sites / pits should be properly managed so that material will not be eroded due to surface runoff. Slopes and embankments should be turfed or protected from erosion by other means after cutting, to prevent wash away of soil. Similarly, any earth heaps should be covered so that material will not be washed away causing contamination of nearby water courses. Dust control measures are necessary to minimize the generation of dust from vehicles and wheel washing within the site.

5.8. Operation of labour camps and possible effects due to disposal of waste (liquid and solid)

On-site sewage disposal using protected pit latrines is possible without causing negative environmental impacts. Contamination of groundwater is not an issue as there are no shallow wells located nearby and the land is in a flat terrain. Proper sanitary conditions should be maintained within the labour camps together with proposer disposal of toilets and kitchen waste.

5.9. Handling Environmental Issues during Construction

- The Contractor shall appoint a suitably qualified Environmental Officer (with community consultation experience) following the award of the contract. The Environmental Officer will be the primary point of contact for assistance with all environmental issues during the pre-construction and construction phases. He / She shall be responsible for ensuring the implementation and monitoring of EMP.
- He/she will also be responsible for community liaison and to handle public complaints regarding environmental / social related matters. All public complaints should be handled as per the ESCAMP Grievance Redress Mechanism. (Refer to item No 10 and Annex 3). The Environmental Officer will promptly investigate and review environmental complaints and implement the appropriate corrective actions to arrest or mitigate the cause of the complaints. A register of all complaints is to be passed to the Engineer within 24 hrs they are received, with the action taken by the Environmental Officer on complains thereof.
- Contractor shall prepare detailed Environmental Method Statement (EMS) clearly stating the approach, actions and manner in which the EMP is implemented. It is required from the contractor to prepare the EMS for each work site, as work will be carried out at more than one site at once and time plan for implementation. The EMS shall be updated regularly and submit for Engineers' review and monitoring.

5.10 - Potential Project Generated Environmental and Social Impacts with Mitigation Measures

Table 19 - Impacts during Construction Stage

Project aspect	Potential impact	Impact level	Mitigation measures
Removal of Top Soil	Soil erosion in the construction area will affect the vicinity.	Medium	Need to minimize removal of top soil. If necessary, Engineer's approval is essential.
Removal of vegetation	This will open the land for soil erosion and forest degradation	Medium	Engineer's approval is necessary for tree removals. Replanting is necessary after the construction.
Demolition waste and construction waste	All materials removed from existing buildings will limit the area for storing of goods and other activities. Asbestos waste is harmful for human and need more vigilant to handle it.	Medium	The best process and plans should be in place minimize construction waste.
Noise and Air Pollution	Noise levels are high in construction sites. Workers need to wear required safety gears. Dust nuisance to villagers from construction works. Dust and noise generated by vehicles.	Medium	Water sprinkled on work areas. Cover material during transportation. Construction work shall be limited to day light hours Labourers must use masks and safety gears. Newly exposed surface areas

			shall be mulched and replanted as soon as possible in order to reduce the potential for erosion and suppress dust.
Water and drainage	<p>Water pollution with construction materials.</p> <p>Drainage congestion</p> <p>Water logging</p> <p>Vector proliferation</p>	Medium	<p>Do not dispose spoil on drainage path.</p> <p>Prohibit direct disposal of solid and liquid waste into nearby water bodies.</p> <p>Spoil management plan to be developed and implemented by the contractor.</p> <p>Awareness session on handling and storage of materials and waste management to be conducted for the construction workers.</p>
Operation of borrow pits	Poor borrow pits maintenance will cause hardships to workers and might create mosquito breeding places.	Medium	Need to maintain borrow pits and rehabilitation of such places is also essential.
Employment opportunities	Outside labour will create disturbance to the environment. Some social issues also could be expected.	Medium	Conduct awareness and training sessions for workers to minimize environmental and social damages / issues.

<p>Transportation and storage of construction materials</p>	<p>Fugitive emissions</p>	<p>Medium</p>	<p>The vehicles carrying the materials should be covered and secured to prevent loss or re-suspension of materials during travel.</p> <p>Construction materials should be stored in covered areas to ensure protection of surrounding areas from dust and emissions.</p> <p>Any transportation of materials on local roads shall be done during day light hours.</p> <p>All vehicle movements or other construction activities shall be restricted to the delineated construction zone, the existing road network.</p>
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6. Environmental Monitoring

(A). Construction Stage:

The environmental monitoring plan forms the basis for verifying the extent of compliance during the implementation stages of the project. The objectives of an environmental monitoring program are:

- i. to evaluate the performance of mitigation measures proposed in the EMP;
- ii. to provide information which could be used to verify predicted impacts and thus validate impact prediction techniques;
- iii. to suggest improvement in environmental mitigation measures if required;
- iv. to provide information on unanticipated adverse impacts or sudden change in impact trends;

Implementation of mitigation measures will be ensured through both routine and periodic monitoring. Proposed monitoring activities for project at different phases of implementation will be

as follows (Refer tables 20 and 21). In addition, attached EMP ([Refer Annex 2](#)) also could be used to monitor whether proposed safeguard measures are being carried out during different phases.

