

**The Government of Sri Lanka  
Ministry of Irrigation and Water Resource Management  
Irrigation Department  
Mahaweli Authority of Sri Lanka  
National Building and Research organization  
Road Development Authority**

**IMPROVING CLIMATE RESILIENCE PROJECT**

**ENVIRONMENTAL ASSESSMENT AND  
MANGEMENT FRAMEWORK**

**Volume 1**

**January 2014**

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# 1. INTRODUCTION

Climate-related hazards are a significant threat to economic and social development in Sri Lanka. Extreme variability of rainfall is the defining feature of Sri Lanka's climate. Climate projections indicate increasing rainfall trend in the wet zone and decreasing rainfall trend in the dry zone, meaning that the risks associated with water-related climate variability are likely to intensify and worsen. Recent disasters have caused major economic and social impacts, which are driving the Government's interest to build resilience to climate-related risks. The annual fiscal loss is significant, estimated to be in excess of US\$50 million, while, in some years, the fiscal loss is much greater. The Eastern Province has been severely affected by floods consecutively for the last three years. Floods in January 2011 affected more than a million people in the Northern, North Central and Eastern provinces and had caused more than US\$600 million in direct damages. Floods of December 2012 affected nearly a half a million people and caused further significant damage. These recent flood events had significant impact on the agriculture sector in particular, destroying crops, livestock and agricultural infrastructure.

Against these hazard risks and vulnerabilities, the country is emerging from a 26-year civil war. This is leading to rapid investment in infrastructure. Since 2009, growth rose to 8 percent initially, largely reflecting a "peace dividend". This performance was underpinned by strong private consumption and investment, which rose at an average of 9.6 and 12.5 percent, respectively. The public sector supported broad economic development through large infrastructure projects - including investments on account of post war reconstruction efforts in the Northern and Eastern provinces. The country's target is to achieve US\$4000 GDP per capita by 2016, from US\$ 2900 in 2012. This drive for development offers a window of opportunity to hardwire resilience to climate-related hazards into the infrastructure of the country. This includes through the rehabilitation of flood protection, and through the mitigation of flood and landslide risks to roads, schools and other new and existing public infrastructure. Mahinda Chinthana Vision for Future (2010) sets out a clear investment program in the modernization of the road and water resources infrastructure in particular.

Despite this significant progress, large-scale, systematic investment in risk understanding and mitigation across sectors is not yet in place. The Government of Sri Lanka (GoSL) is making efforts to integrate disaster risk management (DRM) into its investment plans. A five year Plan for DRM is due to be submitted to Cabinet in early 2014. This will set a framework for scaling up investment in risk mitigation, which will include a significant budget line for flood mitigation works. The investments planned under the proposed Project provide a critical first investment drive under this Plan, through improving physical resilience to hydro-meteorological events and a first wave of 'no-regret' mitigation investments. In so doing, the project will provide an

experiential foundation on which the country can develop a longer term investment plan to build disaster resilience.

The GoSL has requested financing from the World Bank to undertake an Improving Climate Resilience Project. The main development objective of the project is to reduce the vulnerability of exposed people and assets to climate risk<sup>1</sup> and to improve Government's capacity to respond effectively to disasters, which will be achieved through evidence-based investment planning and urgent risk mitigation measures.

An assessment of the environmental consequences of the proposed Project was necessary to understand the environmental risks associated with project activities and to identify potential ways to avoid, minimize, mitigate and manage any adverse effects that might arise due to project investments, as well as long-term planning. Project envisages rehabilitation and improvement of key infrastructure associated with the water sector, roads network and other key areas such as educational institutions. While details of potential project activities are known, their exact scope are not known during preparation, as designing of infrastructure to ensure their climate resilience will require longer time than preparation. Therefore, an assessment of the current environmental status of selected project sites and an environmental management framework as a guide to be used during implementation, when the scope and designs will be known has been developed.

## **1.1 Objective of the Environmental Assessment and Management Framework**

It is anticipated that environmental issues and impacts would be minimal for infrastructure rehabilitation and improvement of existing infrastructure, particularly due to the project's underlying objective is to improve the climate resilience. However, designing of irrigation and road structures for better movement of water to reduce potential flooding and improvement of stability of steep inclines along roads and other critical sites and undertaking rehabilitation and construction work depending on the locality, there may be possible impacts to the environment and people where the infrastructures are running through or closer to forested areas, wetlands, settlements, business premises, etc. However as the planned development works are to be carried out within the existing reservations, the activities to be financed by the project generally do not have the potential to trigger significant negative environmental impacts. Thus the project is categorized as a Category B project under World Bank environmental classification of projects.

As a means to address the potential environmental impacts of the project, this environmental assessment and management framework (EAMF) has been prepared by the Ministry of irrigation and Water Resources Management (MIWRM). The objective of the EAMF is to provide guiding

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<sup>1</sup> Climate risks managed under this project will include hydro-meteorological risk of flood, drought, and landslides

principles for assessment and management of environmental aspects of all physical works targeted under this project. It will help to; a) systematically identify, predict, and evaluate beneficial and adverse environmental impacts of infrastructure rehabilitation and improvement activities integrating climate risk reduction, b) designing enhancement measures for beneficial impacts, and c) implement mitigating measures for adverse impacts.

