

# Environmental Monitoring Report

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Project Number: 47037-004  
October 2015

Period: July–September 2015

## SRI: Green Power Development and Energy Efficiency Improvement Investment Program – Tranche 1

Prepared by Ceylon Electricity Board (CEB) for the Asian Development Bank.

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# Environmental Safeguard Monitoring Report

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Reporting Period : July 2015 to September 2015  
Date : October 2015  
Loan No. : 3147 / 3146 (SF) - SRI

## SRI: Green Power Development and Energy Efficiency Improvement Investment Program (Tranche-01) Moragolla Hydropower Project

Prepared by Ceylon Electricity Board of the Ministry of Power and Energy for the Asian Development Bank

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## ABBREVIATIONS

|       |  |
|-------|--|
| ADB   | Asian Development Bank                           |
| APs   | Affected Persons                                 |
| CEB   | Ceylon Electricity Board                         |
| CEA   | Central Environmental Authority                  |
| GoSL  | Government of Sri Lanka                          |
| GRC   | Grievance Redress Committee                      |
| DS    | Divisional Secretariat                           |
| DWC   | Department of Wild Life Conservation             |
| EARF  | Environmental Assessment and Review Framework    |
| EIA   | Environmental Impact Assessment                  |
| EMP   | Environmental Management Plan                    |
| EMoP  | Environmental Monitoring Plan                    |
| EPL   | Environmental Protection License                 |
| FSL   | Full Supply Level                                |
| FD    | Forest Department                                |
| IA    | Implementing Agency                              |
| IUCN  | International Union for Conservation of Nature   |
| IEE   | Initial Environmental Examination                |
| LAA   | Land Acquisition Act                             |
| NEA   | National Environment Act                         |
| NZG   | National Zoological Gardens                      |
| MASL  | Mahaweli Authority of Sri Lanka                  |
| MCM   | Million Cubic Meter                              |
| MFF   | Multi Financing Facility                         |
| MHP   | Moragolla Hydropower Project                     |
| MoPE  | Ministry of Power and Energy                     |
| MV    | Medium Voltage                                   |
| MPC   | Ministry Procurement Committee                   |
| PD    | Project Director                                 |
| PMO   | Project Management Office                        |
| PMU   | Project Management Unit                          |
| PPC   | Project Procurement Committee                    |
| Rsp   | Responsibility                                   |
| SCAPC | Standard Cabinet Appointed Procurement Committee |
| SPS   | Safeguard Policy Statement                       |
| TL    | Transmission Line                                |

### Electrical Terminology

|     |                     |                        |
|-----|---------------------|------------------------|
| V   | Volt                | Unit of Voltage        |
| kV  | Kilovolt            | 1000 volts             |
| W   | Watt                | Unit of active power   |
| kW  | Kilowatt            | 1000 watts             |
| MW  | Megawatt            | 1000kW                 |
| MWh | Megawatt hour       | Unit of energy         |
| VA  | Volt ampere         | Unit of apparent power |
| MVA | Million volt ampere | 10 <sup>6</sup> VA     |

## Executive Summary

Moragolla Hydropower Project (MHP) is one of several hydropower projects identified by the Government of Sri Lanka (GoSL) to reduce the role of fossil-fuelled power generation, which has outstripped hydropower over the past 30 years as readily exploitable locations have been utilized. The Executing Agency of The project is the Ministry of Power and Energy (MoPE) and the implementing Agency is the Ceylon Electricity Board (CEB). Financial assistance is given by the Asian Development Bank (ADB) under the Tranch 1 of Green Power Development and Energy Efficiency Improvement Investment Program.

The Project involves construction of a 37m high, 236 m long concrete gravity dam (crest at 550 masl), to create a 38.5ha, 1.98 MCM reservoir with a Full supply Level (FSL) at 548 masl. The concrete spillway contains 5 radial gates (13x14m) designed to pass a 10,000 year flood (6,700m<sup>3</sup>/s) with no increase in FSL, or with a 2m increase if one gate was non-operational and closed. Water will be diverted by an intake just upstream of the dam, into a 2.7km, 4.7m  $\phi$  underground headrace tunnel, surge tank and penstock on the left bank, to an above-ground powerhouse and 28m open-channel tailrace outfall, through which water will return to the river. A 500 m transmission line (TL) with two towers will connect the switchyard to an existing 132kV transmission line from Kiribathkumbura to Polpitiya.

The Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) are the main practical tools employed during the project implementation to provide the environmental protection measures. The purpose of the Environmental Management Plan (EMP) is to set out clearly the required mitigation measures and allocate responsibility for each, and to provide additional information to assist in planning and implementing the various activities.

The impacts and mitigation for this project fall into four distinct categories, based on the phase in which the mitigation will be provided and the parties who will take the necessary action. For this reason the EMP as well as EMoP for this project is subdivided into the equivalent four parts. These are as follows:

- a) Construction Phase EMP;
- b) Operation Phase EMP;
- c) Special Issues EMP: Aquatic Ecology;
- d) Special Issues EMP: Terrestrial Ecology.

