Environmental Management Plan

June 2016
Project Number: 47381-002

SRI: Mahaweli Water Security Investment Program

Minipe Anicut Raising and Rehabilitation of the Minipe Left Bank Canal Project in Kandy District

Updated EMP

Prepared by Ministry of Mahaweli Development and Environment for the Asian Development Bank.

Democratic Socialist Republic of Sri Lanka
Ministry of Mahaweli Development and Environment

MINIPE ANICUT RAISING AND REHABILITATION OF MINIPE LB CANAL PROJECT

UPDATED ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Program Management, Design and Supervision Consultant

Mahaweli Water Security Investment Program (MWSIP)

June 2016

LAHMEYER INTERNATIONAL | GEOCONSULT | InfotechsIDEAS KNOWLEDGE. INNOVATION. SOLUTIONS. | ENGINEERING CONSULTANTS (PVT.) LIMITED | NIRAS

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Prepared for:

Ministry of Mahaweli Development and Environment
Mahaweli Water Security Investment Program
Program Management Unit
No. 493 1/1, T.B. Jayah Mawatha
Colombo 10
Sri Lanka

Prepared by:

Program Management, Design and Supervision Consultant
Joint Venture Lahmeyer International GmbH – GeoConsult ZT GmbH
in Association with NIRAS (Denmark), Engineering Consultants Ltd. (Sri Lanka), and Infotechs IDEAS (Pvt.) (Ltd.) (Sri Lanka)
No. 493 T.B. Jayah Mawatha
Colombo 10
Sri Lanka

Lahmeyer International Main Office
Friedberger Str. 173
61118 Bad Vilbel
Germany

Distribution Register:

Distribution List:	Date of Issue	Number of Copies
MMDE	March 2016	4
ADB	March 2016	2

Revision History:

Rev.	Date	Author	Department	Checked by	Approved	Description
1	27.06.16	Dr. A.P. Kasige	PMDSC	R. McIntyre	Chegwin	Responded to Comments given by PMU (Ref. MWSIP/PMU/07/02) and improved with additions

ABBREVIATIONS

ADB	Asian Development Bank
APs	Affected Persons
BoQ	Bill of Quantities
CEA	Central Environmental Authority
CEMP	Contractor's Environmental Management Plan
DoI	Department of Irrigation
DWLC	Department of Wild Life Conservation
EA	Executive Agency
EIA	Environmental Impact Assessment
EMC	Environmental Monitoring Committee
EMP	Environmental Management Plan
EO	Environmental Officer
EPL	Environmental Protection License
ERP	Emergency Recovery Plan
FFPO	Fauna & Flora Protection Ordinance
FO	Forest Ordinance
GoSL	Government of Sri Lanka
GRC	Grievance Redress Committee
GSMB	Geological Survey & Mines Bureau
IAS	Invasive Alien Species
ID	Irrigation Department
IEE	Initial Environmental Examination
IEER	Initial Environmental Examination Report
LB	Left Bank
LGA	Local Government Authority
MDP	Mahaweli Development Program
MFF	Multi Tranche Financing Facility
MLBCRP	Minipe Left Bank Canal Rehabilitation Project
MMDE	Ministry of Mahaweli Development and Environment
MWSIP	Mahaweli Water Security Investment Program
MRB	Mahaweli River Basin
NCP	North Central Province Canal Project
NWCP	North Western Canal Project
PD	Program Director
PHI	Public Health Officer
PIU	Project Implementation Unit
PMDSC	Project Management & Design Supervision Consultant
PMU	Project Management Unit
PSC	Program Steering Committee
RB	Right Bank
UECP	Upper Elahera Canal Project
VRR	Victoria Randenigala Rantambe

Table of Contents

List of Tables

List of Figure

List of Annexes

1 INTRODUCTION

1. The Mahaweli Water Security Investment Program (MWSIP), under the Ministry of Mahaweli Development and Environment of the Government of Sri Lanka (GoSL), is a project funded by the Asian Development Bank (ADB) (Loan No. 47381-002-SRI (SF) and GoSL, which assists the goal to maximize the productivity of the Mahaweli River Basin (MRB) water resources, by transferring available water to the north and north western dry zone areas for irrigation, drinking and commercial purposes.

2. The investment program will implement Phase I of the North Central Province Canal Project (NCPCP), using the Asian Development Bank's (ADB's) Multi Tranche Financing Facility (MFF) modality, loaned to the government in three tranches. The updated Mahaweli Development Program (MDP) comprises three main individual investment projects:

(i) Upper Elahera Canal Project (UECP)

(ii) North Western Canal Project (NWPCP)

(iii) Minipe Left Bank Canal Rehabilitation Project (MLBCRP)

3. Minipe Left Bank Canal Rehabilitation (MLBCR) Project, located downstream of the Mahaweli Hydropower Complex on the Mahaweli River, will: (i) add upstream storage by heightening the headwork's weir by 3.5 meters to regulate generation inflows; (ii) construct new automatic downstream-controlled intake gates to the left bank canal; (iii) construct new emergency spillweirs to both left and right bank canals; and (iv) rehabilitate the 74-km Minipe Left Bank Canal, including regulator and spill structures, to improve conveyance and reliability of service to existing farmers.

4. This EMP comprises the following sections, incorporating the mitigatory measures and the monitoring plan:

(i) Introduction

(ii) Summary of Potential Impacts

(iii) Description of Planned Mitigatory Measures

(iv) Due Diligence Study of Potential Involuntary Land Acquisition and Resettlement Impacts

(v) Procedures for Dealing with Chance Finds

(vi) Description of Planned Environmental Monitoring

(vii) Procedures for Site Rehabilitation

(viii) Reporting & Review

(ix) Contractor's Cost

1.1 Purpose of this Document

5. This Environmental Management Plan (EMP) is based on the Initial Environmental Examination Report (IEER) prepared in April 2015. The requirements of the letter of conditional approval of the CEA (REF. CEA/CPO/KY/07/929/12 DATED AS 16TH OCTOBER 2015) as given in Annexure 1, Facility Administration Manual (MWSIP RRP Sri 47381-001 of 2015) and Environmental Assessment Review Framework (2014) of the Asian Development Bank (ADB), were taken into account in preparing this EMP.

6. The EMP is developed for the final designs of the civil works and other work contracts of the respective contract packages. The Works to be executed under each construction Contract are clearly defined in the various Sections of the Bidding Document for that Contract.

7. The purpose of the EMP is to provide a framework for minimizing the adverse environmental impacts of the Project in all its phases. It defines the roles of key stakeholders, and reporting and feedback mechanisms. The EMP also provides a basis for the systematic collection of data to determine the actual environmental effects of the Project, compliance with regulatory standards, and measurement of the success of the environmental protection activities identified during the IEE process.

8. This draft EMP prepared by the Project Management Design & Supervision Consultant (PMDSC) in March 2016, and revised in May/June 2016, is submitted to the MMDE's Program Management Unit (PMU) for onward transmission to the Central Environmental Authority (CEA) and ADB. The EMP approved by the CEA will be considered as the Final EMP to be used in the contract document, which will be the baseline document in preparing the Contractor's Environmental Management Plan (CEMP). The CEMP, which will be prepared by the Contractor after mobilization, based on this final EMP, will be submitted to the Environmental Monitoring Committee (EMC) appointed by the CEA. A detailed and specific CEMP for each of the Contract packages (which are described in Section 3, paragraph 29) will be prepared based on this EMP and submitted to the Environmental Monitoring Committee after mobilization of the Contractor.

9. The monitoring program, including the Monitoring Scope, institutional responsibilities and the implementation schedule, are also included in the EMP. In consideration of recommendations given as mitigation measures for potential environmental impacts indicated in the IEE report, as well as the conditions mentioned in the CEA approval letter (Annexure 1), the parameters to be monitored continuously during the project implementation with participation from Project Implementation Unit (PIU) project staff of the Irrigation Department, are incorporated in the EMP. The CEA approval letter, including Annexure 1, is attached at Appendix A.

1.2 Management Structure

10. The Ministry of Mahaweli Development and Environment (MMDE) is the Executing Agency (EA) of the entire Investment Program and the Irrigation Department is the Project Implementing Agency (PIA) for implementing Minipe Left Bank Canal Rehabilitation Project (MLBCRP). The management structure for the MWSIP PMU Organization and Environmental Management is described in **Figures 1-1** and **1-2** respectively.

11. The Program Director (PD) is the head of the Investment Program implementation, and the PMU operates under his management. There are three Project Directors responsible for the implementation of the three main projects (MLBCRP, UECP and NWPCP) assigned for each Project Implementation Unit (PIU) based in the respective field offices.

12. A safeguards cell is established in the PMU, which is responsible for overseeing the overall monitoring and verification of the environment and resettlement activities of the investment program with the assistance of the PIU and the PMDSC. The two counterpart personnel of Environmental Specialist and Social Safeguard Specialist with relevant experience are assigned to the safeguards cell, and will have responsibility for ensuring compliance of the safeguards requirements including (i) environment, and (ii) resettlement, including gender issues. The EA will be responsible for overall coordination, planning, and financing of the resettlement implementation program (RIP) and the implementation of RIPs is the responsibility of PMU.

13. The Resident Engineer (RE) appointed under the PMDSC assumes primary responsibility for ensuring the implementation by the Contractors of the CEMP. The relevant activities will be guided by

the Environmental Specialist of PMDSC and supported by the Site Engineering Supervisors. An Environmental Officer is assigned to the Project Team under the Project Director of PIU, and with the guidance of the Environmental Specialist and Social and Resettlement Specialist of PMU will hold environmental monitoring responsibilities. PMDSC will assist during the monitoring activities as resources allow (allowance may need to be made for dedicated environmental staff to be added to the PMDSC team). The duties of the Environmental Officer will include: (i) oversight of construction contractors for monitoring and implementing mitigation measures; (ii) preparing and implementing environment policy guidelines and environmental good practices; (iii) liaising with the environmental agencies and seeking their help to solve the environment-related issues of project implementation; (iv) providing awareness training on environmental and social issues related to the program; and (v) preparation of environmental monitoring reports once a year for the IEE as required by ADB.

14. The Environmental Specialist engaged by the PMDSC will: (i) update the environmental assessments including EMP based on detailed designs; (ii) ensure EMPs are included in bidding documents and civil works contracts; (iii) provide guidance to the contractors to properly carry out the implementation of the CEMPs; (iv) review and evaluate the effectiveness with which the CEMPs are implemented, and recommend corrective actions to be taken as necessary; and (v) maintain documents for preparing periodic environmental monitoring reports to ADB/CEA with the coordination of PMU Environmental Specialist. The PMU Environmental Specialist of PMU will (i) provide oversight on environmental management aspects of the project and ensure that the relevant requirements of the EMPs that are included in the CEMPs are being implemented by the contractors; (ii) facilitate and ensure that contractors comply with all government rules and regulations regarding permits as well as any other relevant approvals required for works for which they are responsible; (iii) conduct ongoing consultation with the community during implementation of the project; and (iv) establish a grievance redress mechanism and ensure it is operated satisfactorily.

15. For the purpose of implementing the Environmental Management Plan, an EMC has been set up under the CEA. The EMC comprises representatives from the Department of Irrigation (DoI), Program Management Unit (PMU), representatives of Divisional Secretaries, and representatives from other stakeholder agencies. The PMU and PMDSC will monitor the implementation of the EMP and will report through periodical progress reports to the EMC of CEA as well as to the ADB.

The key responsibilities of the PMU/PIU and PMDSC staff engaged in environmental safeguard compliance is summarized in the **Table 1-1.**

Table 1-1: Key responsibilities of the PMU/PIU and PMDSC staff relating to safeguard compliance

PMDSC	• Environmental Specialists • Social Safeguard Specialists	• Update the environmental assessments including EMP based on detailed designs • Ensure EMPs are included in bidding documents and civil works contracts • Preparation of Environmental Monitoring formats • Provide guidance to the contractors to properly carry out the implementation of the EMPs • Guidance on routine environmental monitoring activities, carried out as a joint effort by PIU Environmental Officer, and staff recruited under the Resident Engineer as per the resources allowed and periodical site inspections • Review and evaluate the effectiveness with which the EMPs are implemented, and recommend

		corrective actions to be taken as necessary • Maintain documents for preparing periodic environmental monitoring reports to ADB/CEA with the coordination of PMU Environmental Specialist • Preparing due diligence reports on safeguard • Undertaking any necessary additional surveys and investigations to support designs and implementation • Preparing Strategic Environmental Assessment (SEA)
PMU	• Environmental Specialist • Social and Resettlement Specialist	• Provide oversight on environmental management aspects of the project and ensure that the relevant requirements of the EMPs which are included in the CEMPs are being implemented by the contractors • Facilitate and ensure contractors comply with all government rules and regulations regarding permits as well as any other relevant approvals required for works for which they are responsible • Conduct ongoing consultation with the community during implementation of the project; and • Establish a grievance redress mechanism and ensure it is operated satisfactorily. • Implementing resettlement implementation and land acquisition plans where necessary
PIU	• Environmental Officer • Social and Resettlement Officer	• EMP Monitoring and implementing mitigation measures with the assistance of the Engineering Assistants of PMDSC as resources allow • Preparing and implementing environment policy guidelines and environmental good practices • Liaising with the environmental agencies and seeking their help to solve the environment-related issues of project implementation • Providing awareness training on environmental and social issues related to the program • Preparation of environmental monitoring reports once a year for the IEE as required by ADB

1.3 Contractors' EMP and Compliance Monitoring

16. Each Contractor is required under his construction contract to develop a CEMP based on the EMP presented here, and the guideline for CEMP is given below, as well as the environmental compliance mechanism that in place to ensure that the EMP is implemented properly. The Environmental Monitoring Plan (EMoP) (see Table 3.2) has been developed, including key monitoring aspects and responsible parties, to ensure environmental best practices during the construction and operation phases of this project.

17. Contractor's EMP will be reviewed by PMDSC to ensure that it addresses requirements mentioned in the CEA approvals and ADB loan covenants, and this CEMP will be submitted to the EMC for approval in compliance with CEA approval condition no.13 (CEA/CPO/KY/07/929/12; 16/10/2015).

18. The Contract will refer the Contractor to the approved IEE Report and the CEA Environmental Approval (CEA/CPO/KY/07/929/12) for the applicable Laws and Regulations related to environmental

management (Section A5 of IEE report) and to the clearances and permits to be obtained prior to commencing the work, including those for which it will be his responsibility to obtain confirmation (Section A6 of the IEE report).

19. The CEMP will be based on the detailed implementation plan and the Contractor's actual construction methodologies, the work schedule, and the types of work and the details given in the Specifications. The CEMP shall be consistent with the project EMP and prepared based on the Contractor's activities at the corresponding locations. The CEMP will include the following:

(i) Contractor's organizational structure showing the implementation, supervision and reporting and responsibilities of key personnel

(ii) The project program and work activities

(iii) The Contractor's plans for specific environmental measures, as follows

a) relocation of utilities, if required (minimization/avoidance of disruption of services such as power, water supply etc.)

