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Environmental and Social Screening Report & Environment and Social Management Plan (ESMP) Mahalindawewa Irrigation Scheme

Integrated Watershed and
Water Resources Management Project (IWWRMP)



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Irrigation Department, Ministry of Mahaweli Development and Environment

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1. Introduction

a. About the IWWRMP

Water availability is becoming more variable and uncertain and studies show that these trends are likely to exacerbate, and the wetter areas of the country would eventually become wetter and the drier areas drier. As a response, to the expected economic, social and environmental losses, the Government of Sri Lanka has developed The Sri Lanka Water Resources Management Project (IWWRMP). The systematic implementation of this project is expected to address and adapt to some of the adverse climate change impacts projected for the country. The project is designed around four components:

- Component 1: Watershed Management (USD 25 million).
- Component 2: Infrastructure Improvements (USD 129 million)
- Component 3: Strengthening Water Resources Management Institutions (US\$ 10 Million).
- Component 4: Contingent Emergency Response (US\$ 0.0 million).

The aim of Component 2 is to enhance the safety and durability of hydraulic assets and support the rationalization of institutional arrangements for ensuring their safety and durability. This component is thus expected to finance the works, goods and consultancy services to rehabilitate headworks and downstream water resources infrastructure to enhance safety as well as related irrigation canal systems that require rehabilitation to improve their operational efficiency and durability.

Of the various sub-projects (dams and canal systems) that have been proposed for rehabilitation under Component 2 of the Project, one of them includes the 'Rehabilitation of Mahalindawewa Dam' with project brief as follows:

Project title	Rehabilitation of Mahalindawewa Irrigation Scheme
Project Proponent	Department of Irrigation
Proposed start date	01/06/2019
Proposed completion date	31/05/2021
Estimated total cost	Rs. 60 million (USD 343,000)

b. Project Description and Justification

The Mahalindawewa tank bund is an earthen type bund. It starts from the Yahalegama tank bund and extends a length of 1,465 m. The catchment area of the tank is about 60.95 square miles and the command area specified is 675 acres. The entire area of 675 acres is cultivated with paddy in Maha¹ seasons (see below for description of Maha seasons). Yala cultivation is done on a Bethma system due to water scarcity; that is an average 0.5 acres for each farmer in the command (about 175 acres of total command area of 675 acres) area is given during Yala for cultivation.

Table 1: Features of the Mahalindawewa Tank

Tank Bund	Bund top level (in relation to MSL)	120 ft RL
	Maximum bund height	25 ft
	Bund top width	15 - 18 ft
	Side slopes	U/S 1:1.5 and D/S 1:2
Sluice	Type	HP Tower
	Sluices	RB (18" diameter) Middle (24" diameter) LB (24" diameter)
Spill	Type	Clear over fall
	Spill length	100 ft
	Spill crest level	112 ft RL
	Number of gates	No

Source: IE Anuradhapura

Mahalinawewa has been identified as one of the high-risk dams with respect to their appurtenant structures and operational efficiency as per the risk assessment conducted by the recently closed Dam Safety and Water Resources Management Project. These dams are required to have immediate interventions to decrease the vulnerability of downstream populations and socioeconomic infrastructure, if breached. The problems identified in the Mahalindawewa (that requires rectification) include seepage from the bund, presence of a breached section in the bund, broken RB sluice gate, seepage from RB spill due to scouring, damaged rip rap. In addition to these, part of the spill tail canal is in a high ground area which needs to be rectified as well. At present, due to the current state of the tank,

- Cropping intensity has become 1.2 due to siltation of tank.
- Severe seepage will be arrested to safeguard the tank bund and water.
- Bund over topping at several locations during heavy floods.

¹ There are two main agricultural seasons in Sri Lanka, Maha and Yala. The rainfall generally follows a bimodal pattern of distribution. The major one of the two rainfall peaks is spread over a period of three months commencing between late September and mid-October and extending to late December or up to mid-January. These are called Maha rains. As the Maha rains fade away, a dry season sets in during which period there is little or no rain. The second rainy season of the year begins any time from mid-March to mid-April and lasts until May or even June, which is called Yala rain corresponding to Yala season. This is shorter compared to Maha rain.

- Remedial works of tank bund has not been attended since 1979 after the last restoration.

The project components are as follows:

- Improvements of tank bund and providing rip-rap from 0m to 1400m.
- Improvements to D/S of the Spill
- Improvements to Spill approach
- Construction of curtain wall for spill wing wall
- Graveling tank bund road
- Construction of clay cutoff wall from 100m to 1400m
- Improvements to LB, RB and middle sluice
- Construction of bathing steps at 50m,300m,1100m

The main objective of the proposed project is to ensure water security for Mahalinda wewa tank related population. Further it can be divided in to the following listed sub-objectives

- Provide irrigation water for 675 acres for both Yala and Maha seasons
- Provide water for washing and bathing during dry periods (6 months)
- Provide ground water replenishment for adjacent 40 dug wells for domestic consumption throughout the year.

The project intends to obtain a cropping intensity of 2 after rehabilitations.

Table 2: Rehabilitation Interventions proposed for the Mahalindawewa Tank

Intervention(s)	Issues	Construction Methodology
Improvements of tank bund, including provision of rip rap	Damages in rip rap (Figure 3.1A)	<ul style="list-style-type: none"> • Clearing and grubbing of weeds • Trimming and leveling the top surface of the bund road by machinery • Removing existing rip rap • Stripping top soil up to 50 mm thickness on bund slope • Cutting steps in the bund slope to receive new earth • Borrowing earth, placing on bund top and slope including watering and compaction • Furnishing and laying gravel on bud top and slope, watering and compaction before making rip rap • Benching along the tank bund slope by machinery and backfilling including watering and compaction • Furnishing and placing a Geo textile along the slope as directed • Furnishing and placing new graded rip rap as directed • Furnishing, placing and compacting of the gravel layer on the surface, including watering and compacting by machinery

Intervention(s)	Issues	Construction Methodology
<p>Construction toe filter and toe drain</p> <p>Rehabilitation of toe road with culverts</p>	<p>Seepage at toe (Figure 3.1B) Water stagnant in D/S area (Figure 3.1C)</p>	<ul style="list-style-type: none"> • Turfing • Uprooting and removal of trees • Providing clay cutoff wall at the existing seepage locations from the ground to up to hard layer at U/S toe • Carrying out U/S filling • Earth excavation for toe drain • Furnishing and laying geo-textile before rubble work as filter layer • Transporting aggregate and compacting for the toe drain as directed • Placing, compacting rubble for the toe drain as directed • Rubble pitching for toe drain with cement and sand mortar • Removing vegetation along the bund toe for toe road path • Earth excavation by machinery • Trimming and levelling the top surface of the bund toe road by machinery • Placing and compacting gravel layer along the top surface of the road including watering • Constructing culverts by earth excavation in foundation and back filling; mixing, placing, compacting and curing 1:3:6 (40 mm) cement concrete using machinery
<p>Identifying breaching section along the bund</p> <p>Correcting the breached area with earth material to the required slope</p> <p>Turfing the area to avoid erosion</p>	<p>Breaching section of the bund (Figure 3.1D)</p>	<ul style="list-style-type: none"> • Clearing and grubbing of weeds • Stripping top soil up to 50 mm thickness on bund slope • Borrowing earth, placing on bund slope including watering and compacting to the required slope • Turfing
<p>Demarcation of reservoir tank bund and tank bed</p>	<p>Unclear tank boundaries (Figure 3.1E)</p>	<ul style="list-style-type: none"> • Demarcating the boundaries where the encroachers have established their cultivations • Placing the boundary stones along the boundary as per demarcation on survey plan
<p>Arresting spill seepage</p> <p>Reinstating scoured abutment</p>	<p>Spill seepage (Figure 3.1F) Scoured RB spill abutment (Figure 3.1G)</p>	<ul style="list-style-type: none"> • Installing a curtain at seepage sections • Masonry and concrete work in reinstating scoured abutment

Intervention(s)	Issues	Construction Methodology
Levelling high ground section Constructing D/S cushion	Part of the spill tail canal is located in the high ground area and the path is not clear (Figure 3.1H)	<ul style="list-style-type: none"> This design is yet to be done by the Irrigation Department. However, concreting with dowelling are to be undertaken in the downstream areas.
Installing and new sluice gage	RB sluice gate broken (Figure 3.1I)	<ul style="list-style-type: none"> Designs are yet to be finalized. However, when the water levels are low particularly in the Yala season, coffer damming needs to be done. Thereafter, new sluice gate will be done
Construction of bridge over spill tail canal to the LB sluice	No access to LB sluice and maintenance and operation is difficult	<ul style="list-style-type: none"> Designs are not yet completed. However, the typical bridge is to be provided where construction methodology would be typical, pier construction, deck construction together with finishes

See **Annex 1** for pictures on main issues of Mahalindawewa Irrigation Area and Dam

c. Project Location

The Mahalindawewa tank is a medium sized tank which operates under Anuradhapura Irrigation Engineer's Division. It is located in the Anuradhapura district within the Nochchiyagama and Nuwaragam Palatha Central Divisions (75% in Nochchiyagama and 25% in Nuwaragam Palatha Central) of the North Central Province. The tank is 8km away from Anuradhapura along Colombo Puttalam (A12) road and 8km away from Ulukulama Junction along Ulukulama Alayapattuwa road. The tank can be accessed through Anuradhapura - Mahawilachchiya road turning left at the Elayapattuwa junction towards the Mankadawala village. At present, the Mahalindawewa Grama Niladhari (GN)² division in Nochchiyagama Divisional Secretariat (DS)³ division, 01 GN division will be covered by the project.

² Smallest administrative unit in Sri Lanka, headed by a Grama Niladhari Officer (formerly village headman).

³ A DS division is made up by several GN divisions, headed by the Divisional Secretary

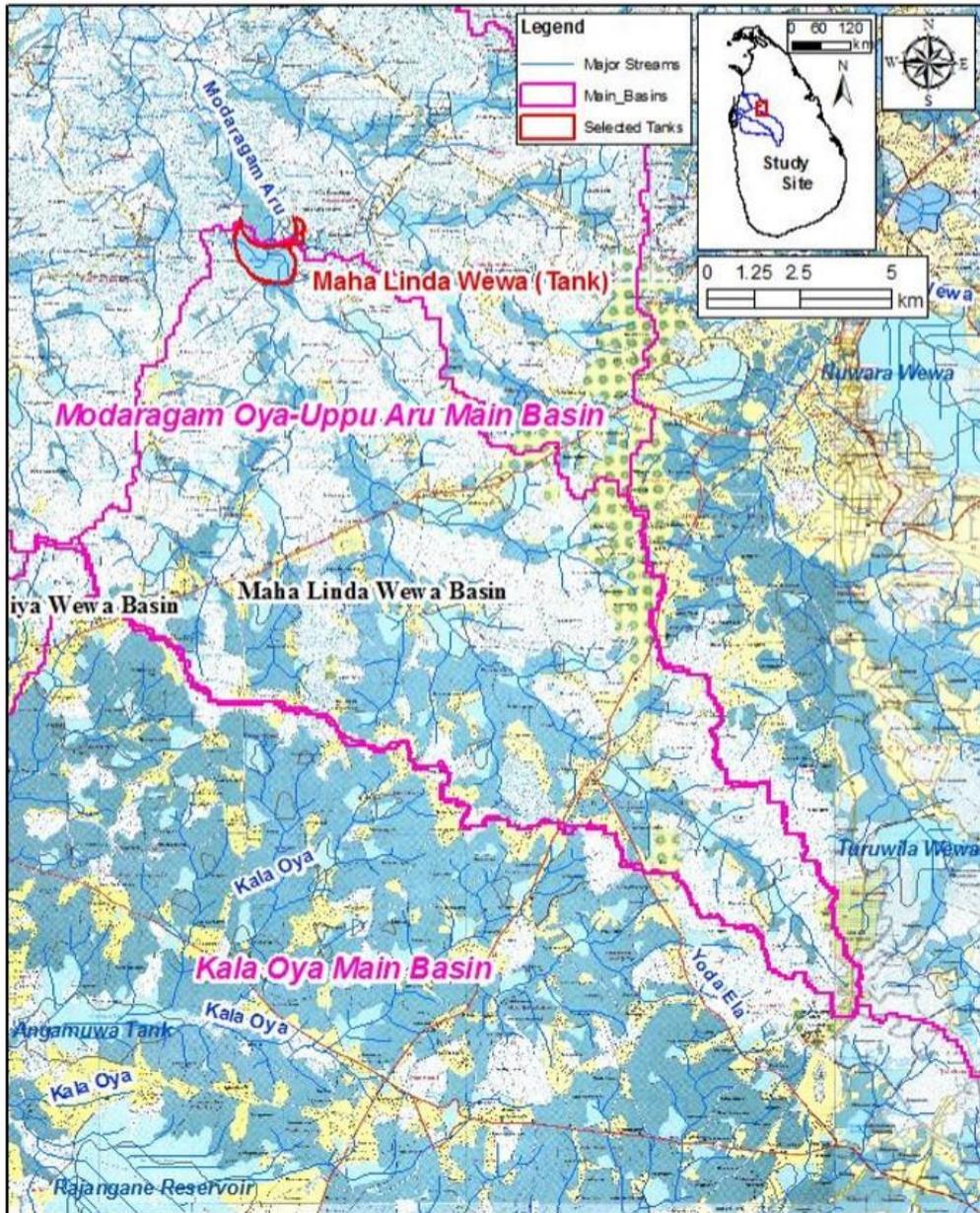


Figure 1: Location of the Mahalina Wewa Tank

See **Annex 2** for a close-up location map.

The Mahalinda Wewa irrigation scheme is located in the dry zone of the country where the climate is characterized by warm, dry conditions and limited rainfall. The rainfall generally follows a bimodal pattern of distribution. The major one of the two rainfall peaks is spread over a period of three months commencing between late September and mid-October and extending to late December or up to mid-January. These are called as Maha rains, and due to relatively long period of rain filling the tanks and even causing floods (see footnote on previous page). As the Maha

rains fade away, a dry season sets in during which period there is little or no rain, in March soil dries up, the forest becomes less lush and the season turns less tranquil. During the dry season decline the water reserves within the district. The second rainy season of the year begins any time from mid-March to mid-April and lasts until May or even June, which is called Yala rain corresponding to Yala season. This is shorter compared to Maha rain. This rain replenishes the depleted tanks and ground water reserves to a substantial level. When the short, wet season is over, dry weather sets in again from May or June. In August, the condition of the climate is arid, tanks are dried up, and the mud is lined cracked. However, this district receives an annual average rainfall of 1420 mm, which is high enough in Maha season and mainly by North East monsoonal component.

d. Project area of influence

The boundaries of the water spread and command area in Figure 2 demarcates the boundary of the project's area of influence. All the components of the tank⁴ (Headwork, catchment, command and settlement) are located in the villages of Mahalindawewa (325 GNDs), Ilandagahawewa, Ranorawa, Thibatuwewa and Elayapattuwe (285 GNDs). This area consists of 506 farmer families and includes chena cultivators and fishermen (mostly from outside the village) with a total number of HHs estimated at 700.

Boundary of the tank headworks roughly coincides with the boundary of the physical activities of the project which is the zone of direct construction impact. In addition, there are few potential quarry sites and the access roads leading to the quarry sites that will be considered as part of the direct impact area. Details of the identified borrow sites are provided in table 2 and are visualized in Figure 3 and Figure 4.

⁴ In Sri Lanka man-made rain water harvesting reservoirs are popularly referred to as Tanks

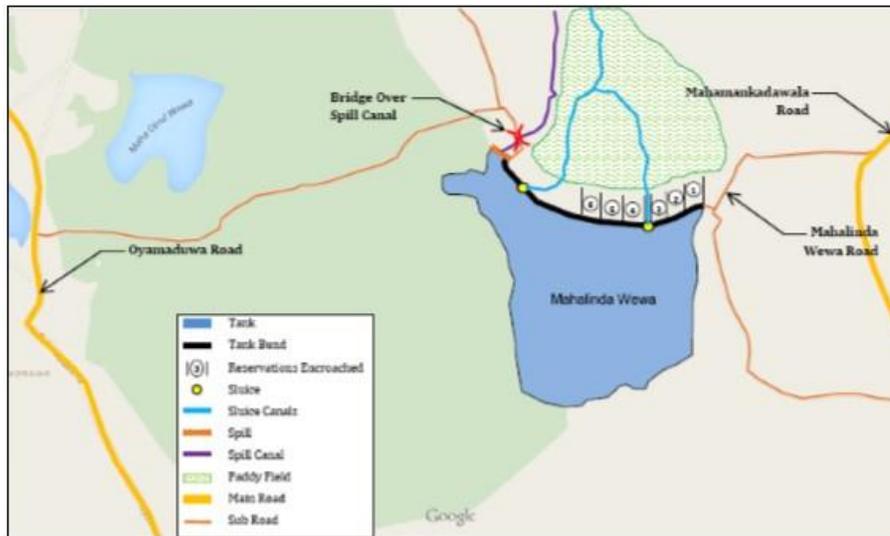


Figure 2: Impact area around tank headworks

e. Objectives of the ESMP

The objective of the Environmental and Social Management Plan (ESMP) for the Rehabilitation of Mahalindawewa Dam is to have a site – specific and well-documented set of mitigation, monitoring and institutional actions to be taken before and during implementation of the project. These measures seek to address adverse environmental and social impacts, offset them or reduce them to acceptable levels. In addition, the ESMP also includes measures needed to implement these actions, addressing the adequacy of the monitoring and institutional arrangements for the upper and lower watersheds in the intervention site. The ESMP has been developed in accordance with the Environment and Social Management Framework (ESMF) developed for the overall Integrated Watershed & Water Resources Management Project (IWWRMP).