Since at the moment project is at preconstruction stage, this report mainly addressed relevant environmental issues and their mitigation measures for preconstruction stage of the Project as mentioned in the following table and forth coming chapters.

Summary of Environmental compliance during the period of 1<sup>st</sup> of July 2015 to 30<sup>th</sup> of September 2015.

**Table No. 1.1 : Summary of Environmental Compliance Status**

| Environmental Mitigation Measures                | Compliance Status |
|--|-------------------|
| Preventing Poaching                              | To be commenced   |
| Confirmation of Fish Distributions (Fish Survey) | To be commenced   |
| Catch- and- Haul (Fish Translocation)            | To be commenced   |
| Animal Rescue Program                            | To be commenced   |
| Afforestation/Habitat Enhancement                | To be commenced   |

## **1.0 Introduction:**

### **1.1 Brief Project Description**

Green Power Development and Energy Efficiency Improvement Investment Program is intended to finance a series of investments via Multi-tranche Financing Facility (MFF) of Asian Development Bank (ADB). Tranche-01 consists of several developments projects in Generation, Transmission and Distribution sectors, including Moragolla Hydropower Project.

Moragolla Hydropower Project (MHP) is one of several hydropower projects identified by the Government of Sri Lanka (GoSL) to reduce the role of fossil-fuelled power generation, which has outstripped hydropower over the past 30 years as readily exploitable locations have been utilized. Returning hydropower to greater prominence would promote sustainable development and reduce greenhouse gas emissions in line with the National Climate Change Policy, and limit exposure to fluctuating international fuel prices. The Executing Agency is the Ministry of Power and Energy (MoPE) and the Implementing Agency is the Ceylon Electricity Board (CEB).

The project will be located in the upper reaches of the Mahaweli Ganga in the Central Highlands of Sri Lanka, approximately 22 km south of Kandy City and 130 km north-east of Colombo.

The project involves construction of a 37 m high, 236 m long concrete gravity dam (crest at 550 masl), to create a 38.5 ha, 1.98 MCM reservoir with a Full Supply Level (FSL) at 548 masl. The concrete spillway contains 5 radial gates (13 x 14 m) designed to pass a 10,000 year flood (6,700 m<sup>3</sup>/s) with no increase in FSL, or with a 2 m increase if one gate was non-operational and closed. Water will be diverted by an intake just upstream of the dam, into a 2.7 km , 4.7 m Ø underground headrace tunnel, surge tank and penstock on the left bank, to an above-ground powerhouse and 28 m open-channel tailrace outfall, through which water will return to the river. A 500 m transmission line (TL) with two towers will connect the switchyard to the existing 132kV transmission line from Kiribathkumbura to Polpitiya.

MHP is designed as a run-of-river scheme, with an installed capacity of 30.2 MW (2 x 15.1 MW); and it will operate as a “peaking” station, generating power in the daily peak demand period (5-9 pm), and at other times if there is sufficient water (mainly in the monsoon season). The dam includes a pipe to discharge a constant “Environmental Flow” (E-flow) of 1.5 m<sup>3</sup>/s, which will pass through a micro-hydro plant on the right bank, generating an additional 360 kW.

## 1.2 Project Progress Status and Implementation Schedule:

### A. Progress Status

The updated status of Moragolla Hydropower project from July 2015 to September 2015 is given below in Table 2.1 and Table 2.2 respectively.

**Table -2.1: Status of the Main Activities of the Project funded by ADB**

| Se. No | Work Description  | Status  |
|--------|---|---|
| 1.0    | <p><b>Lot 1 - Civil Works</b></p> <p>Part A – Preparatory Works consists of construction of Base camp for the Employer and Engineer, upgrading and construction of irrigation facilities, and construction and improvement of permanent access roads.</p> <p>Part B – Main work Consists of construction of a dam, intake, headrace tunnel, surge tank, penstock shaft, power house, tailrace, and switchyard and all related works</p> | SCAPC approval was granted for Bidding                      |
| 2.0    | <p><b>Lot 2 – Mechanical and Electrical Facilities</b></p> <p>Consist of dam gates, penstock, generators and all hydro mechanical works and electromechanical works.</p>  | Reviewing bidding documents for submission to SCAPC and ADB |
| 3.0    | <p><b>Lot 3- Consultancy Service</b></p> <p>Consultancy Supervision Services for the project</p>  | CACPC approval is pending for awarding                      |

**Table -2.2: Status of the Preliminary Activities of the Project funded by CEB**

| Se. No | Work Description                     | Status   |
|--------|--------------------------------------|--|
| 1      | Land Acquisition                     | Udapaltha DS Division - possession of 34 nos lots (Out of 45 lots) have been taken over by CEB from DS division. Advance tracing of balance blocks were completed.<br>Gangaihala Korale DS division – 20 nos lots were send to Land Ministry to issue directions to DS division. Advance tracing of other lots were completed. |
| 2      | Resettlement Land                    | Section 2 notice published for the new resettlement land and advance tracing was completed. Details were send to Land Ministry to issue directions to DS division.   |
| 3      | Construction of Resettlement Village | Bids were floated and will be closed in early October.   |
| 4      | Environmental activities             | RFP was floated and closed for the river flow data monitoring of the Mahaweli river. Proposals were rejected due to inappropriateness on commercial and technical grounds. Investigations being done with the data available at the Mahaweli Authority to access the river flow.   |