Contractor's Facilities Management Plan, for management of impacts due to establishment and operation (detailed designs, methodologies and installation locations of all construction-related facilities such as access roads, workers' camps, storage areas, equipment maintenance areas etc., pollution control facilities such as drainage channels, settling tank/ponds and septic tanks, temporary noise barriers etc.)

b) air pollution (dust and gaseous emissions) control

c) noise and vibration control

d) waste management (solid, liquid, hazardous)

e) spoil disposal

f) drainage management

g) erosion and sedimentation control

h) traffic management

i) chemicals and hazardous materials management

j) workers and public safety

k) Emergency Response Plan

(iv) The approach and program for implementing various mitigation measures specified in the Project EMP

(v) Plan for self-monitoring and reporting to ensure compliance with EMP/CEMP provisions

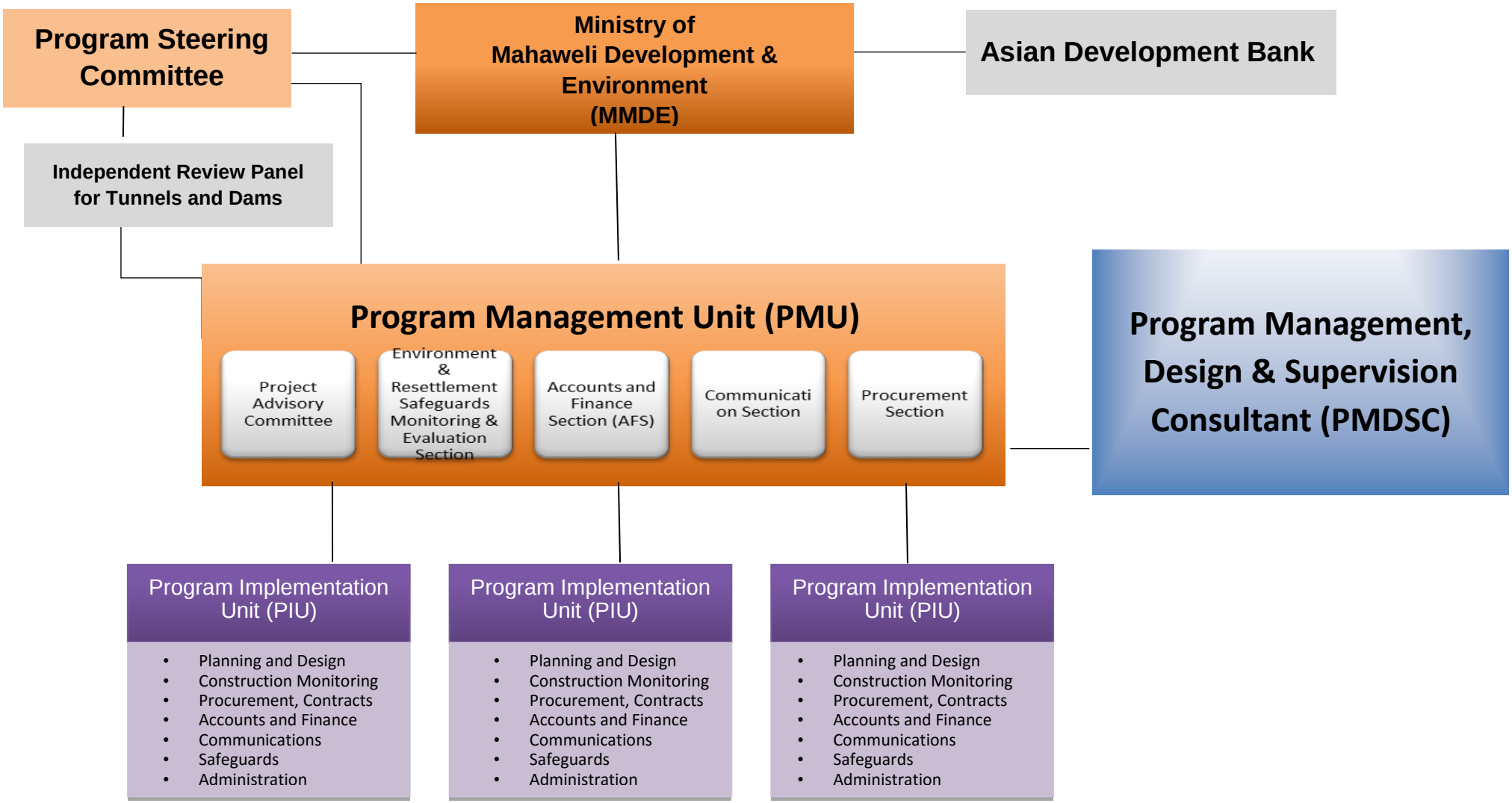

Figure 1-1: MWSIP Organizational Chart

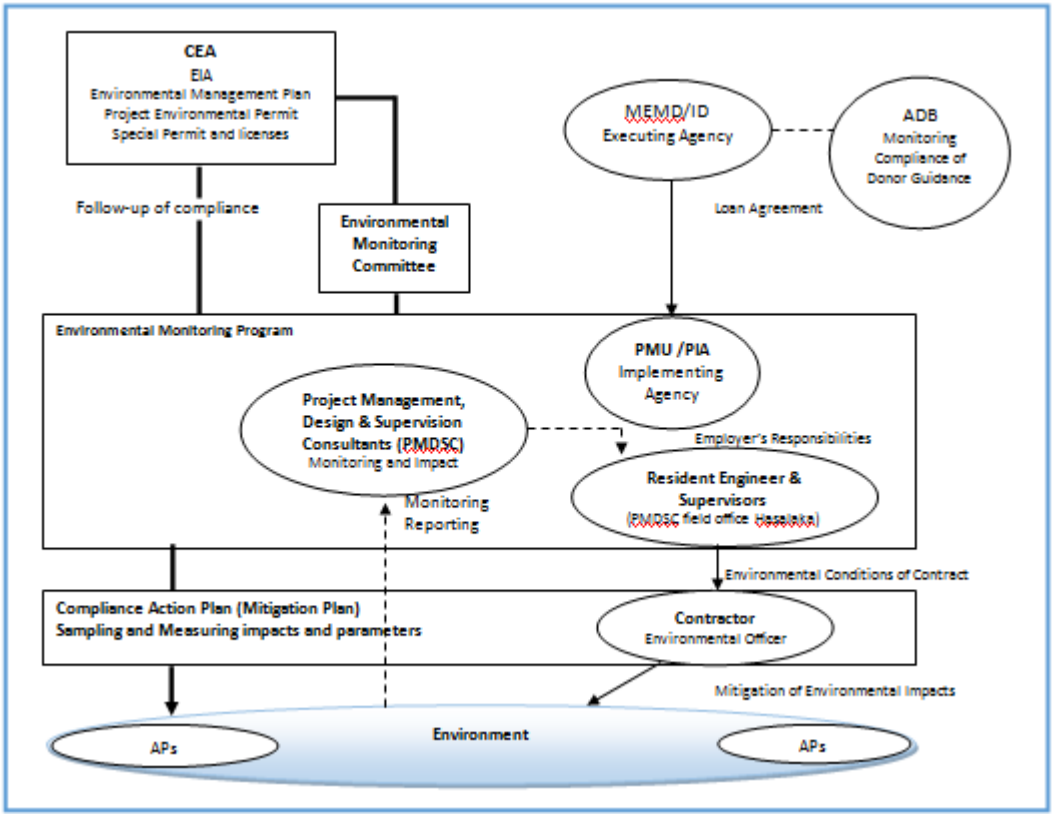

Figure 1-2: Environmental Management Organization Chart

20. Environmental compliance monitoring is essential for successfully implementing the project-specific environmental management program developed through the Environmental Assessment carried out for the project and the EMP prepared, taking into account project-specific environmental impacts that may arise and mitigation measures required to make the project both environmentally and economically viable.

21. Environmental compliance monitoring involves a systematic collection and analysis of environmental mitigation/compliance-related information as the project progresses. It aims to improve the efficiency and effectiveness of the project. Monitoring will help determine whether the project is meeting the environmental standards and whether the environmental mitigation component results in the expected outputs. It is important that the environmental officers assigned to each PIU, and the supervision staff of the Engineer under the construction contracts, understand the importance of monitoring as a tool for analysing and understanding the status of the project.

22. During the construction phase the Contractor is responsible for implementation of all the requirements of the EMP, which are identified in the CEMP, while the Resident Engineer will supervise the compliance monitoring. Monitoring will ensure that the contractor complies with the terms and conditions of the CEMP for which he is responsible. The Project Director of the PIU is responsible for the assignment of Environmental Officers to carry out the monitoring together with the Engineer and supervision staff of the respective construction contract. The PMU Environmental Specialist, apart from supervising the work of the PIU Environmental Officers, will prepare monitoring protocols and will arrange for any necessary training for the PIU Environmental Officers and, if appropriate, specifically assigned staff from the Engineer's supervision team. The national and international Environmental Specialists of the PMDSC will also provide technical support for the environmental monitoring work.

23. The Contractor is responsible for implementation of the CEMP while the PMDSC and PMU are responsible for compliance monitoring and reporting to the EMC appointed by the CEA. Monitoring

will ensure that the contractor complies with the terms and conditions of the CEMP. The Resident Engineer with his supervisory staff will carry out monitoring related to the CEMP, and the periodical environmental monitoring activities as per the updated EMP will be carried out by the PIU Environmental Officer with the involvement of engineering supervisory staff of PMDSC as allowed by the resources availability. Environmental Specialists assigned to PD-PMU and PMDSC will provide technical inputs as and when required. In addition, the Environmental Specialist of the PMU is responsible for preparing environmental monitoring protocols and training the environmental officer as well as supervising the work done by environment officer-PIU. In addition s/he will oversee and attend to resolution of critical issues on the environmental management, grievance redress mechanism, compliance with regulatory and ADB safeguard requirements, reviewing environmental documentation submitted to ADB and CEA and presenting the Project environmental progress as and when required by PMU. The national and international environmental specialists of the PMDSC are to provide technical support for the environmental monitoring work through (i) updating the EIAs and IEE, and the respective EMPs based on final detailed designs; (ii) training and building capacity of PMU and PIU staff on environmental management, supervision, reporting, and monitoring of implementation of EMPs; (iii) orienting contractors on implementation of the EMPs; (iv) reviewing the environmental method statements provided by contractors and guide them on any revisions required; (v) monitoring implementation of the EMP and recommending any corrective actions on any unforeseen environmental impacts; and (vi) taking the lead in preparing environmental monitoring reports for PMU to be submitted to ADB and CEA.

24. It is the responsibility of the PMDSC staff working under the Resident Engineer to undertake monitoring of CEMP as part of construction supervision, with technical inputs from the PIU environmental officer. The monitoring formats for monitoring EMP implementation at the construction site, and other indirect impact areas, such as quarries, borrow and waste disposal and dumping areas, shall be prepared by the Environmental Specialist of the PMDSC and introduced at the orientation program. All forms of monitoring should be accompanied by regular monitoring reports including, where appropriate, dated photographs, interview results, and any test reports produced by independent firms or accredited laboratories (such as water, air and sediment quality). All the reports produced should be kept with the Project Director of the PIU, and a copy should also be kept on site by the Engineer to be made readily available to any interested party.

25. Apart from the routine monitoring conducted by the PIU Environmental Officers and the Engineer's staff, the PMU Environmental Specialist will also carry out periodic reviews (at quarterly intervals) to ensure that all the mitigation measures proposed have been carried out as specified in the EMP. The PIU Environmental Officers will report directly to the respective PIU Project Director, and the PIU Project Directors as well as the PMU Environmental Specialist then report to the Program Director. **Table 1-2** summarizes the site environmental monitoring and recording/ reporting events.

Table 1-2: Summary of site environmental monitoring and recording/ reporting events

No.	Mode	Frequency	Purpose/ Action	Agency Responsible
1.	Ambient Environmental quality monitoring (Air Quality, Noise, Vibration, Water and Sediment quality)	Quarterly intervals for the routing monitoring during the construction phase	Ensure compliance particularly for the key parameters having critical impacts	Independent accredited laboratory contracted through the PMDSC
2.		As and when required	Correcting any environmental issue (i.e. oil spill, sedimentation, high noise & vibration, upon any complain of non compliance etc.)	Contractor's Environmental Officer under the guidance and supervision of

				counterpart staffs of PIU/PMU and Site Engineer
3.	Monitoring Contractor's EMP items particularly related with constructional impacts on physical environment (hydrology, soil, ambient air quality, noise & vibration, traffic etc)	As per the implementation schedule given in the CEMP	• Site Environmental monitoring walk around the construction area and other direct /indirect impact areas (burrow sites, disposal, stockpiling and Contractor's facilities) • Completing the Monitoring formats • Feeding monitoring data into the Data base (Information Management System -IMS) • Accidental Environmental issues to be informed to the Environmental Officer / PIU and Environmental Officer PMU/PMDSC and take immediate remedial actions	Construction Supervision Engineers and PIU Environmental Officer, under the guidance of Environmental Specialist of PMU/PMDSC
4.	Monitoring impacts and implementation of mitigatory measures as per the updated EMP (particularly impacts related to the ecological and socio-economic aspects) and conditions given by CEA Environmental approval	As per the implementation schedule given in the updated EMP		PIU Environmental Officer with the assistance of the supervision engineers as per the availability of the resources , under the guidance of Environmental Specialist of PMU/PMDSC
5.	Reporting and reviewing	Monthly	Monthly compliance monitoring reports	Environmental Officer (EO) of PIU with Resident Engineer
			• Daily Review mitigations • Daily updating Environmental Issue log, Environmental safety log, Grievance log • Concise summary of environment management during past month; 2 weeks in advance of Monthly Progress meeting	Environmental officer of the Contractor Review by the RE / PIU
6.	Site audit	Weekly-regular	Site environment monitoring walk round by EO-PIU with RE's and Contractor's relevant staffs	EO-PIU with Engineer and Contractor
7.	Site audit	Monthly-regular	Site environment inspection by RE and PD with participation of ES-PMU, EO-PIU & other relevant staffs	EO-PIU with counterpart staffs of Engineer and Contractor
8.	Surprise site audit	Once in 2 months (minimum)	Un noticed site inspection/ document review by ES-PMU and ES-PMDSC	ES-PMU

9.	Monthly Project Progress Meeting (MPPM)	Monthly-regular	Key environment events/ concerns will be taken up at PD and RE level	PD-PIU, RE-PMDSC and ES-PMU & EO-PIU
10.	Monthly Environment Meeting	Monthly-regular	As a follow-up meeting to sort out matters arising at MPPM and in the Monthly Environmental Monitoring Reports (EMR) or any new developments	EO-PIU with counterpart staffs of Engineer and Contractor. ES-PMU as required
	Environment Monitoring Committee	Quarterly or as advice by CEA	Site monitoring, review of reports and mitigations adopted as decide by the EMC	EO-PIU to coordinate
11.	Periodical EMR	Annually to ADB and quarterly to EMC (CEA)	A summary of Project environment management over the last year, including self-monitoring findings, issues with mitigations and independent ambient environment monitoring results, progress in grievance redress and forecast for next year etc.	Produce by PMDSC Review & Submit to ADB & CEA by PMU
12.	Progress Meeting of the Program	Monthly	Brief the key achievements, drawbacks and issues on environment management	PD-PIU, ES-PMU & PMDSC
13.	Steering Committee Meeting of the Program	Monthly	Brief the key achievements, drawbacks and issues with inputs from monthly progress meeting; on environment management	PD-PMU, PD-PIU (and ES-PMU & PMDSC as required)

26. The PIU Project Director should convene the CEA Monitoring Committee once every four months at the site of each construction contract, where the responsible PIU Environmental Officer, supported by the PMU Environmental Specialist, will present a report on the environmental monitoring activities and progress related to mitigation measures. The CEA Monitoring Committee meeting should then be followed by a site visit to clarify any specific issues pertaining to monitoring.