2. Legal Framework and World Bank's Safeguards Policies

This ESMP has been prepared in compliance with the national regulations as well as the World Bank's safeguards policies and is in accordance with the ESMF prepared for the overall IWWRMP.

a. National Laws, Regulations and Policies

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 and non-land related social 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). Besides, there are several other sectoral legislative enactments that are in place as elaborated in the ESMF prepared for the overall IWWRMP. Table 3 indicates the applicability of these legislations to the context of the Mahalindawewa Irrigation Rehabilitation project.

Table 3: Applicability of National Laws and Policies

	Permit/Clearance	Yes	No	TBD	Remarks
1	National Environmental (Amendment) Act, Certified on 18 th August,2000		√		The proposed work does not come under the prescribed categories of the EIA/IEE regulations, hence there is no need for an IEE/EIA under national regulations. However, an Environmental Recommendation from the Anuradapura Regional Central Environmental Authority to implement the project will be obtained
2	Soil Conservation (Amendment)Act No. 24 of 1996		√		As work sites are not located in vulnerable area declared by National Building Research Organization, it is not necessary to obtain clearance.
3	Coast Conservation Act No 57 of 1981.		√		Not relevant
4	Fauna and Flora (Amended) Act No 49 of 1993)		√		As per the Fauna and flora Protection(Amendment) Act, No.49 of 1993, there are no conservation sites located whinin Nochchiyagama and Nuwaragam Palatha Central DS

	Permit/Clearance	Yes	No	TBD	Remarks
					divisions. Hence, clearance is not required.
5	Local Authority Act No.23 of 1992	√			Approval will be obtained for new constructions, for waste collection and to issue machinery permits.
6	Irrigation (Amendment) Act (No. 48 of 1968)	√			It has been received.
7	Archaeological Ordinance No. 9 Of 1940, Acts No.2 of 1955, No. 22 of 1955, No.2 of 1998 and No. 12 of 2005		√		The list of conservation sites in Nochchiyagama and Nuwaragam Palatha Central DS division has been obtained. Project construction sites are not in close proximity to those sites. However, Department of Archaeological, will be informed.
8	Agrarian Development Act No. 46 of 2000 (Section 32)	√			The encroached area is cultivated with paddy and converting such paddy lands to construct/ rehabilitate bund headworks (toe drain, toe filter etc) require written permission of Commissioner General of Agrarian Services Department.
9	Mines & Minerals Act No. 33 of 1992	√			Obtain clearance from Geological Survey and Bureau an Industrial Mining License (IML) for burrowing/quarrying sites
10	Felling of Trees Control Act No. 9 of 1951 as amended through Act No. 30 of 1953	√			In Mahalindawewa approval is required from Divisional Secretariat of Nuwaragampalatha Central / Nochchiyagama followed by respective Grama Niladhari for removal of timber logs. These logs would have to be removed as per the requirement set forth by the DS and the Timber Cooperation.
11	Land Acquisition Act, 1950 Land Acquisition Regulations, 2008 National Involuntary Resettlement Policy, 2001		√		Project activities does not include any interventions that will require additional land-taking.

b. World Bank's Safeguards Policies

Projects and programs funded by IBRD resources need to comply with and satisfy the requirements of the World Bank's operational policies, in addition to conformity with national environmental regulations. The World Bank's safeguards policies triggered under the overall

IWWRMP include: OP/BP/GP 4.01: Environmental Assessment, OP/BP 4.04: Natural Habitats, OP/BP 4.36: Forests, OP/BP 4.11: Physical Cultural Resources, OP/BP 4.12: Involuntary Resettlement and OP/BP 4.37: Safety of Dams. However, not all these policies are applicable in the context of the ‘Rehabilitation of Mahalindawewa Dam’ sub-project for the reasons provided in Table 3.

Table 4: Applicability of WB Safeguard Policies Triggered by the Project

Safeguard Policies Triggered by the Project	YES	NO	Explanation
Environmental Assessment (OP/BP/GP 4.01)	X		This policy is applicable because the project will support the rehabilitation of existing dam headworks of Mahalindawewa which will involve earth works, civil works, burrowing for construction material etc and hence requires proper screening and impact mitigation.
Natural Habitats (OP/BP 4.04)	X		On a precautionary basis, the NH is considered applicable as sites selected for burrowing could impinge on natural habitats.
Forests OP/BP 4.36		X	The applicability of this policy is not relevant in this case as no physical resources are threatened as a result of the project.
Physical Cultural Resources (OP 4.11)		X	The applicability of this policy is not relevant in this case as no forest resources are threatened as a result of the project.
Involuntary Resettlement (OP/BP 4.12)	X		This policy is applicable as implementation may result in livelihood losses for farmers and fishermen dependent on the tank. Proposed boundary demarcation of tank may lead to additional losses of income.
Safety of Dams (OP/BP 4.37)	X		This policy is applicable as a precautionary measure although the Mahalindawewa dam does not fall under the large dam category.

In addition to applicable OP's presented above, the World Bank Group's General Environmental Health and Safety Guidelines, Guidelines on Managing the Risks of Adverse Impacts on Communities from Temporary Project Induced Labour Influx, and Good Practice Note on GBV for low risk projects, as recommended by the WB's GBV task force, are also applicable for this project and will be followed when relevant.

3. Environmental and Social Characteristics

a. Physical Features

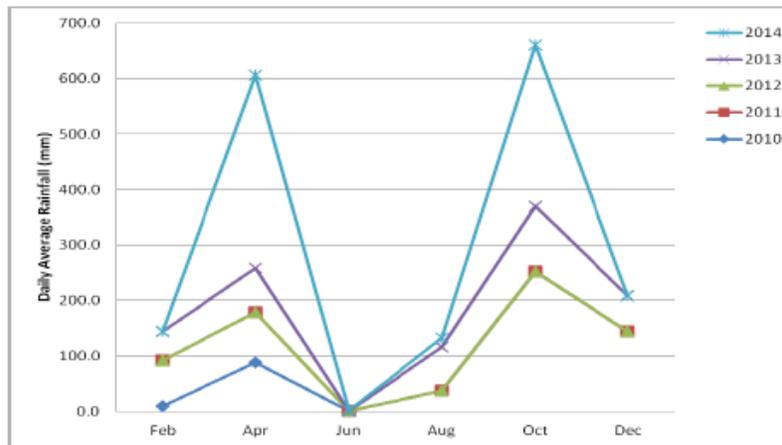
Topography and Terrain

Mahalindawewa is located in the North Central Province which lies within the lowermost peneplain. The landscape in the vicinity of the site is characterized by flatlands, with almost no altitude changes, partly due to the fact that the land has already been cleared and prepared for agriculture. Secondary development with people in-migrating to these areas have taken place parallelly. According to the pre-existed topography, the elevation in the proposed site area had varied from 60 m MSL in the northern boundary to 107.5 m MSL in southwestern edge, with a gently sloping landscape with 0.5-1.5% surface gradient in the western and north-west direction. See **Annex 3** for topography map.

Climate

The Mahlindawewa tank is located in dry zone where the environment of the area consists with dry and hot climatic conditions throughout the year. The climate of the Mahalindawewa is typical to that of Anuradhapura district. It is situated in the monsoonal belt and is governed by its tropical location as well by the monsoonal regime, thus rainfall exhibits a strong seasonal variation. It has two rainfall peaks, Maha and Yala seasons, and long dry periods in between. The area falls under the dry zone and receives a long-term mean precipitation of which 75% expectancy value of annual precipitation is > 900 mm. More than 50% of the total rainfall is received during the Second Inter Monsoon and North-Eastern Monsoon (October to December)

Figure 4: Monthly Average Rainfall in Nochchiyagama Area during 2010-2014



Source: Department of Meteorology

Soil Type and Quality

According to the geomorphological map of Sri Lanka, the area is located between the boundary of hornblende gneiss and low plantation surfaces with thin soils (dry zone). The soil types that are dominant in the area are dominantly reddish-brown earth, low humic gley soils, non-calcic brown soils and regosols as well as alluvial soils in some places in the subsurface layers. Predominant rocks are Precambrian, essentially gneissic and crystalline rocks. Main rocks are Vijayan and Wannu series rocks of the Precambrian and the Palaeozoic eras. See **Annex 4** for Distribution of Soil Groups in the area.

Surface Water

Mahalindawewa Tank is the main water sources in the area, It is located at the midstream part close to the southern boundary of the main catchment Modaragam Aru and Uppu Aru Basins (Figure 3 & Figure 4). The main basin consists of a catchment of 378 km² and is characterized by a large number of dry zone irrigation tanks in a cascade pattern along main channels and their tributaries. The Modaragam Aru and Uppu Aru feeding the Mahalindawewa sub-catchment and the stream network contributing to the flows are located within the Agro-ecological Region DL1b,

Apart from irrigation, agriculture water is used by 100 families residing in Mahalindawewa, Ilandagaswewa, Ranorawe and Mahamankadawela area for bathing and washing activities. About 20-25 families in Mahalindawewa, Ilandagaswewa, Ranorawa are involved in inland fishing.



Figure 3 : Main Mahalindawewa



Figure 4 : Location of the Mahalindawewa basin in relation to Modaragam Aru and Uppu Aru Basins

Ground water

Ground water in the vicinity of the tank are heavily reliant on the tank water level. The monsoonal rain replenishes the depleted tanks and ground water reserves to a substantial level. Water level and quality analysis results of the drinking water wells selected within the proposed project area is not available.

Flooding

The sub-catchment area is presumably not subjected to any flooding under regular seasonal monsoonal storm event, except for extreme events where backwater flows from downstream accumulation due to flow constrictions may cause localized temporary inundation in some areas. For example, past flooding records indicate that the project area was flooded particularly in the recent past to a height of 3 feet. However, water level recedes soon after the rainfall ceases as the direct catchment seems to be small compares to those of adjacent ones. However, during flooding, people in the area find difficult to travel.

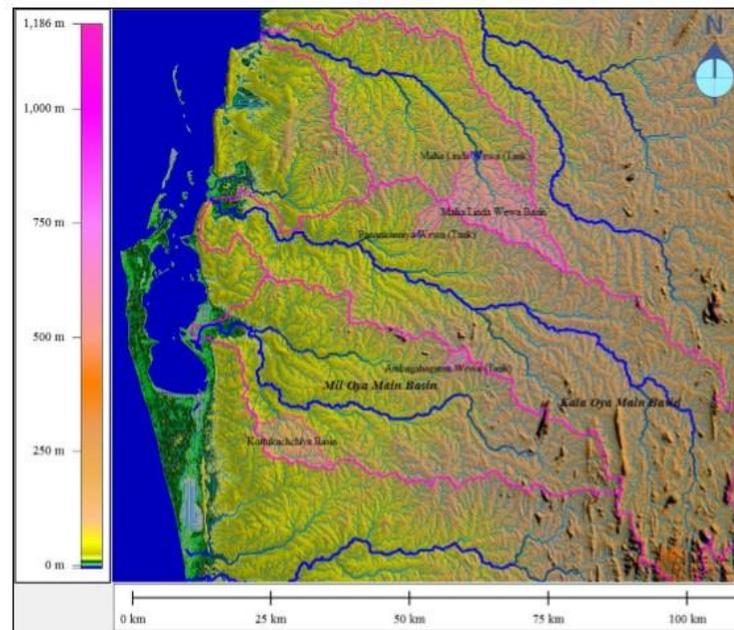


Figure 5 : Drainage patterns of the main basins

Air quality

Wind blows are a common feature in the bund area. Such wind blowing brings airborne suspended particles, however, it is not scenario to be even reckoned as an issue. Occasional vehicular movements were recorded along the bund sometimes causes the airborne particles to be locally present. However, the canopy trees that have rooted down in the vicinity of the bund sheltering the area help trap the airborne particles hence, no air quality issues have been recorded for the area.

In terms of air quality data, none is available for the project area. Since the project is located in a rural area, air quality is deemed to be within the limits of National Ambient Air Quality Standards. Similarly, noise levels commensurate with rural activity in the area.

b. Ecological Features

Vegetation

Biological environment around the Mahalindawewa tank includes both aquatic and terrestrial habitats. Conserved or nationally protected habitats or highly environmentally sensitive areas are not found around Mahalindawewa tank. The main aquatic ecosystem of the area seems to be the Mahalindawewa tank which provides breeding, feeding, nesting and roosting sites for different species of aquatic birds. A large number of aquatic birds belonging to different species inhabit in the tank and on the surrounding trees. Home gardens, cultivated land, including paddy

fields and Chena cultivations are located in the surrounding area of the tank which also provide various habitats for species.

Vernonia zeylanica (Pupula) is the endemic plant species observed within the tank bund vegetation. Nationally vulnerable (VU) aquatic plant species, *Aponogeton natans* (Kekatiya) was also observed in the tank water near the tank bund. Some of the more common tree species observed are Kumbuk (*Terminalia Arjuna*), Thal (*Borassus Flabellifera*), Kohomba (*Azadirachta Indica*) and Siyambala (*Tamarindus Indica*).

Paddy fields are located in the downstream area of the tank where about 6 houses are located close to left and right corners of the tank. Some coconut plots, vegetable and banana cultivations are located close to the tank bund. Amba (*Mangifera indica*), Kessel (*Musa*) Pera (*Psidium guajava*), Pol (*Cocos nucifera*), Kohomba (*Azadirachta indica*), Kos (*Artocarpus heterophyllus*), Del (*Artocarpus incises*), Siyambala (*Tamarindus indica*), Puwak (*Areca catechu*), Caju (*Anacardium occidentale*), Beli (*Aegle marmelos*), Tekka (*Tectona grandis*) are the commonly observed species in home gardens in the downstream area of the tank.

A total of 71 trees, belonging to different species are located in the proposed construction area of upstream/downstream of the dam and spill area of the tank. From the total of 71 trees, 53 (BDH - 0.6 to 6.0 m) located in the upstream area of the tank and 14 (BDH - 0.4 to 6.0 m) are located in the downstream slope may require to be removed in the rehabilitation work of spills rip rap, toe filter of Mahalindawewa bund. These species include naturally grown species belonging to different user categories such as timber, fruits and other economically and commercially important species. These include *Azadirachta indica* (Kohomba), *Tamarindus indica* (Siyambala), *Terminalia arjuna* (Kumbuk) among others. Images below show Kumbuk located close to the Spill of the Tank.



Weedy shrubs, herbs and thorny bushes distributed in the tank bund, road reservations, reservation area of the tank, home gardens, paddy fields and beside the water ways include Rata tana (*Panicum maximum*), Nidi Kumba (*Mimosa pudica*), Gandapana (*Lantana camara*), Katu Pila (*Flueggea leucopyrus*), Bevila (*Urena lobata*), Pani thora (*Cenchrus echinatus*), Maduru thala (*Ocimum tenuiflorum*), Wara (*Calotropis gigantea*), Kala Wel (*Derris parviflora*), Heen eraminiya

(*Ziziphus oenoplia*), Bowitiya (*Osbeckia aspera*), Kappetiya (*Croton laccifer*), Karamba (*Carissa spinarum*), Ranawara (*Cassia auriculata*), Bo Kala Wel (*Derris scandens*), Andara (*Dichrostachys cinerea*), Demata (*Gmelina asiatica*) etc. Downstream tank bund is completely covered by Rata tana (*Panicum maximum*).

Japan Jabara (*Eichhornia crassipes*) is the most common and highly spreading aquatic species observed in the tank. Additionally, *Salvinia* (*Salvinia molesta*), Kankun (*Ipomoea aquatic*), Hambu pan (*Typha angustifolia*) and Olu (*Nymphaea pubescens*) are other aquatic species inhabited in the tank.



See **Annex 5** for the list of tree species that are close to the spill (3), upstream slope of the tank (53), downstream slope of the tank (14).

Proposed Gravel Exploitation Site

Gravel for Mahalindawewa rehabilitation work to be obtained from existing gravel borrowing sites is located about 15 km away from the tank. Secondary vegetations and teak plantations are the major existing vegetations/ habitats observed in and around the proposed gravel exploitation site. No endemic and nationally threatened plant species observed within the site. Image below shows the vegetation at the gravel extraction site.



Proposed Earth Exploitation Site

The proposed earth exploitation site for Mahalindawewa rehabilitation work is located in the periphery of the tank beyond the water level. Secondary scrub vegetation dominated by plant species such as *Dichrostachys cinerea* (Andara), *Lantana camara* (Gandapana), *Chromolaena odorata* (Podisinnamaran), *Limonia acidissima* (Divul), *Ipomoea marginata* etc. See image below. Some of these species such as *Gadapana* and *Podisinnamaran* are invasive species.