Table 20 - Construction Phase Monitoring

S.N	Indicators of Monitoring	Types of Monitoring/ Method of Monitoring	Monitoring Frequency	Responsibility
1	Transportation of construction material in covered condition, and safe loading & unloading.	Direct Observation	Regular during construction	FD, & Contractor
2	Stockpiling of excavated materials	Direct Observation	Everyday	FD & Contractor
3	Reuse of excavated materials	Direct Observation	Everyday	FD & Contractor
4	Solid waste segregation disposal	Direct Observation	Everyday	FD & Contractor
5	Clearing of trees/vegetation	Direct Observation	Everyday	FD & Contractor
6	Occupational health and safety, use of safety gears	Direct observation	Once a month	FD & Contractor
7	Safety to workers	Record of injury	Once a week	FD & Contractor
8	Water logging and vector proliferation	Direct observation	Once a week	FD & Contractor

FD = Forest Department

(B). Operational Stage:**Sample of Operational Phase Monitoring****Table 21- Operational Phase Monitoring**

S.N	Indicators of Monitoring	Types of Monitoring/ Method of Monitoring	Monitoring Frequency	Responsibility
1	Development of monitoring reports	Preparation of monitoring reports	Monthly	FD
2	Solid waste management system	Records of waste collected and managed	Quarterly	FD
3	Develop orientation, awareness and training programs	Community consultations. Number of awareness, orientation and trainings conducted	Regular	FD
4	Env. / Impact Audit	Compliance with EMF	Annual	FD / PMU

PMU = Project Management Unit

FD = Forest Department

7. Socio-economic Impacts or Issues:

There are no human settlements or villages in the surrounding and there for no major socio-economic impacts envisaged. There are no physical and cultural resources within the proposed site. However, dust, air and sound pollution will affect the communities who pass this locality. There is a possibility of NGO intervention to observe impacts when the construction work starts. Now environmental NGOs are in full alert after the discussions on Sinharaja, Nuckeles and KDN.

8. Proposed Alternatives to the Existing Development Plans

The construction plan has been developed with minimum adverse impacts for the environment, fauna and flora. But this report suggests further impact reduction to fauna and flora through following alternatives.

8.1. Reduction of tree removals

It was observed that further reduction of tree removals could be done through minor alternatives to the plan. It is the duty of FD to protect valuable trees in the site with alternatives to move constructions to areas with less trees or grasslands.

8.2. Relocation of RFO quarters close to the proposed BFO quarters (No.11)

The proposed location for BFO quarters is acceptable with less vegetation. It was noted that even RFO quarters could be relocated in the same area in order to minimise tree removal. The planned area for RFO quarters has covered with vegetation with valuable trees.

8.3. Foot-path instead of a proposed road (No. 14)

Development of a footpath is recommended instead of a proposed road from dormitory to the dining area. A significant number of trees should be removed to construct the proposed road. An environmental friendly and similar to forest trail is more suitable for this path. Most private sector training centres and even some five star hotels followed these types of eco-friendly footpaths.

8.4. Requirement of a man-made pond (No.12)

An acceptable justification is mission for the proposed pond (not very far from the existing tank) in the planned location. Even though the removal of trees is minimal and the area is a low land and mostly covered with Ginia grass. An acceptable justification is needed to go ahead with the pond construction. However, a culvert is essential for the free flow of storm water to the tank (wewa) in the downstream.

9. Public Consultation

9.1. Consultation and Information Disclosure

Consultation and information disclosure will be a continuous process during the preparation of the environmental assessment document and implementation of the environmental monitoring plans. The environment assessment will ensure to conduct meaningful consultation with affected people and concerned stakeholders, including civil society and facilitate their active participation. The meaningful consultation shall begin early in the project preparation stage and carried out in an ongoing basis throughout the project cycle. Consultation should be organized in a congenial environment without intimidation, and should be gender sensitive as well.

9.2. Grievance Redress Mechanism

The main objective of the Grievance Redress Mechanism (GRM) is to provide a time bound and transparent mechanism to voice and resolve complaints of stakeholders. The environment consultants engaged through the Consultants (Eg. design and supervision consultants) are responsible for handling grievances. They will (i) record the complaints, categorize and prioritize them; (ii) consult with all relevant stakeholders (including contractors), visit the project site, and do the required examination; (iii) settle the grievances in consultation with the complainant and the project staff; (iv) report to the aggrieved parties about the decision/solution; and (v) forward the unresolved cases to higher authorities for resolution. In case of complex complaints, the authorities and consultants will inform the Project Director and guide him about practical options for resolving the grievances.