27. The PMU Environmental Specialist will be responsible for preparing and submitting a regular Monitoring Report to the ADB, which will be displayed in the ADB website.

2 SUMMARY OF POTENTIAL IMPACTS

28. The following section summarizes the most important potential environmental and social impacts related to Minipe anicut raising and LB canal rehabilitation as per the Scope of Work and the List of Works specified in the Section 6 (Employer's Requirements) of the Bidding Documents for the relevant contract packages.

29. **Tables 2-1 and 2-2** provide summaries for the anticipated impacts during construction and operation and the details of mitigation measures are given in Section 3 of this document.

Table 2-1: Anticipated Impacts during pre - Construction & Construction

	Direct/ Indirect	Primary/ Secondary	Tempo-rary/ Cumulative	Reversi-ble/ Irreversi-ble	Short Term/ Long Term	Mitiga-tion Prior-ity
A. ECOLOGICAL						
Felling of trees and inundation of 23 ha in VRR sanctuary	Direct	Primary	Cumulative	Irreversible	Long term	Moderate
Impacts on sensitive ecosystems	Indirect	Primary	Cumulative	Irreversible	Long term	Moderate
Impacts on aquatic fauna	Direct	Primary	Cumulative	Irreversible	Long term	Moderate
Impacts on threat-ened Flora	Direct	Primary	Cumulative	Irreversible	Long term	Low
Effects on flood plain ecology	Indirect	Secondary	Cumulative	Irreversible	Short term	Low
Loss of flora and fau-na	Direct	Primary	Cumulative	Irreversible	Long term	Moderate
Effects on protected areas	Indirect	Primary / second-ary	Cumulative	Irreversible	Long term	Low
Habitat deterioration	Direct /Indire ct	Primary	Cumulative	Irreversible	Long term	Moderate
Potential Human-wild life conflict	Indirect	Secondary	Cumulative	Irreversible	Long term	Low
Disturbances to the water supply to Kadu-ruwela tanks in Wasgamuwa National park	Direct	Primary	Cumulative	Reversible	Short term	Moderate

	Direct/ Indirect	**Primary/ Secondary**	**Tempo-rary/ Cumulative**	**Reversi-ble/ Irreversi-ble**	**Short Term/ Long Term**	**Mitiga-tion Prior-ity**
B. SOCIAL						
Relocations of people	None	None	None	None	None	None
Impacts on livelihood activities (Irriga-tion/fishing / business etc.) / economic activ-ities	Direct	Primary	Cumulative	Reversible	Short term	Moderate
Impacts on land use patterns	Direct /Indire ct	Primary / Second-ary	Cumulative	Irreversible	Long term	Moderate
Impact on altering water supply on users	Direct	Primary	Temporary	Reversible	Short term	Moder-ate
Impacts on occupa-tional health and safe-ty and community health and safety	Direct /Indirect	Primary / Secondary	Cumula-tive	Partially reversible	Long term	High
Socio-cultural impacts due to migratory works	Direct /Indirect	Secondary	Temporary	Irreversi-ble	Short term	Moder-ate
Socioeconomic bene-fits (Other than em-ployments) to be pro-vided to the local people	Direct /Indirect	Secondary	Temporary	Reversible	Short term	Moder-ate
Impacts on existing infrastructure and service facilities avail-able for people of the area	Direct /Indirect	Secondary	Cumula-tive	Reversible	Short term	Low
Impact on water users of LB main scheme	Direct	Primary	Temporary	Reversible	Short term	Moder-ate
Impact on water users of RB main scheme	None	None	None	None	None	None
C. PHYSICAL						
Soil erosion and sedi-mentation	Direct	Primary	Temporary	Irreversi-ble	Short term	Moder-ate
Dust, emissions	Direct	Primary	Temporary	Reversible	Short term	Moder-ate
Noise & Vibrations	Direct	Primary	Temporary	Reversible	Short term	Moder-ate

	Direct/ Indirect	Primary/ Secondary	Tempo-rary/ Cumulative	Reversi-ble/ Irreversi-ble	Short Term/ Long Term	Mitiga-tion Prior-ity
Transport and dispos-al of dredged material	Direct	Primary	Temporary	Reversible	Short term	Moder-ate
Impacts on borrow areas	Direct	Primary	Temporary	Reversible	Short term	Moder-ate
Drainage problems	Direct	Primary	Temporary	Reversible	Short term	Moder-ate
Inundation of the ad-jacent forest area	Direct	Primary	Cumulative	Irreversi-ble	Short term	Moder-ate
Groundwater re-charge	Indirect	Secondary	Cumulative	Irreversi-ble	Long term	Low
Traffic	Direct/ Indirect	Prima-ry/Secondary	Temporary	Reversible	Short term	Low
Impact on land stabil-ity	None	None	None	None	None	None

Table 2-2: Anticipated Impacts during Operation and Maintenance

	Direct/ Indirect	Primary/ Secondary	Tempo-rary/ Cumula-tive	Reversible/ Irreversible	Short Term/ Long Term	Mitigation Priority
A. ECOLOGICAL						
Low flows along the stretch of the Ma-haweli river down-stream of the Minipe anicut up to the con-fluence of the Badulu Oya (approximately 6.5 km in length)	Direct	Primary	Cumula-tive	Irreversible	Long term	Moderate
Increased wildlife-human conflict	Indirect	Secondary	Cumula-tive	Irreversible	Long Term	Moderate
Better supply of water to Kaduruwela tanks in Wasgamuwa National park	Direct	Primary	Cumula-tive	Irreversible	Long term	Moderate
B. SOCIAL						
Continuous supply of water to the LB tail end	Direct	Primary	Cumula-tive	Irreversible	Long term	High

Improvement of the living standards of benefiting the community	Direct	Primary / Secondary	Cumulative	Irreversible	Long term	Moderate
Issues with the water management	Indirect	Secondary	Temporary	Reversible	Long term	Low
C. PHYSICAL						
Increased Pollution	Indirect	Secondary	Cumulative	Irreversible	Long Term	Low
Increase the disturbance to soil resulting in increase in the sedimentation rates.	Indirect	Secondary	Cumulative	Irreversible	Long Term	Moderate
Increased use of fertilizer and pesticides that will result in increased pollution	Indirect	Secondary	Cumulative	Irreversible	Long Term	Moderate

3 DESCRIPTION OF PLANNED MITIGATORY MEASURES

30. An Environmental Management Plan (EMP) has been provided containing (i) project activity; (ii) potential environmental impacts; (iii) planned mitigation measures; (iv) monitoring scope; (v) institutional responsibility; and (vi) proposed timing for implementing mitigation measures related to the Minipe Left Bank Canal rehabilitation and anicut raising.

31. The EMP in **Table 3-1** is divided into three sections for ease of reference – of specific relevance to the Contractor's responsibilities on site are the activities under Section B (Construction):

(A) Preconstruction

32. Activities related to land acquisition, addressing grievances of affected communities, livelihood management related to the forthcoming construction works.

(B) Construction

(i) Activities related to initial mobilisation and establishment of the site:

a) achieving initial access into the site and construction of temporary access roads

b) preparation of site establishment areas for the various temporary site facilities

c) construction of Contractor's camps, including facilities for offices, storage, accommodation, equipment, aggregate production/storage, concrete production etc., as well as facilities for the Employer and the Engineer, and establishment of associated utilities and systems

d) establishment of borrow areas, ready to commence operations

e) establishment of quarries, ready to commence operations

(ii) Generic environmental impact management issues related to construction activities:

a) Health and safety related to all construction activities

b) Transport and storage of construction materials and machinery operation

c) Clearing of site, removal and disposal of construction debris and excavated materials

d) Activities related to significant noise and vibration

e) Activities related to the emission of dust

f) Activities related to the hindrance of surface runoff and soil erosion

g) Construction / removal of water diversions and cofferdams

h) Provision of information disclosure among stakeholders.

(iii) Special environmental impact management issues related to construction activities:

33. The impacts related to the list of works identified in the Section 6 (Employers Requirements) of the Bidding Document such as:

a) Restricting any damages to the nearby wild life protected areas

b) Avoiding any tree felling other than the identified trees and if any additional trees are to be felled, they should be enumerated and removed with the consultation of respective Divisional Secretary and Forest Department through the State Timber Cooperation

c) Selection of suitable construction material borrow, disposal, and stock piling areas avoiding the protected areas under the Fauna and Flora Protection Ordinance (FFPO) or Forest Ordinance (FO) of GoSL

d) Maintaining a continuous water supply in the LB canal during construction to ensure water availability in the Kadurupitiya 1 & 2 tanks located in the Wasgamuwa National Park

e) Planting of trees along the canal reservation in order to compensate the habitat loss due to heightening the Minipe anicut

f) Provision of silt traps where required and carrying out rock excavation, canal lining, and other related earth & concrete work in the LB canal with the minimum disturbances to the existing natural aquatic and terrestrial ecosystems along the LB canal and to the livelihood and socio-economic activities of the community living in the area

(C) Operation and Maintenance

34. Activities related to the operation and maintenance phase of the Works under each contract.

35. The Contractor will be responsible for fulfilling the mitigatory measure requirements set out under the Section B (Construction) throughout the construction period. Table 3-2 shows the Environmental Monitoring Plan (EMoP) of the key monitoring aspects identified related to the EMP to ensure that required mitigation measures are in place, which comply with the appropriate safeguard policies.

Table 3-1: Environmental Management Plan (EMP)

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
1. Felling of trees 2. Inundation of the wild life areas due to Minipe anicut raising	a. Loss of habitats	• The Contractor shall remove only the required trees that would disturb the construction activities. • If any trees to be saved due to lowering of the weir height by 0.5m, such trees shall be protected without removing from the site. • If there are any additional trees to be removed, other than the identified trees, the Contractor must obtain required approval from the Divisional Secretariat under the guidance of PMDSC and PMU • Trees shall be removed from the construction sites before commencement of construction with prior permission from the concerned department. • Compensatory plantation by way of Re-plantation of at least twice the number of trees cut should be carried out in the project area. • Reforestation program to be initiated by the Contractor of the relevant contract packages (during the LB canal rehabilitation) in the identified reforestation areas along the LB canal (directed by PMU/PIU). (Annex 2). • The reforestation to be carried out using the native tree species and the recommended tree species are given in the Table 4 under the Annexure V of the IEE report (April 2015) • Contractor shall make every effort to avoid removal and/or destruction of trees of religious, cultural and aesthetic significance.	• The approval from relevant government agency (Local authority / DWLC / FD) is obtained for the all pre-identified and marked trees to be removed which are more than 30 DBH/cm • Trees are removed from the site before starting the construction activities contacting concerned department (Timber cooperation/ Local authority etc) • Reforestation program is initiated by the Contractor as per the guidance given in the EMP and contract documents and planted area (Ha)	Contractor to implement PMU/PMDSC to guide the Contractor EO of Contractor, Environmental officer of PIU and the environmental specialist of PMU	Weekly during the preconstruction stage Reforestation activities to be monitored every week during the initial stage and once the planting is done once in every 2 weeks monitoring to maintain it

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		• If such action is unavoidable the Engineer shall be informed in advance and carry out public consultation and report on the same should be submitted to the Engineer. • Contractor shall adhere to the guidelines and recommendations made by the Central Environmental Authority, if any with regard to felling of trees and removal of vegetation. • Removed trees must be handed over to the Timber Corporation	• No burning of vegetation parts within the construction site • Excess vegetation matter is properly disposed or reused		
3. Construction of labour camps	b. Contamination of receptors (water, land, air) c. Environmental & Social damages d. Social unrest	• The location, layout and basic facility provision of labour camp must be submitted to the Engineer prior to their construction. • The location of labour camps must be strictly avoided the areas of wildlife/forest protected, any areas with environmental and social sensitivity (near religious places, schools, canal reservations etc.) • The prior approval of Pradeshiya Sabha-Local Authority-, Hasalaka shall be obtained for construction of labor camp • The construction will commence only upon the written approval of the Engineer. • The Contractor shall maintain necessary living accommodation and ancillary facilities in functional and hygienic manner and as approved by the Engineer. • All temporary accommodation must be constructed and maintained in such a fashion that uncontaminated water is available for drinking, cooking and	• Site is not established within areas protected under FFPO and FO • Site Management Plan for the camp available and Camp is installed strictly in accordance with Safety Management Plan • Labour camps with proper facilities such as enough spaces, ventilation, beds, mosquito nets, lavatories, bathing facilities, drinking water are available	Self monitoring by EO of the Contractor EO of PIU and Resident Engineer of PMDSC for supervision	Weekly inspection during the Preconstruction period

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		washing. The sewage system for the camp must be planned and implemented with concurrence from the Local Public Health Inspector (PHI) • Adequate health care is to be provided for the work force. The layout of the construction camp and details of the facilities provided should be prepared and shall be approved by the engineer. • The required training, notices and sign boards in and around the site related to best construction & engineering practices, occupational health and safety, commutable diseases, best behavioural practices shall be facilitated by the Contractor at the labour recruitment • The procedural and infrastructural requirements for emergency responses shall be incorporated in to the camp site construction plan and be duly made available • Labour camp sites after use should be cleared and the site should be reinstated to previous condition at the close of the construction work.	• Waste water collection and treatment is implemented properly • The sewage system for the camp is planned and implemented with concurrence from the Local Public Health Officer (PHI) • Camp is kept clean from debris, garbage, etc. Waste is collected and disposed of in approved sites		
4. Burrowing of Earth and Management of Burrow Sites	a. Resource depletion b. Damage to wildlife, forest resources c. Environment Pollution d. Health & safety issues	• Earth available from construction site excavation works as per design, may be used as embankment materials, subject to approval of the engineer • The Contractor shall comply with the environmental requirements/guidelines issued by the CEA and the respective local authorities in respect of locating burrow areas and with regard to all operations related to excavation and transportation of earth	• Site is not established within areas protected under FFPO and FO Water and air quality • EPLs from CEA have been obtained and not expired • LGA permits are	Resident Engineer of PMDSC for supervision and Contractor will execute PIU- EO to supervise	Once a week during Preconstruction and Construction Period

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		from such sites. • The Contractor can also find suitable soil materials from currently operated, licensed burrow pits in the surrounding area, subject to approval of the engineer • No burrow-sites be used (currently approved) or newly established within areas protected under FFPO and FO • Burrow areas shall not be opened without having a valid mining license from the GSMB. The location, depth of excavation and the extent of the pit or open cut area shall be as approved by the engineer. • All burrow pits/areas should be rehabilitated at the end of their use by the Contractor in accordance with the requirements/guidelines issued by the CEA and the respective local authority. • Establishment of burrow pits/areas and its operational activities shall not cause any adverse impact to the nearby properties. Also shall not be a danger of health hazard to the people. • The Contractor shall take all steps necessary to ensure the stability of slopes, including those related to temporary works and borrow pits. • If the Contractor uses non-commercial burrow/quarry sites, the sites should be remediated accordingly once material sourcing has been completed. The Project Supervision Engineer will re-	available Construction material storage areas • Burrow site reinstatement • Approved site rehabilitation plan is available • Operation manual is available on site • Excessive site noise managed by restricting operating hours • Noise & vibration level has been checked periodically • Dust control is implemented on dump, excavation or topsoil stockpile site • Slopes are stable and no possibilities of eroding / landslides • Sediment laden runoff from excavation or dumping sites does not enter natural water		