No endemic and nationally threatened plant species have been observed in this area. Plant species, *Lantana camara* (Gandapana), *Chromolaena odorata* (Podisinnamaran), *Panicum maximum* (Rata Tana) that were observed during the study within the proposed earth exploitation area are considered as alien invasive plant species.

Refer **Annex 6** for the location of earth and gravel extraction sites

Presence of wetlands

Mahalindawewa tank, tank associated seasonally flooded areas and the paddy fields found in the project area are the main wetlands present, which have been covered above.

Fish and wildlife habitats

Two species of exotic fish, *Tillapia* (*Oreochromis mossambicus* and *Oreochromis niloticus*) have been introduced to the tank for commercial fishing. Other species of fish in the tank include indigenous species such as *Weligouva* (*Glossogobius giuris*), *Mada kanaya* (*Channa punctata*), *Hirikanaya* (*Labio dussumieri*), *Anda* (*Anguilla bicolor bicolor*), *Ankutta* (*Mystus vittatus*), *Lula* (*Channa striata*), *Climbing perch* (*Anabas festudineus*) etc.

Black palm civet cat (*Paradoxurus hemaphroditusi*), *Indian wild pig* (*Sus scrofa cristatus*), *Kangaroo Rat* (*Tatera india*), *Black napped hare* (*Lepus nigricollis*), *Palm squirrel* (*Funambulus palmarum*), *Giant squirrel* (*Ratufa macroura*) and *Toque monkey* (*Macaca Sinica*) are the

mammals observed in the area. Out of these species Toque monkey (*Macaca sinica*) is an endemic mammal. No rare, threatened or endemic flora species were recorded during the study.

Wildlife and forest reserves are not present in the immediate vicinity of the project-affected area. Wilpattuwa National Park is located 15-20 km, away from the project site. There are no elephant corridors, elephant crossings or migration paths of other animals recorded within or surrounding area of the project location. During the dry season (August, September, October) wild elephants rarely move from Wilpattuwa area to project affected area.

As per the assessment above, the species assemblage observed in the project impacted area comprise of mostly common species with few endemic species. None of the species observed are listed as nationally or globally threatened. Therefore, the project affected area does not contain any critical species or habitats.

Birds

The avifaunal diversity of the tank and the surrounding area is very high. This includes a many species of common aquatic birds that show a wide distribution in Sri Lanka and, based on the IUCN red list (2012), 2 species of endemic birds {Sri Lanka gray hornbill (*Tockus gingalensis*) and Sri Lanka jungle fowl (*Gallus lafayettii*)}, a rare, threatened bird (Great comorant- *Phalacrocorax carbo*) and a threatened aquatic bird Spot billed pelican (*Pelecanus philippensis*).

The project-affected area does not contain any critical habitats for migratory birds. The migratory birds present in the project affected area are migratory species that inhabit human modified landscapes such as home gardens and croplands.



Figure 2: Feeding of water bird around spill of the tank

Presence of special habitat areas

There are no special habitats within the proposed project area that are either designated as protected areas or identified as critical habitats.

c. Socio-Economic Factors

The Mahlindawewa tank serves 6 villages with approximately 700 families, out of which 506 are farmer families. These families are mostly (95%) Sinhalese Buddhists. In addition, there are few families from other villages in the Nochchiyagama DS division who engage in cultivation in the command area, but they do not reside in the tank related villages. The details of the people in both categories are given in Table 5 below.

Village	Land owing families		Landless Families	
	No.	Population	No.	Population
Mahalindawewa	80	285	0	0
Ilandagahawewa	13	45	28	110
Ranorawe	90	279	40	155
Mahamankadawela	70	270	85	310
Elayapattuwe	15	15	160	600
Thibbatuwewa	20	80	80	255
Other villages	37	135	-	-
Total	325	1109	393	1430

Note: Six families (6) have encroached land in the downstream area of tank bund, however, none of these families reside in the land they encroached.

Table 5: Population and Household Description

According to the representatives of the farmer organizations interviewed, nearly 55% of the families in the project in the 6 villages are farmers. These farmers are engaged in paddy cultivation and rarely engaged in cultivating other field crops. The distribution of income generation activities among families in the project related 6 villages is given in Table 4.

Economic Activity	Percentage of Families
Farming	55
Government employment	15
Private sector employment	20
Others (fishery, small business & foreign employment)	10

Table 6: Distribution of income Generation Activities among Families in Project Related Villages

Use of water and source of drinking water:

There are about 100 families residing in Mahalindawewa, Ilandagaswewa, Ranorawe and Mahamankadawela area who use water from Mahalindawewa for bathing and washing purposes. The source of drinking water is dug wells and community based water supply schemes connected to dug wells. While the Mahalindawewa tank water is not directly used for drinking water schemes, about 40 shallow wells in Mahalindawewa and Ranorawa villages are used as drinking water sources by villagers which depend on the tank for maintaining its water level. Therefore, the water levels in these wells will go down with the fluctuation of water levels in Mahalindawewa reservoir. However, if the above listed rehabilitations are performed, it would be possible to retain the water level in the tank throughout the year.

Landownership Patterns

The legal ownership of the Mahalindawewa Tank and the canal buffer zones lie with the irrigation department. The catchment area of this tank has not been encroached, and all the households are either titleholders or tenants. The land belt extent of 1.5 acres located just below the tank bund, defined as the tank bund reservation has been encroached by 6 farmers. The details of these 6 farmers are shown in **Annex 7**. These farmers however legally own irrigable lands in other locations of the tank command area.

Residential/Sensitive Areas

This is a rural setting, and sensitive/residential areas like hospitals, school etc. are not situated within the projects immediate area of influence. However, material haulage routes may have some residential and commercial areas which could be slightly affected. Social infrastructure in the vicinity includes:

- Schools: Ranorawa Primary School, Mahamankadawela high school;
- Hospital: Alayapaththu vilage hospital, Ranorawa Vilage hospital ;
- Temple : Sribodhi Rukkaramaya , Mahamankadawala Purana Rajamahaviharaya ;
- Roads: Nochchyagama road, Alayapaththu-Ulukkulama road

Besides these, there are no other ongoing development projects in the area that involves civil works.

Traditional economic and cultural activities

Besides the household's economic activities, there are few rice-based cottage industries located in the project area of influence. These include 2 rice mills, in Mahalindawewa and Mahamankadawela. There are about 100 families residing in Mahalindawewa, Ilandagaswewa, Ranorawe and Mahamankadawela area. These people use Mahalindawewa for bathing and washing activities.

Archeological resources

There are no archeological resources recorded in the project's area of influence.

4. Environmental and Social Impacts

The social and environmental screening for the Mahalindawewa Dam sub-project based on the administering of the Environmental and Social Screening Report and consultations with local communities and other relevant stakeholders indicate that all the potentially adverse effects associated with the project can be classified as general construction related impacts and are mitigatable with known technology. Public concern does not warrant further assessment. Therefore, as per the ESMF prepared for the IWWRMP, a stand-alone Environmental and Social Assessment is not required, an Environmental and Social Management Plan would suffice. Below is a summary of the key social and environmental impacts associated with the subproject with the results of the social and environment screening checklist provided in Table 7.

- Loss of crops
- Impacts on livelihoods
- Removal of trees

70 trees have been identified including endemic species within the project area with potential need to be removed. Tree felling in the bund area will be carried out only in the required areas, although the entire possible areas are surveyed. Prior approval on this activity will be obtained, particularly from the Divisional Secretariat and Grama Niladhari. Some trees if removed will take a long time to reestablish and these may have impacts especially on avifauna of the area.

With regards to loss of crops and the livelihood disruption on the fishing communities, once the impacts on cultivation are known (dependent on cultivation season and the demarcation of reservoir tank bund and tank bed), the project will prepare an inventory of losses for the affected households (if any) and pay compensation following the project's RPF and ESMF. In addition, based on the extent of loss and impacts, the livelihood restoration plan will be prepared and implemented following the steps and procedures as mentioned in ESMF.

A baseline survey will be conducted once the project boundaries have been established , designs finalized and marked on the ground which shall ensure the accuracy of the survey. The baseline survey will cover all affected persons for potential livelihood support assistance (LSA) programmes and provide inputs for the cost estimate for each LSA programme, in accordance with the RPF. This baseline survey will be carried out by the PMU with assistance from the consultants and MASL, ID and NPC, covering all affected persons for LSA programmes.

The livelihood support assistance programme will include specific measures or components for the most vulnerable households, such as female-headed households, families that include members with chronic illness or disability, and households living below the poverty line (beneficiaries of Samurdhi and similar programs).

- Burrowing for material

All the borrow sites need sound managements to avoid or minimize pollution potential and best practices for managing sites will be adopted. All the other borrow areas will be accepted for material exploitation only if proper approvals from the relevant authorities are obtained. Borrow site in the tank bed must be utilized with a proper rehabilitation and safety plan for the protection of fauna inhabiting the area.

- Managing Soil Erosion

Soil erosion during the rehabilitation activity is expected with burrowing in the tank reservation, removal of trees, stripping of topsoil, etc. This is likely to increase the turbidity of water and may impact downstream users.

- Temporary loss of access

Work on the tank bund and rip-rap activity will cause temporary disruptions to the communities' travel routes though the risks are low. Alternative route must be identified for the commuters on the bund when the bund construction is in the progress.

- Risks and vulnerabilities to public safety

The risks and vulnerabilities to public due to construction activities can be expected at points of civil works undertaken. However, such risks are considered to be low since the construction activities only involve rehabilitation-related works.

- Impact at operational stage

Upon completion of the rehabilitation interventions, the outcomes are expected to be positive with increased water productivity which will benefit all the users and reduce soil erosion. The proper demarcation of boundaries and buffers will help enhance the ecology in the area.

Table 7: Environmental and Social Screening Checklist

	Screening question	Yes	No	Significance of the effect	Remarks
Project Design					
a. General					
1	Will the sub project include any physical construction work?	√		Moderate	Mostly rehabilitation work including, improvements tank bund, providing rip-rap, spill improvements to Spill approach, construction of curtain wall for spill wing wall, graveling of tank bund road, construction of clay cutoff wall, improvements to sluice, construction of bathing steps, and desilting of tank bed.
2	Does the project include upgrading or rehabilitation of existing physical facilities?	√		Moderate	-DO-
b. Rehabilitation of dam head works and rip rap associated irrigation infrastructure					
3	Will improvements to tank bund including the headworks and rip rap structures require the water level in the reservoir to be artificially drawn down?		√		This impact could be very significant if the water levels are lowered suddenly. However, the construction is planned to be done particularly during Yala season where water level is low. Lowering of water level is not thus necessary for the proposed interventions, hence no impact.
4(i)	If yes, can this lead to any alteration of water flows in surface as well as groundwater sources, especially in the dry season?		N/A		The water tables are always low during the proposed construction periods of the dry Yala months. There are no alterations in water flows caused by this activity.
4(ii)	Will the water draw down affect the ecology of the tank and other important wetlands that depend on the main lake and canal system to maintain water level?		N/A		Since water draw down is not anticipated, there will be no ecological impacts caused by water scarcity due to project activities.
5	Will repairs to irrigation canals require temporary suspension of water issuance in order to facilitate civil works?		√		The identified sluice repair works can be performed in parallel to bund rehabilitation work during dry season. Therefore, there is no need for temporary suspension of irrigation water.

	Screening question	Yes	No	Significance of the effect	Remarks
	Can this lead to diminishing of other downstream water uses that can result in social issues such as community bathing, drinking water supplies, irrigation of home gardens etc.				
6	Will civil works lead to diminishing of other downstream water uses as a result of water quality impairment?	√		Low	No canal rehabilitation works are envisaged, hence this impact will not be significant. Civil works on the tank headworks can impact on the water quality during rehabilitation work with sediment runoff increasing. This may affect those using water downstream for bathing other water uses, hence sediment runoff must be controlled.
7	Will there be changes to original design levels of the head works that will result in inundation of new land in the catchment		√		There will be no changes to design levels of the dam crest, spill crest or any other structure. Hence there will be no inundation of additional areas.
8	Will the rehabilitated scheme serve new areas of paddy under its command?		√		No, the extent of paddy cultivation in the command area will remain the same.
c. Additional supplementary facilities					
9	Will there be construction of new irrigation or drainage canals or widening of existing canals?		√		However, construction of bridge over spill tail canal to the LB sluice is anticipated. The path is not yet defined, however, the area through which the bridge is to span does not have any ecological resources of significance.
9(i)	If yes, will new/modified canal trace/alignments interfere with existing land uses (habitats, home gardens) in a negative way?		N/A		No
9(ii)	If yes, will the trace interfere with other sensitive infrastructure such as roads, pedestrian paths, schools and temples?		√		No
Project Construction					
10	Will construction and operation of the Project involve actions which will cause physical	√		Low	The existing structures will be rehabilitated, and few new structures will be constructed. This rehabilitation including the installation of a sediment

	Screening question	Yes	No	Significance of the effect	Remarks
	changes in the locality (topography, land use, changes in waterbodies, etc)				trap will have a significant beneficial impact on the irrigation system and improve the overall efficiency.
11	Will construction of the project cause soil erosion within the site due to steep grade or soil content?	√		Moderate	<p>Exposed areas of the bund and slopes are susceptible to erosion during construction. Stripping top soil up to 50 mm thickness on bund slope will increase the chances of soil erosion due to wind and rain. However, the general terrain is flat and since the construction work is under taken during the dry season soil erosion is expected to be controlled.</p> <p>Operation of borrow pits in hillock would increase the chances of erosion of sides in borrow areas. Borrow pits need to be properly sloped and once over properly closed to avoid loss of topsoil, vegetation and habitat. Borrow material once brought to the site has to be unloaded and stockpiled. This might contribute to erosion onsite and block existing run – on and off paths which may create erosion problems elsewhere.</p> <p>Work on the breaching section in the slope and correcting the breaching section with borrow materials will induce soil erosion.</p> <p>Removal of trees within the areas to be rehabilitated will also lead to soil erosion. However, these impacts are expected to be temporary and mitigatable with proper construction planning and management.</p>
12	Will the Project involve dredging and disposal of dredge material as well as other solid wastes during construction?	√		Moderate	Desilting of the tank bed will be carried out especially in the water stagnant D/S area and unclear path of spill tail canal.
13	Will the Project release pollutants or any hazardous, toxic or noxious substances to air?		√		There will be no hazardous, toxic or noxious substances released into the air, other than fumes emanated by a few construction vehicles. Further, construction activities that would produce airborne dust are temporary and limited to short durations and will be restricted to a small area.

	Screening question	Yes	No	Significance of the effect	Remarks
14	Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?	√		Low	Noise and vibration is expected to be very low due to the small-scale nature of construction activities and the largely rural setting. There can be insignificant levels of noise produced during material transportation and construction work, but due to heavy machinery there may be temporary disturbances to the animals (especially birds) inhabiting the tank area.
15	Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater?	√		Low	Other than pollutants such as petroleum, oil and grease that can be released from construction vehicles and machinery, no other sources of pollution with the potential to cause land and water pollution are envisaged.
16	Will the project cause localized flooding and poor drainage during construction? Is the project area located in a flooding location?		√		The project is not in a known flooding area. During construction obstruction of natural drainage path may lead to temporary flooding unless managed but this is highly unlikely to be an issue.
17	Are there any areas or features of high landscape or scenic value on or around the location which could be affected by construction activity?		√		No such location has been identified in the project area.
18	Are there any other areas on or around the location which are important or sensitive for reasons of their ecology e.g. wetlands, watercourses or other waterbodies, the coastal zone, mountains, forests which could be affected by the project?		√		No such location has been identified in the project area.
19	Are there any areas on or around the location which are used by protected, important or sensitive species of fauna or flora e.g. for		√		No. The trees existing along the bund inhabits are likely to be roosting sites for many of the avifauna in the area. However, no sensitive species

	Screening question	Yes	No	Significance of the effect	Remarks
	breeding, nesting, foraging, resting, migration, which could be affected by the project?				have been recorded and the other trees in the area will compensate for the loss of possible roosting, nesting grounds.
20	Will any part of the project's construction activities be located in a previously undeveloped area where there will be loss of greenfield land?		√		No. This is a rehabilitation project, hence no new areas will be opened up.
d. Land related impacts					
21	Will the sub-project require acquisition of land and or other assets?			√	Legal ownership of the Mahalindawewa Tank and the canal buffer zones lie with the irrigation department. Rehabilitation work for the project does not require acquisition of additional land.
22	Is land for material mobilization or transport for the civil work available within the identified work site / Right of way?	√		Low	0.5 acre mobilization site available next to the Mahalindawewa that belongs to the Irrigation Department. Materials required for civil works will be transported along the Pradeshiya Sabha and ID road, and permission will be obtained accordingly.
23	Is the site chosen for this work free from any encumbrances (e.g. squatters, encroachers)?	√		Moderate	The land belt extent of 1.5 acres located just below the tank bund, defined as the tank bund reservation has been encroached by 6 farmers. They do not have any structures but crops and trees for which compensation would have to paid or prior notice given for harvest as mentioned in the ESMF and the RPF.
24(i)	If the land parcel is to be acquired, is the actual plot size and ownership status known? If so, how much?	√			Legal ownership of the Mahalindawewa Tank and the canal buffer zones lie with the irrigation department.
24(ii)	Will the affected land/structure owners likely to lose less than 10% of their land/structures area?		N/A		
24(iii)	If any land required for the work is privately owned, will this be purchased or obtained through voluntary donation?		N/A		
24(iv)	Are the land/structure owners willing to voluntarily donate the required land for this sub- project?		N/A		Community members are willing to donate land, if necessary. So far, there is no such requirement for this project