## B. Implementation Schedule for Pre-Construction Environmental Activities of Moragolla Hydropower Project

### B.1 Aquatic Ecology

**Table No. 3.1: Preventing Poaching**

| Activities   | 2014             | 2015 | 2016 | 2017         | 2018 | 2019 | 2020      | 2021 |
|--|------------------|------|------|--------------|------|------|-----------|------|
|  | Pre-construction |      |      | Construction |      |      | Operation |      |
| Worker dissemination sessions.                               |                  |      | X    | X            | X    |      |           |      |
| Monitoring (spot checks) of worksites adjacent to the river. |                  |      |      | X            | X    | X    | X         | X    |

**Table No. 3.2: Confirmation of Fish Distributions (Fish Survey)**

| Activities  | 2014             | 2015 | 2016 | 2017         | 2018 | 2019 | 2020      | 2021 |
|---|------------------|------|------|--------------|------|------|-----------|------|
|   | Pre-construction |      |      | Construction |      |      | Operation |      |
| Logistics preparation for survey (equipment procurement; maps, boat). |                  | X    |      |              |      |      |           |      |
| Fish survey.  |                  |      | X    |              |      |      |           |      |
| Linkage to fish translocation program.                                |                  |      | X    |              |      |      |           |      |
| Fish Survey   |                  |      | X    | X            | X    | X    | X         | X    |

**Table No. 3.3: Catch- and- Haul (Fish Translocation)**

| Activities   | 2014             | 2015 | 2016 | 2017         | 2018 | 2019 | 2020      | 2021 |
|--|------------------|------|------|--------------|------|------|-----------|------|
|  | Pre-construction |      |      | Construction |      |      | Operation |      |
| Review of fish survey data.  |                  |      | X    |              |      |      |           |      |
| Survey and selection of translocation sites.                           |                  |      |      | X            |      |      |           |      |
| Undertake catch-and-haul.  |                  |      |      | X            |      |      |           |      |
| Public awareness-raising at target sites to support fish conservation. |                  |      |      | X            | X    |      |           |      |



## B.2 Terrestrial Ecology

**Table No. 3.4: Animal Rescue Program**

| Activities             | 2014             | 2015 | 2016 | 2017         | 2018 | 2019 | 2020      | 2021 |  |  |  |  |  |
|------------------------|------------------|------|------|--------------|------|------|-----------|------|--|--|--|--|--|
|                        | Pre-construction |      |      | Construction |      |      | Operation |      |  |  |  |  |  |
| Animal rescue program. |                  |      | x    | x            | x    |      |           |      |  |  |  |  |  |

**Table No. 3.5: Afforestation/Habitat Enhancement**

| Activities                                  | 2014             |  | 2015 |  | 2016         |   | 2017 |   | 2018      |   | 2019 |   | 2020 |   | 2021 |   |
|---|------------------|--|------|--|--------------|---|------|---|-----------|---|------|---|------|---|------|---|
|   | Pre-construction |  |      |  | Construction |   |      |   | Operation |   |      |   |      |   |      |   |
| Final selection of afforestation sites.     |                  |  |      |  | x            |   |      |   |           |   |      |   |      |   |      |   |
| Survey and demarcation of planting sites.   |                  |  |      |  | x            |   |      |   |           |   |      |   |      |   |      |   |
| Final site-specific selection of species.   |                  |  |      |  | x            |   |      |   |           |   |      |   |      |   |      |   |
| Preparation of detailed afforestation plan. |                  |  |      |  |              | x |      |   |           |   |      |   |      |   |      |   |
| Preparation of detailed planting maps.      |                  |  |      |  |              | x |      |   |           |   |      |   |      |   |      |   |
| Establishment and maintenance of nurseries. |                  |  |      |  |              |   | x    | x |           |   |      |   |      |   |      |   |
| Land preparation for planting.              |                  |  |      |  |              |   |      | x |           |   |      |   |      |   |      |   |
| Supply of planting material.                |                  |  |      |  |              |   |      | x |           |   |      |   |      |   |      |   |
| Afforestation planting.                     |                  |  |      |  |              |   |      | x |           |   |      |   |      |   |      |   |
| Post-planting maintenance and management.   |                  |  |      |  |              |   |      |   | x         | x | x    | x | x    |   |      |   |
| Weeding.                                    |                  |  |      |  |              |   |      |   |           | x |      | x |      |   |      |   |
| Fire protection.                            |                  |  |      |  |              |   |      |   |           | x |      | x |      | x |      |   |
| Application of fertilizer.                  |                  |  |      |  |              |   |      | x |           | x |      |   |      |   |      |   |
| Cutting of climbers and creepers.           |                  |  |      |  |              |   |      |   | x         |   | x    |   | x    |   |      |   |
| Pest and diseases control.                  |                  |  |      |  |              |   | x    | x | x         | x | x    | x |      |   |      |   |
| Vacancy planting.                           |                  |  |      |  |              |   |      |   | x         |   |      |   |      |   |      |   |
| Monitoring.                                 |                  |  |      |  |              |   |      |   | x         | x | x    | x | x    | x | x    | x |

## 2.0 Compliance to National Regulations:

The relevant applicable Acts and Legislations to the project are given in the Table No. 4.1.