Grievances will be redressed within two to four weeks from the date of lodging the complaints. If resolution attempts at the FD level fail, the FD will refer the complaints to the relevant DFO along with the minutes of the hearings. If a decision made at this level is found unacceptable by the aggrieved person(s), DFO could refer the case to PSE with the minutes of the hearings at both grass root and district levels. The FD/DFO will keep records of all resolved and unresolved complaints and grievances and make them available for review as and when asked for by PMU and WB Resident Mission in Colombo, Sri Lanka. Information about GRM will be made public through non-governmental organizations (NGOs).

10. Conclusion

The environmental impacts / issues identified during the study in Inamaluwa could be mitigated and manageable. The survey findings indicate possible impacts on physical, environmental, socio-economic and cultural fields due to the proposed development. No households will be directly affected by the proposed project as development works carried out within the existing centre. However, indirect impacts will be possible for communities passing this place and work in a close proximity.

It is the responsibility of project implementers to address identified issues before the commencement of project activities. Services from private sector and NGOs could be obtained to train

identified stakeholders. Mitigation measures have been proposed all identified / predicted adverse impacts and enhancement of project benefits.

However, there may be some impacts / issues not predicted at this stage but might appear later. In such cases, project authorities could obtain services of consultants, environmental experts and NGOs to mitigate such impacts or issues.

Project management will have obligation to carry out mitigation, enhancement and monitoring activities in appropriate stages and time. EMP should be a live document and environmental mitigation measures should be incorporated or upgraded in the EMP as and when necessary.

The study noted more benefits in the proposed program. If the identified issues and impacts are managed properly with proposed mitigation measures, this will be a successful project.

10.03.19

**ENVIRONMENT MANAGEMENT PLAN
PROPOSED NEW BUILDINGS AND STRUCTURES IN FIELD
TRAINING INSTITUTE – INAMALUWA
ECOSYSTEM CONSERVATION AND MANAGEMENT PROJECT**

PHYSICAL ACTIVITIES OF SUB COMPONENT 3
LK-ESAMP-FD-47452-CS-QCBS

Table 01. Contact Details of Responsible Officers

Position	Name	Postal Address	Contact Number/s	Email
Contractor				
Site Supervisor				
DFO	Asoka Herath	DFO Office, Matale	0718048083	
RFO		FD Field Training Institute, Inamaluwa		
BFO	Ragal	FD Field Training Institute, Inamaluwa	0718358442	
Environmental and Social Safeguard Specialist -ESCAMP	Dr. Dunstan Fernando	ESCAMP, Sampathpaya, Rajamalwatta Rd., Battaramulla	0773021095	dun_fernando @yahoo.com
Environment Officer- ESCAMP	Sandun Bandara	ESCAMP, Sampathpaya, Rajamalwatta Rd., Battaramulla	0713512391	sanduntrigo@yahoo.com
Environment Officer- ESCAMP	Sameera Pamarathne	ESCAMP, Sampathpaya, Rajamalwatta Rd., Battaramulla	0719938138	kushan.escamp@gmail.com
Social Development Officer- ESCAMP	Kalpa Pathirana	ESCAMP, Sampathpaya, Rajamalwatta Rd., Battaramulla	0705819529	pskalpa@gmail.com

Abbreviations Used

FD	Forest Department
ESCAMP	Ecosystem Conservation and Management Project
DFO	Divisional Forest Officer
RFO	Range Forest Officer
BFO	Beat Forest Officer
PA	Protected area
ESSS	Environment and Social Safeguard Specialist
PMU	Project Management Unit

EO Environment Officer
TO Technical Officer
NP National Park

SUMMARY SHEET

Works

1. Rehabilitation and/or construction of internal roads of the IFTI.
2. Construction of necessary infrastructure facilities of the IFTI.
3. Construction of solar panel power generation station.
4. Construction of boat yard & timber deck.

Observation

1. Delivering of construction materials & equipment into the areas, trail improvements and other infrastructure development should be done according to the social and environment safeguards.
2. Labour camps may be established within the existing FD building.
3. Lorries, tractors and excavators will enter in to the sites.
4. Selected Trees and bushes will be removed where the construction activities are carried out.