	Screening question	Yes	No	Significance of the effect	Remarks
25	Is the project likely to cause partially or fully damage to, or loss of housing, shops, or other resource use?		√		The project does not require any land acquisition that would lead to damages or loss of houses, shops, etc. The catchment area of this tank has not been encroached, and all the households are either titleholders or tenants.
26	Are there any routes or facilities on or around the location which are used by the public for access to recreation or other facilities, which could be affected by the project?		√		There are no such sites, facilities or routes with main access through the tanks and its village.
e. Livelihoods Related Impacts					
27	Are there any non-titled people (squatters) who are living/ or doing business who may be partially or fully affected because of the civil works?		√		The land belt extent of 1.5 acres located just below the tank bund, defined as the tank bund reservation has been encroached by 6 farmers. They do not have any structures but crops and trees for which compensation would have to paid or prior notice given for harvest as mentioned in the ESMF and the RPF
28	Will there be damage to agricultural lands, standing crops, trees, etc.?	√		Moderate	A total of 70 trees, belonging to different species are located in the proposed construction area (see below); and the paddy cultivation carried out by 6 farmers in the encroached land of the tank bund reservation will also be affected
29	Will there be any permanent or temporary loss of income and livelihoods as a result of the civil works? If so, for what period?	√		Moderate	There is a fishing community (less than 10% of the total population) associated with Mahalindawewa tank.. Once the construction design is finalized, if any impact on the fishing communities are identified, income generation activities will be offered and facilitated that would include compensation for lost income following the ESMF and RPF.
29(i)	Have these people/ businesses who may suffer temporary loss of incomes or livelihoods been surveyed and identified for payment of any financial assistance?		√		A baseline survey will be conducted only after a clear understanding of the interventions has been agreed. The survey will be conducted once the project boundaries have been established, designs finalized and marked on the ground which shall ensure the accuracy of the survey. The baseline

	Screening question	Yes	No	Significance of the effect	Remarks
					survey will cover all affected persons for LSA programmes and provide inputs for the cost estimate for each LSA programme as per the RPF.
29(ii)	Are there any vulnerable households affected?		√		If during the baseline survey, vulnerable groups are identified, the livelihood support assistance programme will include specific measures or components for the most vulnerable households, such as female-headed households, families that include members with chronic illness or disability, and households living below the poverty line (beneficiaries of Samurdhi and similar programs).
29(iii)	Will people permanently or temporarily lose access to facilities, services, or natural resources?		√		Constructions are mainly performed during dry season. During dry season the tank completely dry off. The water supply for the people are provided by drinking water wells located around the tank. Since water is not available during this season there is no aggravated water shortage caused by construction activities
f. Impacts on community resources, public services, cultural/historical sites, etc					
30	Are there any areas on or around the location which are densely populated or built-up, which could be affected by the project?		√		The project site is in a rural setting with sparse populations and spaced out dwellings with generally large homesteads.
31	Are there any areas or features of historic or cultural importance on or around the location which could be affected by the project?		√		No such places are found within the project area.
32	Are there any areas on or around the location which are occupied by sensitive land uses e.g. hospitals, schools, places of worship, community facilities, which could be affected by the project		√		No such sensitive receptors in the zone of influence.
33	Are there any areas on or around the location which are already subject to pollution or		√		Not as per the information available and site observations.

	Screening question	Yes	No	Significance of the effect	Remarks
	environmental damage e.g. where existing legal environmental standards are exceeded, which could be affected by the project?				
34	Will the project cause the removal of trees in the locality?	√		Moderate	A total of 70 trees, belonging to different species are located in the proposed construction area. From the total of 70 trees, 53 (BDH - 0.6 to 6.0 m) are located in the upstream face of the tank and 14 (BDH - 0.4 to 6.0 m) are located downstream face which may require to be removed in the rehabilitation work of spills, rip rap, toe filter of Mahalindawewa bund.
35	Are there existing land uses or socio-economic activities on or around the location which could be affected by the project?		√		Since water level drop down is not anticipated, the normal patterns in livelihood is expected to continue.
35(i)	Are there bathing spots that will be unusable during the construction period?	√		Moderate	The tank and its associated system are used by about 100 people for bathing. Bathing steps will be rehabilitated under this project along with other. Hence, some impact, in terms of access restriction, is expected.
35(ii)	Is there subsistence fishing taking that will get disturbed due to canal rehabilitation	√		Moderate	Subsistence fishing is going on and they will be affected during the bund and rip-rap work as there will be no access to the tank. There are 25 fishing families that will be potentially affected. This will mainly be during headworks.
35(iii)	Are there any home gardening and other industrial, agricultural activities that will get disturbed due to construction activity	√		Low	Agricultural activities will not be affected due to lowering of water levels is not required. However, paddy cultivation in the encroached land will affected 6 farmers.
35(iv)	Are there drinking water supply sources located in the project area that may be rendered unusable during construction period?		√		There are no intakes in the tank for drinking water schemes. People use wells as their source of drinking water.
35(v)	Are there tourism activities taking place in the project area that will get disturbed by construction activity?		√		
g. Construction related impacts (labor influx, community health and safety, etc)					

	Screening question	Yes	No	Significance of the effect	Remarks
36	Will there be any risks and vulnerabilities to public safety due to physical hazards during construction of the Project?	√		Low	There will be to some extent with operation of heavy machinery in the project area and with material haulage along transport routes. However, this is not a major issue and can be avoided by adopting safety regulations at construction sites.
37	Are there local village roads that will become unsafe due to contractor's usage	√		Low	Transportation routes of the borrow material are via Anuradhapura-Rambewa road (A20) via Puttlam road and Oyamaduwa road to reach the LB side of the tank bund. This will cause elevated traffic issues and airborne dust and noise will disturb the existing community around the tank area and along the road. There are no settlements within the 100 m distance from the identified borrow sites and hence, no impact due to burrowing activities. In addition, the bund road will be either fully or partially closed during rehabilitation work and that is likely to affect local people.
38	Are there any transport routes on or around the location which are susceptible to congestion or which cause social and environmental problems, which could be affected due to construction work?	√		Low	Material transport, stockpiling especially for graveling the bund road, rip rap construction, correcting the slopes of the bund etc will impact the neighboring communities and accesses temporarily. Constructing the rip rap, providing clay cutoff wall, etc. will obstruct the movements along the bund for the community.
39	Will the project require significant number of workers (skilled and unskilled)	√		Low	Skill -87 labour days Unskilled- 1337 labour days Period – 2 years
39(i)	Will the project attract significant number of migrant workers to the area?		√		Going by previous Dam Safety project, large influx of labour are not expected to be fielded for rehabilitation work at a given time. Also, the general practice is for most of the unskilled labour to be sourced from the local area.
40	Will construction activity lead to burrowing of earth, gravel and sand? And/or quarrying for rock?	√		Moderate	Burrow sites are identified. The contractors need to make sure that these sites are operated with all due permission and that proper management is implemented as per the EMP.
41	Will the project increase the risk of introduction of alien invasive species to the locality	√		Low	The earth, burrowing site for slope corrections is located on the right bank side (eastern part of the tank) of Mahalindawewa tank. These slopes

	Screening question	Yes	No	Significance of the effect	Remarks
					<p>are submerged during the wet season. Thus, spreading of invasive species due to extraction of earth from the tank bed is unlikely.</p> <p>Gravel will be brought from the Mankadawala tank reservation in Mankadawala GND which is about 12 km away from the tank and there could be a possibility of introducing invasive species together with the material brought into the site and this needs to be confirmed. The dam site, as highlighted earlier, is already invaded by several common terrestrial and aquatic invasive species.</p>
Operational Impacts					
42	Will the project lead to stagnant water and drainage problems causing increased mosquito breeding	√		Moderate	Unless burrow pits on quarry, earth, gravel borrowing on the right bank side (eastern part of the tank) of Mahalindawewa tank and Mankadawala tank reservation are closed conforming to stipulated conditions, they can become sources for mosquito breeding.
43	Will the project involve removal and disposal of aquatic invasive species?		√		This will be minimal if at all.
44	Will the project involve regular maintenance dredging of the canal network		√		
45	Will the scheme after rehabilitation serve a larger command area?		√		Command area will remain same as there is no capacity enhancement of the tank planned.

Significance of impact = Low, Moderate, High

5. Public Consultation and Disclosure

Since this the Mahalidawewa Dam rehabilitation project was initially considered under the Dam Safety and Water Resources Planning Project, consultations were carried out during the ESIA process starting in May 2015 (See, DWSRP Final Report Environmental Assessment for Rehabilitation of Mahalindawewa Tank). Since then a number of additional consultations have been carried out as shown in Table 8. The issues raised and the feedback provided have been incorporated while preparing this ESMP.

Table 2: Summary of public consultations and key issues raised

Public consulted/ Location	Consultation method	Date	Details/Issues raised
Focus Group (Mixed – including women) List of Farmers given in Annex 7.	The stakeholders such as Irrigation Department, farmer organizations, fishing-community, Grama Niladhari, affected people, beneficiaries and other direct and indirect users of water including women in the reservoir were consulted to obtain data and their concerns related to the proposed project. The farmers were met in groups and as individuals.	May 2015	<ul style="list-style-type: none"> • Not satisfied with water quality of existing water sources • Inadequate water quantity during dry weather period • Frequently faced with agriculture water scarcity issues
Focus Group	Farmers and local Irrigation Engineers (IEs)	20 January 2019	<ul style="list-style-type: none"> • Since the off-season is only 5 – 6 months, the IE suggested that rehabilitation work be extended over two dry seasons so that there would be no impact on the incomes of the farmer communities. This was shared with the farmer’s present and there was unanimous agreement among those present. • There was also a request to construct a promised road at the toe end of the bund, i.e. a toe road. Issues of travel for school children, especially during the rainy season and the fact that consent had been obtained for land donation were mentioned. • A compelling issue that was raised by the farmers was the need for the tank to be de-silted prior to any rehabilitation work. The issue was discussed in

Public consulted/ Location	Consultation method	Date	Details/Issues raised
			<p>length and this was agreed as an important issue. It was also agreed with the Irrigation Engineers present that this needed to be accompanied with a silt trap put in place for reducing further silting of the tank bed.</p> <ul style="list-style-type: none"> • It was claimed that the field canals here had not been repaired for a good number of years and even the bathing steps were in a state of disrepair as women find it difficult to get into the reservoir for bathing and washing purposes. • Drinking water was identified as a non-issue for this community as a rural water scheme had been established covering the area. • The farmers confirmed that there were no farmers engaged in fishing activities and that this was only being carried out by people coming in from outside. • As a coping mechanism during the Yala season, the farmers from the RB borrow land from the LB to continue their cultivation activities. • Agreement was reached with the IE that further consultations will be carried out during design of the proposed activities. • During the consultations with the 6 farmers who occupied encroached land expressed their wiliness to give over the occupied land to facilitate the tank rehabilitation work and further did not request for any compensation. Type of crops being cultivated already included in 'Annex 7 – Table 2'. These are 61 coconut trees and 15 areca nut trees in the encroached land of the 6 farmers.

Besides these consultations, additional consultations will be carried out during implementation. This will involve:

- Focus group discussion with the fishing community
- Discussions will be conducted with the residents who reside along the vicinity of the project site
 - Residents will be briefed about the project, purpose and design and outcomes via a documented community consultation session
 - The community consultation session will be organized immediately after the contractor is mobilized.

- The contractor will take note of all impacts, especially safety hazards that will be of concern to the residents and take necessary measures as stipulated in the ESMP to mitigate them.
- The contractor will maintain a log of any grievances/complaints and actions taken to resolve them.
- A copy of the ESMP will be available always at the project supervision office on site.

6. Environmental and Social Management Plan

Based on the potential social and environmental impacts identified, an Environmental and Social Management Plan (ESMP) (Table 8) has been prepared in accordance with the national regulations, World Bank's safeguards policies triggered for the Project, and the ESMF and the RPF prepared for the IWWRMP.

This ESMP and relevant guidelines will be included as a Special Condition in the Bid Document; and ESMP will be attached to contract to form part of the contract requirement. The ESMP will also be equally applicable to sub-contractors including nominated sub-contractors if any. The Contractor will be responsible for the compliance with the requirements of the ESMP. With the assistance of the "Engineer" on behalf of the Employer the Project Proponent (PP) will monitor the compliance of the ESMP by the Contractor.

The bidders will be advised to carefully consider the ESMP requirements during construction stage when preparing the bid and pricing the items of work. In particular, prior to bidding the associated costs is to be provided as a provisional sum and/or as part of the engineering cost. The prescriptions and clauses detailed in the ESMP are integral components of the specifications for relevant item of work unless separate items are included in the Bill of Quantities. Thus, separate payments will not be made in respect to compliance with the ESMP.

The Contractor through an appointed Environmental and Social Officer will assist the "Engineer" to conduct his/her duties as required in the ESMP implementation by:

- a) maintaining up to date records on actions taken by the Contractor with regard to the implementation of ESMP recommendations
- b) through timely submission of reports, information and data to the employer through the Engineer,
- c) via participating in the meetings conveyed by the Engineer or any relevant line agency and
- d) any other assistance requested by the "Engineer".

In case the Contractor or the sub-contractor/s fails to implement the actions specified in the ESMP, the Contractor will be informed in writing. If corrective actions are still not taken, the Engineer will take whatever actions it is deemed necessary to ensure that the ESMP is properly implemented.

Reporting on ESMP implementation

1. The contractor will submit a monthly progress report on EMP compliance to the PMU via the project engineer.

2. The PMU will submit a bi-annual monitoring report to the World Bank in which all projects in implementation will be summarily presented. Hence, Mahalindawewa EMP implementation will formally be reported to the World Bank twice a year,

Table 3: Environment and Social Management Plan (ESMP) for the Mahalindawewa Dam Project

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
Design Stage					
1	Incorporation of Environmental Design Recommendations	<ul style="list-style-type: none"> ■ The following will be maintained at minimum for flow structures: <ul style="list-style-type: none"> ○ For culverts designs will be considered to allow overland flow and sheet flow from paved areas, cross drainage without any blocking ○ For bridges designs will be considered to allow overland flow and cross waterways without any blockage ○ For leader ways, designs will be considered for smooth flow without any obstruction to the flow ○ For silt traps designs will be considered for trapping of silt in proper manner with facilities for easy removal of silt, if any. ○ For catch pits appropriate designs will be considered in order to drain out rain water without blocking / flooding ○ Designed drainage facilities will be made capable of disposing of the runoff generated in a given water catchment without inundating the surrounding land for a selected rainfall event. 	Design Cost	IA the Site in collaboration with the IA/PMU	IA/PMU
2	Design Considerations for conservation of habitats	<ul style="list-style-type: none"> ■ Design rehabilitation work to minimize the removal of large trees. As much as possible, large trees will be incorporated into the rehab design, ■ The final footprint will be discussed with the safeguards team of the PMU and be approved. 	Design Cost	IA the Site in collaboration with the IA/PMU	IA/PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
3	Incorporation of Green Design	<ul style="list-style-type: none"> ■ Green infrastructure guidelines will be followed in designing and construction whenever possible. ■ The use of natural material sourced from sustainable sources, such as natural rocks, choir, soil strengthening grasses etc. may be used for design of bank protection infrastructure and will be used where suitable. ■ No material will be sourced from within any protected area. ■ Structures built will incorporate earthy and natural colors that will mingle in with the natural scape and not hinder the aesthetic value of the area. ■ Where possible the use of alternate energy sources will be explored. 	Design Cost	IA the Site in collaboration with the IA/PMU	IA/PMU
4	Assistance for loss of paddy cultivation in encroached land	<ul style="list-style-type: none"> ■ Wage assistance under the LSA program, ■ Reasonable time shall be given to harvest the crops, ■ Assistance in diversifying the cropping and establishment of Fruit Orchards (fruits with export markets and super foods), ■ Assistance in animal husbandry and fodder and pasture development, ■ Assistance in vegetable cultivation on permanent terraces and floriculture, ■ Assistance to improve crop production and livelihoods through Bee keeping, ■ Assistance to adopt precision agriculture. 	Design Cost	IA the Site in collaboration with the IA/PMU	IA/PMU
Pre-Construction/Site preparation phase					
1	Site Access Closure	<ul style="list-style-type: none"> ■ All public access to the site will be prohibited or controlled via (especially the bund road) adequate fencing and signage in order to avoid risk to the public. ■ The site entrance will include adequate signage indicating the details of the proposed subproject, implementing agencies etc as well as safety signage to keep public away. 	Engineering Cost	IA the Site in collaboration with the IA/PMU	IA/PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		<ul style="list-style-type: none"> ■ A fence shall be erected to cover the working area, where possible, using cost effective fence materials consisting of chain link fence fabric, concrete post, etc. in order to ensure, animals and public are unable to freely access the site. <ul style="list-style-type: none"> ○ To avoid land disturbance and movement, the fence shall generally follow the contour of the ground. ○ Grading shall be performed where necessary to provide a neat appearance. 			
2	Material Sourcing	<ul style="list-style-type: none"> ■ The contractor is required to ensure that all construction materials, including gravel, and earth is sourced from the identified sites. Any change to these sites and the identification of new sites will require prior safeguards approval via the engineer. ■ Quarry material and sand shall be purchased from licensed operators, if the contractor will operate his own quarry site he will be required to obtain all licenses. ■ The contractor is required to maintain the necessary licenses and environmental clearances for all burrow and quarry material they are using –including soil, fine aggregate and coarse aggregate. ■ Sourcing of any material from protected areas and/or designated natural areas, including tank beds, are strictly prohibited. ■ If the contractor uses a non-commercial burrow/quarry sites, the sites will be developed and remediated per the guidance provided in this ESMP. ■ The contractor is required to submit in writing all the relevant copies, numbers and relevant details of all pre-requisite licenses etc. and report of their status to the engineer on a quarterly basis. 	Engineering Cost	Contractor	IA/PMU
3	Coffer Dams	<ul style="list-style-type: none"> ■ The contractor will prepare the method statement for coffer damming (for sluice gate repairs) where relevant and have it 			