**Table No. 4.1: Applicable Acts and Legislations to the project**

| Act /Rule/Notification   | Year                 | Objectives   | Compliance Status |
|--|----------------------|--|-------------------|
| National Environment Act (NEA) No 47 of 1980 as amended by act No 56 of 1988 and act No 53 of 2000   | 1980<br>1988<br>2000 | Sri Lanka national basic charter for protection and management of environment.   | Being Complied    |
| EIA regulations gazetted under NEA (Government Gazette Extraordinary No.772/72 dated 24 June 1993 and in several subsequent amendments)    | 1993                 | Schedule of State agencies as the project approving agencies under NEA.  | Being Complied    |
| Environmental Protection License (EPL) regulations gazetted under NEA (Government Gazette Extraordinary No. 1533/16 dated 25 January 2008) | 2008                 | Schedule of activities for which a EPL is required under NEA   | Being Complied    |
| Wastewater Discharge Standards-Gazette Notification No. 1534/18 dated 01/02/2008   | 2008                 | General standards and criteria for the discharge of industrial effluents into inland surface waters  | Being Complied    |
| National Environmental (Noise Control) Regulations 1996 - Gazette Notification no. 924/12 dated 23.05.1996                                 | 1996                 | To regulate and control noise generating sources with the objective of maintaining the standards (Under NEA)   | Being Complied    |
| Sri Lanka Electricity Act, No. 20 of 2009  | 2009                 | The Act does not explicitly deal with environmental implications of activities related to power generation, transmission and distribution. However, CEB Integrates environment protection as a part of its project activities. | Being Complied    |
| Mines and Minerals Act No. 33 of 1992  | 1992                 | Provide for the establishment of the Geological survey and mines Bureau to regulate the exploration for mining, transportation, processing, trading in or export of minerals.  | Being Complied    |
| Mahaweli Authority of Sri Lanka Act No. 23 of 1979   | 1979                 | To plan and implement the Mahaweli Ganga Development Scheme including the construction and operation of reservoirs,  | Being Complied    |

| Act /Rule/Notification   | Year                         | Objectives   | Compliance Status |
|--|------------------------------|--|-------------------|
|  |                              | irrigation distribution system and installations for the generation and supply of electrical energy.   |                   |
| Soil Conservation Act No. 25 of 1951 and No. 29 of 1953 and amended by Act No. 24 of 1996  | 1951<br>1953<br>1996         | To make provision for the enhancement and substance of productive capacity of the Soil; to restore degraded land for the prevention and mitigation of soil erosion; for the Conservation of soil resources and protection of land against damage by floods, salinity, alkalinity water clogging, and to provide for matters connected therewith or incidental thereto. | Being Complied    |
| Irrigation Ordinance No. 32 of 1946, Act No.1 of 1951 and No. 48 of 1968, Law No. 37 of 1973   | 1946<br>1951<br>1968<br>1973 | Construction and Maintenance of Irrigation Works , Protection of Irrigation Works and Conservation of Water  | Being Complied    |
| Fauna and Flora Protection Ordinance as amended by Act No. 49 of 1993 and subsequent amends.   | 1993                         | To provide for the protection, conservation and preservation of the fauna and flora of Sri Lanka   | Being Complied    |
| The Antiquities Ordinance, No.9 of 1940 (now Act) and the subsequent amendments, particularly the Antiquities (Amendment) Act No. 24 of 1998 is the primary Act. | 1940<br>1998                 | This Ordinance provides for the preservation of the antiquities of Sri Lanka   | Being Complied    |
| The Urban Development Authority Act No. 41 of 1978   | 1948                         | Minister in-charge of the subject of Urban Development declares the areas suitable for development.  | Being Complied    |

### 3.0 Compliance to Environmental Covenants from the ADB Loan Agreement:

The Table 5.1 shows the applicable Environmental Covenants from the ADB Loan Agreement.