Date of initial Observation

07th 08th March 2019

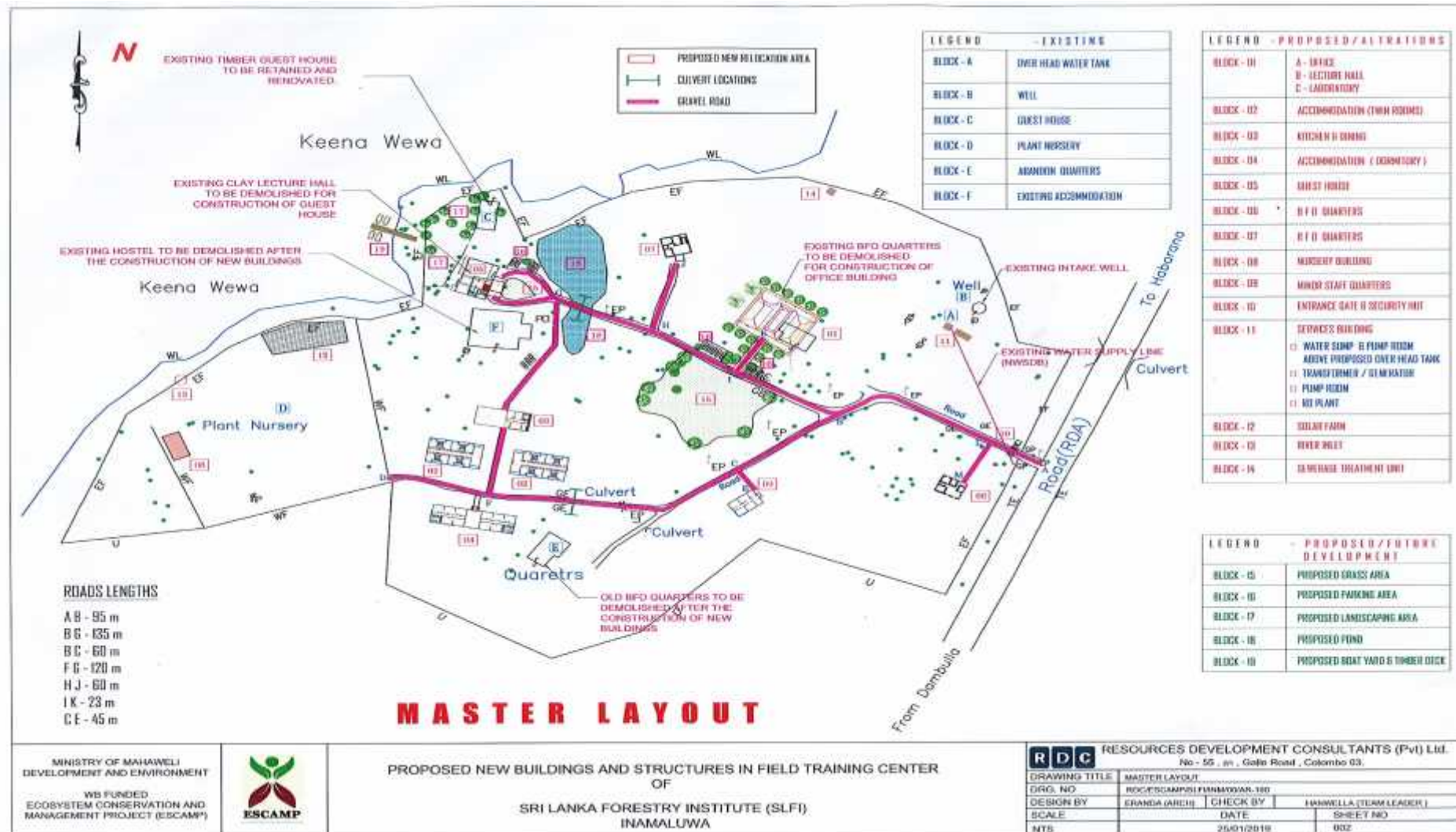
Officers Attended for initial observation

1. Mr. Kushan Sameera Pamarathne - EO, ESCAMP
2. Mr. Sandun Bandara - EO, ESCAMP
3. Dr. Dunstan Fernando - ESSS, ESCAMP

Preamble:

Forest Education of Sri Lanka is important to ensure the conservation of existing forest ecosystems and natural habitats. Accordingly, development plans have been prepared by Forest Department to improve short-term and long-term education / training programs on forestry and related disciplines for forest officers and other interested groups. The proposed project will improve the infrastructure and teaching / learning facilities in both Sri Lanka Forestry Institute (SLFI) and the Inamaluwa Field Training Institute (IFTI). Under the IFTI concept, improvement of infrastructure facilities will be done with ESCAMP funding. The final goal of the IFTI improvement is to increase the frequency of conducting field educational programs, improve the quality of trainings, promote forest education among forest officeres and other interested groups. This is an important attempt to enhance the quality of training and improve infrastructure facilities for the future generations.

The extent of IFTI is around 5.56 ha and the impact of infrastructure development can be considered as less significant during the construction period. However, this Environmental Management Plan has been prepared for further mitigation of environmental impacts and concerns during construction and operational stages.