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		approved by the engineer prior to commencement or work or use the method statement provided by the project proponent with designs.			
4	Work Site Management	<ul style="list-style-type: none"> ■ The contractor will identify an area onsite to store construction materials and equipment which will be approved by the engineer and demarcated for material storage as per the site plan. Minimum safeguards protection such as covering, fencing of material storage areas would be required. ■ 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 will provide instruction and advice will be given to drivers and operators (both company-owned and hired) to park vehicles and store equipment at this designated area. 	Engineering Cost	Contractor	IA/PMU
	Labor Camps	<ul style="list-style-type: none"> ■ The location, layout and basic facility provision of labor camps, site offices and resting facilities to be set up will be submitted to the Engineer prior to establishment. ■ The establishment of labor camps will commence only upon the written approval of the Engineer. ■ Resting and sanitary facilities will be provided separately for both men and women laborers. ■ The contractor will maintain necessary living accommodation and ancillary facilities in functional and hygienic manner and as approved by the Engineer. ■ All temporary accommodation will be established and maintained in such a fashion that uncontaminated water is available for drinking, cooking and washing. 	Engineering Cost	Contractor	IA/PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		<ul style="list-style-type: none"> ■ The sewage system for the camp, if not available, will be planned & implemented with concurrence from the Local Public Health Officer (PHI) 			
	Labor Training and Code of Conduct	<ul style="list-style-type: none"> ■ The contractor will be required to develop a labor code of conduct and translated it in to local languages upon clearance from the Engineer. The code of conduct must be made available to all staff and displayed in the work site in local languages. ■ Labor awareness programs to educate the laborers about the code of conduct, general conduct, the Environmental and Social Management Plan, Occupational Health and Safety etc. will be conducted throughout the contract period as agreed in the contracts Environmental and Social Management Plan. ■ No labor under the age of 18 will be hired for work under this contract. 	Engineering Cost	Contractor	IA/PMU
7	Tree Removal	<ul style="list-style-type: none"> ■ Only trees required to be removed along the dam where deemed necessary and justified via the technical design will be removed. ■ Contractor will adhere to the guidelines and recommendations made by the safeguards staff of the project and the CEA/Divisional Secretariat, if any, with regard to felling of trees and removal of vegetation. ■ The following will be conducted at minimum: <ul style="list-style-type: none"> ○ Contractor will make every effort to avoid removal and/or destruction of trees of religious, cultural and aesthetic significance. ○ If such action is unavoidable, the Engineer will be informed in advance and carry out public consultation and report on the same will be submitted to the Engineer. ○ Trees will be removed from the construction sites before commencement of construction with prior permission from Divisional Secretariat of Nuwaragampalatha Central / 	Engineering Cost	Contractor	IA/ Divisional Secretariat of Nuwaragampalatha Central / Nochchiyagama /PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		<p>Nochchiyagama followed by respective Grama Niladhari depending on the location.</p> <ul style="list-style-type: none"> ○ During removing, attention will be paid to maintaining minimum disturbances to soil cover and also care will be taken not to damage adjoining trees. ○ 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 ○ The following procedure will be followed: Remove the logs, branches of trees; Stack them properly until removal; Remove roots and rehabilitate the bund and toe areas where tree were uprooted. ○ The easily decomposable vegetation could either be utilized as a soil conditioner after drying or be composted in a proper manner. Large vegetation parts could be sold or else be used as firewood. ○ Removed trees of economic value will be handed over to the Timber Corporation. <p>■ Compensatory Planting</p> <ul style="list-style-type: none"> ○ Compensatory plantation by way of Re-plantation of at least twice the number of trees cut will be carried out in the project area. The location of replanting sites will be worked out in close collaboration with the safeguards team of the PMU. ○ All planted trees will be native species to match removed ones where possible. ○ 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. 			

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		<ul style="list-style-type: none"> ■ Additional Tree Removal <ul style="list-style-type: none"> ○ Additional trees and vegetation will 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 and the PMU safeguards team. ○ If any trimming/pruning of roots of existing trees anticipated during construction, it will be consulted with the Engineer and the safeguards team of the PMU, prior to undertaking the identified trimming of roots. ○ This will be to ensure that the health and stability of the tree will not be impacted from trimming. 			
8	Removal of Utilities	<ul style="list-style-type: none"> ■ The common utilities to be affected by project activities such as: telephone cables, electric cables, electric poles, water pipelines, public water taps, etc (if any). will be identified prior. ■ Affected utilities shall be relocated with prior approval of the concerned agencies before construction starts in collaboration with the agencies ■ All efforts will be made to ensure that there will be no/or minimal disruption to services during this process. ■ Ensure community consensus and minimum impact to common utilities like telephone cable, electric cables, electric poles, water taps and etc., ■ The contractor will take all measures to inform the effected public of the process prior to commencing work. ■ Proper clearance will have obtained from the concerned authorities and sent to the PMU before commencement of works. 	Engineering Cost	Contractor	IA/PMU/CEB/ Water Board/Sri Lanka Tele Com.

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
9	Information Disclosure among Stakeholders	<ul style="list-style-type: none"> ■ Discussions will be conducted with the residents who reside along the vicinity of the project site <ul style="list-style-type: none"> ○ Residents will be briefed of the project, purpose and design and outcomes via a documented community consultation session ○ This will be done immediately once the contractor is mobilized. ○ The contractor will take note of all impacts, especially safety hazards that will be of concern to the residents and take necessary measures as stipulated in the ESMP to mitigate them. ■ The contractor will maintain a log of any grievances/complains and actions taken to resolve them. ■ A copy of the ESMP will be available always at the project supervision office on site. 	Engineering Cost	Contractor/IA/IA/PMU	IA/PMU
Construction/Intervention Phase					
1.	Site Clearance and Land Development	<ul style="list-style-type: none"> ■ Prevention of removal of trees will be maintained as far as possible. ■ During removing, attention will be paid to maintaining minimum disturbances to soil cover and also care will be taken not to damage adjoining trees. ■ Trees removed will need to be compensated at the minimum of a 1:2 at basis. Planting locations could be either onsite or in the tank catchment, as practical and suitable. ■ Water spraying will be done at a regular interval to avoid dust generation due to site clearance 	Engineering Cost	Contractor	IA/PMU
2.	Disposal of Debris and Spoil	<ul style="list-style-type: none"> ■ All debris and residual spoil material including any left earth shall be disposed only at locations approved by the engineer for such purpose and subjected to the following clauses: 	Engineering Cost	Contractor	IA/PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		<ul style="list-style-type: none"> ■ The contractor shall obtain the approval from the relevant Local Authority for disposal of spoil at the specified location, as directed by the Engineer ■ Private land that will be selected for disposal will also require written consent from the land owner ■ The debris and spoil shall be disposed in such a manner that; <ul style="list-style-type: none"> ○ waterways and drainage paths are not blocked ○ the disposed material will not be washed away by runoff and ○ will not be a nuisance to the public ■ All material that is reusable or recyclable shall be used for such purposes either by the contractor or through dealers. ■ The debris and residual spoil material including any left earth shall be used, to refill the burrow areas as directed by the engineer, subjected to laying of topsoil as per recommendations for conservation and reuse of top soil provided below. ■ Excavated earth materials and all debris materials shall be disposed immediately without allowing to stockpile at identified locations for debris disposal, recommended by the engineer. During transportation, dispose materials will be covered with tarpaulin. ■ If approved by the engineer, contractor can dispose the debris and spoil as a filling material provided that the contractor can ensure that such material is used for legally acceptable purposes with disposed in an environmentally acceptable manner. 			
3	Conservation and Reuse of Topsoil	<ul style="list-style-type: none"> ■ Top soil of productive areas where it must be removed for the purpose of this project shall be stripped to a specified depth of 50mm and stored in stockpiles of height not exceeding 2m, if directed by the engineer. If the contractor is in any doubt on 	Engineering Cost	Contractor	IA/PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		<p>whether to conserve the topsoil or not for any given area he/she shall obtain the direction from the engineer in writing</p> <ul style="list-style-type: none"> ■ Removed top soil could be used as a productive soil when replanting/establishing vegetation ■ 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. ■ Topsoil thus stockpiled for reuse shall not be surcharged or overburdened. As far as possible multiple handling of topsoil stockpiles will be kept to a minimum. 			
4	Transport and Storage of construction materials	<ul style="list-style-type: none"> ■ The contractor will avoid over loading trucks that transport material to construction sites. ■ During transportation, materials will be covered with tarpaulin. ■ Peak hours in roads with moderate to high traffic will be avoided. ■ The contractor shall minimize possible public nuisance due to dust, traffic congestion, air pollution, etc., due to such haulage; ■ If local roads are used, routes are to be selected based on the truck load; loads will be divided to prevent damages to local roads and bridges. ■ Speed limits as nationality stipulated for haulage must be maintained. ■ The contractor should deploy flagmen and traffic control measures as necessary depending on the route taken for transport of material. ■ All vehicles used for haulage will be in good condition. <ul style="list-style-type: none"> ■ If there are damages to local roads and other utilities due to hauling in roads caused by the contractor. The contractor 	Engineering Cost	Contractor	IA/PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		shall attend to repair all damaged infrastructure/ roads, if needed through relevant authorities			
5	Emission of Dust during cover application and construction.	<ul style="list-style-type: none"> ■ All construction materials such as sand, soil, metal, etc. will 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 cinder blocks, with the edges of the sheeting buried, or by the use of other anchoring systems, in order to minimize the levels of airborne dust. ■ Mud patches caused by material transporting vehicles in the access road will be cleaned immediately. ■ Continual water sprinkling will be carried out in the work and fill areas and the access road if dust stir is observed. ■ Water sprinkling will 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 will be provided to all laborers for the use at required times 	Engineering Cost	Contractor	IA/PMU
6	Prevention of soil erosion during site preparation	<ul style="list-style-type: none"> ■ Debris material shall be disposed in such a manner that waterways, drainage paths would not get blocked. ■ Drainage paths associated with the infrastructure will be improved / erected to drain rain water properly. ■ Silt traps will be constructed to avoid siltation into water ways where necessary. ■ To avoid siltation, drainage paths will not be directed to any waterway directly and they will be separated. ■ Barricades such as humps will be erected at excavated areas for culverts, silt traps, toe walls, filling and lifting with proper sign boards, (all work will be carried out during the dry season). To 	Engineering Cost	Contractor	IA/PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		<p>prevent soil erosion in these excavated areas, proper earth drain system will be introduced.</p> <ul style="list-style-type: none"> ■ Embankment slopes, slopes of cuts, etc. shall not be unduly exposed to erosive forces. These exposed slopes shall be graded and covered by grass or other suitable materials per the specifications. ■ All fills, back fills and slopes will be compacted immediately to reach the specified degree of compaction and establishment of proper mulch. ■ All work will be carried out during the dry 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. ■ The work, permanent or temporary shall consist of measures as per design or as directed by the engineer to control soil erosion, sedimentation and water pollution to the satisfaction of the engineer. Typical measures include the use of berms, dikes sediment basins, fiber mats, mulches, grasses, slope drains and other devices. All sedimentation and pollution control works and maintenance thereof are deemed, as incidental to the earthwork or other items of work and no separate payment will be made for their implementation. 			
7	Burrowing of Earth and Management of Self Operated Burrow Sites	<ul style="list-style-type: none"> ■ In the event the contractor will use a self-operated burrow site: ■ Approval from the Geological Survey and Mines Bureau will have to be sought for extraction and transport. Burrow areas shall not be opened without having a valid mining license from the GSMB⁵. 	Engineering Cost	Contractor	IA/PMU

⁵ GSMB- Geological Survey and Mines Bureau

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		<ul style="list-style-type: none"> ■ Burrow sites and gravel pits have been identified for this project, any change in the sites will have to be informed to the project Engineer and identification of new areas will need to be reviewed by the safeguards staff. ■ A site operational plan for opening and closing the burrow site, for any burrow site, will be prepared and submitted to the engineer for clearance. Refer guidelines for burrow site provided in the ESMF or in the attached at the bottom of table 7. ■ The contractor shall comply with the environmental requirements/guidelines issued by the Central Environmental Authority (CEA) and the respective local authorities with respect to locating new burrow areas (in addition to what has been identified) and with regard to all operations related to excavation and transportation of earth from such sites. ■ No burrow-sites be used (current approved) or newly established within areas protected under FFPO⁶ and FO⁷ ■ The location, depth of excavation and the extent of the pit or open cut area shall be as approved by the engineer. ■ All burrow pits/areas will 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 and guidelines presented in the ESMF. ■ Establishment of burrow pits/areas and its operational activities shall not cause any adverse impact to the near-by properties and people. ■ Contractor shall take all steps necessary to ensure the stability of slopes including those related to temporary works and burrow pits. 			

⁶ FFPO- Fauna and Flora Protection Ordinance

⁷ FO-Forest Ordinance

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		<ul style="list-style-type: none"> ■ The burrow sites will be temporarily fenced off using an inexpensive material to ensure that wild animals will not stray in and fall. 			
8	Quarry Operations and Management of Self Operated Quarry Sites	<ul style="list-style-type: none"> ■ In the event the contractor manages a self-owned existing quarry sites available in the project area the following will be followed: <ul style="list-style-type: none"> ○ A site operational plan for opening and closing the quarry site, for any new quarry site, will be prepared and submitted to the engineer for clearance. ○ This will be approved by GSMB with valid Environmental Protection License (EPL) and Industrial Mining Licenses; ○ Prior approval will be obtained from GSMB, CEA and local authorities such as Pradeshiya Sabha. ■ Selected quarry sites will 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. ■ Quarry sites will not be established within protected sites identified under the FFPO and FO. ■ It is recommended not to seek material from quarries that have ongoing disputes with community. ■ The maintenance and rehabilitation of the access roads in the event of damage by the contractor's operations shall be a responsibility of the contractor. ■ Copies of all relevant licenses will be maintained by the contractor for review and documentation by the engineer 	Engineering Cost	Contractor	IA/PMU
8	Machinery Operation	<ul style="list-style-type: none"> ■ Only experienced and well trained workers will be used for the handling of machinery, equipment and material processing plants. 	Engineering Cost	Contractor	IA/PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
9	Noise from vehicles, machinery, equipment and construction activities.	<ul style="list-style-type: none"> ■ Noise generating work will be limited to day time (6:00AM to 6:00PM). No work that generates excessive noise will be carried out during night hours (from 6:00PM to 6:00AM on the following day). ■ All equipment and machinery will be operated at noise levels that do not exceed the permissible level of 75 dB⁸ (during construction) for the day time. ■ For all construction activities undertaken during the night time, the noise level will be maintained at below 50 dB as per the CEA noise control regulations ■ All equipment will 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 will not be carried out during public holidays and religious days. ■ Laborers will be advised to work with minimum noise. Strict labor supervision will be undertaken in this respect. ■ No night time residency of laborers on site will be encouraged, post work hours. ■ Idling of temporary trucks or other equipment will not be permitted during periods of loading / unloading or when they are not in active use. This practice will be ensured especially near residential and sensitive areas. ■ Stationary construction equipment will be kept at least 100m from the site periphery, which has proximity to households. All 	Engineering Cost	Contractor	IA/PMU

⁸ dB-Decibels

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		<p>possible and practical measures to control noise emissions during drilling shall be employed.</p> <ul style="list-style-type: none"> ■ Contractor will submit the list of high noise/vibration generating machinery & equipment to the engineer 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 will be regular and up to the satisfaction of the Engineer to keep noise levels at the minimum. 			
10	Pollution of Soil and Water via Fuel and Lubricants	<ul style="list-style-type: none"> ■ The contractor will ensure that all construction vehicle parking locations, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling site shall be located away from the canal that is adjacent to the site by least 200m away. ■ Contractor will 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 further contaminate the ground. ■ Contractor will 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/MMDE⁹. ■ Engineer will certify that all arrangements comply with the guidelines of CEA/MMDE or any other relevant laws. 	Engineering Cost	Contractor	IA/PMU