**TableNo.5.1: Environmental Covenants**

| Product       | Schedule | Para No. | Description  | Remarks   |
|---------------|----------|----------|--|---|
| Loan 3146-SRI | 5        | 5        | The Borrower and CEB shall ensure that the preparation, design, construction, implementation, operation and decommissioning of the project and all project facilities comply with (a) all applicable laws and regulations of the Borrower relating to environment, health, and safety; (b) the Environmental safeguards; (c) the EARF; and (d) all measures and requirements set forth in a respective IEE or EIA and EMP, and any corrective or preventive actions set forth in a Safeguards Monitoring Report.   | <p>It is being compiled as per ADB Safeguard Policy Statement (SPS) (2009) as set out in the EARF.</p> <p>EMP is being implemented in accordance with applicable laws and regulations of GOSL and ADB guide lines.</p> <p>Further an Environmental Management Office of the MHP will carry out the regular environmental monitoring as set out in the EMP.</p> <p>The Environmental Monitoring actions has been planned and will be carried out in all three phases of preconstruction, during construction, and post construction phase.</p> |
| Loan 3146-SRI | 5        | 6        | By 2015, CEB shall undertake, to the satisfaction of ADB, (a) dry and wet season fisheries surveys for the endangered Green Labeo fish on the stretch of Mahaweli River from around the site of the Moragolla Hydropower plant tailrace and the confluence with the Atabage Oya to appropriate point downstream on the Mahaweli river and (b) collect hourly, daily and monthly flow data on the Mahaweli river downstream of the Moragolla Hydropower Plant tailrace and the confluence with the Atabage Oya over the period of January 2015 to December to Identify the minimum required downstream environmental river flows during the dry and wet seasons to satisfy the critical habitat requirements of the safeguard Policy Statement. CEB shall ensure that such minimum required downstream environmental river flows are maintained following completion of the Moragolla Hydropower plant to avoid any measurable adverse impacts on the habitat of the endangered Green Labeo fish. | <p>Being complied</p> <p>Preliminary work was commenced for the dry and wet season fisheries surveys for the endangered Green Labeo fish.</p> <p>Procurement process is in progress for River flow data monitoring on appropriate points of the Mahaweli River. RFP was floated and closed. Proposals were rejected due to inappropriateness on commercial and technical grounds. Investigations being done with the data available at the Mahaweli Authority to access the river flow.</p>   |

| Product       | Schedule | Para No. | Description   | Remarks  |
|---------------|----------|----------|---|--|
| Loan 3146-SRI | 5        | 7        | CEB shall enter into an agreement with Mahaweli Authority, acceptable to ADB, which shall, <i>inter alia</i> , set out(a) to the extent possible, the minimum hourly, daily and monthly environmental river flows downstream of the Moragolla Hydropower Plant tailrace during the dry and wet seasons; and (b) a regulatory mechanism for the coordinated operation of the Moragolla Hydropower Plant following its construction and the existing Kotmale hydropower plant to ensure that, at all times, adequate downstream flows are released to avoid any measureable adverse impacts on the Labeo fishery and maintain the population of the endangered Green Labeo fish inhabiting the Mahaweli River downstream of the tail race of the proposed Moragolla Hydropower Plant and the confluence of the Atabage Oya with the Mahaweli River. | To be carried out<br><br>A revised Environmental Impact Assessment report was submitted to the project approving authority for approvals due to some changes in EIA. Once this is approved the agreement between CEB and Mahaweli Authority is expected to be reached. |
| Loan 3146-SRI | 5        | 8        | Within 180 days of the effective date CEB shall established an Environment Management office, acceptable to ADB, which shall be responsible for (a) the environmental monitoring of construction activities of the Moragolla Hydropower plant; and (b) implementation of the relevant EMP for the Moragolla Hydropower plant including monitoring of the Green Labeo fishery and downstream minimum environmental river flows during operations of the Moragolla Hydropower plant.  | Complied.<br><br>Environment Management Office was established in June 2015 with one Engineer and Supervisor to take care the Resettlement, Environmental and Social issues. Other necessary staff is to be recruited with the approval of CEB management.             |

#### **4.0 Compliance to Environmental Management Plan:**

The Environmental impacts and mitigation for this project fall into four distinct categories, based on the phase in which the mitigation will be provided and the parties who will take the necessary action. For this reason the EMP for this project has subdivided into the equivalent four parts. These are as follows:

1. Construction Phase EMP
2. Operation Phase EMP
3. Special Issues EMP: Aquatic Ecology
4. Special Issues EMP: Terrestrial Ecology

Since at present this project is in pre-construction stage, special issues of EMP; Aquatic Ecology and Terrestrial Ecology and relevant environmental issues and their mitigation measures for preconstruction stage of the Project are being carried out and addressed in this report.

Based on the Environmental Management Plan the Compliance Status on Environmental Issues in Moragolla Hydropower project for preconstruction stage is presented in Table No.6.1. It is to be noted that since no physical pre-construction work has yet being commenced, activities related to Environmental issues is yet to be implemented.