The assessment provides the initial status of the environment of sample of investments and the framework serves as a template to undertake appropriate environmental analysis of sub-projects under this project. Adhering to the principles and procedures laid out in this EAMF will ensure compliance with the World Bank's environmental safeguard policies and the relevant provisions under national environmental legislation and associated regulations. The document will provide the necessary background for environmental considerations to be built into the design of the project so that environmentally sustainable implementation can take place. To aid this process, the EAMF highlights relevant general policies, guidelines, codes of practice and procedures to be taken into consideration for integration of environmental aspects into the project design.

The EAMF will be made available for public review and comment in appropriate locations in Sri Lanka and in International Development Association (IDA) Infoshop in accordance with BP 17.50 requirements of disclosure. Detailed assessments for individual sub-projects will be carried out (in accordance with the EAMF) by the implementing agencies prior to completing engineering designs and commencing bidding process and will be reviewed and cleared by the designated Project Approving Agency (PAA), as applicable, under prevailing national environmental legislation in Sri Lanka and by IDA prior to the approval of disbursement of funds.

## **1.2 Project Description**

The main aim is to help Sri Lanka begin a process that would build a more climate-resilient economy. With rapid economic progress in recent times, the assets at risk to extreme hydrometeorological events have increased significantly. Investments in disaster and climate resilient infrastructure will ensure continued and sustainable growth. Given the current lack of understanding of the multisectoral impacts of climate change, flood/drought modeling and scenario analysis work is required. Once completed a large climate resilience investment program would be identified and financed through multiple funding sources. Key line ministries would be brought together in the assessment of risks or impacts on particular sectors and an investment road map would be developed. While there is a lack of understanding of comprehensive climate and disaster risk, there are urgent climate risk mitigation investments required to ensure the short-term integrity of flood control and irrigation infrastructure, transport network and critical education facilities at risk. Given the impacts of floods and landslides of the

north central, central and eastern provinces in recent years, urgent investment is required to implement the immediate risk mitigation activities.

To address long-term capital development needs and short-term flood mitigation requirements, the project will comprise the following four components.

***Component 1: Development of Basin Investment Plans (US\$13 million).*** The objective is to identify over US\$1 billion of investments in the form of basin investment plans. These investment plans will be informed by a robust understanding of climate risks. Government engineers and experts will be supported to carry out comprehensive flood and drought modeling and assessment of the underlying causes of flood and drought including rainfall variability and land use changes.

Nine river basins have been identified for investment planning. The selection of the basins was based on extensive discussions with Irrigation Department (ID) and Mahaweli Authority of Sri Lanka (MASL), taking into consideration several key criteria. The overarching criteria include the: i) historical major flood and/or drought events and associated human and economic impacts; ii) the concentration of human and economic assets in the hazard prone areas; and iii) potential for water resources development and plans for economic development. The selected nine basins constitute significant proportion of the water resources of the country and include the following: i) Mahaweli Ganga; ii) Kala Oya; iii) Dedura Oya; iv) Maha Oya; v) Attanagula Oya; vi) Kelani Ganga; vii) Gin Gana; viii) Nilwala Ganga; and ix) Gal Oya.

The analytical work under this component will serve as a basis for future climate resilience investments and will help the Government to understand the risk and adopt the required risk mitigation measures. The resulting output will be: i) flood and drought maps that can be used by the Government to establish appropriate water and land use policies; ii) development of flood and drought risk models that will help quantify the expected losses; iii) recommended mitigation measures and investment plans; iv) feasibility study of investment plans; and, v) strategic environmental impact assessment of investment plans

The risk modeling work under this component will include the following elements:

- Development of hydrological and hydraulic models
- Generation of a probabilistic catalog of flood and drought events to be used as an inputs to the risk model
- Development of flood and drought exposure and vulnerability data to be integrated with the flood/drought event model to calculate probable damage
- Development of vulnerability curves based on engineering and agricultural output assessment and past historical data

- Determination of expected human impacts as well as economic damages and losses
- Creation of alternative mitigation measures and investment plans to alleviate losses
- Creation of water resources operations guidelines that address flood and drought
- Assessment of environmental impact, including social aspects particularly related to resettlement of people from vulnerable areas

A high-resolution Digital Elevation Model (DEM) will be used in the flood modeling exercises. Acquisition of the DEM will be an integral part of this component and will be carried out early in the project to ensure that the project will be delivered on time.

The long term objective of the project is to support the Government in making investments in a holistic manner that considers current and future climate risk across sectors. To accomplish this objective, the project will operationalize the Special Projects Unit (SPU) under the MIWRM. Initially, this Unit will draw upon the experience gained through the small cells established under Dam Safety and Water Resources Planning Project (DSWRPP) and comprise engineers and planners from MIWRM, ID, MASL and an international risk modeling firm. The international consultant will be responsible for building the capacity of government engineers by guiding and training them to complete the flood and drought risk models for the selected basins. The analytical work to be completed by SPU will consist of: i) geospatial information, including a high accuracy DEM; ii) and hydro-meteorological information; iii) hydraulic information; iv) generation of probabilistic hazard, development of exposure data; v) modeling of flood and drought risk; vi) identification and feasibility study of investments; and, vii) development of strategic environmental impact assessment.

The objective of the operationalization of the SPU goes beyond successful completion of this project. The ultimate goal is for SPU is to serve as the foundation for a Climate Resilience Planning Unit (CRPU) that will act as a multi institutional planning cell comprising key government agencies. The CRPU will have a mandate to ensure sustainability and resilience of works by incorporating climate risk as a key parameter in the design and implementation of investments. In particular, the CRPU will convene departments that compete for water resources in order to rationalize the allocation of water across key sectors such as power, agriculture, urban development and others.