⁹ MMDE-Ministry of Mahaweli Development and Environment

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
<u>11</u>	Preventing loss of minor water sources and disruption to water users	<ul style="list-style-type: none"> ■ The Contractor will make employees aware on water conservation and waste minimization in the construction process by: <ul style="list-style-type: none"> ○ Arrange adequate supply of water for the project purpose throughout the construction period. ○ Not obtain water for project purposes, including for labor camps, from public or community water supply schemes without a prior approval from the relevant authority. ○ Not extract water from ground water or surface water bodies without the permission from engineer & relevant authority. ○ Obtain the permission for extracting water prior to the commencing of the project, from the relevant authority. ○ Apply best management practices to control contamination of run-off water during maintenance & operation of equipment. ○ Maintain adequate distance between stockpiles & water bodies to control effects to natural drainage paths. ■ Contractor will protect sources of water (potable or otherwise) such as water sources used by the community so that continued use of these water sources will not be disrupted by the work. In case closure of such sources is required on temporary basis, the contractor will provide alternative arrangement for supply (this may be necessary during the rehabilitation of the bathing steps). Alternative sources such as wells thus provided will be within acceptable distance to the original sources and accessible to the affected community. ■ In case the contractor's activities adversely affect the quantity or quality of water, the contractor will serve notice to the relevant authorities and downstream users of water sufficiently in advance. 	Engineering Cost	Contractor	IA/PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
12	Preventing siltation into water bodies	<ul style="list-style-type: none"> ■ Contractor will take measures to prevent siltation of water bodies because of construction work including, construction of temporary / permanent devices to prevent water pollution due to siltation and increase of turbidity. These shall include the measures against erosion highlighted in this ESMP ■ Construction materials containing small / fine particles will be stored in places not subjected to flooding and in such a manner that these materials will not be washed away by runoff. ■ Temporary soil dumps will be placed at least 200m away from all water bodies ■ If temporary soil piles are left at the site for a long time those piles will be covered with thick polythene sheets ■ All fills, back fills and slopes will be compacted immediately to reach the specified degree of compaction and establishment of proper mulch 	Engineering Cost	Contractor	IA/PMU
13	Preventing contamination of water from construction wastes	<ul style="list-style-type: none"> ■ Measures as stipulated in this ESMP shall be taken to prevent the wastewater produced in construction from entering the water bodies or the irrigation systems directly. ■ The discharge standards promulgated under the National Environmental Act shall be strictly adhered to. 	Engineering Cost	Contractor	IA/PMU
14	Managing alteration of drainage paths	<ul style="list-style-type: none"> ■ Contractor shall not close or block existing canals and streams permanently. If diversion or closure or blocking of canals and streams is required for the execution of work (e.g. for construction of bypass), contractor must first obtain the Engineers approval in writing. ■ Contractor shall carry out an investigation and report to the Engineer, if an investigation is requested by the Engineer. ■ Contractor shall also obtain the approval from the relevant agencies such as ID/ /Divisional Secretary prior to such action is taken. 	Engineering Cost	Contractor	IA/PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		<ul style="list-style-type: none"> ■ Contractors shall restore the drainage path back to its original status once the need for such diversion or closure or blockage is no longer required. ■ All work will only be undertaken during the dry season. 			
15	Public Safety	<ul style="list-style-type: none"> ■ At all times the site will restrict the entry of public on to the site. ■ Safety signboards and signboards prohibiting entrance and risks, will be displayed at all necessary locations. ■ The contractor will obtain a Third-party insurance to compensate any damages, injuries caused to the public or laborers during the construction period. ■ All construction vehicles will be operated by experienced and trained operators under supervision. ■ Material loading and unloading will be done only within the project site. 	Engineering Cost	Contractor	IA/PMU
<u>16</u>	Safety of Workers	<ul style="list-style-type: none"> ■ Contractor will comply with the requirements for safety of the workers as per the ILO Convention No. 62 and Safety & Health Regulations of the Factory Ordinance of Sri Lanka to the extent that those are applicable to this contract. ■ The contractor will supply all necessary safety measures at site- including provision of first aid kits and fire extinguishers. ■ Signage providing instructions on first aid management, emergency contact and emergency operational procedures in local languages will be displayed at the site office. ■ Basic onsite safety training will be conducted for all laborers during the ESMP training prior to the start of the construction activities. ■ The training to laborers will also include a brief on the risks of working on a dam rehabilitation site. 	Engineering Cost	Contractor	IA/PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		<ul style="list-style-type: none"> ■ The contractor will obtain a Third-party insurance to compensate any damages, injuries caused to laborers during the construction period. ■ Protective footwear and protective goggles will be provided to all workers employed on mixing of materials like cement, concrete etc. ■ Welder's protective eye-shields will be provided to workers who are engaged in welding works. ■ Earplugs will 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 equipment such as safety goggles, helmets, safety belts, ear plugs, mask etc. to workers and staff. ■ In addition, the contractor shall maintain in stock at the site office, gloves, ear muffs, goggles, dust masks, safety harness and any other equipment considered necessary. ■ A safety inspection checklist will be prepared taking into consideration what the workers are supposed to be wearing and monitored monthly and recorded. 			
17	Prevention of accidents	<ul style="list-style-type: none"> ■ Prevention of accidents involving human beings or vehicles or accidents during construction period will be done via adequate training and guidance to all workers. ■ A readily available first aid unit including an adequate supply of sterilized dressing materials and first aid supplies will always be available at the site office . ■ Availability of suitable transport always to take injured or sick person(s) to the nearest hospital will also be insured. 	Engineering Cost	Contractor	IA/PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		<ul style="list-style-type: none"> Names and contact information for emergency services such as Ambulance services, hospitals, police and the fire brigade will be prepared as a sign board and displayed at the work site. 			
18	Operation of labor camps	<ul style="list-style-type: none"> A supply of sufficient quantity of potable water will be provisioned for in every workplace/labor camp site at suitable and easily accessible places, and regular maintenance of such provisions will be carried out. The sewage system for the offsite labor camp, if newly established, will be 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. Adequate water supply will be provided in all toilets and urinals. Contractor will provide garbage bins in the camps and ensure that these are regularly emptied and disposed of in a hygienic manner. 	Engineering Cost	Contractor	IA/PMU
19	Handling of environmental and social issues during construction	<ul style="list-style-type: none"> The Contractor will appoint a suitably qualified Environmental and Social Officer following the award of the contract. The Environmental and Social Officer will be the primary point of contact for assistance with all environmental issues during the pre-construction and construction phases. He/ She will be responsible for ensuring the implementation of ESMP. The Contractor will appoint a person responsible for community liaison and to handle public complaints regarding environmental/ social related matters. All public complaints will be entered into the Complaints Register. The Environmental Officer will promptly investigate and review environmental complaints and implement the appropriate corrective actions to arrest or mitigate the cause of the complaints. A register of all complaints is to be passed to the Engineer within 24 hrs. They 	Engineering Cost	Contractor	IA/PMU

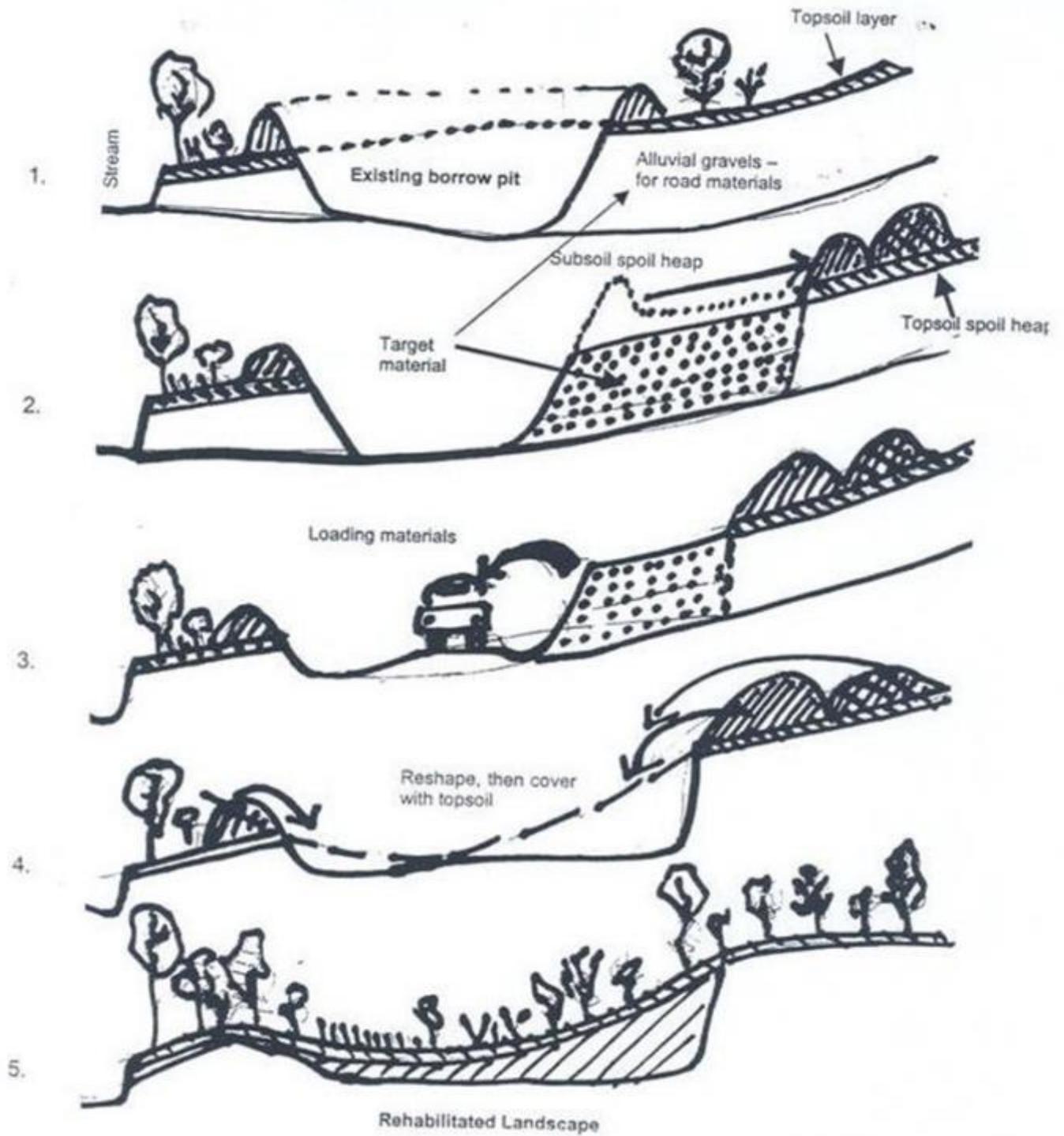
	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		<p>are received, with the action taken by the Environmental Officer on complains thereof.</p> <ul style="list-style-type: none"> ■ Contractor shall prepare detailed Environmental Method Statement (EMS) clearly stating the approach, actions and way the ESMP is implemented. The EMS shall be updated regularly and submit for Engineers review. 			
20	Management of chance find of Archeological Property	<ul style="list-style-type: none"> ■ 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 Antiquities Ordinance of 1940 (Revised in 1956 & 1998) ■ The contractor shall take reasonable precaution to prevent his workmen or any other persons from removing and damaging any such article or thing and shall, immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out the Engineer's instructions for dealing with the same, awaiting which all work shall be stopped within 100m in all directions from the site of discovery. ■ If directed by the Engineers, the Contractor will obtain advice and assistance from the Department of Archaeological of Sri Lanka on conservation measures to be taken with regard to the artifacts prior to recommencement of work in the area. 	Engineering Cost	Contractor	IA/PMU
21	Chance find of important Flora/Fauna	<ul style="list-style-type: none"> ■ Flora <ul style="list-style-type: none"> ○ While any rare/threatened/endangered flora species will be identified and removed prior to construction, during construction if by chance such species are found, it shall be immediately informed to the PMU by the contractor. ○ All activities that could destroy such flora and/or its habitat shall be stopped with immediate effect. Such activities shall 	Engineering Cost	Contractor	IA/PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
		<p>be started only after obtaining the Engineer's approval. Contractor shall carry out all activities and plans that the Engineer instructed him to undertake to conserve such flora and/or its habitat.</p> <ul style="list-style-type: none"> ■ Fauna <ul style="list-style-type: none"> ○ All works shall be carried out in such a manner that the destruction or disruption to the fauna and their habitats is minimum. ○ Construction workers shall be instructed to protect fauna including birds and aquatic life as well as their habitats. ○ Chance found important Fauna ○ During construction, if any faunal species is found, it shall be immediately informed to the PMU by the contractor. All activities that could destroy such fauna and/or its habitat shall be stopped with immediate effect. Such activities shall be started only after obtaining the Engineer's approval. Contractor shall carry out all activities and plans that the Engineer instructed him to undertake to conserve such fauna and/or its habitat. 			
22	Site Closure and Demobilization	<ul style="list-style-type: none"> ■ The contractor will remove all excess material, equipment, vehicles from the project site prior to completing demobilization from the site. ■ Cofferdams, if erected need to be completely removed and associated debris has to be cleared from the. ■ All temporary site offices will be dismantled and removed from the site. ■ If the parking site has been dilapidated in any way as per the evaluation of the engineer, the contractor will reinstate it to the original condition prior to demobilization. 	Engineering Cost	Contractor	IA/PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
23	Prevention of issues (e.g. GBV) related to labour influx	<ul style="list-style-type: none"> ■ Avoid or reduce labour influx where possible ■ Contractors to implement robust measures to prevent sexual harassment, gender-based violence (GBV) ■ training of workforce – on unacceptable conduct ■ informing workers about national laws ■ Worker Code of Conduct as part of the employment contract ■ introduce sanctions for non-compliance (e.g., termination) ■ cooperation with law enforcement agencies 			
Post Construction/Operation and Maintenance Phase					
<u>1</u>	Greening and maintenance of earthen embankment	<ul style="list-style-type: none"> ■ Only native species of plants may be used for the planting process- Vetiver grass is recommended as a suitable species that grows well on sandy loam soils and toxic conditions and has good potential to control soil erosion. ■ Attempts will be made to also identify suitable “living filter” plant species that are known to minimize the amounts of toxins in a given environment. ■ A supply of water will be available for the routine maintenance of the vegetation until it succeeds naturally. ■ Routine maintenance of planted species will be conducted to identify issues with establishment on site. ■ Replacement planting will be conducted as appropriate. 	Operational Cost	Facility Operator	IA, CEA
<u>2</u>	Flood management infrastructure	<ul style="list-style-type: none"> ■ Routine desilting and clearing of sediment traps, waste traps and silt traps will be included in the operations and maintenance plan for the sites and conducted as per the guidelines of the Central Environmental Authority. 	Operational Cost	Facility Operator	IA, CEA
<u>3</u>	Income generation for beneficiaries	<ul style="list-style-type: none"> ■ Providing labor and other services for construction units can be allocated to local communities after providing required training to ensure enough income for local communities. 	Operational cost	Contractor	IA, PMU

	Activities and Associated Impacted	Protection and preventive measures	Mitigation cost	Responsibility	
				Implementation	Monitoring
	during construction periods				
3.	Provide adequate support for social organizations of the community	<ul style="list-style-type: none"> To maintain the goodwill of the community and to pursue undisturbed operations during construction, it is recommended to provide some beneficiary services to community organizations through cooperate social responsibility budgets 	Operational cost	Contractor	IA,PMU

Guidelines for the Rehabilitation of Burrow Pits



Mitigatory Measures to be Implemented

The following conditions must follow by the contractor during the construction period in burrowing earth:

- The sides of the pits will be sloped with a minimum angle of 1:3, to enable the escape of animals that may accidentally fall into the pits.
- The burrow pits will be restored by filling them or when it is not practical to rehabilitate them as small tanks/water holes enabling wild animals to use as a water source
- The earth burrowing activity at the identified site will be carried out only during the given time period of from 6.00 am to 6.00 pm
- Burrowing earth, transportation and unloading will be carried out under the inspection of Assistant Director (Mahaweli/Irrigation) or an officer appointed by him
- A 15-cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
- Suitable drainage ditches or conduits shall be constructed or installed to avoid conditions where small pools of water that are, or are likely to become noxious, or foul, collect or remain on the burrow area. Surface drainage must be designed to minimize erosion during runoff and major rainfall events.
- Burrow Pit shall be backfilled with clean or inert fill. There shall be no material of deleterious nature (i.e. any material that would be classed as hazardous or waste). Please refer to the diagram above for the Illustration on burrow pit rehabilitation.
- Non-usable material including overburden, screenings and rocks, will be placed in the pit bottom and covered with Topsoil stripped from the surface so as to facilitate water seepage, planting grass and tree planting to be carried out using the Native trees.
- Once the site is reclaimed, any fences where they exist shall be removed to permit re-vegetation.
- Access and haul roads to the pit must be restored in a mutually agreeable manner where these are considered unnecessary after extraction has been completed.
- Above conditions will be included in the contract document and must monitor whether they are followed.
- Precautions must be taken to minimize spreading of the listed invasive species.
 - Destroy the listed invasive plants as much as possible prior to burrowing material.
 - Surface soil of the burrow site will be separated and stored to prevent transporting seeds of the invasive plants to the tank. This surface soil can use when restoring the burrow pit.
 - When restoring the invasive plants if any germinated in soil will be removed and burn.
 - Wash down of all vehicles that use to transport burrow materials before leaving the site

7. Livelihood Support Assistance

As mentioned in the earlier sections, once the impact on the six farmers (encroachers) and the fishing communities are determined and verified by the project, and inventory of loss will be prepared in consultation with the affected households and appropriate compensations and livelihood support will be paid by the project following the RPF and ESMF.