**Table No.6.1: Compliance Status on Pre-Construction Environmental Issues of Moragolla Hydropower Project**

| Project Activity                 | Environmental Issues  | Management/<br>Mitigation Measures  | Responsibility |                |                      |                     |                     | Compliance Status/Remarks        |
|----------------------------------|---|---|----------------|----------------|----------------------|---------------------|---------------------|----------------------------------|
|                                  |   |   | Planning       | Implementation | Monitoring           | Supervision         | Review Agency       |                                  |
| Fish Poaching by Project workers | Adverse impacts on <i>local fish</i> population   | <b>Preventing fish Poaching</b><br>Dissemination session for all project workers and Monitoring (spot checks) of work sites adjacent to the river                         | CEB            | CEB            | CEB                  | CEB                 | CEB                 | To be implemented as per the EMP |
| Blasting and Excavation          | Adverse impacts on <i>Labeo fisheri</i> distribution in the Mahaweli Ganga Section near project | <b>Confirmation of Fish Distributions (Fish Survey)</b><br>Fish survey of all the pools above and below the dam site  | CEB            | CEB/Consultant | CEB                  | CEB                 | CEB                 | To be implemented as per the EMP |
|                                  | Adverse impacts on <i>local fish</i> population   | <b>Catch-and- Haul</b> (Fish Translocation)   | CEB            | CEB/Consultant | CEB/FD/D WC/NZG/IUCN | CEB/FD/DWC/NZG/IUCN | CEB/FD/DWC/NZG/IUCN | To be implemented as per the EMP |
| Site Clearance and Inundation    | Adverse impacts on animals at project site  | <b>Animal Rescue Program</b><br>Vulnerable animals will be captured and moved to adjacent habitat, if possible or allowed to move away from the land clearing work sites. | CEB            | CEB/Consultant | CEB/Consultant       | IUCN/CEA            | IUCN/CEA            | To be implemented as per the EMP |
|                                  | Losing habitats of wildlife due to land clearing and inundation                                 | <b>Afforestation/Habitat Enhancement</b> Enhancing habitat for wild life to compensate lost habitats by afforestation of 100m buffer strip around the reservoir           | CEB            | CEB/Consultant | CEB/Consultant       | FD                  | CEB/FD              | To be implemented as per the EMP |



## **5.0 Safeguards Monitoring Results and Unanticipated Impacts:**

### **Environmental Monitoring Schedule**

The individual environmental monitoring measures are identified in the EIA/Main Report and in the EMP and relate primarily to those activities in which there are measurable environmental emissions (eg air quality, water quality, noise, etc). These activities are drawn together in the Environmental Monitoring Plan (EMoP), which describes in detail the purpose of each monitoring activity and the methodology to be employed (including the approach, parameters to be measured, survey locations, frequency, and other information). It also recommends thresholds that will signal the need for corrective actions.

EMoP for this project is divided into four parts, equivalent to the different parts of the EMP such as construction phase, Operation Phase, Special Issues; Aquatic Ecology and Special Issues; Terrestrial ecology. Construction phase shows that some quite extensive monitoring is required in relation to the three main fields in which there is the most risk of impacts from the construction work (water quality, air quality and noise and vibration). This involves monitoring at and around all of the main construction sites and several of the ancillary sites (quarry, disposal sites and main transportation route), and before construction begins (baseline) and regularly throughout the construction period. This monitoring is assigned to the contractor to raise awareness of the environmental risks and impacts associated with the construction work and the way they need to be mitigated.

The remainder of this EMoP involves: small-scale monitoring to confirm the requisite E-flow is provided during reservoir impoundment; regular monitoring of water levels in domestic wells during tunnel construction; and checking the structural condition of buildings that may be at risk of structural damage throughout the construction period. These activities are assigned to CEB because they involve contact with the public regarding some quite sensitive issues, and because provision of a continuous E-flow is one of the main conditions of the Environmental Approval for the project, granted by MASL. CEB will probably appoint specialized consultants and contractors to conduct this work, but it is important that the responsibility for the monitoring and any resulting remedial action remains with CEB as the Project Proponent.

EMoP for the operation stage of the project are not expected to be major environmental impacts during this stage, so there is no need for extensive environmental monitoring. Monitoring in relation to the hydrological changes downstream of the tailrace only requires simple checks, because if CEB mitigates these impacts by operating the Moragolla and Kotmale stations out-of-phase in the dry season it is very unlikely that there will be noticeable changes in flow when one station begins to operate.

EMoP for the Special Issues on Aquatic ecology and Terrestrial Ecology is shown in Table No. 7.1. Since the project is at pre-construction stage, relevant activities in this table are planned to be carried out.