The result of this component would be the development of a comprehensive climate resilience investment plans that would be financed by the Government, the Bank and other donors.

***Component 2: Building climate resilience of infrastructure (US\$90 million).*** The objective of this component is to: i) implement immediate flood and drought risk mitigation work; ii) reduce risk to of flood related transport interruptions; iii) protect schools from landslide risks. All

interventions are identified and prioritized by recent risk assessments and engineering investigations. As such, this component consists of three sub-components. These include strengthening hydraulic infrastructure to mitigate flood loss, improving the transport network to reduce the probability of loss due to high rainfall events; and stabilizing 18 landslide prone schools that have been identified as high risk.

Sub-component 2.1: Flood Mitigation. The interventions under this sub-component will focus on rehabilitating hydraulic infrastructure that is at risk to flood loss. The infrastructure was identified for rehabilitation of recent flood damages because it is expected to result additional flood damage if left unattended. These interventions are not simple maintenance works, but are rather geared to strengthen the system in the event of future similar disasters and enhance them to meet future demands.

All improvement measures are supported by detailed local flood modeling. Based on the levels of risk identified using the models, detailed designs of the interventions have been prepared by ID and MASL. After extensive discussions and analysis with MIWRM, ID, and MASL, approximately 25 flood prone sites have been identified, all of which have experienced flood and/or drought disasters in the past decade. Various interventions are required but the main areas of work are described below:

- Increase of conveyance capacity by removing obstacles and bottlenecks
- Realignment of canals
- Upgrade and maintenance of flood pump stations
- Rehabilitation of flood bunds damaged by recent flooding
- Rehabilitation of diversion structures damaged by recent flooding

Sub-component 2.2: Ensuring transport continuity: road and bridge improvements. The transport investments aim to reduce direct loss to transport infrastructure, indirect economic losses due to detours, and increase the effectiveness of post disaster response. Rapid expansion of the road network development has led to an increase in landslides while low bridges constructed in flood plains continue to be flooded on regular basins. The increase in the number of landslides is due in large part to a lack of consideration of landslide risk in the construction of new road links. The need to expand bridges is that several are too low to cross during flood events. Investments will be financed to support the stabilization of road slopes to minimize landslide risks and the expansion of low bridges or replacement of causeways that are frequently flooded.

A total of 20 segments of roads will be stabilized against landslides and 9 bridges will be rehabilitated. The stretch of road to be stabilized at each location ranges from 50 to 500 meters. The majority of the investments are on Kandy-Mahiyangana-Padiyatalawa road, which is significantly affected by flood and landslides.

Sub-component 2.3: School Safety – Landslide Mitigation. Investments will be made to improve slope stability and drainage capacity of 18 schools that serve about 30,000 students and have been identified as highly vulnerable to landslides. Currently, given the high landslide risk, these schools close during heavy rainfall periods. Improvements to slope stability will promote education continuity as schools will not need to close and also will protect the residents of these hill slopes from potential landslides.

Most of the landslides in Sri-Lanka occur in the central part of the country which is mostly mountainous with highly fractured basement rock overlain by residual soil. This mountainous area makes up about 20 percent of the total land area and is home to more than 30 percent of the population of the country. Major landslides in the past two decades have caused loss of thousands of lives and have left about 175,000 people homeless. The main landslide mitigation works to protect vulnerable schools include:

- Slope re-shaping , benching and surface preparation with geo-textiles
- Soil-anchoring/nailing
- Slope protection measures with geo-mesh and geo-grids
- Drainage development, both surface and sub-surface through lateral drains
- Building retaining walls

The investigation, design and construction of these interventions will be carried out by National Building Research Organization (NBRO).

***Component 3: Implementation Support (US\$5 million).*** The objective of this component is to ensure the successful implementation of the activities carried out under the proposed project. Activities to be supported under this component include: i) implementation support in the areas of project management, monitoring and evaluation, procurement, financial management, and environmental and social safeguards; ii) public awareness and communications support regarding project interventions and management of public expectations; iii) support to the implementing agencies (IAs) in construction, supervision, and compliance with environmental and social safeguards; iv) purchase of vehicles, office furniture, and IT equipment for the project management unit (PMU); v) operating costs of the PMU; and, vi) hiring of experts to reinforce the staffing of the PMU.

***Component 4: Contingent Emergency Response Component (US\$2 million).*** Following an adverse natural event that causes a major natural disaster, the GoSL may request the Bank use these funds to finance immediate recovery activities. The Government may also request that project funds be reallocated to this component to further support response and reconstruction.

Disbursements would be made against a positive list of critical goods or the procurement of works, and consultant services required to support the immediate response and recovery needs of the Government. All expenditures under this component, should it be triggered, will be in accordance with OP 10.00 and will be appraised, reviewed and found to be acceptable to the Bank before any disbursement is made. In accordance with OP 10.00, this component would provide immediate, quick-disbursing support to finance goods (positive list agreed with the Government), works, and services needed for response, mitigation, recovery, and reconstruction activities. Operating costs eligible for financing would include the incremental expenses incurred by the Government for early recovery efforts arising as a result of the impact of major natural disasters.

Goods, Works and Services under this component would be financed based on review of satisfactory supporting documentation presented by the government including adherence to appropriate procurement practices in emergency context. All supporting documents for reimbursement of such expenditures will be verified by the Internal Auditors of the Government and by the Project Director, certifying that the expenditures were incurred for the intended purpose and to enable a fast recovery following the damage caused by adverse natural events, before the Application is submitted to the Bank. This verification should be sent to the Bank together with the Application.