A baseline survey will be conducted once the project boundaries have been established, designs finalized and marked on the ground which shall ensure the accuracy of the survey.

The baseline survey will cover all affected persons for LSA programmes and provide inputs for the cost estimate for each LSA programme following the RPF. The baseline surveys will be carried out by the PMU with assistance from the consultants and MASL, ID and NPC, covering all affected persons for LSA programmes.

The survey will provide information on livelihood/income related losses and offer a realistic assessment of how such losses will be compensated and what income restoration strategies will be needed. The information gathered during the baseline survey will provide a baseline standard or benchmark data for subsequent monitoring exercises.

The livelihood support assistance programme will include specific measures or components for the most vulnerable households, such as female-headed households, families that include members with chronic illness or disability, households living below the poverty line (beneficiaries of Samurdhi and similar programs).

8. Implementation Arrangements and Monitoring Plans

The Project Director for IWWRMP will be the overall in-charge of the project management team. Additional Director General of Irrigation (SM) and Director Asset management of Irrigation Department will be responsible for handling matters from the head office on behalf of the Irrigation Department. The Regional Director of Irrigation (Anuradhapura), District Irrigation Engineer (Anuradhapura) stationed at Anuradhapura under the Project Director will be in-charge of project management unit for Anuradhapura, including the Mahalindawewa rehabilitation project.

The overall responsibility of ensuring compliance with safeguard requirements lie with the PMU supported by the WB while the contractor will be responsible for implementing the provisions in the ESMP that are related to the construction stage. In addition, the contractor will be directly responsible for developing and implementing the contractor's ESMP. The overall supervision will be carried out by the District Irrigation Engineer of the Irrigation Department and the PMU (MASL) that is responsible for the overall design and supervision of the proposed sub-project. Any consequent design modification will be reflected in the project cost.

Environmental and monitoring will be carried out largely through compliance monitoring using the checklist provided in the ESMF by the Environmental Officer of the PMU and the contractor jointly. The Environmental and social officer(s) of the PMU will visit the site on a regular basis and report to PMU on the contractor's performance on the implementation of the ESMP.

In addition, the contractor shall inform the progress of EMP implementation formally through a monthly monitoring report submit to the PMU through the engineer. The contractor will hire a Social, Environmental and Safety Safeguards Officer to plan and manage the implementation of the ESMP.

9. Grievance Redress Mechanism

A three-tier grievance redress system has been envisaged for the IWWRMP that will function at local (DS level) and regional level (District level), with recourse to a national-level body for appeal and for ensuring high-level government commitment, policy support and coordination for the process. The most immediate for the needs of the Mahalindawewa project will be the local (DS level) GRM. Accordingly, the following measures will be taken:

- The social and environmental officers of the PO, PMU and the District Irrigation Engineer of the Irrigation Department will be responsible for creating awareness about the GRM, including its structure, functionalities of the GRM, mechanisms for registering complaints, and the procedures that would have to be followed by the different tiers of the GRM.
- The contractor will also be responsible for creating awareness as well as supporting the implementation of a grievance redress mechanism (GRM), established by the PMU, to handle complaints at the site level (tier 1). Complainants will be made aware of a second and third tiers of the GRM – an appeal process - at the PMU level.
- Grievances submitted in writing will be referred to the IA/PMU by the safeguard officer of the Contractor through the Engineer.
- Verbal communications will be directed to IA/PMU through Engineer. Contact information of Engineer/IA/IA/PMU/in print form shall be available at the site.

The grievances shall be submitted to the Engineer on the same day of receiving. It must be recorded and the safeguard officer of the Engineer will be responsible for ensuring the timely redress through the IA/PMU.

10. Budget

Most of the mitigation measures described in the ESMP are deemed as incidental to construction work and included in the contract. However, the costs provided in the ESMP need to be considered as specific mitigation costs

Description	Cost (rs)
Social, Environment and Safety Officer for 10 months	1,000,000
Landscape plan for replanting 140 native trees	250,000
General mitigation works (including safety measures, signage etc)	1,000,000
Total	2,250,000

ANNEXES

Annex 1: Pictures on Main Issues of Mahalindawewa Irrigation Area and Dam



Figure 1: Damages in rip rap



Figure 2: Seepage at toe



Figure 3: Water stagnant in D/S area



Figure 4: Breaching section of the bund



Figure 5: Unclear tank boundaries



Figure 6: Spill seepage



Figure 7: Scoured RB spill abutment



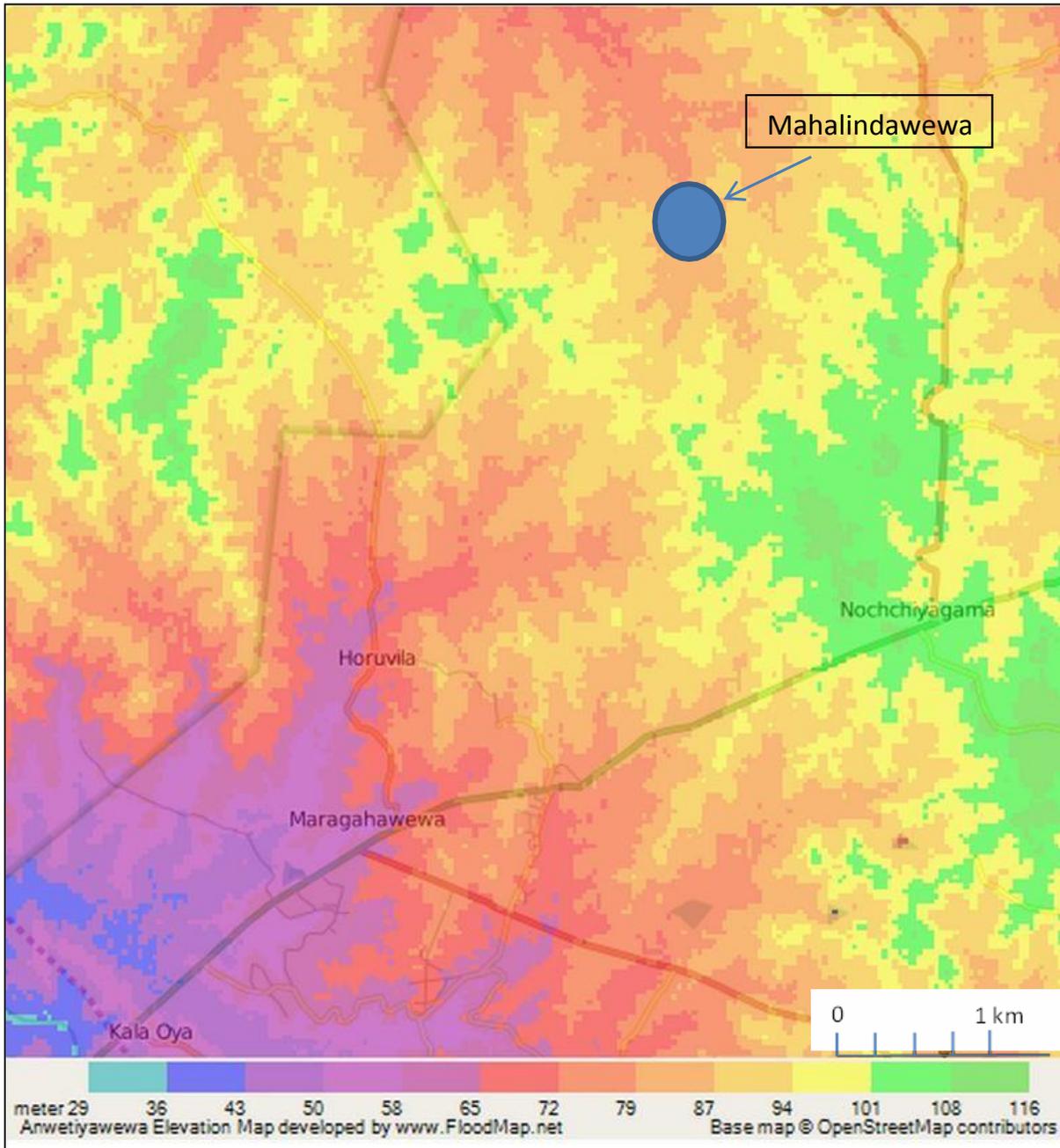
Figure 8: Unclear path of spill tail canal



Figure 9: RB sluice gate broken



Annex 3: Topography Map



Topography of the Area

(Note: Mahalindawewa is Located between 70 m and 80 m Contour Lines)

Annex 5: Details of the Trees Identified to potential removal

Locations where tree removal is needed

The typical cross section of the Mahlindawewa tank bund is given in in the figure below.

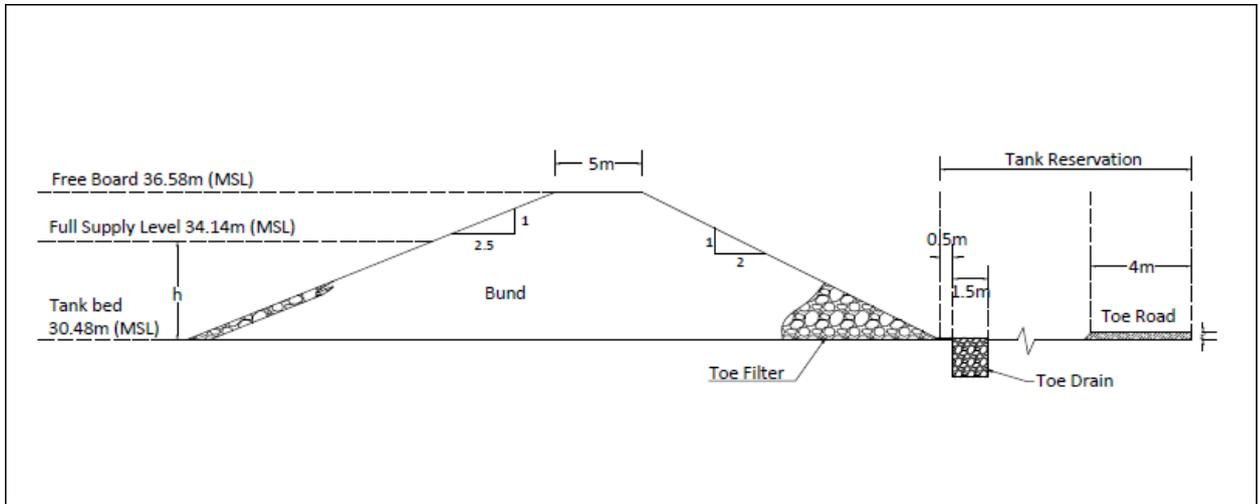


Figure 1: Typical Cross Section of the Mahalindawewa Tank Bund

The bund height of Mahalindawewa tank is about 25 ft. Therefore, the downstream tank reservation is about 100 ft (i.e., about 4 x height of the bund). Toe filter, toe drain and the toe drain can be built in this area. Trees which impede such interventions will have to be removed.

The schematic diagram showing the locations where tree removal may be required is given in the Figure below.

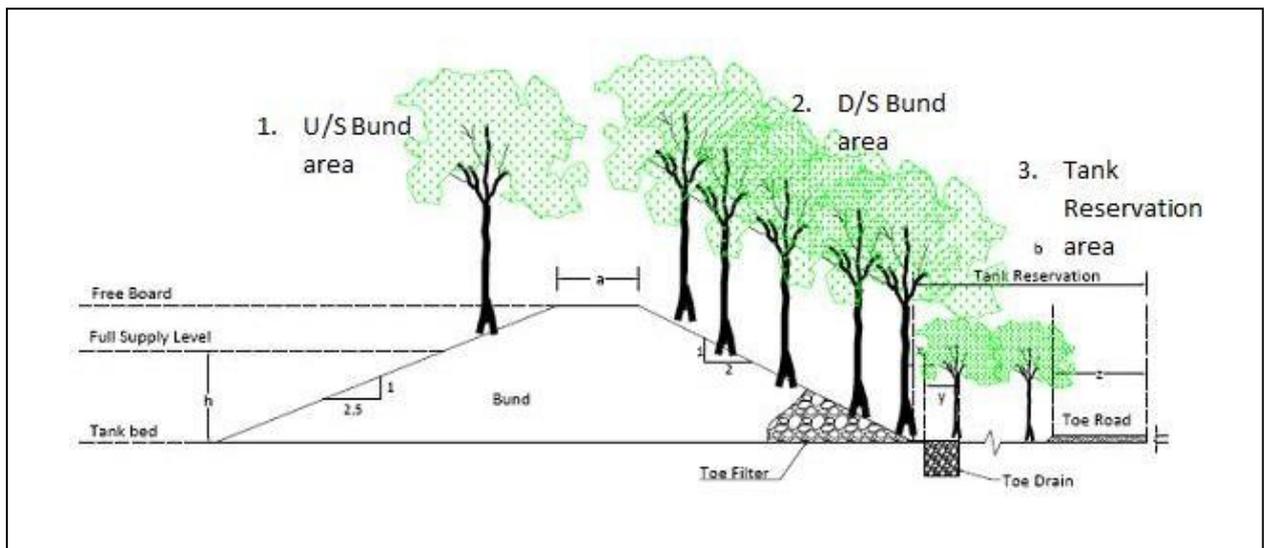


Figure 2: Schematic Diagrams where tree Removal is Required

The removal of these trees will depend on the interventions such as rehabilitation of rip rap on U/S area and toe road, toe drain and toe filter construction in the D/S area of the tank. The decision on which trees to be removed will be finally decided by the Irrigation Engineer of the Mahalindawewa tank.

Table 1: Trees located Close to Spill

Tree Number	GPS Location	Tree Species		Girth (m)
		Scientific Name	Local Name	
1	N 08° 22.166', E 080° 15.846'	<i>Terminalia arjuna</i>	Kumbuk	8.3m
2	N 08° 22.166', E 080° 15.841'	<i>Terminalia arjuna</i>	Kumbuk	4.8m
3	N 08° 22.167', E 080° 15.846'	<i>Terminalia arjuna</i>	Kumbuk	3.3m

Table 2: Trees located on the Upstream Slope of the Tank

Tree Number	GPS Location	Tree Species		Girth (m)
		Scientific Name	Local Name	
7	N 08° 22.001', E 080° 16.469'	<i>Azadirachta indica</i>	Kohomba	1.9m
2	N 08° 22.003', E 080° 16.006'	<i>Terminalia arjuna</i>	Kumbuk	3.6m
5	N 08° 22.007', E 080° 15.997'	<i>Terminalia arjuna</i>	Kumbuk	2.3m
1	N 08° 22.008', E 080° 15.995'	<i>Terminalia arjuna</i>	Kumbuk	2m
0	N 08° 22.011', E 080° 15.991'	<i>Terminalia arjuna</i>	Kumbuk	2m
6	N 08° 22.014', E 080° 15.986'	<i>Terminalia arjuna</i>	Kumbuk	2m
1	N 08° 22.020', E 080° 15.959'	<i>Terminalia arjuna</i>	Kumbuk	4.5m
8	N 08° 22.033', E 080° 15.448'	<i>Terminalia arjuna</i>	Kumbuk	2.3m
9	N 08° 22.041', E 080° 15.946'	<i>Terminalia arjuna</i>	Kumbuk	1m
75	N 08° 22.068', E 080° 15.918'	<i>Terminalia arjuna</i>	Kumbuk	6m
77	N 08° 22.073', E 080° 15.911'	<i>Terminalia arjuna</i>	Kumbuk	1.8m