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		quire maintaining the numbers and relevant details of all necessary licenses etc. and report of their status accordingly.	courses • No water ways/ bodies blocked • Water logging is not evident in the site • No soil/water contamination from oil/fuel/leachate /debris etc. • No damage to important flora/fauna or habitats • No human - wild life conflicts • No spreading of invasive species promoted • No unnecessary or improper interference has been done to the convenience of public, access, occupation of public, private road, or foot paths • No materials have been stacked or placed to cause danger or inconvenience to any person		

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
			or the public • Tires of vehicles are free of mud and entrained material before entering public roads • Public roads are cleaned of any material dropped during transit • Haulage routes and the vehicle fleet schedules are strictly followed to ensure no traffic congestions		
5. Quarry Operations and Management of Quarry Sites	a. Resource depletion b. Damage to wildlife, forest resources c. Environment Pollution d. Health & safety issues	• Utilizing the existing quarry sites available in the project influential area as much as possible, which are approved by GSMB with valid EPL and Industrial Mining Licenses; • If new quarries are to be opened, prior approval should be obtained from GSMB, CEA and local authorities such as Pradeshiya Sabha. • Selected quarry sites should have proper safety measures such as warnings, safety nets etc., and third party insurance cover to protect external parties that may be affected due to blasting. • Quarry sites should not be established within pro-	• Site is not established within areas protected under FFPO and FO Water and air quality • EPLs from CEA have been obtained and not expired • LGA permits are available Construction material storage areas • Obtained required	Resident Engineer of PMDSC for supervision and Contractor will execute EO of PIU to provide necessary guidance	Once a week during the Pre-construction and Construction Period

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		tected sites identified under the FFPO and FO • It is recommended not to seek material from quarries that have ongoing disputes with the 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 should be maintained by the Contractor for review and documentation by the engineer	approvals from the Defence Ministry to use/transport explosives for quarry operations • Burrow site reinstatement • Approved site rehabilitation plan is available • Operation manual is available on site • Excessive site noise managed by restricting operating hours • Noise & vibration level has been checked periodically • Dust control is implemented • No spreading of invasive species promoted • No unnecessary or improper interference has been done to the convenience of public, access, occupation of pub-		

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
			lic, private road, or foot paths		
6. Information Disclosure among Stakeholders	a. Social unrest b. Disturbances to the livelihood	• Discussions should be conducted with the residents who reside around the immediate vicinity of the construction site; provide them with information on the project activities muster their views for possible impact mitigation as this will also ensure a good rapport and less complains. This should be done immediately once the Contractor is mobilized. a) Disclosure of DDR Results b) Consultation and verification with encroaching farmers, on sites specified by the Contractor, where they will require for construction – as per Contractor's construction plan. c) People affected if canal water cut due to Contractor (not annual cuts by authorities) will need appropriate coverage of awareness • The Community organizations and religious chiefs to be addressed and discuss the expectations and project interventions, and arrange the method of communication during the project activities where necessary • The Contractor will maintain a log of any grievances/complaints and actions taken to resolve them. (Types of complaints, numbers of complaints, how complaints were resolved, numbers unresolved, those sent to next level of GRM, satisfactory outcome etc.)	• People informed about the project activities prior to the Contractor mobilization • People are notified on inconveniences, road closure, stopping water issue in the canals, drinking water supply, electricity breaks, etc., Meeting with community members on construction activities, environmental impacts and mitigation measures held • Grievance Log maintained • Complains observed during the last visit addressed	EO & Social & Resettlement Officer of PIU Resident Engineer of PMDSC for supervision Contractor will execute	Every 2 weeks

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		• A copy of the approved IEE report, the CEA Approval and any other approval issued by Government Authority and the EMP should be available at all times at the project supervision office on site.			
CONSTRUCTION PHASE: **Generic environmental impact management issues related to construction activities & Activities related to initial mobilisation and establishment of the site**					
7. Health & Safety related to all construction activities	a. Public and Worker Safety	• The construction site should be barricaded at all time in a day with adequate marking, safety tape, flags, reflectors etc. for safety of individuals using the site daily basis. (Items such as parking cones, lights, tubular markers, orange and white strips and barricades of a luminous nature for night visibility shall be procured where deemed necessary) • At all times, the Contractor shall provide safe and convenient passage for vehicles, pedestrians and livestock. Work that affects the use of existing accesses shall not be undertaken without providing adequate provisions to the prior satisfaction of the Engineer. a) Alternative accesses to be arranged; b) Nearby pedestrian access be arranged (across canls in the case of bridge reconstruction); c) Adequate signage for detours is provided. • The construction site should be clearly demarcated by the above means and restriction of access to public to the site will help the safety of public. • Safety signboards should be displayed at all neces-	• Warning signs and exclusion barriers erected around work site areas • Workers are provided with and are using the uniform, applicable safety / protection equipment for site conditions • Worker's health checks implemented • Sanitary-hygienic conditions for workers are provided: drinking and washing water supply, mealtime utilities, toilets, rest time, resting areas	Contractor will execute and EO of PIU with the supervision engineers will monitor under the supervision of RE	Every 2 weeks during the Construction period

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		sary locations. • The Contractor should obtain a Third party insurance to compensate any damages, injuries caused to the public or laborers during the construction period. • All construction vehicles should be operated by experienced and trained operators under supervision. • Basic on-site safety training should be conducted for all labourers during the EMP training prior to the start of the construction activities. • All digging and installation work should be completed in one go, if this task is not accomplished in the area should be isolated using luminous safety tape and barricading structures surrounding the whole area. • Trenches should be progressively rehabilitated once work is completed. • Material loading and unloading should be done in an area, well away from traffic and barricaded • Construction wastes should be removed within 24 hours from the site to ensure public safety. • The procedural and infrastructural arrangements shall be in place to ensure the compliance with the Labor Law of Sri Lanka (Factories Ordinance Act No. 45 of 1942) and the Core Labor Standards 2006	etc • First aid kit is available on-site and is accessible to all workers • Fire extinguisher available • Security/emergency alarms/ lighting etc are in place • Copy of ERP and emergency contact list are available, updated and posted in a visible place at all work sites • Accident report maintained • Damage of utilities and/or other structures managed • Program' H&S Manual and its updates • Maintained Risk Register		

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		(ADB & ILO) and as otherwise required by the Program Health and Safety manual (and updated documents) prepared by the PMDSC • Health and safety manual to be referred followed by the training conducted by the Health and Safety Specialist of PMDSC			
	b. Safety Gear for Labor	• Protective footwear and protective goggles should be provided to all workers employed in mixing of materials like cement, concrete etc. • Welder's protective eye-shields shall be provided to workers who are engaged in welding works. • Earplugs shall be provided to workers exposed to loud noise, and workers working on crushing, compacting, or concrete mixing operation. • The Contractor shall supply all necessary safety appliances such as safety goggles, helmets, safety belts, ear plugs, mask etc. to workers and staffs. • In addition, the Contractor shall maintain in stock at the site office, gloves, ear muffs, goggles, dust masks, safety harness and any other equipment considered necessary. Safety gear should be worn for specific potential risks of a specified activity in which the worker is engaging. • A safety inspection checklist should be prepared taking into consideration what the workers are supposed to be wearing and monitored on a monthly ba-			

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		sis and recorded			
	c. Prevention of accidents	• Prevention of accidents involving human beings, animals or vehicles falling or accidents due to open trenches/manholes during the construction period. This needs to be ensured with proper barricading, signage boards and lighting etc. • A readily available first aid unit, including an adequate supply of sterilized dressing materials and appliances should be available at the site office at all times • Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital should also be insured. • Safety protocols/ arrangements for working; (i) over heights, (ii) near or over water, (iii) during night time/ under poor lighting and (iv) in confined spaces etc. • Site emergency response protocol including evacuation plan shall be available and displayed at key locations in the site. The evacuation route and assembly points shall be duly marked with sign boards and mock drill shall be undertaken in a defined time intervals. • A brief/ detailed site safety orientation (induction) shall be given to any new comer to the site by the Contractor's safety staff. • A qualified and experienced safety staff shall be			

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		available to ensure site safety compliance. • any person entering to the active work site shall wear necessary safety gears and follow the safety protocols • Names and contact information for emergency services such as Ambulance services, hospitals, police and the fire brigade should be prepared as a sign board and displayed at the work site.			
8. Transport and Storage of construction materials and machinery operation	a. Spreading dust and impact due to hazardous material	• All material should be transported in fully covered trucks. Overloading of vehicles with materials should be controlled and done in a manner to suit the truck capacity and tailgates of the trucks should be closed. • Construction material such as cement, sand and metal should be stored in closed structures or in a contained manner. • Material haulage routes and stockpiling areas to be well defined with the prior approval of the respective authorities and the engineer, and all the measures to be followed by the suppliers to avoid any environmental issues (dust, noise, nuisance to public, traffic etc.)	• Required licence and approval in compliance with CEA regulations • Emission from machineries has been controlled • All the machineries have been fitted with proper exhaust silencers • Exhaust silencers have been checked periodically • Tires of vehicles are free of mud and entrained material before entering public roads • Public roads are	EO of PIU will monitor with the assistance of supervision Engineers Contractor will execute under the self monitoring of EO of the Contractor	Every 2 weeks during the Construction phase

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
			cleaned of any material dropped during transit • Haul trucks use tarpaulins to cover loads for transportation on public roads • Haul truck tailgates and sides fit properly and do not allow material to fall on public roads • Haulage routes and the vehicle fleet schedules are strictly followed to ensure no traffic congestions		
	a. Pollution of Soil and Water via Fuel and Lubricants	• The Contractor shall ensure that all construction vehicle parking locations, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refuelling sites shall be located away from rivers, at least 200m away, and irrigation canal/ponds. • The Contractor shall ensure that all vehicles/machinery and equipment operation, maintenance and refuelling will be carried out in such a fashion that spillage of fuels and lubricants does not con-	• Hazardous material are transported/ stored and handled as per the safety data sheet • All the locations are well identified and demarcated for vehicle parking, fuel / lubricants storage,	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	Ever 2 weeks during the Construction phase Water quality monitoring every 3 months

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		taminate the ground. • The Contractor shall arrange for collection, storing and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to the Engineer) and approved by the Engineer. Oil spills and collected petroleum products will be disposed of in accordance with standards set by the CEA/MEMD. • The engineer will certify that all arrangements comply with the guidelines of CEA/MEMD or any other relevant laws.	vehicle, machinery and equipment maintenance and refuelling etc • Above sites are located away from rivers/ water ways, at least 200m away • Visual observations of waste remains left onto the soil surface (oil spills, grease patches, any other chemical spillage etc.) • Vehicles and machinery are up to the standard operation conditions (standard emission conditions, no oil/grease leak etc)	Periodical water quality monitoring through qualified 3rd party consultant	
9. Clearing of site removal and disposal of construction debris and excavated materials	a. Environmental Pollution b. Nuisance to the public	• During site clearance activities, removal of vegetation and debris must be carried out swiftly and in well-planned manner. • The Contractor shall identify the sites for disposal of material cleared. • Plants, shrubs and other vegetation cleared should	• The work site and the surrounding area kept clean free from debris, garbage, etc. • Sign boards in place to direct / notify about waste / spoil	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self	Every 2 weeks during the Pre-Construction phase

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		not be burned on site. • Spoil and other disposal materials should only be dumped at sites for which prior approval from relevant authorities such as the Local Authority has been obtained. Taking into account the following • The dumping does not impact natural drainage courses • No endangered / rare flora are impacted by such dumping • Should be located in non-residential areas located on the downwind side • Located at least 100m from the designated forest land. • Avoid disposal on productive land. • Should be located with the consensus of the local community, in consultation with the Local Authority and the relevant Road Development Authority • Minimize the construction debris by balancing the cut and fill requirements. • The Contractor should avoid any spillage of spoil when transporting such materials to the approved material dumping sites. • Hazardous waste shall be disposed of as per the Schedule VIII of Part 11 of the National Environmental (Protection & Quality) Regulation No. 1 of 2008, as	disposal location and mechanism within and around the work site • EPL for waste water treatment facilities and waste disposal sites are obtained and up-to-date • Drainage paths not blocked • Construction wastes are removed within 24 hours from the site • Hazardous material are transported/ stored and handled as per the safety data sheet • Waste disposal sites are located away from rivers/ water ways, at least 200m away and 100 m away from the forest lands	monitoring of EO of the Contractor	

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		amended by the gazette notification No. 1534/18 dated 01.02.2008 on the generator of scheduled waste			
10. Activities related to significant noise and vibration	a. Noise from vehicles, machinery and equipment	• Noise generating work should be limited to day time (6:00AM to 6:00PM). No work that generates excessive noise should be carried out during the night hours where in close proximity (from 6:00PM to 6:00AM on the following day). • All equipment and machinery should be operated at noise levels that do not exceed the permissible level of 75 dB (during construction) for the daytime. For all construction activities undertaken during the night time, it is necessary to maintain the noise level at below 50 dB as per the Central Environmental Authority (CEA) noise control regulations • All equipment should be in good serviced condition. Regular maintenance of all construction vehicles and machinery to meet noise control regulations stipulated by the CEA in 1996 (Gazette Extra Ordinary, No 924/12) must be conducted for vehicles/machinery that will be used in construction on the site and for transport. • Ideally noise generating work should not be carried out during public holidays and religious days. Special care should be taken as there is a temple nearby. • Labour gangs should be warned to work with minimum noise. Strict labour supervision should be undertaken in this respect. Number of night time resi-	• Construction equipment - estimated noise emissions and operating schedules • Allowable noise levels in the boundary of construction sites are kept below 75 dB in day time. • Operation hours • Allowable vibration limits as per the CEA interim standards (2008) • Stationary construction equipment are kept at least 500m away from sensitive receptors (temporary, schools, public places etc.) • Idling of temporary trucks or other equipment are not	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor Periodical Noise & Vibration monitoring through qualified 3rd party consultant through an accredited laboratory	Every 2 weeks during the Construction phase Noise & Vibration quarterly year concerning the construction activity schedule

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		dent labourers should be minimized.	permitted during periods of loading / unloading or when they are not in active use • The vehicles/ machineries used by the Contractor (specially the high noise & vibration generating) is as per the list approved by the RE and no additional are used		
	b. Vehicular noise pollution at residential / sensitive receptors	• Idling of temporary trucks or other equipment should not be permitted during periods of loading / unloading or when they are not in active use. The practice must be ensured, especially near residential / commercial / sensitive areas. • Stationary construction equipment will be kept at least 500m away from sensitive receptors, where possible. These include places of worship and households. • All possible and practical measures to control noise emissions during drilling shall be employed. • Contractor shall 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 shall be regular and up to the satisfaction of the Engineer to keep noise levels at the minimum.		Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	Every 2 weeks during the Construction phase
11. Activities related to the emission of dust	a. Impact of dust	• All construction materials such as sand, metal, lime, bricks etc. Should be transported under cover to the site and stored under cover at the site. Plastic sheeting (of about 6 mm minimum thickness) can be used and held in place with weights, such as old tires or	• Construction area is barricaded properly to avoid spreading dust/emissions etc	Supervision Engineers under RE will monitor EO of PIU will peri-	Every 2 weeks during the Construction phase