Layout of the Site

Environmental Management Plan

Upgrading of Inamaluwa Field Training Centre (IFTI)

1. Environmental Management Plan

Activity & impact	Mitigation Measures	Project phase & location	Institutional Responsibility		Monitoring frequency	Implementation Cost Rs.	Monitoring Indicator/s
			Implementation	Supervision			
IMPACTS ON FLORA							
Disturbed dry forest vegetation.	<ul style="list-style-type: none"> Minimum removal of trees. Only approved trees could be removed. 	Pre-construction stage Construction sites and immediate surroundings (<3 m).	Engineer	FD	Regular monitoring	No additional cost	No of complains received from stakeholders / FD officers
Activities outside the work zone.	<ul style="list-style-type: none"> Demarcation of construction sites and immediate surroundings and ensure no activities outside the work zone. 	Pre-construction and construction stage Outside the construction sites and immediate surroundings (<3 m).	Engineer	FD, PMU	Periodical monitoring during the site preparation and construction stages.	No additional cost	No of complains received from stakeholders / FD officers
Activities in the work zone	<ul style="list-style-type: none"> FD, Contractor should provide necessary instructions to workers not to destroy forest and ground vegetation cover unnecessarily. 	Pre-construction, construction stages in sites and surrounding area.	Contractor	Engineer	Periodical monitoring during site preparation and the construction stages.	No additional cost	No of complains received from visitors / FD officers
Loss of critical endangered, vulnerable, near threaten and endemic plants / shrub species (<10 cm dbh).	<ul style="list-style-type: none"> All protected and removal plants / shrubs shall be clearly marked by the Engineer in the field. Translocation (e.g. root balling) of such plant / shrub species (<10 cm dbh) need to be done. Monitoring and maintenance of the translocate trees for period of five years. 	Pre-construction, construction and post-construction stage Construction sites	Engineer, Contractor.	FD, Engineer / PMU	Frequent monitoring during the construction period.	Root balling cost: Rs 20,000/= per tree. (Approximately)	No of complains received from stakeholders / FD officers
Loss of critical endangered and endangered tree species	<ul style="list-style-type: none"> These tree species (>10 cm dbh) shall not be permitted to fell unless it is un-avoidable due to 	Pre-construction and construction stage	Engineer	FD	Frequent monitoring during the construction period.	No additional cost	No of complains received from visitors / FD officers

Activity & impact	Mitigation Measures	Project phase & location	Institutional Responsibility		Monitoring frequency	Implementation Cost Rs.	Monitoring Indicator/s
			Implementation	Supervision			
(>10 cm dbh).	design constraints. • Redesigned to avoid such trees.	Construction sites					
Loss of vulnerable, near threaten, endemic and trees having timber value (>10 cm dbh).	• All such trees shall be marked in the field and counted before clearance. • If un-avoidable these trees can be removed provided that compensation planting of such species is recommended. In 1:10 ratio.	Construction and post-construction stage Construction sites and immediate surroundings (<3 m).	Engineer, Environment Consultant	FD, Engineer	Frequent monitoring during the construction and post construction period.	Tree planting and maintaining cost: Rs 750-900/= per tree. (height of a tree more than 3 feet)	No of complaints received from stakeholders / FD. Number of trees removed and re-planted.
Off road transportation	• Material transportation should be carried out in established tracks and roads only.	Construction stage	Contractor	FD, Engineer	Frequent monitoring during the construction period.	No additional cost	No of complaints received from stakeholders / FD officers
Disturbance/destruction to the flora	• All construction works should be carried out with minimum disturbance/destruction to the vegetation. Trees and vegetation shall be felled / pruned only if that interrupts directly on the permanent works or necessary works. In all such cases contractor shall take prior approval from the Engineer.	Pre-construction, construction and post construction stage Construction sites and surrounding area.	Contractor	FD, Engineer	Periodical monitoring during the construction and site preparation period.	No additional cost	No of complaints received from stakeholders/ FD officers
Encroachment of invasive alien species	• Ensure all plant/planting materials and equipment & vehicles coming to sites have been cleaned and free from weeds and invasive seeds.	Construction and post-construction stage Construction sites and surrounding area.	Contractor	FD, Engineer / Site supervisors	Frequent monitoring during the construction and post construction period.	No additional cost, as included in the plant / plant material cost.	No of complaints received from visitors/ FD officers
Impact of fire in the dry condition	• No one will be allowed for smoking during working hours or bringing cigarettes, lighters, matchboxes or any other smoking material/ apparatus <i>etc.</i> into the sites.	Construction stage Construction sites and surrounding area.	Contractor	Engineer, FD	Frequent monitoring during the construction period.	No additional cost	No of complaints received from stakeholders/ FD officers
IMPACTS ON FAUNA							
Disturbances on fauna	• Construction workers shall be instructed to protect fauna including terrestrial and aquatic including their habitats.	Entire construction period and in construction areas.	Contractor	Engineer, FD	Frequent monitoring during the construction period.	No additional cost	No of complaints received from stakeholders / FD