Specific eligible expenditures under the category of Goods include: i) construction materials; water, land and air transport equipment, including supplies and spare parts; ii) school supplies and equipment; iii) medical supplies and equipment; iv) petroleum and fuel products; v) construction equipment and industrial machinery; and vi) communications equipment.

Specific eligible expenditures under the category of Works may include urgent infrastructure works (repairs, rehabilitation, construction, etc.) to mitigate the risks associated with the disaster for affected populations. Specific eligible expenditures under the category of Services may include urgent studies (either technical, social, environmental, etc.) necessary as a result of the effects of the disaster (identification of priority works, feasibility assessments, delivery of related analyses, etc.).

## **2. APPLICABLE POLICIES, LEGISLATION AND REGULATIONS**

### **2.1 Government of Sri Lanka Environmental Legislation and Regulations**

The project will need to take the following legislation and associated regulations into consideration while planning and implementing project activities. It will be the responsibility of the respective implementing agency to obtain the relevance clearances as per the legislation.

#### **2.1.1 National Environmental Act No. 47 of 1980 and its amendments**

Under provisions of Part IV C of the National Environmental Act (NEA) No. 47 of 1980 as stipulated in Gazette (Extra Ordinary) No. 772/22 dated June 24, 1993 GoSL made environmental assessment (EA) a legal requirement for a range of development projects. The list of projects requiring an environmental impact assessment (EIA)/ initial environmental examination (IEE) is prescribed in the above Gazette notification. Further amendments to the NEA stipulated environmental approvals for material extraction, emissions, noise and vibration levels should also be taken into account. These regulations will also have a bearing on this development project.

According to provisions of the NEA regulations, the project activities do not fall under the prescribed project requiring an EA. However, other prescribed projects requiring environmental assessments, listed in the same regulations relevant to the proposed project include;

- All projects and undertakings irrespective of their magnitude, if located partly or wholly within 100 meters from the boundaries of or within any area declared under the National Heritage Wilderness Act; the Forest Ordinance; 60 meters from a river or stream bank and having a width of 25 meters or more at any point of its course; any archeological reserve, ancient or protected monument as defined or declared under the Antiquities Ordinance (Chapter 188); any areas declared under the Botanical Gardens Ordinance; and within 100 meters from the boundaries of or within any areas declared as a Sanctuary under the Fauna and Flora Protection Ordinance.

According to GOSL procedure, all new development activities require environmental clearance. In order to obtain such clearance, the project proponent has to fill in a Basic Environmental Information Questionnaire. The questionnaire requires information from the project proponent to enable the Central Environmental Authority (CEA) to determine the level of environmental analysis required prior to providing approval for the project. Upon reviewing the questionnaire, the CEA determines whether the project requires an IEE or an EIA or whether no further environmental analysis is required, depending on the nature of the potential impacts.

### **2.1.2 Coast Conservation Act (Coast Conservation and Coastal Resource Management Act) No. 57 of 1981 and its amendments**

A project or any development activity that falls within the “Coastal zone” as stipulated in the Coast Conservation Act (CCA) and its amendments will have to obtain approval/ permit from the Coast Conservation Department.

### **2.1.3 Fauna and Flora Protection Ordinance (FFPO) No.2 of 1937 and its amendments**

Implemented by the Department of Wildlife Conservation, this act specifies that any development activity that takes place within one mile of the boundary of a National Reserve declared under the Ordinance require an EIA/IEE. The FFPO follows a similar process as the NEA in conducting scoping, setting the terms of reference, preparation of EA, review of EA and public consultation and disclosure. The decision of project approval or disapproval is finally granted by the Director of the Department of Wildlife Conservation.

### **2.1.4 North Western Province Environmental Statute (NWPES) of 1991 implemented by the North Western Provincial Council for areas coming under the North Western Province**

Environmental assessments are required for prescribed projects that have been gazetted in Gazette Extraordinary 1020/21 of 27<sup>th</sup> March, 1998. It specifies two lists of project types (a) where EIA/IEE is mandatory and (b) where the EA can be requested if the PAA decides so. The scoping process is similar to that of the NEA and will be headed by one of the two listed PAAs; (a) Provincial Environmental Authority and (b) Provincial Ministry of Fisheries and Aquaculture. Representation of the CEA and the Ministry of Environment in the scoping committee is a mandatory requirement. Setting up of the terms of reference, preparation of the EA, review and public disclosure and consultation, granting of the project decision are the same as specified in the NEA.

### **2.1.5 Mines and Minerals Act No. 33 of 1992**

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

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

### **2.1.6 Forest Ordinance of No. 17 of 1907 and its amendments**

The Forest Ordinance of Sri Lanka is the law for conservation, protection and management of forest and forest resources for the control of felling and transport of timber and forest related matters. Under the section 4 of No. 23 of 1995 Forest Act, Minister in charge of the forest, has special power to order and declare any specified area of state land or the whole or any specified part of any reserve forest which has unique eco systems, genetic resources or a habitat of rare and endemic species of flora and fauna and microorganism and of threatened species or which need to be preserved in order to achieve an ecological balance in the area by preventing landslides and fire hazardous to human life, as a Conservation Forest.

## **2.2 World Bank Environmental Safeguard Policies**

Projects financed with IDA resources need to comply with World Bank Operational Policies (OPs) for safeguards. Based on the likely activities financed by the project and potential environmental impacts, the following OPs have been triggered.