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		cinder blocks, with the edges of the sheeting buried, or by the use of other anchoring systems. This will minimize the levels of airborne dust. • Mud patches caused by material transporting vehicles on the access road should be immediately cleaned  • Continual water sprinkling should be carried out in the work and fill areas and the access road if dust stir is observed. Water sprinkling should be done more frequently on the days that are dry and windy (at least four time's day) as the levels of dust can be elevated during dry periods.	• Trucks are operating using covers • Material stored under cover suing proper anchoring systems • Tires of trucks / machineries are cleaned before entering city roads • Regular watering of access roads and the construction site • Turfing of finished earthen structures • Dust masks are provided for the workers and using at the required time • Ambient air quality including dust levels monitored through an accredited laboratory during this week	odically monitor Contractor will execute under the self monitoring of EO of the Contractor Periodical Ambient Air quality monitoring through qualified 3rd party consultant assigned to accredited laboratory	

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		 • Dust masks should be provided to the labourers for the use at required times.			
12. Activities related to the hindrance of surface runoff and soil erosion	a. Impact of hindrance to surface runoff, soil erosion and sedimentation	• The debris material shall be disposed in such a manner that the tank, canals and other existing drainage paths are not blocked. • Drainage paths associated with the dam and other irrigation structures should be improved / erected to drain rain water properly. • Silt traps will be constructed to avoid siltation into the waterways, the tank and canals, where necessary. • To avoid siltation, drainage paths should not be directed to the tank and irrigation canals and they should be separated from these water bodies • Bund 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.	• Drains not blocked by sediment or other debris • No flood due to construction work • Silt traps in places • No slope failures and cuts made according to technical standards specified in the design • Earth work is done during the dry spell • Turfing of completed embankments/	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	Every 2 weeks during the Construction phase

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		• All fills, back fills and slopes should be compacted immediately to reach the specified degree of compaction and establishment of proper mulch. • Work that leads to heavy erosion shall be avoided during the raining season. If such activities need to be continued during rainy season prior approval must be obtained from the Engineer by submitting a proposal on actions that will be undertaken by the Contractor to prevent erosion. • 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.	slopes • Grievance log for any public complaints related to erosion/slope failures etc • Visual observation of any turbidity of downstream water ways and erosion, slope failures, deposition of soil/sediment in the agriculture lands • Earth material & debris of the excavated material is properly placed / disposed/ reuse for back filling • Surface water quality measurements of the adjacent water ways as per the baseline conditions set at least 6 months prior to the contract mobilization		

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
13. Construction/ Removal of Cofer Dams	a. Breaching of coffer dams and subsequent social and environmental damages	• Construction and subsequent removal of the cofferdam must be planned and executed with the same degree of care as its installation, on a stage by stage basis as per the approved Method statement by the engineer. • Safety requires that every cofferdam and every part thereof shall be of • Suitable design and construction, of suitable and sound materials and of • Sufficient strength and capacity for the purpose for which it is used. • Thus all material used will be pre assessed by the engineer prior to use and cleared in writing as suitable for the purpose. • As the effect of the removal of the permanent structure must also be considered. For this reason, it may be advisable that sheet piles extending below the permanent structure are cut off and left in place, since their removal may damage the foundation soils adjacent to the structure. • Stringent supervision of respective loads on coffer dams at operation should be done in order to avoid accidents and ensure worker safety • An emergency response plan including means of communication shall be prepared and implemented	• Specifications of the coffer damning • Safety measures • Downstream community awareness • Alarming system	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	When applicable during the Construction phase

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
					
14. Clearing vegetation and water weeds in the canal bed, secondary growth in canal banks	**Impact on Ecological Environment**				
	a. Spreading of invasive species	• Weeds should be removed and placed in a way that drainage will be directed away from the bank and slope. • Significant amounts of sediment are removed during the mechanical process of the weeds, and hence care should be taken to place fragmented vegetative-propagated weeds (i.e. Water hyacinth and hydrilla) away from the slopes because of their ability to re-establish themselves within the canal within a relatively short period of time. • Transportation and disposal of removing weed to be done as per the instructions given by the Engineer, through the identified routes and disposal sites to avoid contamination of associated waterways • It is encouraged to use the removed weeds for making compost fertilizer following standard tech-	• Inspection of soil storage areas, wash down areas, vehicle parking areas and disposal sites for the presence of weeds or alien invasive species by an Environmental officer who identify the IAS and take necessary actions to control the spreading (cleaning vehicles tiers, monthly monitoring of areas where the material transport etc.) • Poster displayed /	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	Once a week during the Pre Construction period

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		niques • Weed control mitigation and management strategies would be clearly explained in the CEMP, including removal mechanism, disposal strategy, location and procedures to reduce spreading of weeds such as visual inspection of vehicles prior to exit from the site, prevention of wash down water drains into waterways etc.	hand outs distributed with the photos of identified IAS to educate villagers/ labors etc • Removal techniques, minimizing habitat degradation and standard disposal practices		
	b. Effect on aquatic fauna and flora	• The area where weed removal is done should be barricaded properly to avoid sediment plumes dispersed over the canal water and disturb the existing fauna and flora • The weed removal techniques to be selected that make the minimal disturbances to the fish and other aquatic species • By passes can be designed around barriers to fish passage. Such bypasses normally have a low gradient and extend from below the obstruction to a considerable distance upstream • No burning of the vegetation cleared on site	• Records on fish die • Turbidity and other water quality parameters	EO of PIU will monitor Contractor will execute under the self monitoring of EO of the Contractor	Once a week during the Pre-Construction phase
	Impact on Social Environment				
	No any significant negative social impact is anticipated if the activities carried out when the water level is low				
	Impact on Physical Environment				
	a. Hindrance to sur-	• Surface run on and off paths should not be selected	• Drains not blocked	Supervision Engi-	Once a weeks

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
	face runoff due to blocking the paths by the removed weeds	for temporary storage of the collected weeds • Provide storm water drain system in the premises which will discharge water to existing storm water drainage networks • Carry out overall storm water management in and around the project influenced area during construction using temporary ditches, sand bag barriers etc. • Proper drainage arrangements to be made, to avoid the overflowing of existing drains due to blocking or hindering by project related activities	by sediment or other debris • No flood due to construction work • Grievance log for any public complaints related to erosion/slope failures etc • Weeds removed and placed in a way that drainage will be directed away from the bank and slope • Transportation and disposal of removed weed done as per the instructions given by the Engineer, through the identified routes and disposal sites to avoid contamination of associated waterways	neers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	during the Pre-Construction phase
	b. Raw water quality of surface water bodies	• The Contractor shall ensure to avoid felling removed weeds into the waterways • The Contractor & the Site Engineer shall ensure to	• Existing canals, streams or water sources have not	Periodical water quality monitoring through qualified	Quarterly intervals per year

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		comply with the mitigatory measures described under Activity 6 (Generic Environmental Impact Management) of this Table 3.1.	been obstructed without relevant permission of the Engineer. • Periodical water quality checks	3rd party consultant RE of PMDSC will supervise EO of PIU and ES of PMDSC will facilitate	Self monitoring will be carried out by the Contractor at any non compliance
15. Clearing secondary growth vegetation, removing roots on canal bunds & cutting overhanging tree branches that disturbed to flow, keeping a minimum 3m on both canal banks	**Impact on Ecological Environment**				
	a. Damage to aquatic and terrestrial habitats	• No removal of large trees and only involves clearing as directed by the Resident Engineer • Scrub and vegetation cleared shall be removed from the construction sites before commencement of construction with prior permission from the respective local authority (where necessary). • The Contractor shall adhere to the guidelines and recommendations made by the Central Environmental Authority (CEA) in the Conditional Approval (CEA/CPO/KY/07/929/12), with regard to removal of vegetation. • 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. The Contractor is responsible for proper management of all vegetative parts that are to be uprooted. • The Contractor shall make every effort to avoid removal and/or destruction of trees of religious, cultural and aesthetic significance. • If such action is unavoidable the Engineer shall be	• Vegetation marking and clearance control (area in ha as specified in BOQ)	EO of PIU will monitor Contractor will execute under the self monitoring of EO of the Contractor	Once a week during the Pre construction

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		informed in advance and carry out public consultation and report on the same should be submitted to the Engineer. • Vegetation clearance must give a proper concern to avoid felling trees / branches into the water body • The project area must be covered or fenced properly to avoid disturbances to the surrounding habitats including the canal water			
	b. Effect on flora, fauna or biodiversity	• All works shall be carried out in a manner that the destruction of the fauna and flora and their habitats is minimized. • There are some threatened / endemic flora species recorded during the IEE study (Section D4), and hence land preparation activities shall be carried out avoiding disturbances to such species. To meet this requirement, the environmental officers to be recruited must have an ecological sense and knowledge • Trees and vegetation shall be cleared 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. • Construction workers shall be instructed to protect fauna, including wild animals and aquatic life as well as their habitats. Hunting, poaching and unauthorized fishing by project workers is not allowed. • No solid or liquid waste resulted during the vegetation clearances should be dumped into natural habitats (Canal & its reservation, surrounding VRR	• Records on wildlife conflicts • Periodical monitoring by the Project team	EO of PIU will monitor ES of PMU will carry out periodical montiroign	Once a week during the Pre construction

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		sanctuary)			
	Impact on Social Environment				
	No any significant negative social impact is anticipated if the activities carried out without limiting the water to the tail end of LB canal. This can be ensure, if all construction activities commence during the dry period without impact is the 2-3 months from August-September-October for construction and construction activities to be completed below Full Supply level of the canal before commencing next Maha season.				
	Impact on Physical Environment				
	a. Increased soil erosion due to removal of roots on the canal bunds	• Plan and conduct earth work during the dry season. • Construct silt traps in drainage paths • Stabilization of the canal banks where erosion is possible using sand bags until the retaining walls are constructed • The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activity 10 (Generic Environmental Impact Management**)** of this Table 3.1.	• Sediment load in the downstream areas • Public complaints	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	Every 2 weeks during the Pre construction
	b. Water pollution	• Construction activities involving significant ground disturbance near surface water bodies should not be undertaken during the rainy season. • The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activity 6 (Generic Environmental Impact Management**)** of this Table 3.1.	• Starting and finishing times of major earthworks near water bodies	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	Every 2 weeks during the Pre construction
CONSTRUCTION PHASE:					

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
Specific environmental impact management issues related to construction activities					
16. Desilting along the canal bed	**Impact on Ecological Environment**				
	a. Impact on aquatic fauna and flora due to increase of the sedimentation in the canal	• The project area must be barricaded properly using sand bags to avoid disturbances to the naturalized habitats existing at the level crossings • De-silting to be carried out in the dry spell when water issues is stopped/ canal bed is dry to avoid spreading the sediment plumes	• Records on fish die • Turbidity and other water quality parameters	EO of PIU will monitor	Every 2 weeks during the construction phase
	b. Dispersion of de-silted material in nearby wetlands and adjoining wild life /forest areas	• The de-silted matter should be timely disposed to the identified disposal sites, so that that dispersion can be avoided. • As far as possible, the de-silted material shall be used for construction activities like (i) strengthening of bank or (ii) formation of embankments. If the material is going to be used for this purpose, then it should be timely used, so that the detrimental effects of the de-silted matter can be minimized	• Visual inspection	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	Every 2 weeks during the construction phase
	c. Impact on the wild-life areas due to dust, noise and dumping de-silted material	• As the VRR sanctuary is located in the close proximity to the LB canal, precautions must be taken to avoid stockpiling the dredged material into those areas • The stockpiling areas to be predefined complying with the CEA standards/FFPO and the identified sites under the approval of local authorities/CEA • The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activities # 7, 8 and 9 (Generic Environmen-	• Records on wildlife conflicts • Periodical monitoring by the Project team • Complaints from Wild Life department	EO of PIU will monitor	Every 2 weeks during the construction phase

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		tal Impact Management**)** of this Table 3.1.			
	d. Impact on wildlife due to the interruption of water supply to Kadurupitiya I & II tanks of Wasgamuwa National Park due to drying canal bed for desilting	• This will be a temporary issue, and will not significantly affect on the water availability of Kadurupitiya tanks I &II • However, if the construction work to be done during extreme dry spell, arrangements to be made to ensure the water availability in those tanks to sustain wildlife in the park and ensure ground water enrichment for the vegetation	• Records on wildlife conflicts • Complaints from Wild Life department • Checking water availability to those 2 tanks		
	Impact on Social Environment				
	a. Temporary water issues affect the domestic water users due to stopping water flow in the canal	• Depending on the water requirements, arrangements shall be made to provide water through bowsers • Coffer damning	• Complaints from the Community • Grievance log	EO & Social & Resettlement Officer of PIU Resident Engineer of PMDSC for supervision Contractor will execute	Every 2 weeks
	b. Mixing sediment to the paddy fields and residential areas	• Silt traps shall be constructed to avoid siltation into waterways and paddy fields where necessary • Consultation with farmers or in other words, working in a collaborative mode is key to minimize many environmental and social challenges faced by the current activities. In order to identify the pragmatic and acceptable solutions to the environmental and social problems, the discussion with the local com-	• Visual Observation • Complaints from the Community	EO & Social & Resettlement Officer of PIU Resident Engineer of PMDSC for supervision	When applicable

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		munity is essential. • Priority should be given to identify the disposal sites near to the desilting place. • In case the path to reach the disposal site goes through the farmland, then concerned farmer should be consulted and a consensus should be tried to achieve to identify the tentative pathway to reach the disposal site.		Contractor will execute	
	c. Temporary disturbances to the livelihood activities (Fishing, farming)	• GRC is formed under the supervision of PIU /PMU and respective stakeholder organizations • The complaints received from such affected people must be addressed incorporating an alternative livelihood assistance program under the consultation of PMDSC Social experts • Contractors will identify in their construction plans, the locations, times, area requirements for construction space in canal reserve areas, and wil PMU/Contractor/PMDSC will consult with farmers at these locations and will have their signatures verified (from agreements to release lands for Contractor use). Any objection will mean review options by Contractor and even RIP. • No trees or structures will be touched, otherwise will trigger RIP process to be implemented with ADB approvals.	• Complaints from the Community	EO & Social & Resettlement Officer of PIU Resident Engineer of PMDSC for supervision Contractor will execute	When applicable
	Impact on Physical Environment				
	a. Noise pollution	• The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described	• Construction equipment - esti-	Supervision Engineers under RE will	Every 2 weeks during the con-

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		under Activity # 8 (Generic Environmental Impact Management**)** of this Table 3.1. • There is a possibility that the local faunal species will get disturbed, so the DWLC (if existing) should be consulted in this regard, so that they can suggest via-media, if possible.	mated noise emissions and operating schedules • Allowable noise levels in the boundary of construction sites are kept below 75 dB in day time. • Operation hours	monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	struction
	b. Wastes of machinery or vehicles; • The leftover / used / discarded oil and/or greases could cause environmental pollution, may be water pollution • If the waste goes to canals/waterbodies/other water sources • Soil pollution if the waste remains left onto the soil surface	• It should be ensured by the executing entity that, the machines and vehicles (for the purpose of silt transportation) should be properly serviced and well-maintained. These should be handled by expert staff. • Any leftover/used/discarded oil and/or greases should not be allowed to be disposed off at the site, so that the associated pollution can be avoided. • Any leftover/ used/ discarded oil/ greases shall be disposed in compliance with the CEA regulations and Local Authority guidelines.	• Visual Inspection and continuous monitoring	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	Every 2 weeks during the construction
	c. In the absence of a comprehensive silt	• Close supervision should be kept to ensure proper disposal / stockpiling of de-silted material at pre-	• Visual Inspection and continuous	Supervision Engineers under RE will	When applicable