Activity & impact	Mitigation Measures	Project phase & location	Institutional Responsibility		Monitoring frequency	Implementation Cost Rs.	Monitoring Indicator/s
			Implementation	Supervision			
	<ul style="list-style-type: none"> Hunting, poaching and fishing by project workers is prohibited Tooting of vehicle horns inside the boundary is prohibited. Vehicles travelling in and out of the construction site should maintain low speeds (<10 kmh⁻¹). All machinery and equipment should be well maintained and fitted with noise reduction devices in accordance with manufacturer's instructions. 						officers
Chance found important fauna and flora	<ul style="list-style-type: none"> During site preparation or construction, if an ecologically significant fauna species or any bird nest, breeding sites/ habitats is found, <ol style="list-style-type: none"> Work in such area shall be stopped immediately it shall be informed to the Engineer and FD Action shall be taken based on the instructions of the Engineer and FD 	Entire construction period and construction sites.	Contractor / Engineer	Engineer/ F/D	Frequent monitoring during the construction period	No additional cost	No of rare / threatened / endangered or endemic species found
CONSTRUCTION WORKS							
Extraction of quarry materials	<ul style="list-style-type: none"> The contractor is required to ensure that sand, aggregates and other quarry material is source from licenced sources. Sourcing from any material from construction site and or designated natural areas including tank beds is not permitted. 	Entire construction period and construction sites	Contractor	Engineer		No additional cost	No of complaints received from stakeholders/ community / FD officers
Dust emission due to surface clearance and roads	<ul style="list-style-type: none"> Watering roads regularly Vehicles travelling in and out of the construction area should maintain low speeds (<10 kmh⁻¹). The contractor shall effectively manage the dust generating activities such as topsoil removal during periods of high winds or during more 	Entire construction period and construction sites.	Contractor	Engineer	Frequent monitoring during the construction period.	No additional cost	No of complaints received from stakeholders/ FD officers

Activity & impact	Mitigation Measures	Project phase & location	Institutional Responsibility		Monitoring frequency	Implementation Cost Rs.	Monitoring Indicator/s
			Implementation	Supervision			
	stable conditions with winds directed towards adjacent residences and other facilities.						
Disturbance to ground cover and vegetation	<ul style="list-style-type: none"> Contractor shall provide necessary instructions to drivers and operators not to destroy ground vegetation cover without proper approvals. Sites used for vehicle and plant service and maintenance shall be restored back to its initial status. Site restoration will be considered as an essential work. 	Construction and pre construction period and construction sites.	Contractor	Engineer	Frequent monitoring during the construction period.	No additional cost	No of complains received from stakeholders/ FD officers
After remove of labour camps (if construct labour camps in the site)	<ul style="list-style-type: none"> Contractor shall remove the labour camps fully after its need is over, empty septic tanks, if instructed by the engineer shall be closed, remove all garbage, debris and clean and restore the area back to its former condition. 	Post construction period and Construction sites	Contractor	Engineer, FD	Frequent monitoring during the construction period.	No additional cost	No of complains received from FD officers
EARTHWORK AND SOIL CONSERVATION							
Soil erosion	<ul style="list-style-type: none"> Ensure effective silt and erosion control measures to reduce potential impacts during the site clearing for proposed infrastructure development. 	Entire construction period and construction sites.	Contractor	Engineer	Frequent monitoring during the construction period.	No additional cost	No of complains received from visitors/ FD officers
Soil erosion during heavy rains	<ul style="list-style-type: none"> Safety measures would be recommended on soil erosion take place during heavy rains from cleared areas for construction works. Design adequate drainage pathways with silt traps as required and recommended. 	Construction and post-construction stage Construction sites and surrounding area.	Engineer and Contractor	Engineer, FD	Frequent monitoring during the construction period.	No additional cost	No of complains received from stakeholders/ FD officers
Disposal of all debris and residual spoil material	<ul style="list-style-type: none"> The debris and spoil shall be disposed in such a manner that <ol style="list-style-type: none"> waterways and drainage paths are not blocked, the disposed material should not be washed away by floods. 	Entire construction period and construction sites.	Contractor	Engineer	Frequent monitoring during the construction period.	No additional cost	No of complains received by FD officers
Labour camps within	<ul style="list-style-type: none"> Setting up of labour camps shall have the approval 	Entire construction	Contractor,	FD	Frequent monitoring	No additional cost	