### **2.2.1 Environmental Assessment (OP/BP 4.01)**

World Bank OP 4.01 requires EA of projects proposed for Bank financing to help ensure that these projects are environmentally sound and sustainable. EA is a process whose breadth, depth and type of analysis depend on the nature, scale and potential for environmental impacts of the proposed project. Considering the work involved and resultant environmental repercussions in irrigation and drainage infrastructure rehabilitation and improvement and landslide protection, the project has been treated as Category B.

World Bank OP 4.01 is very clear that for a project in Category B proposed for financing under an IDA Credit, the project proponent must consult project affected groups and local non-governmental organizations about the project's environmental aspects and take their views into

account in the design and implementation. The EA should particularly incorporate such comments to improve social acceptability and environmental sustainability. Such consultations should be initiated as early as possible, in the Project cycle and it is mandatory that consultations are undertaken after the draft EA is prepared. In addition, the project proponent and contractor are expected to consult with stakeholders throughout project implementation as necessary to address environmental related issues that affect them. The OP 4.01 also highlights the importance of analyzing alternative designs, technologies and operational strategies systematically in terms of their potential environmental impacts in order to select the most environmentally friendly and economically viable option.

The purpose of conducting an EA is to identify environmental and social consequences of the proposed sub-projects or components, in order to:

- Ensure the identification of potential environmental issues and social concerns early in the implementation of a proposed project to incorporate necessary safeguards in project design in order to prevent potential adverse impacts by determining appropriate mitigation and compensation measures;
- Minimize risks and enhance positive impacts/benefits;
- Avoid delays and extra costs which may subsequently arise due to unanticipated environmental problems;
- Identify the potential for maximizing environmental resources management and socio-economic benefits to local communities within the scope of the sub-project.

The EA should cover physical-chemical, biological, socio-economic and cultural issues that are likely to arise during rehabilitation and improvement of infrastructure including landslide prevention structures and associated activities as appropriate. As of this stage, designs of specific sub-projects are still being prepared; hence as a result, site-specific EAs and/or environmental management plans (EMPs) cannot be fully completed. Therefore, initial assessments of sample of sites have been undertaken and identification of generic issues that are typically associated with the project activities have been carried out. ***Once further design details are available, updating of the assessments and/or further improvements to the EMPs will be undertaken by the project proponents prior to finalization of the designs and moving forward with the bidding process.*** In such circumstances, OP 4.01 requires that arrangements be made whereby the project implementing institutions undertake the functions of sub-project screening, improvement or preparation of EAs and EMPs and implementation of mitigation and monitoring plans, as described in the framework part of this EAMF. The EAMF, EAs and EMPs will be made available for public review and comment. Detailed EAs where applicable will be carried out (in accordance with the EAMF) by the implementing agencies and will be reviewed and cleared by the designated PAA, as applicable, under prevailing national environmental legislation in Sri Lanka and by IDA prior to the approval for disbursement of funds.

### **2.2.2 Natural Habitats (OP/BP 4.04)**

Some of the project activities under the proposed project may have impacts on the known natural habitat such as protected area and their buffer zones, on areas proposed for protection/conservation, and/or on areas of known high conservation value. The policy prohibits World Bank support for projects, which would lead to the significant loss or degradation of any critical natural habitats. ***Sub-projects that may have impacts on natural habitats will need to undergo full EA, approved by the relevant national agency as per the FFPO and/or FO and IDA. The project will not activities that are located in or dependent on resources from critical natural habitats, as well as that will lead to significant loss or degradation of habitats.***

### **2.2.3 Physical Cultural Resources (OP/BP 4.11)**

This policy addresses physical cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, pale-ontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial or national level, or within the international community. The Bank assists countries to avoid or mitigate adverse impacts on physical cultural resources from development projects that it finances. The impacts on physical cultural resources resulting from project activities, including mitigating measures, may not contravene either the borrowers' national legislation, or its obligations under relevant international environmental treaties and agreements. The Bank adheres to the following project financing policies:

- ***The Bank finances only those projects that are sited and designed so as to prevent significant damages to non-replicable cultural property.*** This policy pertains to any project where the Bank is involved, irrespective of whether the Bank is itself financing the part of the project that may affect cultural property.
- ***Deviation from this policy may be justified only where expected project benefits are great, and the loss of or damage to cultural property is judged by competent authorities to be unavoidable, minor, or otherwise acceptable.*** The Bank also requires a discussion with specific details for their justification in the documents.

Furthermore, should any other site get identified the Project will do the following:

- ***Whenever chance finds are made during the works, the contractor will immediately inform the project execution agency which will, in turn, inform the government department concerned with cultural property.***

- The project execution agency will be responsible for securing the artifacts from theft, pilferage and damage until the responsibility is taken over by the relevant authorities.
- Failure to report a chance find immediately by the contractor will result in cancellation of the contract and punishment according to the relevant laws.
- These conditions and procedures regarding chance finds will be included as standard provisions in the construction document in details and made available for IDA review and other interested persons and entities.

### **3. ASSESSMENT OF ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES**

The purpose of this section of the report is to identify the possible environmental impacts and issues that could arise as a result of the proposed project activities. Impacts and issues of any road development project could be distinguished between physical, biological/ ecological (covered under this document) and social environments (addressed separately). These impacts could be significant or non-significant, positive or negative, direct or indirect and could be immediate or long term impacts.