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
	disposal plan, there could be overall environmental degradation in that particular area. Key impacts caused by the improper disposal of desilted material will be; • Loss of vegetation from the banks of canals and adjoining areas • In case if high wind blows, the whole vicinity will be covered by a fine layer of silt • It may lead to disruption in movement of machines and trucks (carrying silt and other material) • Degradation/pollution of local water-bodies	decided & approved sites, as per the plan. (CEMP should clearly indicate such) • Deposition of silt on the banks (where it has been pre-decided) should be done in the presence of experienced people (may be a departmental entity or as the case may be), so that in a scenario where the labor is not much aware about the repercussion of their negligence can be checked (from doing so). • After the completion of desilting work in an area, it should be ensured that the area gets restored to its original shape; in addition to this no excess machinery should be kept • If there are any excess of de-silted material unused for backfilling, should be disposed in a predicated/ approved site and site need to be treated properly; – Development of vegetative cover (some species of bushes and dense plants shall be grown to reduce the impact of high surface winds and rainfall (which may cause soil erosion) It is highly essential and should be grown onto the surface area of the disposal site to avoid contamination and dispersion of desilted matter into the nearby existing natural resources (namely – soil and water) of that area. This treatment also doesn't involve much capital, so it should be promoted – Provisions should be clear in the Contract document so that there is no possibility of back-track by the Contractor on this aspect. – In addition to this, the penalty for non-compliance	monitoring • Proper disposal plan in place including storage areas etc. • Public complaints	monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		should also be ensured			
17. Grading, levelling, filling potholes and graveling the operation and maintenance road	**Impact on Ecological Environment**				
	a. Effect on flora, fauna or biodiversity – Disturbance of biodiversity in the area due to vegetation clearance of road side – There are several endemic and threatened fauna and flora species which have been identified during the ecological survey in the associated habitats of the project areas including the identified borrow sites – Habitat loss and pollution of water, including sedimentation, oil-grease contamination, emissions due to the operation of machinery and vehicles would	• All works shall be carried out in a manner that the destruction of the fauna and flora and their habitats is minimized complying with the FFPO and conditions laid by the CEA (CEA/CPO/KY/07/929/12) and DWLC conditions (jcS/6/1/1/171-vii) (Annex 1) • Trees and vegetation shall be felled / removed only if that impinges directly on the permanent works or necessary temporary works. In all such cases, Contractor shall take prior approval from the Engineer. • The Contractor shall make every effort to avoid removal and/or destruction of trees of religious, cultural and aesthetic significance. • If such action is unavoidable the Engineer shall be informed in advance and carry out public consultation and report on the same should be submitted to the Engineer. • Construction workers shall be instructed to protect fauna, including wild animals and aquatic life as well as their habitats. Hunting, poaching and unauthorized fishing by project workers is not allowed. • No solid or liquid waste should be dumped into natural habitats • The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activities # 1-10 (Generic Environmental Impact Management**)** of this Table 3.1.	• Periodical monitoring • Timing of the work to avoid migratory season • Continuous inspection	EO of PIU will monitor	Every 2 weeks during the construction phase

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
	affect the survival of such species – Significant levels of noise and dust produced during material extraction, transportation and construction work, and due to heavy machinery there may be temporary disturbances to the animals (especially migratory birds) inhabiting in the VRR sanctuary and associated wetlands				
	b. The threat of spreading of alien invasive species	• Close monitoring of transportation, storage of borrowing material for the spread of any invasive species must be done. Vehicles should be covered during transportation. • The Contractor shall follow the Mitigation measures mentioned in "Material Sourcing" (Item 2) under Preconstruction stage impacts • Washing the vehicles periodically to prevent carrying any invasive species • All the gravel transporting vehicles must be covered during transportation. Frequent checks for invasive species must be undertaken by the Environmental	• Monthly inspection of soil storage areas, wash down areas, vehicle parking areas and disposal sites for the presence of weeds or alien invasive species by an experienced / knowledgeable Environmental officer with	EO of PIU will monitor	Frequent monitoring during the specific activities take place

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		Specialist (having a sound ecological background).	• Community awareness about the invasive species spreading, causes, prevention etc.		
	Impact on Social Environment				
	a. Disturbance to the day today activities of the people due to obstruction of access roads	• The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activity # 4 (Generic Environmental Impact Management**)** of this Table 3.1. • Road closure and alternative access roads proposed to be prior informed using proper communication methods (notices, announcements etc.)  • Temporary access will be provided when permanent access is blocked for construction. When construction work is in progress on one side, the other side will be opened for traffic & properly trained flagmen	• Community complaints • Grievance log • Proper signalling, displays, and community awareness	EO & Social & Resettlement Officer of PIU Resident Engineer of PMDSC for supervision Contractor will execute	When applicable

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		will be made available with proper sign boards for control vehicles. At the end of each day, the debris that blocked access path will be cleared away under the supervision of a supervisor.			
	Impact on Physical Environment				
	a. Hindrance to surface runoff b. Increasing the possibilities of erosion	• The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activity # 10 (Generic Environmental Impact Management**)** of this Table 3.1.	• Turbidity of downstream water ways • Public complaints	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	Every 2 weeks during the construction phase
	c. Increase in vehicular traffic during transport of construction materials	• A proper traffic management plan should be in place, including a route diversion/alternative routes where applicable. • The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activity # 6 (Generic Environmental Impact Management**)** of this Table 3.1.	• Vehicle fleet • Transport routes taken by construction related vehicles • Implementation of traffic management where necessary	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	Every 2 weeks during the construction phase
	d. Generation of noise, vibration and dust affecting	• The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activity # 8 (Generic Environmental Impact	• Public complainants • Maintenance of	Supervision Engineers under RE will	Ever 2 weeks during the Con-

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
	the social and biological environment	Management) of this Table 3.1.	Grievance log • Watering, noise levels etc.	monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor Periodical monitoring through qualified 3rd party consultant	struction phase Periodical monitoring every 3 months
	e. Generation of dust affecting the social and biological environment f. The dust that can occur during transportation and storing material, during other construction activities would affect the surrounding community, labours and the biological environment including wildlife	• The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activity # 9 (Generic Environmental Impact Management) of this Table 3.1.	• Vehicle fleet • Transport routes taken by construction related vehicles • Watering • Vehicle maintenance log		
	g. Impact due to construction waste	• The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activity # 7 (Generic Environmental Impact Management) of this Table 3.1.	• Waste management plan in place • Approval for the identified waste dumping sites • Public complaints • Visual inspection	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of	Every 2 weeks during the construction phase

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
				the Contractor	
18. Construction of new Turn out structures and cross regulators 19. Construction of curtain walls to existing retaining walls and construction of new retaining walls etc. 20. Construction of bathing steps and side drain inlets at bridges 21. Construction of waste canal from Pallegama Road Crossing up to	**Impacts on ecological Environment**				
	a. Damage to terrestrial and aquatic habitats due to material extraction, transportation, mixing of hazardous material to the surface waters, machinery and equipment handling and other construction activities such as dumping construction waste, material storage etc.	• The project area must be barricaded properly using sand bags to avoid disturbances to the naturalized habitats existing at the level crossings and avoid, minimize water pollution • All works shall be carried out in a manner that the destruction of the fauna and flora and their habitats is minimized complying with the FFPO and conditions laid by the CEA (CEA/CPO/KY/07/929/12) and DWLC conditions (jcS/6/1/1/171-vii) (Annex 1) • The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activities # 1-10 (Generic Environmental Impact Management**)** of this Table 3.1.	• Sediment load in the downstream areas • Public complaints • Visual inspection	EO of PIU will monitor	Frequent monitoring when the specific activity is take place
	b. Affect on wildlife and aquatic fauna due to addition of hazardous material and non-decomposable solid waste (Polythene, Plastic, metal etc.)	• Operation of any concrete mixing shall be located away from the waterways and wildlife areas • The Contractor must ensure to have a Waste management plan in place and the staffs needs to be aware about that. • 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	• Periodical monitoring • Timing of the work to avoid migratory season • Continuous inspection	EO of PIU will monitor	Frequent monitoring when the specific activity is take place

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
Namini Oya Canal spill to prevent entering waste coming from Hettipola town to canal 22. Improvements to Bogahawatta – Maraka – Radunna feeder canals		paths			
	c. The threat of spreading of alien invasive species	• Close monitoring of transportation, storage of borrowing material for the spread of any invasive species must be done. Vehicles should be covered during transportation. • The Contractor shall follow the Mitigation measures mentioned in "Material Sourcing" (Item 2) under preconstruction stage impacts • Washing the vehicles periodically to prevent carrying any invasive species • All the gravel transporting vehicles must be covered during transportation. Frequent checks for invasive species must be undertaken by the Environmental Specialist (having a sound ecological background).	• Monthly inspection of soil storage areas, wash down areas, vehicle parking areas and disposal sites for the presence of weeds or alien invasive species by an experienced / knowledgeable Environmental officer with • Community awareness about the invasive species spreading, causes, prevention etc. • Removal techniques, minimizing habitat degradation and standard disposal practices	EO of PIU will monitor	Frequent monitoring when the specific activity is take place
	d. Impact on wildlife due to the interruption of water supply to Kadurupitiya I & II	• This will be a temporary issue, and will not significantly affect on the water availability of Kadurupitiya tanks I &II • However, if the construction work to be done during extreme dry spell, arrangements to be made to	• Records on wildlife conflicts • Complaints from Wild Life depart-	EO of PIU will monitor	Frequent monitoring when the specific activity is take place

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
	tanks of Wasgamuwa National Park due to drying canal bed for desilting	ensure the water availability in those tanks to sustain wildlife in the park and ensure ground water enrichment for the vegetation	ment • Checking water availability to those 2 tanks		
	Impact on Social Environment				
	a. Impact on irrigation activities	• No any significant negative social impact is anticipated if the rehabilitation activities carried out with water issues, and major rehabilitation works are carried out during water close period immediately after Maha & Yala seasons. • Coffer damning along the LB canal to separate watering areas	• Complaints from the Community • Grievance log • Stage IV of the LB canal where the conflict is likely to take place	EO & Social & Resettlement Officer of PIU Resident Engineer of PMDSC for supervision Contractor will execute	Frequent monitoring when the specific activity is take place
	b. Temporary water issues affect the domestic water users due to stopping water flow in the canal	• Arrangements to issue limited quantity of water for domestic uses, either through recharging wells or, if Contractor requires longer period of dry canal, through supply water by Contractor. • Canal will not be closed off longer than the off-season period. • Any canal disruption shall be in coordination with canal irrigation authorities, farmer groups and Project			
	c. Shortage of water to farmers due to diversion of water for repair work	• Plan activities that require diversion during non cultivation periods • Discuss with Farmer Organizations and agree with any restrictions during the construction period • Coordination with canal irrigation authorities			
	c. Nuisance to the	• Temporary access will be provided when perma-		Supervision Engi-	Every 2 weeks

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
	public due to hindrance to access, dust, noise and traffic issues etc.	nent access is blocked for construction. When construction work is in progress on one side, the other side will be opened for traffic & properly trained flagmen will be made available with proper sign boards for control vehicles. At the end of each day, the debris that blocked access path will be cleared away under the supervision of a supervisor. • Accesses will be check regularly (several times daily) by Contractor HSE personnel and any problems immediately rectified. • The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activities # 1-10 (Generic Environmental Impact Management**)** of this Table 3.1.		neers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	during the construction
	d. Health problem may occur due to poor sanitation facilities and breeding of mosquitoes. Poor solid waste management shall be a major concern.	• The Contractor shall take all precautions to prevent odour and offensive smell emanating from chemicals and processes applied in construction works or from labor camps. In a situation when/ where odour or offensive smell does occur, the Contractor shall take immediate action to rectify the situation. The Contractor is responsible for any compensation involved with any health issue arisen out of bad odour and offensive smells. To prevent the breeding of vectors, the labor camps should be kept clean and hygienic. If there is any outbreak of disease, then the MOH or PHI of the area should be informed immediately. PHI and his staff to be requested for fumigation anti-mosquitoes chemicals at regular period to avoid spreading of Dengue, Ma-	• Periodical checks of Water stagnating points • Time framing • Visual inspection of drainage and sanitation issues • Appropriate selection of fill disposal and dispersal locations • Presence of proper sanitation, water	EO of PIU will monitor	Every 2 weeks during the construction phase

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		laria etc	supply and waste disposal facilities • Complaints from the Community • Grievance log		
	e. Blockage of movement across the LB canal	• Prior notification to road users during a closure in appropriate local language (Sinhala or Tamil) • Provide alternate routes with proper signage • Minimize road closure through proper planning • Provide alternate and safe bridges if a longer period of closure is required			
	Impact on Physical Environment				
	a. Extraction of water	• The Contractor is responsible for arranging adequate supply of water for the project purpose throughout the construction period • The Contractor shall not obtain water for labor camps including other project works from the public or community water supplies without approval from the relevant authority	• Required license and permits • Presence of proper water supply and waste disposal facilities	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor	Every 2 weeks during the construction phase
	b. Surface soil erosion, siltation into water bodies, paddy fields & marshy lands, blockage of water ways & drainage paths, wash away of disposing soil materials during floods are created while handling dispose soil &	• The debris material shall be disposed in such a manner that waterways, drainage paths would not get blocked. • Drainage paths in LB / RB of the canal should be improved / erected to drain rain water properly. • Earth / scupper drains on the road along the LB canal, should be developed (erected, deepen & re-shaped) to drain rain water properly. • Silt traps will be constructed to avoid siltation into waterways and paddy fields where necessary • To avoid siltation, drainage paths should not be directed to paddy fields / marshy lands and they should be separated from the paddy fields / marshy			

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
	other construction waste material	lands when road lying along paddy fields / marshy lands • Disposed materials should not be allowed to wash away during floods • To avoid erosion of unloaded soil, level the disposal once a week in dry period or regularly during rainy season. • Water spraying should be done regularly • The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activity # 10 (Generic Environmental Impact Management**)** of this Table 3.1.			
	c. Surface soil erosion, siltation into water bodies, paddy fields & marshy lands, blockage of water ways & drainage paths, wash away of disposing soil materials during floods are created while handling dispose soil & other construction waste material	• The debris material shall be disposed in such a manner that waterways, drainage paths would not get blocked. • Drainage paths in LB / RB of the canal should be improved / erected to drain rain water properly. • Earth / scupper drains on the road along the LB canal, should be developed (erected, deepen & re-shaped) to drain rain water properly. • Silt traps will be constructed to avoid siltation into waterways and paddy fields where necessary • To avoid siltation, drainage paths should not be directed to paddy fields / marshy lands and they should be separated from the paddy fields / marshy lands when road lying along paddy fields / marshy lands • Disposed materials should not be allowed to wash away during floods			