**Table No. 7.1: Environmental Monitoring Plan for the Moragolla Hydropower Project: Special Issues**

| Impact  | Mitigation   | Monitoring   | Parameters   | Method  | Rsp | Frequency  | Location  |
|---|--|--|--|---|-----|--|---|
| <p>1. Aquatic Ecology:<br/>The project area supports 8 nationally threatened fish species, including <i>Labeo fisheri</i>, which is of high conservation priority. These species may be affected by disturbance, poaching, turbidity, blasting, etc</p>                     | <p>Special measures to protect the rare fish include catch and haul (translocation) to the nearby Kelani River; and cutting channels in the river bed downstream of the dam to improve connections between pools in dry season</p>     | <p>Catch and haul requires a prior survey to determine the presence and distribution of <i>L. fisheri</i> and other large species; and this should then be repeated during MHPP operation to assess changes in the populations</p> | <p><u>Monitor:</u> Locations of river bed pools above and below the dam site; fish species present, their distributions and approximate numbers in pools in the river bed; locations of pools and fi</p>                                 | <p>Use an inflatable raft and portable electronic fish finder to determine depth of riverbed, numbers and depth of fish, &amp; locations (GPS coordinates). Use small mesh nets to catch fish samples for species identification; release the captured specimens upstream or downstream</p> | CEB | <p>Two surveys: one pre-construction and one after one year of MHPP operation</p>                            | <p>In all major pools in the river bed, at the sites of the reservoir and dam, down to Atabage Oya.</p> |
|   |  | <p>The translocation area in Kelani River should then be surveyed annually for the first four years after translocation to monitor survival and population expansion</p>   | <p>Monitor: Fish species present and their distributions. Estimate population densities and record other features, such as breeding status</p>   | <p>Use similar netting techniques to capture samples of fish in the translocation area</p>  |     | <p>Five surveys: one baseline before translocation and then annually post-translocation</p>                  | <p>Kelani River, over around 5 km upstream and downstream</p>   |
| <p>2. Terrestrial Ecology:<br/>The project will remove &gt;900 trees, none of which are endangered. Terrestrial fauna includes 41 endemic or endangered species of which 5 are high priority. These are not at risk from the project but their habitat will be enhanced</p> | <p>CEB will reforest a 100 m buffer around the reservoir to reduce soil erosion and planting will incorporate measures to provide habitat for the 5 priority faunal species</p>  | <p>The planted area will need to be regularly monitored so that dead seedlings can be replaced and other remedial action (weed removal, disease treatment, etc) planned and implemented as necessary</p>                           | <p><u>Monitor:</u> seedling deaths, indications and presence of pests and disease, invasive species, human encroachment, farming and other unauthorized activities</p>   | <p>Conduct walkover surveys of features that can be recognised visually (seedling survival, encroachment) and smaller scale investigations of other aspects (pests, disease). Record locations on maps to plan remediation</p>  | CEB | <p>Surveys every 3 months for the first year, then every six months for the next four years</p>              | <p>Cover the whole planted buffer zone</p>  |
|   | <p>When the MHPP is operating the main mitigation will be to protect the reservoir catchment from human impacts by implementing a Watershed Management Plan to improve vegetative cover, stabilise soil and enhance faunal habitat</p> | <p>Once the WMP is underway there will need to be regular monitoring of the key expected improvements in order to record progress and plan refocusing if needed</p>  | <p><u>Monitor:</u> the key parameters in which improvements are needed: soil conservation, vegetation cover and the presence of the key faunal species (reservoir and river water quality will also be monitored as described above)</p> | <p>Monitoring methodologies will be developed in detail during the planning stage for the WMP</p>   |     | <p>Surveys every six months, plus shorter-term records of aspects like faunal sightings when appropriate</p> | <p>The overall WMP area, and in particular those locations targeted for specific activities</p>         |

## 6.0 Implementation of Grievance Redress Mechanism and Complaints Received from Stakeholders

Construction activities of hydropower projects, especially where Involuntary Resettlement is involved, might give rise to grievances among Affected Persons (APs), however much the potential sources of conflict have been addressed in Environmental Management Plans and Resettlement Plans and Policies. Grievances may be related to social issues such as eligibility criteria and entitlements, location of resettlement sites, quality of services at those sites, allocation of houses, livelihoods and social and cultural issues, etc. Grievances may also be related to environmental issues such as dust generated due to clearing and grubbing works, vibration and damages to structures, noise, traffic congestion, decrease in water level and water pollution in private and public wells due to blasting and tunneling, damage to tea plantations and agricultural lands, etc.

Social grievances occur mostly at the time of implementation of the Resettlement Action Plan; and complaints on environmental issues and public nuisances generally occur during the construction period. Both types of grievances are different in nature. However, it is imperative to have a mechanism in place to examine each and find solutions in a transparent manner, to demonstrate to the people that their grievances are examined carefully.

The Moragolla Hydropower Project, in keeping with the ADB and national safeguard policies, will set up a Grievance Redress Committee (GRC), which will function as an independent body to find solutions to grievances and disputes among the affected and concerned parties.

It is expected to fully function the GRC by November 2015. The tentative nominations for the committee is received by the PMO and formal setting up of the committee will be done in near future. Once it is appointed it will be notified to the general public by publication of a notice in national newspapers in three languages ie., Sinhala, Tamil and English. The local community will also be informed about the grievance handling procedures of the project through Grama Niladharis<sup>1</sup> of the area and displaying notices at important public places within the Divisional Secretariat Divisions of Udapalatha and Ganga IhalaKorale.

The Additional District Secretary of the Kandy District will function as the Chairperson of the GRC. Members to represent the Affected Persons (AP) at the GRC will be appointed from among respected persons in the area on the recommendations of the Divisional Secretaries of Udapalatha and Ganga IhalaKorale. Other members of the GRC shall be the Civil Engineer of the PMO, a senior representative of the Design and Supervision Consultant and representative(s) of the Contractor(s). An officer nominated by the Project Director of the MHPP will serve as the Secretary to the GRC. An honorarium will be paid to the members of the GRC; the required funds for operation of the GRC will be borne by CEB.