#### **3.1 Component-specific Preliminary Assessment of Impacts and Mitigation Measures**

*Component 1: Development of basin investment plans.* Nine basins including i) Mahaweli Ganga; ii) Kala Oya; iii) Dedura Oya; iv) Maha Oya; v) Attanagula Oya; vi) Kelani Ganga; vii) Gin Gana; viii) Nilwala Ganga; and ix) Gal Oya have been selected to ensure climate risks are and appropriate risk mitigation measures are identified and built into investments plans. Overall, the process that will be followed to develop the plans will be environmentally beneficial, as basin-level strategic environmental and social assessments will be also undertaken and integrated as part of the mitigation measures to reduce impacts to critical environmental resources and further degradation of the environment. Generic terms of reference for the assessments is provided in Annex 1. Once the full scope of the basin investment plans are in place, the terms of reference will be updated and agreed with IDA prior to undertaking the assessments.

*Component 2: Building climate resilience of infrastructure.* This component will finance three types of investments that will include rehabilitation and improvement of existing infrastructure and landslide mitigation measures that will likely to have both short and long-term environmental impacts unless adequately planned and implemented.

*Flood mitigation* – This sub-component will include activities to increase of conveyance capacity by removing obstacles and bottlenecks, realignment of canals, upgrade and maintenance of flood pump stations, rehabilitation of flood bunds damaged by recent flooding and rehabilitation of diversion structures damaged by recent flooding. These activities can have downstream impacts unless all associated structures have the conveyance capacity to respond to high precipitation events. The works associated with these activities will likely to generate site-specific and temporary impacts associated with demolition and removal of damaged structures and construction work and impacts due to use of construction material such as sand, gravel and metal. Some of the requirements identified for investments are also due to inadequate operation

and maintenance of infrastructure. Hence there is a necessity to develop and agree on an operation and maintenance system that is cost-effective and includes a plan to obtain regular resources for the purpose.

*Road and bridge improvement for transport continuity* – This sub-component will focus on activities that will improve bridge widths and heights in response to effective post-disaster response and reduce flooding respectively. In addition, it will also provide support to improve the stabilization of steep embankments of critical road links through landslide mitigation measures. Similar to flood mitigation, improvements to bridges will likely to have downstream impacts of flooding unless all associated structures that connect the waterways that go under the bridges have the capacity to convey the water level and pressure during high precipitation events. While the landslide prevention structures will help to reduce potential landslide in a given site, due diligence will be necessary to ensure the surrounding areas will not reduce their stability due to the mitigation measures. The works associated with these activities will have similar impacts are identified under flood mitigation works.

Recently rehabilitated Kandy-Mahiyangana-Padiyatalawa road where most of the investment of this component are expected to be provided which requires extensive slope stabilization due to inadequate assessment of the landslide potential and not adhering to standards of slope cutting and not inclusion of slope protection structures, a full scale assessment of landslide potential and an EA to assess the designs and impacts to the Victoria-Randenigala-Rantambe Sanctuary will need to be carried out and cleared prior to finalization of the designs and commencing bidding process. In addition, the proposed slope stabilization close to Hakgala Strict Nature Reserve will require initial consultation with stakeholders (including the Department of Wildlife Conservation, Forest Department, officials of the Hakgala Gardens, communities living in the vicinity, and conservation community) prior to making the final decision on financing through this project.

*Landslide mitigation for school safety* – This sub-component will support slope re-shaping, benching and surface preparation with geo-textiles, soil-anchoring/nailing, slope protection measures with geo-mesh and geo-grids, drainage development, both surface and sub-surface through lateral drains and building retaining walls. Landslide prevention structures should ensure the surrounding areas will not reduce their stability due to the mitigation measures. The works associated with these activities will have similar impacts are identified under flood mitigation works.

***Component 3: Implementation support.*** This component will ensure there is adequate human resource capacity at the PMU level, as well as within implementing agencies to implement the environmental safeguards requirements identified in this document. Details of the implementation arrangements are provided under Section 5.

**Component 4: Contingent emergency response.** While no-specific activities are identified at this point, this component will support recovery and reconstruction activities followed by a natural disaster event. In such situations the project will use generic EMPs to undertake reconstruction work of the first year following the disaster event and any activity that will be financed the second year onwards will follow the requirements laid out for component 2. However, in the event a dam is breached based on the scope and complexity of the dam, the requirements described under OP 4.37 will need to be followed.

### 3.2 Generic Impacts and their Significance

Following impacts are for the proposed activities of component 2.

#### 3.2.1 Impacts to physical and ecological environment during construction phase

##### *Impacts on soil at construction and material extraction sites and yard*

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

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

Impact description	Duration of the impact	Level of impact
Siltation of waterways due to modifications to surface water flow and drainage patterns	Long-term	Moderate
Flooding of local areas due to rechannelization of waterways	Short-term	Moderate
Impacts of impoundment, channel deepening and filling	Long-term	Moderate
Degradation of surface water quality due to equipment	Short-term	Low

and material piling on the site		
Degradation of water quality due to waste water from worker camps	Short-term	Moderate
Degradation of water quality in water bodies in the vicinity of quarry and borrow sites	Short-term	Moderate
Reduction in groundwater recharge due to drainage and excavation, especially in dry areas	Long-term	High
Improvement of surface water quality due to better runoff management	Long-term	High (positive)