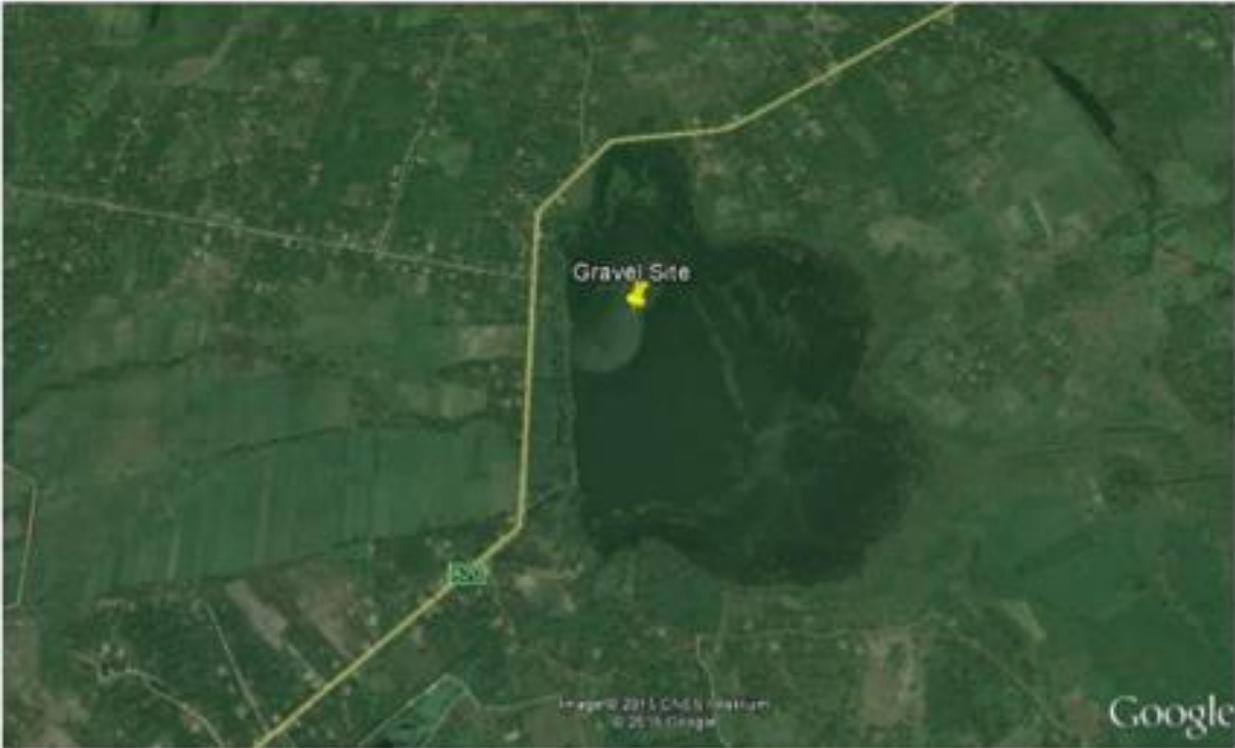
Tree Number	GPS Location	Tree Species		Girth (m)
		Scientific Name	Local Name	
72	N 08° 22.074', E 080° 15.910'	<i>Terminalia arjuna</i>	Kumbuk	2.2m
75	N 08° 22.090', E 080° 15.896'	<i>Terminalia arjuna</i>	Kumbuk	3m
71	N 08° 22.094', E 080° 15.891'	<i>Terminalia arjuna</i>	Kumbuk	1m
70	N 08° 22.094', E 080° 15.892'	<i>Terminalia arjuna</i>	Kumbuk	1.1m
76	N 08° 22.095', E 080° 15.890'	<i>Terminalia arjuna</i>	Kumbuk	1m
71	N 08° 22.096', E 080° 15.889'	<i>Terminalia arjuna</i>	Kumbuk	1.1m
78	N 08° 22.097', E 080° 15.889'	<i>Terminalia arjuna</i>	Kumbuk	3.5m
79	N 08° 22.097', E 080° 15.889'	<i>Terminalia arjuna</i>	Kumbuk	1.5m
25	N 08° 22.103', E 080° 15.884'	<i>Terminalia arjuna</i>	Kumbuk	3m
27	N 08° 22.104', E 080° 15.883'	<i>Terminalia arjuna</i>	Kumbuk	1m
22	N 08° 22.106', E 080° 15.881'	<i>Terminalia arjuna</i>	Kumbuk	2.5m
25	N 08° 22.107', E 080° 15.878'	<i>Terminalia arjuna</i>	Kumbuk	1.6m
21	N 08° 22.110', E 080° 15.876'	<i>Terminalia arjuna</i>	Kumbuk	1.8m
20	N 08° 22.111', E 080° 15.876'	<i>Terminalia arjuna</i>	Kumbuk	1.5m
26	N 08° 22.112', E 080° 15.875'	<i>Terminalia arjuna</i>	Kumbuk	4.5m
21	N 08° 22.116', E 080° 15.873'	<i>Terminalia arjuna</i>	Kumbuk	2.2m
28	N 08° 22.122', E 080° 15.867'	<i>Terminalia arjuna</i>	Kumbuk	5m
29	N 08° 22.124', E 080° 15.867'	<i>Terminalia arjuna</i>	Kumbuk	2m
55	N 08° 22.924', E 080° 16.029'	<i>Terminalia arjuna</i>	Kumbuk	2.5m
57	N 08° 22.948', E 080° 16.294'	<i>Terminalia arjuna</i>	Kumbuk	3.5m
52	N 08° 22.953', E 080° 16.224'	<i>Terminalia arjuna</i>	Kumbuk	2m
55	N 08° 22.956', E 080° 16.205'	<i>Terminalia arjuna</i>	Kumbuk	1.8m
51	N 08° 22.957', E 080° 16.198'	<i>Terminalia arjuna</i>	Kumbuk	2.9m
50	N 08° 22.957', E 080° 16.199'	<i>Terminalia arjuna</i>	Kumbuk	3.2m
56	N 08° 22.958', E 080° 16.234'	<i>Terminalia arjuna</i>	Kumbuk	1.1m
51	N 08° 22.959', E 080° 16.181'	<i>Terminalia arjuna</i>	Kumbuk	3.2m
58	N 08° 22.961', E 080° 16.163'	<i>Terminalia arjuna</i>	Kumbuk	3m
59	N 08° 22.964', E 080° 16.136'	<i>Terminalia arjuna</i>	Kumbuk	3m
15	N 08° 22.966', E 080° 16.126'	<i>Terminalia arjuna</i>	Kumbuk	4m
17	N 08° 22.971', E 080° 16.106'	<i>Terminalia arjuna</i>	Kumbuk	2.3m
12	N 08° 22.974', E 080° 16.419'	<i>Borassus flabellifera</i>	Thal	1.5m
15	N 08° 22.977', E 080° 16.425'	<i>Vitex altissima</i>	Maila	2.5m
11	N 08° 22.978', E 080° 16.426'	<i>Borassus flabellifera</i>	Thal	1.5m
10	N 08° 22.979', E 080° 16.429'	<i>Borassus flabellifera</i>	Thal	1m
16	N 08° 22.979', E 080° 16.431'	<i>Vitex altissima</i>	Maila	0.5m
11	N 08° 22.988', E 080° 16.446'	<i>Terminalia arjuna</i>	Kumbuk	3.8m

Tree Number	GPS Location	Tree Species		Girth (m)
		Scientific Name	Local Name	
18	N 08° ,22.989', E 080° 16.043'	<i>Terminalia arjuna</i>	Kumbuk	4m
19	N 08° 22.993', E 080° 16.032'	<i>Mitragyna tubulosa</i>	Halamba	0.8m
05	N 08° 22.994', E 080° 16.030'	<i>Terminalia arjuna</i>	Kumbuk	3m
07	N 08° 22.994', E 080° 16.455'	<i>Terminalia arjuna</i>	Kumbuk	3.2m
02	N 08° 22.995', E 080° 16.556'	<i>Albizia saman</i>	Mara	5.8m
05	N 08° 22.997', E 080° 16.528'	<i>Terminalia arjuna</i>	Kumbuk	3.2m

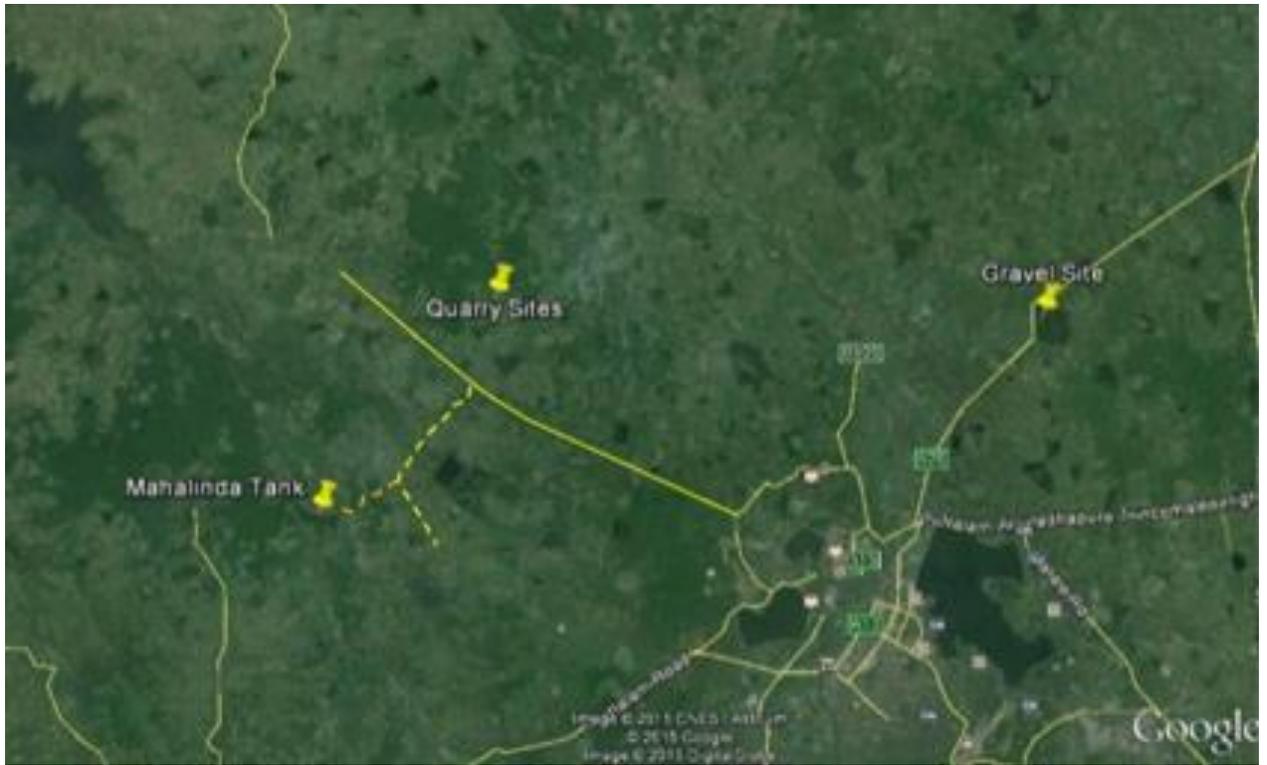
Table 3: Trees located on the Downstream Slope of the Tank

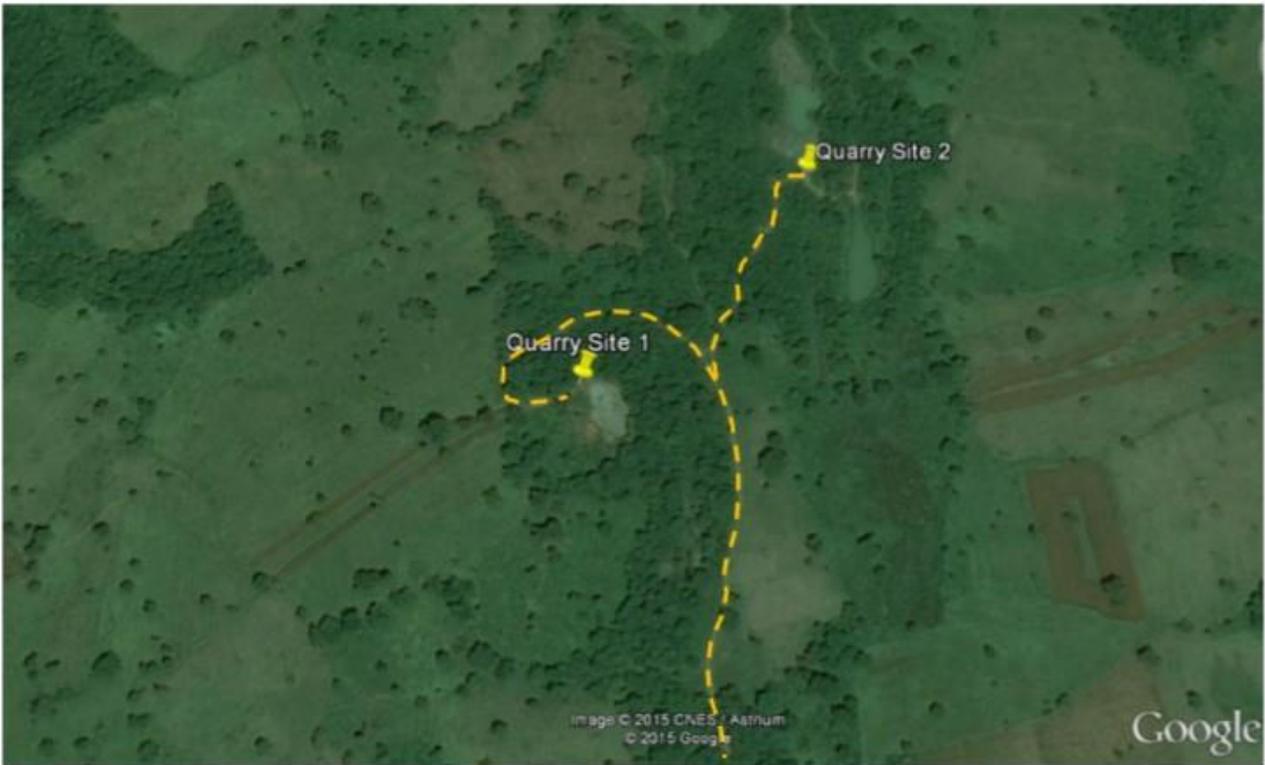
Tree Number	GPS Location	Tree Species		Girth (m)
		Scientific Name	Local Name	
1	N 08° 22.002' , E 080° 16.339'	<i>Borassus flabellifera</i>	Thal	1m
2	N 08° 22.003', E 080° 16.464'	<i>Borassus flabellifera</i>	Thal	1.9m
3	N 08° 22.007', E 080° 16.473'	<i>Borassus flabellifera</i>	Thal	1.2m
4	N 08° 22.013', E 080° 16.483'	-	Kahapenela	1.5m
5	N 08° 22.013', E 080° 16.483'	<i>Azadirachta indica</i>	Kohomba	1.5m
6	N 08° 22.014', E 080° 16.511'	<i>Azadirachta indica</i>	Kohomba	1.8m
7	N 08° 22.019', E 080° 15.992'	<i>Terminalia arjuna</i>	Kumbuk	1.5m
8	N 08° 22.021', E 080° 15.992'	<i>Terminalia arjuna</i>	Kumbuk	2m
9	N 08° 22.022', E 080° 15.991'	<i>Terminalia arjuna</i>	Kumbuk	1.2m
10	N 08° 22.024', E 080° 15.991'	<i>Terminalia arjuna</i>	Kumbuk	1.4m
11	N 08° 22.131', E 080° 15.867'	<i>Tamarindus indica</i>	Siyambala	3.3m
12	N 08° 22.135', E 080° 15.862'	<i>Tamarindus indica</i>	Siyambala	2m
13	N 08° 22.139', E 080° 15.860'	<i>Tamarindus indica</i>	Siyambala	3m
14	N 08° 22.982', E 080° 16.094'	<i>Terminalia arjuna</i>	Kumbuk	6.5m

Annex 6: Locations maps of gravel, burrow and quarry sites



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Annex 7: List of Farmers consulted including encroached farmers.

Table 1: Details of the Farming Community

Name	Position	Address	Telephone No
G.K. Senananda	Chairman	Gamunu Farmer Organization (Mahalindawewa, Mahamankadawela)	072-4952644
A. Punchibanda	Secretary	-do-	025-5687645
J.M. Wickramasingha	Treasurer	-do-	NA
D. Piyasena	Farmer	Mahalindawewa, Mahamankadawela	NA
K.M. Ananada Samarakoon	Farmer	Mahalindawewa, Mahamankadawela	NA
D. Amarasena	Farmer	Mahalindawewa, Mahamankadawela	NA
P. Jayawardhana	Farmer	Mahalindawewa, Mahamankadawela	NA
B. Tikiribanda	Farmer	Mahalindawewa, Mahamankadawela	NA
K.B. Ratnayaka	Farmer	Mahalindawewa, Mahamankadawela	NA
W. Disna Riyandika	Farmer	Mahalindawewa, Mahamankadawela	NA
K.B. Irangani	Farmer	Mahalindawewa, Mahamankadawela	NA
D.A. Pathirana	Chairman	Parakum Farmer Organization, Mahalindawewa, Mahamankadawela	NA
D.A. Darmasena	Secretary	-do-	NA
P. Chathura Wasantha Kumara	Treasurer	-do-	NA
R. Darmapala	Farmer	Mahalindawewa, Ranorawe	NA
H.M. Karunarathna	Farmer	-do-	NA
M. Chandrathilaka	Framer	-do-	NA
B.M. Podimanika	Farmer	-do-	NA
S.M. Ratnawathi	Farmer	-do-	NA
N.K. Ranbanda	Farmer	-do-	NA

Table 2: Details of Farmers Encroached Downstream Reservation of the Tank

Serial No	Name	Extent Encroach-Acres	Coconut (No of Trees)	Aricanut (No of Trees)
1	D. M. Sunil	0.25	6	-
2	P. Siripala	0.25	15	-
3	G.S. Senananda	0.25	10	-
4	P.B. Ilangasingha	0.25	10	15
5	M. Anurasiri Wijekoon	0.25	12	-
6	N. K. Ranbanda	0.25	8	-
Total		1.5	61	15