Activity & impact	Mitigation Measures	Project phase & location	Institutional Responsibility		Monitoring frequency	Implementation Cost Rs.	Monitoring Indicator/s
			Implementation	Supervision			
the site	of F/D	period and construction sites.	Engineer		during the construction period.		
	<ul style="list-style-type: none"> On completion of the works, temporary structures shall be cleared away in full, all rubbish properly disposed, waste dumps and septic tank shall be cleared and closed. Workplaces, roadsides and labour camps etc., also shall be cleared and cleaned. 	At the end of the Construction period All construction sites	Contractor, Engineer	Engineer, FD	Once prior to hand over the sits back	No additional cost	No of complaints received from visitors/ FD officers & site observations
BORROWING OF EARTH							
Borrow areas	<ul style="list-style-type: none"> Contractor shall comply with the environmental requirements / guidelines issued by the Central Environmental Authority (CEA), Geological Survey and Mines Bureau (GSMB) and the respective Local Authority in respect of locating borrow areas and with regard to all operations related with excavation and transportation of earth from such sites. All borrow pits/areas shall be rehabilitated at the end of their use by the contractor in accordance with the requirements/guidelines issued by the Central Environmental Authority (CEA), Geological Survey and Mines Bureau (GSMB) and the respective Local Authority. Borrow areas shall not be opened without the permission of the Engineer. The location, depth of excavation and the extent of the pit or open cut area shall be done as approved by the Engineer. Establishment of borrow pits/areas and its 	Entire construction period and borrow sites.	Contractor, Engineer	Engineer, FD	Frequent monitoring during the construction period.	No additional cost	No of complaints received from communities, CSOs, FD officers

Activity & impact	Mitigation Measures	Project phase & location	Institutional Responsibility		Monitoring frequency	Implementation Cost Rs.	Monitoring Indicator/s
			Implementation	Supervision			
	operational activities shall not endanger the properties. Also shall not be a danger or health hazard to the people / communities.						
SOLID AND LIQUID WASTE MANAGEMENT							
Demolished material / Solid waste	<ul style="list-style-type: none"> Demolished material from the building sites / construction sites should be reuse or taken away from the area under the approval of the Engineer and FD. 	Entire construction period and construction sites.	Contractor	Engineer, FD	Frequent monitoring during the construction period.	No additional cost	No of complaints received from FD officers
Removal and disposal of Asbestos sheets (if use):	<ul style="list-style-type: none"> Do not cut, drill or break asbestos sheets Use spanner for undoing U bolts if U bolts are difficult to undo, try to cut it off (using a grinder) rather than break the asbestos. Properly store the removed sheets in a covered area until they are dispose Any damaged sheets / broken parts shall be properly stored in a covered area until they are disposed in a land fill. 	Entire period of demolition and existing building sites	Contractor	Engineer	Frequent monitoring during the construction period.	No additional cost	No of Observations / complains received from visitors / FD officers
Sewage disposal	<ul style="list-style-type: none"> Sewage and other biological waste material from the construction sites shall be properly disposed and they should not be leaking to the ground water systems or lake. 	Construction and post construction period and construction sites.	Contractor	Engineer	Frequent monitoring during the construction period.	No additional cost	No of complaints received from visitors / FD officers
Fuel and Lubricants	<ul style="list-style-type: none"> Any lubricant, fuel or any chemical substance, any other solvent should not be brought to the site for any purpose without receiving written permission from the Engineer and under supervision of respective FD officer. Waste oil, other petroleum products and untreated wastewater shall not be discharged on ground/ within the project site. Vehicle/machinery and equipment serving and 	Entire construction period and construction sites.	Contractor	Engineer	Frequent monitoring during the construction period.	No additional cost	No of complaints received from communities/CSOs/FD officers