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

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

***Impacts on ecosystems, fauna and flora***

<b>Impact description</b>	<b>Duration of the impact</b>	<b>Level of impact</b>
Clearing of vegetation for construction activities may lead to disturbance to natural habitats (wetlands, forest areas, lagoons, etc)	Long-term	High
Clearing of surface vegetation in quarry sites and borrow sites may lead to the loss of land/ natural habitats	Long-term	High
Loss of important fauna and flora due to construction works	Long-term	Moderate
Disturbance to animal migration routes and patterns	Long-term	High
Changes to aquatic ecosystems due to siltation of waterways, changes to speed and volume of water flow	Long-term	High
Contamination of biota by emissions to air, water and	Short-term	Moderate

soil during construction and material extraction works		
Loss of standing crops, fruit trees and commercially valuable trees due to construction works close to home gardens, chena lands and paddy fields	Long-term	Moderate

### 3.2.2 Impacts to physical and ecological environment during operational phase

Impact description	Duration of the impact	Level of impact
Flooding due to blocking of irrigation channels, culverts and other drainage structures due to inadequate maintenance	Long-term	High
Threats of modification of previously pristine areas by humans as a direct result of improved accessibility	Long-term	High
Safety issues related to poor operations	Short-term	High
Threats of modification of previously pristine areas by humans as a direct result of improved accessibility	Long-term	High
Encroachment into reservations	Long-term	High (positive)
Improved accessibility	Long-term	High (positive)
Improved safety from landslides	Long-term	High (positive)
Reduced flooding and improvement of surface water quality due to better run off management	Long-term	High (positive)

### 3.3. Detailed Assessment of Potential Impacts and Mitigation Measures

The following table provides a detail assessment of likely impacts of proposed activities under Component 2, proposed mitigation measures and institutional responsibilities.

Site-specific assessments of sample of sites are provided in Annex 2.

Activities	Protection and preventive measures		Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
<b>1.0</b>	<b>Advance Works</b>					
	<b>1.1</b>	<b>Design for culverts, bridges, leaderways, silttraps and catch pits</b>				
	(a)	RDA should obtain prior consent from relevant authorities such as Department of Coast Conservation, ID. MASL etc., for implementation of proposed drainage management plan and any proposed construction works on/at areas belong to these institutions. RDA should obtain prior consent from relevant public if any land use of people is likely to be interfered temporarily or permanently by the proposed drainage improvement work.	Design stage Design stage	-	RDA	
	(b)	For culverts designs should be considered to allow overland flow and sheet flow from the pavement or cross drainage without any blocking For bridges designs should be considered to allow overland flow and cross waterways without any blockage For leaderways designs should be considered for smooth flow without any blocking For silttraps designs should be considered for trapping of silt in proper manner For catch pits appropriate designs should be considered in order to drain out rain water without blocking / flooding Designed drainage facilities must be capable of disposing of the runoff generated in a given water catchment without inundating the surrounding land (adjacent properties and utilities or land uses) in an event of a fifty year return period flood”.		Design cost	RDA	
	<b>1.2</b>	<b>Design of slope protection / land-slide management structures</b>				
	(a)	Design must ensure structural integrity and safety of structures to address issues such as physical trauma associated with failure of structures and address potential reduction of stabilization of the nearby land due to slope protection activities. Incorporate as appropriate the following during planning, siting and design phases: Inclusion of buffer strips or physical separations around project sites Incorporation of siting and safety engineering criteria to prevent failures due natural and/or man-made risks (such as wind, flooding, landslides, etc.)	Design stage	Design cost	NBRO	

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		Application of locally regulated building codes to ensure structural integrity Certification of designing and constructing infrastructure, the applicability and appropriateness of structural criteria				
	<b>1.3</b>	<b>EMP</b>				
	(a)	EMP should be included as a Special Condition in the Bid Document; and EMP should be attached to contract to form part of the contract requirement	Prior to bidding	To be provided as a provisional sum and/or as part of the engineering cost	RDA, NBRO/PMU, ID and MASL	
<b>2.0 Construction Phase</b>						
	<b>2.1</b>	<b>Earthwork and Soil Conservation</b>				
	<b>2.1.1</b>	<b>Site Clearance and Land Development</b>				
		Prevention of removal of trees as far as possible. During removing, attention should be paid to maintain minimum disturbances to soil cover and also care should be taken not to damage adjoining trees. Degraded state land identified for forestry activities will be improved to compensate for the trees removed as 1:2 at least Water spraying should be done at a regular interval to avoid dust generation due to site clearance	Applicable throughout the construction areas	Engineering cost	RDA, NBRO/PMU, ID and MASL	FD
	<b>2.1.2</b>	<b>Disposal of Debris and Spoil</b>				
	(a)	All debris and residual spoil material including any left earth shall be disposed only at locations approved by the engineer for such purpose and subjected to the clauses 2.1.1.b and 2.1.1.c. All material that is reusable or recyclable shall be used for such purposes either by the contractor or through dealers.	Disposal sites to be identified by the contractor and approved by Engineer.	Engineering cost	contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	The contractor shall obtain the approval from the relevant Local Authority such as Prdeshiya Sabha, Municipal Council and other government agencies (as				

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		required) for disposal and spoil at the specified location , as directed by the Engineer Private land that will be selected for disposal should also require written consent from the land owner				
	(c)	The debris and spoil shall be disposed in such a manner that; (i) waterways and drainage paths are not blocked (ii) the disposed material should not be washed away by runoff and (iii) should not be a nuisance to the public				
	(d)	The debris and residual spoil material including any left earth shall be used, to refill the burrow areas as directed by the engineer, subjected to laying of topsoil as per EMP clause 2.1.2.	All burrow sites (licensed sites) identified by contractor and approved by engineer.			
	(e)	Excavated earth materials and all debris materials shall be disposed immediately without allowing to stockpile at identified locations for debris disposal, recommended by the engineer. During transportation, dispose materials should be covered with tarpaulin.	Applicable throughout the project sites			
	(f)	If approved by the engineer, contractor can dispose the debris and spoil as a filling material provided that the contractor can ensure that such material is used for legally acceptable purposes with disposed in an environmentally acceptable manner.	In identified filling sites subjected to the approval of engineer			
	<b>2.1.2</b>	<b>Conservation and reuse of top soil</b>				
	(a)	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 engineer. 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	Within the project sites where topsoil from productive land to be removed	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	Removed top soil could be used as a productive soil when replanting/establishing vegetation	Site(s) identified for replantation			