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		• To avoid erosion of unloaded soil, level the disposal once a week in dry period or regularly during rainy season. • Water spraying should be done regularly • The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activity # 10 (Generic Environmental Impact Management**)** of this Table 3.1.			
	d. Generation of Noise & Vibration due to vehicle and machinery operations	• The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activity # 8 (Generic Environmental Impact Management) of this Table 3.1.	• Construction equipment - estimated noise emissions and operating schedules • Allowable noise levels in the boundary of construction sites are kept below 75 dB in day time. • Operation hours	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor Periodical monitoring through qualified 3rd party consultant	Every 2 weeks during the construction phase Periodical monitoring quarterly a year
	e. Dust, soil & other debris materials are generated during earthworks	• The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activity # 9 (Generic Environmental Impact Management) of this Table 3.1.	• Regular watering of access roads • Turfing of finished earthen structures		
	f. Loss of stripped top soil removed during excavation for edge widening	• Top soil of the agricultural areas and any other productive areas where it has to be removed for the purpose of this project shall be stripped to a specified depth of 150mm and stored in stockpiles of height not exceeding 2m, if directed by the engi-	• Turbidity of downstream water ways • Public complaints	Supervision Engineers under RE will monitor EO of PIU will peri-	Every 2 weeks during the construction phase

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		neer. • If the Contractor is in any doubt on whether to conserve the topsoil or not for any given area he shall obtain the direction from the engineer in writing • Removed top soil could be used as a productive soil when replanting/establishing vegetation • Stockpiled topsoil must be returned to cover the areas including cut slopes where the topsoil has been removed due to project activities. Residual topsoil must be distributed on adjoining/proximate barren areas as identified by the engineer in a layer of thickness of 75mm – 150mm. • Topsoil thus stockpiled for reuse shall not be surcharged or overburdened. As far as possible multiple handling of topsoil stockpiles should be kept to a minimum.		odically monitor Contractor will execute under the self monitoring of EO of the Contractor	
23. Canal Bank - Rock Excavation 24. Canal lining with gabion boxes and concrete base. 25. Construction of trapezoidal canal sections with ceramic	**Impact on Ecological and Social Environment** a. Adverse effects of air ,noise pollution and vibration impacts on nearby Settlements and ecologically sensitive habitats (VRR sanctuary/LB canal wetlands) b. The settlements within 1 km distance are most	• Control blasting techniques to be followed with prior approvals obtained from the Geological Survey & Mines Bureau (GSMB) • All works shall be carried out in a manner that the destruction to the fauna and flora and their habitats is minimized complying with the FFPO and conditions laid by the CEA (CEA/CPO/KY/07/929/12) and DWLC conditions (jcS/6/1/1/171-vii) (Annex 1) • The Contractor & the Site Engineer shall ensure to comply with the mitigatory measures described under Activities # 8 & 9 (Generic Environmental Impact Management**)** of this Table 3.1.	• Required approval and safety measures • Grievance log and public complaints • Noise levels & dust	EO & Social & Resettlement Officer of PIU Resident Engineer of PMDSC for supervision Contractor will execute	Every 2 weeks during the construction phase

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
measuring gauge	likely to be affected	• The area should be properly barricaded to avoid any fly rocks • The properties and life of the people of the surrounding area to be covered by Public Liability Insurance Policy paid by the Contractor for the possible damages, which might accidentally occur even after taking all mitigatory measures • The Contractor will immediately repair the damages which might be caused by accidental fly rocks or any other reasons connected to the operations, even after taking all mitigatory measures			
	Impact on Physical Environment				
	a. Risk and Safety issues due to blasting	• The alarms, warning sign boards shall be permanently erected around the proposed site to inform the general public that this is a blasting site and entry is dangerous. The method of signalling the firing of blast round to be in the same sign board. The flagmen with red flags shall be stationed in close vicinity around the blasting area, in order to prevent unauthorized persons, including other workers on the site except members of blasting gun, when charging proceeds. • Smoking or other sources of fire shall not be allowed while charging proceeds. Standard guidelines to be strictly followed during storing, transporting, handling, charging and blasting of explosives in order to prevent accidental misfire etc. • When the charging is completed and it is ready to fire, red flagmen shall inform the houses in close	• Required approval and safety measures • Grievance log and public complaints	Supervision Engineers under RE will monitor EO of PIU will periodically monitor Contractor will execute under the self monitoring of EO of the Contractor Periodical water quality monitoring through qualified 3rd party consultant	Ever 2 weeks during the Construction phase Water quality monitoring every 3 months

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
		proximity. An air siren, which can be heard more than 500 m from the site, shall be operated three times before firing a shot. Soon after the firing of shot, Mine Engineer or blasting Headman will inspect the blasted area for detecting un-detonated explosive devices, if any. If he is satisfied that everything is in order to the work and machinery shall be allowed to proceed on, after a short intermittent, siren spell to inform people that blasting is completed			
OPERATION & MAINTENANCE PHASE					
26. Low flows along the stretch of the Mahaweli river downstream of the Minipe anicut up to the confluence of the Badulu Oya (approximately 6.5 km in length)	a. Impact on species of threatened and endemic aquatic fauna and flora that may undergo a population reduction under the new flow regime b. Reduction of the carrying capacity of this stretch of the river for aquatic fauna, mainly freshwater fish c. Negative impact on the aquatic plants due to the reduction of wet-	• As per the conditions laid by the Department of Wild Life Conservation, continuous environmental flow should be released from the Minipe Anicut keeping the flow as 1.6 m3/sec and 3.2 m3/sec , during the cultivation and non-cultivation season (30th January to 15th April and 25th August to 15th November respectively). Two dedicated Cast Iron gates are designed for the release of e-flow continuously, as per the conditions laid by the Department of Wild Life Conservation • Continuous monitoring and maintenance of E-flow release gates to ensure that the continuous flow is released • Rapid ecological survey to be carried out during the operation period twice a year	• Operation of E-flow gates and release of designed flow continuously • Ecological survey to ensure the survival of critical fauna and flora species along this stretch	Irrigation Department	Every 2 weeks for the release of e-flow Rapid ecological survey, twice a year during first 3 years of the operation period

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Institutional Responsibility	Implementation Schedule
	ted perimeter as a result of low flows				
27. Water management of the system	Inadequate water delivery to some of the outlets	Prepare a water delivery plan for the whole system Liaison with MASL to obtain a required quota of water	• Number of public complaints received	Irrigation Department	Annually
28. Maintenance of the system	Degradation of the system	Ensure utilization of a proper maintenance gang for regular maintenance	• Visual inspection of the LB canal	Irrigation Department	Annually
29. Enhanced water supply to the command area of the Minipe LB canal	Changes in cropping patterns in the command area of the LB canal resulting in spreading of human-wildlife conflict into new areas	• Provide measures to reduce the human wildlife conflict, such as construction of electric fences (termagant fences around dwellings and perennial crop fields and temporary fences around seasonal crop fields which can be removed at the end of the cropping season to allow access to crop fields during the fallow period) • Isolated villages that cannot be protected with existing electric fence system, village electric fences should be provided. For this purpose it is necessary to establish 200 km of new fences and to repair the existing fences where necessary	• Stage IV of the LB canal where the conflict is likely to take place • Command area of the Minipe LB canal	• Irrigation Department • Department of Wild Life Conservation	Bi annually
	Increase the disturbance to soil resulting in an increase in the sedimentation rates. Increased use of fertilizer and pesticides that will result in increased pollution	• Demarcation of the LB canal reservation • Conduct an extensive awareness campaign within the command area of the Minipe LB canal to promote soil conservation and water conservation measures as well as reduce the use of Agrochemicals through the practice of an integrated pest management approach			

Table 3-2: Environmental Monitoring Plan (EMoP)

	Mitigation Activities and Method of monitoring environmental Changes	Location / timing of sampling	Parameters to be monitored	Frequency of monitoring	Responsibility
Construction Phase					
1.	Establishment of a riverine vegetation in the LB canal reservation	Along the LB canal trace (Annex 2)	Number of Ha successfully planted	Reforestation activities to be monitored every week during the initial stage and once the planting is done monitoring every 2 weeks to maintain it up to a certain growth level which can be independently survive	EO of Contractor, Environmental officer of PIU and the environmental specialist of PMU
	Establishment and maintenance of Contractor's facilities	Labour camps Storage / stock piling areas Disposal sites Burrow areas	• Site is not established within areas protected under FFPO and FO • Site Management Plan for the camp available and Camp is installed strictly in accordance with Safety Management Plan • Labour camps with proper facilities such as enough spaces, ventilation, beds, mosquito nets, lavatories, bathing facilities, drinking water are available • Waste water collection and treatment is implemented properly • The sewage system for the camp is planned and implemented with concurrence from the Local	Weekly	Self monitoring by EO of the Contractor Environmental Officer of PIU

	Mitigation Activities and Method of monitoring environmental Changes	**Location / timing of sampling**	**Parameters to be monitored**	**Frequency of monitoring**	**Responsibility**
			Public Health Officer (PHI) • Camp is kept clean from debris, garbage, etc. Waste is collected and disposed of in approved sites • Required approval are granted • Approved site rehabilitation plan is available		
2.	Surface Run-off, soil erosion, slope failures from hill slopes	Minipe anicut and Minipe LB canal	Soil erosion from cleared ground sections along anicut axis and LB canal trace	Every 2 weeks	Engineering supervisors and PIU Environmental Officer
			Disposal of excavated unusable soil materials, dredged material and construction wastes		
			Soil erosion from excavated soil materials along canal traces		
			Placement of soil stockpiles and other erodable construction material		
			Silt traps in places		
			Turfing of completed embankments/ slopes		
3.	Water quality, Ambient air Quality, Noise and vibrations, sediment	Along the LB canal at the identified locations for the baseline data collection	a) Surface Water Quality Temperature (oC), pH, Electrical Conductivity (µs/cm), DO (mg/l), BOD (mg/l), COD (mg O2/L), TDS (mg/l), TSS (mg/l), Turbidity (NTU), E-coli, Oil &	Quarterly intervals for the routing monitoring during the construction phase	Independent accredited laboratory contracted through the PMDSC under the ap-

	Mitigation Activities and Method of monitoring environmental Changes	**Location / timing of sampling**	**Parameters to be monitored**	**Frequency of monitoring**	**Responsibility**
		During construction period and first 3 years of the operational phase	Grease		proval of PMU Resident Engineer will facilitate and Environmental Specialist of PMDSC will supervise
			b) Ambient Air Quality Particulate Matter (PM10), SO_2, NO_2, CO		
			c) Existing Noise Levels 24 hrs measurements and 3 hr measurements (2 hr Day and 1 Hr night)	Quarterly intervals for the routing monitoring during the construction phase selecting appropriate construction activity which produce significant noise & vibration (i.e. blasting activities)	
			d) Existing Vibration level 24 hr measurements and 1 hr measurements		
			e) Sediment sampling surface and bottom suspended sediment concentrations	Quarterly intervals for the routing monitoring during the construction phase	
		Correcting any environmental issue (i.e. oil spill, sedimentation, high noise & vibration, upon any complain of non compliance etc.)		As and when required	Self monitoring by EO of the Contractor
4.	Nuisance to general public	Along the LB canal trace	Traffic reports	Every 2 weeks	GRC , Environmental Officer, Social and Re-

	Mitigation Activities and Method of monitoring environmental Changes	**Location / timing of sampling**	**Parameters to be monitored**	**Frequency of monitoring**	**Responsibility**
			Road surface of routes used to transport material Grievance log maintenance		settlement Officer of PIU
5.	Water shortages to farmers due to canal diversion for repair work	Along the LB canal trace	Public complaints Interview survey of selected farmer organizations	Every 4 weeks during the cultivation period	GRC , Environmental Officer, Social and Resettlement Officer of PIU
6.	Proper disposal of solid, liquid and construction waste	Minipe Anicut and along the LB canal	Waste management plan in place and implementation Approval for the identified waste dumping sites Public complaints / Grievance Log maintenance Visual inspection Visual inspection of camp sites, project offices and construction sites Interviews with local authorities for compliance	Every 2 weeks	GRC , Environmental Officer, Social and Resettlement Officer of PIU
7.	Introduction of weeds and Alien invasive species	Construction material storage areas, vehicle wash down areas, vegetation and weed removal during pre-construction stage	Monthly inspection of soil storage areas, wash down areas, vehicle parking areas and disposal sites for the presence of weeds or alien invasive species by an experienced / knowledgeable Environmental officer with Community awareness about the invasive species spreading, causes, prevention etc. Removal techniques, minimizing habitat degradation and standard disposal practices	Every 4 weeks during the construction period	Environmental officer of PIU

	Mitigation Activities and Method of monitoring environmental Changes	**Location / timing of sampling**	**Parameters to be monitored**	**Frequency of monitoring**	**Responsibility**
8.	Survival of critical fauna and flora species along the stretch of 6.5 km subjected to low flows during the anicut construction	Stretch of the Mahaweli river downstream of the Minipe anicut up to the confluence of the Badulu Oya (approximately 6.5 km in length)	 • Endemic and Endangered plant species *Cryptocoryne parva*	Every 2 weeks during the construction period	Environmental officer of PIU

	Mitigation Activities and Method of monitoring environmental Changes	**Location / timing of sampling**	**Parameters to be monitored**	**Frequency of monitoring**	**Responsibility**
			 • Endemic and Vulnerable plant species *Cryptocoryne beckettii* • Other aquatic / semi aquatic species recorded as per the IEE study		
Operation Phase					
1.	Continuous environmental flow released from the Minipe Anicut keeping the flow as 1.6 m3/sec and 3.2	Low flows along the stretch of the Mahaweli river downstream of the Minipe	Continuous flow as 1.6 m3/sec and 3.2 m3/sec , during the cultivation and non-cultivation season	Daily	Irrigation Engineer Minipe

	Mitigation Activities and Method of monitoring environmental Changes	**Location / timing of sampling**	**Parameters to be monitored**	**Frequency of monitoring**	**Responsibility**
	m3/sec , during the cultivation and non-cultivation season (30th January to 15th April and 25th August to 15th November respectively)	anicut up to the confluence of the Badulu Oya (approximately 6.5 km in length)			
2.	Continuous monitoring and maintenance of dedicated Cast Iron gates for the E-flow release to ensure that the continuous flow is released		• Operation of E-flow gates and release of designed flow continuously	Weekly	Irrigation Engineer Minipe
3.	Rapid ecological survey to be carried out during the operation period twice a year		Survival of critical fauna and flora species along the stretch of 6.5 km subjected to low flows during the anicut construction • Endemic and Endangered plant species *Cryptocoryne parva* • Endemic and Vulnerable plant species *Cryptocoryne beckettii* • Other aquatic / semi aquatic species recorded as per the IEE study	Twice a year during the first 3 years of the operation period	Irrigation Engineer Minipe
4.	Water management in the system	Command area of the Left Bank	Interview survey of selected farmer organizations	Twice per cropping season for three years	Irrigation Engineer of Minipe