Activity & impact	Mitigation Measures	Project phase & location	Institutional Responsibility		Monitoring frequency	Implementation Cost Rs.	Monitoring Indicator/s
			Implementation	Supervision			
	maintenance work shall be carried out only in designated locations/ service stations approved by the Engineer.						
Small /fine particles	<ul style="list-style-type: none"> Construction materials containing small/fine particles shall be stored in places not subjected to flooding and in such a manner that these materials will not be washed away by runoff. 	Entire construction period and construction sites.	Contractor	Engineer	Frequent monitoring during the construction period.	No additional cost	Periodic Site supervision & No of complaints received from stakeholders/ FD officers
Impacts on water bodies (Lake / tank)	<ul style="list-style-type: none"> Construction work close to the (water body) tank shall be avoided during heavy rainy/monsoon periods. 	Entire construction period and construction sites.	Contractor	Engineer, FD	Frequent monitoring during the construction period.	No additional cost	Observations during rainy season
Waste water	<ul style="list-style-type: none"> Contractor shall adhere to the CEA recommendations on disposal of wastewater. Wastewater shall not be discharge to ground or tank in a manner that will cause surface or ground water pollution. 	Construction and post construction period and construction sites.	Contractor	Engineer	Frequent monitoring during the construction period.	No additional cost	No of complaints received from stakeholders/ FD officers
WORKERS SAFETY - ACCIDENTS AND RISKS							
Workers Safety from wild animals, etc.	<ul style="list-style-type: none"> Limit activities to day time working hours from 8.00 am to 6.00 pm. The contractor shall comply with requirements for the safety of the workforce and all reasonable precautions shall be taken to prevent danger of the workers from accidents causes due to snake bites, wild elephant attacks etc. 	Entire construction period. construction sites.	Contractor	Engineer	Frequent monitoring during the construction period.	No additional cost	No of complains received from FD officers
Workers Safety	<ul style="list-style-type: none"> All reasonable precautions shall be taken to prevent danger of the workers and the public from accidents. Strict safety measures shall be taken when removing / demolished asbestos materials from 	Entire construction period and construction sites.	Contractor	Engineer	Frequent monitoring during the construction period.	No additional cost	No of complaints on incidence

Activity & impact	Mitigation Measures	Project phase & location	Institutional Responsibility		Monitoring frequency	Implementation Cost Rs.	Monitoring Indicator/s
			Implementation	Supervision			
	<p>the building sites and construction sites.</p> <ul style="list-style-type: none"> Contractor shall take necessary actions to prevent breeding of mosquitoes at places of work, labour camps, plus office and store buildings, stagnation of water in all areas including gutters, used and empty cans, containers, tyres, ... etc. At every workplace, first aid kit shall be provided as per the regulations. 						
Hazardous and risky chemicals/material	<ul style="list-style-type: none"> Prior to the commencement of work, the Contractor shall provide a list of harmful, hazardous and risky chemicals/material that will be used in the project work to the Engineer. Contractor shall also provide the list of places where such chemicals/ materials or their containers or other harmful materials will be disposed as waste at the end of the project. 	Construction and post construction period. Construction sites.	Contractor	Engineer	Frequent monitoring during the construction period.	No additional cost	No of complains received from / FD officers
SPREADING OF INVASIVE PLANT SPECIES							
Contaminated burrow materials	<ul style="list-style-type: none"> Burrow materials should 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 burrow material. The inspected burrow sites should be certified by the engineer and the contractor should maintain necessary documentation on the sources of burrow material. Construction vehicles should be cleaned and washed periodically to prevent carrying any invasive species. 	Construction period. construction sites.	Contractor	Engineer, FD	Frequent monitoring during the construction period.	No additional cost	No of complains received from FD officers on invasive materials
Spreading of invasive plant species	<ul style="list-style-type: none"> Regular monitoring 	Construction and post construction period.	Contractor	Engineer	Frequent monitoring during the	No additional cost	No of complains received from FD

Activity & impact	Mitigation Measures	Project phase & location	Institutional Responsibility		Monitoring frequency	Implementation Cost Rs.	Monitoring Indicator/s
			Implementation	Supervision			
	<ul style="list-style-type: none"> Removing of invasive species if any should be carried out 	Construction sites.			construction period.		officers
PUBLIC SAFETY							
Garbage disposal	<ul style="list-style-type: none"> Contractor shall keep all places of work clean, devoid of garbage to prevent breeding of rats and other vectors such as flies. No garbage dispose is allowed within the construction site. 	Construction and post construction period Construction sites.	Contractor	Engineer	Frequent monitoring during the construction period.	No additional cost	No of complaints received from stakeholders/ FD officers
Sound pollution	<ul style="list-style-type: none"> Any means of noise pollutions should be controlled. 	Construction and post construction period Construction sites.	Contractor	Engineer	Frequent monitoring during the construction period.	No additional cost	No of complaints received from stakeholders/ FD officers
Notice/Awareness	<ul style="list-style-type: none"> Notice/Awareness/Sign board as a “Working Place” should be exhibited at the front of main construction sites before commencement of construction works (especially for areas, where the construction of offices and quarters) 	Construction period Construction sites.	Contractor	Engineer	Frequent monitoring during the construction period.	No additional cost	No of complains received from visitors/ FD officers
CHANCE FOUND ARCHAEOLOGICAL PROPERTY							
Archaeological property	All fossils, coins, articles of value of antiquity and structures and other remains or things of geological or archaeological interest etc. discovered on the site and/or during construction work shall be the property of the Government of Sri Lanka, and shall be dealt with as per provisions of the relevant legislation. Contractor should educate all workers on such materials and proper instructions should be given to all workers.	Construction period Construction sites.	Contractor	Engineer, FD	Frequent monitoring during the construction period.	No additional cost	No of new identifications found