During this reporting period, only effective social activity in progress is the land acquisition process. Some formal complaint or grievances have been received to PMU. Some issues were sorted and others need some further actions for a formal solution. Detail list of grievances/complaints received is given below.

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<sup>1</sup>Grama Niladhari (Village leader) is a Sri Lankan public official appointed by the central government to carryout administrative duties in a Grama Niladhari division, which is a sub unit of a divisional secretariat. The duties of a Grama Niladhari include the reporting of issuing of permits, gathering statistics, maintaining the voter registry and keeping the peace by settlement of personal disputes. They are responsible for keeping track of any criminal activity in their area and issuing character certificates on behalf of residents when requested.

**Table No. 8.1: List of grievances/complaints received for Moragolla Hydropower Project**

| Person who raised the grievance | Address   | Date of complaint / grievance | Brief description of the grievance/complaint   | Brief description of solution given  | Remarks   |
|---------------------------------|---|-------------------------------|--|--|---|
| D G S Wasantha Kumara           | No 679/21, Dewala watta, Mawela Road, Ulapane.  | 2015 - 06 - 29                | Decided to build a new house on his land and relevant authorities request from the project for no objection letter |  | Described in detail at Social Safeguard Monitoring report |
| S Kariyawasum                   | 889/1, Samanal Bangalawa Road, Athgala, Gampola | 2015 - 09 - 01                | Fear of scarcity of water due to impact to the water table by drilling the tunnel                                  | During the EIA study the rock condition is assessed in the tunnel trace. A letter was written to the Water Board for possible solutions if any adverse effect occur. |   |
| S K Krishnamoorthi              | 113/A, Mawela Road, Ulapane                     | 2015 - 09 - 02                | Request for a new house and land, being affected by the project  |  | Described in detail at Social Safeguard Monitoring report |
| N S Abeyratne                   | No 30 ½, Weliganga, Mawathura, Gampola          | 2015 - 09 - 08                | The tube well being inundate due to the project.   | An alternative permanent water source will be provided by the project before filling of the reservoir  |   |

## 7.0 Conclusion and Recommendations

EMP provides the framework for implementing the environmental mitigation, enhancement and compensation. It is in four parts, comprising EMPs for construction and operation phases, and EMPs for the two special issues (aquatic and terrestrial ecology) where mitigation is more complex and requires action in all phases. Each part deals with specific environmental issues, in turn, summarizes the potential impacts and mitigation to be applied, and assigns responsibility for each action.

At present, the Project is in pre-construction stage due to some unavoidable reasons. In this stage, special consideration has to be given for the conservation of *Labeo fisheri* in which fish surveys for identifying their baseline and establishing control points for monitoring before resuming construction and thereafter surveys for annual monitoring should be conducted.

Mitigation in the construction phase is mainly the responsibility of the contractors and action in the operational phase is mainly allocated to CEB; but some action is required of both parties, and the design consultant, in all phases. Construction contracts will require contractors to provide all mitigation and conduct all monitoring work assigned to them in the EMP and EMoP.

The EMoP provides the mechanism to ensure that: a) all of the actions to provide the mitigation are taken as set out in the EMP; b) the actions mitigate impacts and protect the environment as intended; and c) residual impacts of the project are recorded, so that additional mitigation can be provided if any unexpected impacts occur. The EMoP is in the same four parts as in the EMP and includes: physical and chemical monitoring of emissions; biological surveys of fish, planted vegetation and other features; and social surveys of river users. In each case the approach to the monitoring is described, including the method, parameters, location, frequency, and responsibility; plus guidance on threshold levels that would trigger corrective action. Emissions monitoring is mainly the responsibility of the contractor, to raise awareness of the impacts of construction activities and the mitigation needed. The remainder of the monitoring is assigned to CEB as the Project Proponent, although this may be outsourced to specialist consultants and contractors if necessary.

CEB expect to establish a Grievance Redress Mechanism (GRM) by mid November 2015, to ensure that any concerns, complaints and grievances about the project's environmental performance are received and resolved. This will have two levels: a) initial complaints received by the contractor or client on site will be resolved in situ where possible by discussion with the complainant and subsequent agreed action; b) any issues that cannot be resolved locally will be referred to a Grievance Redress Committee (GRC), comprising senior representatives of local government and the project agencies (client, contractor, supervision consultant), the local community and Affected Persons. A complaints register will be maintained in the client's site office and by the GRC. CEB will inform complainants in writing of decisions made, action to be taken and the program. Decisions by the GRC will be deemed final, although complainants may take further action through a court of law if they wish.

Implementing EMP and establishing GRC for the project has got delayed by few months. However since commencement of the construction phase had been shifted, these lapses can be recovered with the immediate startup of relevant activities of EMP in this phase.