	Mitigation Activities and Method of monitoring environmental Changes	**Location / timing of sampling**	**Parameters to be monitored**	**Frequency of monitoring**	**Responsibility**
5.	Management of the system	LB Canal and Minipe Anicut	Visual inspection of Anicut, LB Canal and associated structures	Twice a year for five years	Irrigation Engineer of Minipe
6.	Reinstatement of burrow areas, temporary material storage areas and Areas used for labour camps and offices	All Burrow Areas, material storage areas, sites where temporary labour camps and offices were located, areas used for parking construction related vehicles and wash down areas for vehicles	Visual inspection to determine whether these areas have been properly rehabilitated Identify whether sites have been invaded by weeds or alien invasive plant species	Daily, during the end of Construction period prior to handover the site	Resident Engineer, Environmental officer of PIU, Environmental specialist of PMU/PMDSC
7.	The prescribed e-flow is released as specified	Area downstream of the Minipe anicut	Visual inspection to determine whether the e-flow is being released as specified Inspection of any changes in the aquatic species composition in the area downstream of the Minipe anicut	Every quarter for three years	Irrigation Engineer of Minipe
8.	Surface Water quality of the LB canal	Sites identified for the baseline data collection and construction phase monitoring	Temperature (oC), pH, Electrical Conductivity (µs/cm), DO (mg/l), BOD (mg/l), COD (mg O2/L), TDS (mg/l), TSS (mg/l), Turbidity (NTU), E-coli, Oil & Grease	Every quarter for three years	Irrigation Engineer of Minipe
9.	Sediment sampling		Surface and bottom suspended sediment concentrations	End of the cultivation season	Irrigation Engineer of Minipe

	Mitigation Activities and Method of monitoring environmental Changes	**Location / timing of sampling**	**Parameters to be monitored**	**Frequency of monitoring**	**Responsibility**
10.	Human-wildlife conflict mitigation	Command area of the Minipe LB canal stage IV	Level of conflict and effectiveness of the mitigation measures	Once a month during the cropping season	Irrigation Engineer of Minipe
11.	Awareness campaign to promote sustainable farming practices	Throughout the command area of the LB canal	Changes in farming practices towards more sustainable ways supported by water quality data generated	Every quarter for three years	Irrigation Engineer of Minipe

4 DUE DILIGENCE STUDY OF POTENTIAL INVOLUNTARY LAND ACQUISITION AND RESETTLEMENT IMPACTS

36. In the MLBCR Project area, there is a situation where a number of farmers, encroaching on canal reservation land, were identified. It was feared that these farmers may be impacted if required to cease agricultural activities on this reservation land in order to make way for civil works contractors' space for construction and access to site, although no construction would occur on that land reserve. An inventory of farmers encroaching on the reserve land areas was prepared, along with two Due Diligence Reports for kilometre 00+000 to 30+140 and for kilometre 30+140 to kilometre 73+960. This section provides a summary (copy extract) of the first due diligence report for 00+000 to kilometre 30+140, with a focus on the findings of the study.

37. The study has focused on three potential areas in which SPS 2009 IR policy may or may not be triggered:

(i) The Project canal rehabilitation footprint

(ii) The construction contractor activities, particularly accessibility through reserve land, on which farmers have encroached

(iii) Potential for loss of access to water from the canal was also examined, given that access to public natural resources for livelihood is also another aspect of SPS 2009, Involuntary Resettlement policy requirement to be considered

(iv) The Due Diligence Study established that:

g) There are 494 farmers encroaching on 498 plots of canal reserve land between kilometre 00+000 and Kilometre 30+140 of the Minipe Left Bank Canal. They are cultivating mostly paddy in two seasons (Maha and Yala). There are also other plots of tree crops and structures. These farmers are encroaching from legally titled plots adjacent to the reserve area.

h) There is adequate access to many of the construction sites by road (or track) along the embankment of the canal, on which there are no encroachments, and there would be space enough for construction activities to occur. However, around some of the structures to be rehabilitated, construction space requirements may impact on agricultural areas. It was thought that some of the reserve land areas may be required to be used at times by the Contractor during construction, but not as part of the footprint of project structures to be constructed. For some structures, there may be some locations where diversion tracks are needed by Contractor. A small number of areas may be required in occupied reserve areas. Actual space requirements, hence magnitude of affected area for construction, cannot be fully finalized until the Contractor is mobilized and the locations, albeit small, are identified. However:

- The PIU will restrict to the extent possible, use of existing roads and tracks to access sites. The Contractor shall as much as possible limit construction work-space to the canal contours and existing access roads and Government lands, as approved by the PMU.
- Farmer Organization Leaders have given an assurance in February that all encroached farmers will voluntarily suspend their agricultural activities during the construction period, if required, in order to allow the Contractors access to the canal and works sites. There is documentary evidence that encroachers will refrain from agricultural activities in the cases that encroached lands are required by the Contractor. Through Farmer Groups, 455 farmers out of 478 (95%) have signed letters consenting to ***"release the lands which are in our possession under encroachments whenever those lands are***

wanted for the development activities of the Minipe left bank canal rehabilitation project".

- No permanent acquisition of land or permanent changes of land use is expected.
- There will be no temporary or permanent impacts on structures or tree crops or forest areas, otherwise an RIP process will be needed in accordance with the ADB/GoSL requirements in Section 5 (above), and RP implementation will have to be completed prior to construction commencing.
- The Contractor will be required to prepare a construction plan on mobilization that will include:
  - Locations, purpose and time periods in which the Contractor will require to utilize the encroached land location;
  - Plans for rehabilitation of the locations back to their pre-project condition, which will be done to the satisfaction of Engineer and land users.
- The Contractor shall allow the farmers time to harvest (where required), prior to using for construction purposes.
- The PIU, with the PMDSC support, and the Contractor shall:
  - Consult again with those land users, on land that the Contractor wishes to utilize for construction works, to verify and confirm signed agreement (Annex F of DDR).
- In the event of objection or grievance, alternatives must be sought to the satisfaction of the land users, alternative locations found and/or RIP processes will be triggered in accordance with the ADB/GoSL requirements in Section 5 (above).

i) Water resources for irrigation should not be impacted, because internal canal rehabilitation activities will be scheduled outside of the two irrigation seasons when canal water resources are required. Canal authorities will annually, for a period during the two off-season times, close off the canal water supply. The surrounding communities use alternative water sources (e.g., wells) for their daily needs, when the canal water supply is closed by authorities. The following requirements are recommended, in order to minimize any disruption to the community:

- During the off-season when canal remains flowing, albeit minimal flow, the Contractor will be required to install diversions and coffer dam systems, in order to allow water supply to be continued, for off-season requirements.
- In the event that the Contractor requires dry canal for their work within the canal area, after the Engineer's approval, they may apply to, and coordinate with, the canal authorities regarding timing of annual canal closure periods and construction timing. This may be an extension for up to one additional month, provided all communities' alternative water supply is maintained. The Contractor may be required to supply potable water to communities if well resources are not adequate – this will be discussed with canal and local authorities.

ii) Most proposed definition walls are located on the right hand side of the canal, which are at minimum 400-500 metres from a road access through gardens and crops. To minimize creating new accesses on the right hand side of the canal, disrupting livelihoods, the Contractor shall:

- Move machinery and materials across the canal from embankment roads during off-seasons, when the canal is generally dry.

- There is adequate space for materials stockpile, and also structure locations are on public unoccupied land areas. Therefore, there should be no impact to communities or occupied reserve lands.

Given that the exact amounts and locations of encroached reserve land, required for construction purposes will not be fully known until the Contractor submits a construction plan, a monitoring plan will be prepared by the MLBCRP PIU, with support of the PMDSC specialists, once this is known. The reporting requirements for the Contractor to follow are inserted as part of the EMP, which is incorporated into bidding documents and will form part of the construction contract.

5 PROCEDURES FOR DEALING WITH CHANCE FINDS

38. Chance found Flora and Fauna;

(i) Under the terms of the construction contract the Contractor is required to take reasonable precautions to prevent workmen or any other persons from removing and/or damaging any flora (plants/vegetation) or fauna (animals), including any unlicensed fishing in any water body or unlicensed hunting/trapping/collecting of any animal.

(ii) If any wild animals – particularly elephants – are found near the construction site at any point of time, the Contractor is required to immediately upon discovery thereof notify the Engineer and carry out any instructions given by the Engineer for dealing with the same.

(iii) The Engineer will report to the nearby office of the Forest Department and/or the local range or divisional office of the Department of Wildlife Conservation, and will take appropriate steps/measures in consultation with the respective officials, if required.

39. Chance Found Archaeological Property;

(i) All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation.

(ii) Under the terms of the construction contract the Contractor will take reasonable precautions to prevent his workmen or any other persons from removing or damaging any such article or thing. Immediately upon discovery thereof he will notify the Engineer, following which the Contractor will await further instructions from the Engineer for dealing with the find, during which time all work that might affect the find will be stopped.

(iii) Where appropriate, the Engineer will seek direction from the Archaeological Department of Sri Lanka and inform the PIU environmental officer to follow the Chance Find Procedures.

6 DESCRIPTION OF PLANNED ENVIRONMENTAL MONITORING

40. The mitigation measures proposed in the working draft of the EMP will be carried out by the responsible agencies. **Table 3-2** presents the monitoring parameters, frequency and responsible agency for measuring ambient environment quality of different media like air, water, vibration etc.

41. The baseline conditions of existing water quality, air quality and noise levels have been established before commencement of the construction, through an accredited, CEA approved laboratory as a third party consultancy appointed with the approval of PMU. The National standards related to the key parameters are shown in **Table 6-1**:

Table 6-1: National Standards related to Key Parameters for Air and Water Quality and Noise Levels

Environmental Protection License (EPL)	National Environmental Act, No. 47 of 1980 as amended by Act, Nos. 56 of 1988 and 53 of 2000. I,
Tolerance limits for waste discharge	National Environmental (Protection and Quality) Regulations, No. 1 of 2008
Prohibition of Polythene or any polythene product of 20 micron or below in thickness	Order published under the Gazette Notification No.1466/5 dated 10.10.2006
License for discharge, emission or disposal of waste/scheduled waste management	Regulations published under the Gazette Notification No. 1534/18 dated 01.02.2008
Municipal Solid Waste	Order published under the Gazette Notification No. 1627/19 dated 10.11.2009
Air emission, fuel & vehicle importation standards	Regulations published under the Gazette Notification No. 1295/11 dated 30.06.2003
Prohibition of Ozone depleting substances	Order published under the Gazette Notification No. 1309/20 dated 10.10.2003
List of vehicle exhaust emission standards	Order published under the Gazette Notification No. 1557/14 dated 09.07.2008
Permissible Ambient Air Quality Standards in relation to class of Air Pollutants	Regulations published under the Gazette Notification No. 1562/22 dated 15.08.2008
Air emission, fuel & vehicle Importation standards	Amended Regulations published under the Gazette Notification No. 1887/20 dated 05.11.2014 with the corrected Gazette Notification No. 1895/43 dated 02.01.2015
Noise Standards	Order published under the Gazette Notification No. 924/12 dated 23.05.1996 & Order published under the Gazette Notification No. 1738/37 dated 29.12.2011

Vibration standards	CEA interim standards (2008)
Hazardous waste disposal	Schedule VIII of Part 11 of the National Environmental (Protection & Quality) Regulation No. 1 of 2008, as amended by the gazette notification No. 1534/18 dated 01.02.2008 for the Scheduled Waste generation and disposal

7 PROCEDURES FOR SITE REHABILITATION

42. Under the terms of the construction Contract the Contractor is responsible for reinstating ('restoring') areas used for construction purposes to their initial state, whether the initial state was agricultural land or not, and the procedures to be followed are summarized in **Table 7-1**. It is required that the Contractor provides details on the following activities in the CEMP:

Table 7-1: Procedures Relating to Reinstatement

Clearing/Closure of Construction Sites/Labour Camps	• A general site restoration plan should be prepared by the Contractor for the approval of the Engineer, indicating the methods of reinstatement appropriate for each area (including storage yards, borrow areas and quarries), the sequencing of the different areas of the site and the schedule details. The approved plan is to be implemented by the Contractor prior to demobilization from the site. • On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the Contractor's expenses, to the entire satisfaction of the Engineer.
Environmental Enhancement / Landscaping	• Where landscape plantation, including grassing of canal banks and edge treatment of water bodies, is specified or called for in the construction contract, this shall be executed in compliance with either the detailed design or approved typical design guidelines. • The Contractor also shall remove all debris, piles of unwanted earth, spoil material etc. from all workplaces and disposed of at locations designated or acceptable to the Engineer.
Reforestation	• Identification and demarcation of the plantation areas. • Identification of individual expert Forestry / Plant Ecologist to be employed by the Contractor under the guidance of PMDSC /PMU to prepare the Reforestation Plan, which will include the types of plants, nursery development and maintenance, planting and maintenance of the plantation etc. • Financing reforestation activities, monitoring the arrangements, and liaison with the project implementing agency (Department of Irrigation) and related stakeholder agencies (Forest Department, Department of Wild Life).

8 REFORESTATION

43. Reforestation or planting of trees along the canal reservation in order to compensate the habitat loss due to the raising of Minipe Anicut is included in the works to be carried out by the Contractors selected for the rehabilitation of Minipe LB canals under the NCB packages. The reforestation areas have been identified by the PMU and confirmed by the relevant authorities including CEA, Wild Life and Forest Departments.

44. Reforestation is considered as an extra mitigation measure that will be separately instructed in accordance with specifications provided by the Resident Engineer (after approval by the CEA and relevant stakeholder agency, Forest or Wild Life department) to be carried out by the Contractor (or by means of nominated sub contractor). A Provisional Sum has been included in the Bill of Quantities (BOQ) to cover the associated costs.

9 REPORTING & REVIEW

45. Monitoring of impacts requires a proper documentation and reporting system and a computerized database for the individual issues, including preconstruction, construction and post construction (operation and maintenance) monitoring results. The database related to each construction contract will be established and maintained at the site during the construction period and regularly copied to the PMU/PIU system, to which the PMDSC also has access for overall monitoring of the impacts.

46. The Contractor's monthly progress reports will contain a specific section reporting on environmental issues, including the results of any testing and verification conducted by the Contractor during the month. These reports are to be submitted to the Engineer and to the PMU. The monitoring performed by the PIU Environmental Officer, together with the Engineer's assigned site staff, will also be reported to the respective PIU Project Director. This report will include any information arising from the Contractor's monthly report, and the PMDSC Environmental Specialist will be involved in the review process. The PD/PIU will then forward the report to CEA and ADB. The reporting format will correspond to the monitoring program as presented elsewhere in this report.

10 CONTRACTOR'S COSTS

47. The Contractor's costs of establishing the temporary site camps and facilities, including all utilities and general systems needed during the construction period, are covered under a number of specific payment items in Bill No. 1 (Preliminaries) of the Bill of Quantities of the respective Contract. If it is envisaged that the Contractor should carry out specific repair and maintenance work to existing roads over and above his normal responsibility to prevent damage deterioration, this may be covered by a dedicated payment item to be instructed by the Engineer. A dedicated payment item for clearance and restoration of the site provides a degree of specific leverage for the Engineer to ensure this is done properly.

48. Where it is envisaged that specific additional environmental mitigation measures will be required, which are not the direct responsibility of the Contractor, such as reforestation of areas not affected by construction activities, a dedicated Provisional Sum or other type of payment item would also be provided.

49. In general, however, the management of relevant environmental obligations is an intrinsic element of the Contractor's working method for each type of construction work, and therefore the costs associated with specific activities or measures would be embedded in the respective payment items for the actual work.

ANNEX

ANNEX 1: Env Approval_CEA_DWLC_Minipe

ANNEX 2 a: MLBCR_Stage 1 Reforest

ANNEX 2 b: MLBCR_Stage 3 Reforest

ANNEX 2 c : MLBCR_Stage 2 Reforest