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
			program			
	(c)	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.	Within the project sites where slope stabilization is carried out and/or on barren land			
	(d)	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.	Locations where topsoil is stockpiled for reuse	-		
	<b>2.1.3</b>	<b>Protection of Ground Cover and Vegetation</b>				
	(a)	Construction vehicle, machinery and equipment shall be used and stationed only in the areas of work and in any other area designated/ approved by the engineer. Entry and exit of construction vehicles and machinery should be restricted to particular points as directed by the engineer	Within the project areas	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	Contractor should provide necessary instructions to drivers, operators and other construction workers not to destroy ground vegetation cover unnecessarily	Within the project areas			
	<b>2.1.4</b>	<b>Burrowing of Earth</b>				
	(a)	Earth available from construction site excavation works as per design, may be used as embankment materials, subject to approval of the engineer	All excavation areas and embankments	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	Contractor shall comply with the environmental requirements/guidelines issued by the CEA and the respective local authorities with respect of locating burrow areas and with regard to all operations related to excavation and transportation of earth from such sites. 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 (current approved) or newly established within areas protected under FFPO and FO	All burrow sites identified and used by the contractor			
	(c)	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.				
	(d)	All burrow pits/areas should be rehabilitated at the end of their use by the		Engineering		

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		contractor in accordance with the requirements/guidelines issued by the CEA and the respective local authority.		cost		
	(e)	Establishment of burrow pits/areas and its operational activities shall not cause any adverse impact to the near-by properties. Also shall not be a danger of health hazard to the people.	All excavation areas, slopes and burrow sites	-		
	(f)	Contractor shall take all steps necessary to ensure the stability of slopes including those related to temporary works and burrow pits.		Engineering cost		
	<b>2.1.5</b>	<b>Prevention of soil erosion</b>				
	(a)	Debris material shall be disposed in such a manner that waterways, drainage paths would not get blocked. Drainage paths associated with the infrastructure should be improved / erected to drain rain water properly. Silt traps will be constructed to avoid siltation into water ways where necessary. To avoid siltation, drainage paths should not be directed to streams, other water bodies and sea directly and they should be separated from streams / other water bodies / sea	Applicable throughout project sites Locations of culverts, leaderways (directly connected to streams / water bodies), toe walls & silttraps to be erected.	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	Barricades such as humps will be erected at excavated areas for culverts, silttraps, toewalls, filling and lifting with roper sign boards, as some work in these sections will have to be stopped during heavy rains due to heavy erosion. To prevent soil erosion in these excavated areas, proper earth drain system should be introduced.	Applicable throughout project sites			
	(c)	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 matreialas per the specifications. All fills, backfills and slopes should be compacted immediately to reach the specified degree of compaction and establishment of proper mulch.				
	(d)	Work that lead to heavy erosion shall be avoided during the raining season. If such activities need to be continued during rainy season prior approval must be obtained from the Engineer by submitting a proposal on actions that will be		-		

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		undertaken by the contractor to prevent erosion.				
	(e)	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.		Engineering cost		
	<b>2.1.6</b>	<b>Contamination of soil by fuel and lubrications</b>				
	(a)	Vehicle/machinery and equipment servicing and maintenance work shall be carried out only in designated locations/ service stations approved by the engineer	Servicing yards to be used for vehicle servicing	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	Approval from CEA in the form of an Environmental Protection Licenses (EPL) should be secured by the contractor if he intends to prepare his own vehicle servicing yard				RDA, NBRO/PMU, ID and MASL Engineer to the sub-project, CEA
	(c)	Waste oil, other petroleum products and untreated wastewater shall not be discharged on ground so that to avoid soil pollution. Adequate measures shall be taken against pollution of soil by spillage of petroleum/oil products from storage tanks and containers. All waste petroleum products shall be disposed of in accordance with the guidelines issued by the CEA or the engineer.	Servicing yards to be used for vehicle servicing and locations where vehicles will be temporarily stationed			
	(d)	Sites used for vehicle and plant service and maintenance shall be restored back to its initial status. Site restoration will be considered as incidental to work.	New servicing yards developed by the contractor for the project			RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	<b>2.1.7</b>	<b>Disposal of harmful construction wastes</b>				
	(a)	Contractor prior to the commencement of work shall provide list of harmful,	Locations identified	-	Contractor	RDA,

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		hazardous and risky chemicals/ material that will be used in the project work to the Engineer. Contractor shall also provide the list of places where such chemicals/materials or their containers or other harmful materials have been dumped as waste at the end of the project.	to store chemicals and waste disposal			NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	All disposal sites should be approved by the engineer and approved by CEA and relevant local authority.				RDA, NBRO/PMU, ID and MASL Engineer to the sub-project, CEA
	(c)	The contractor shall clean up any area including water-bodies affected/contaminated (if any) as directed by the engineer at his own cost.	All affected water bodies close to material storage and waste disposal sites			
	<b>2.1.8.</b>	<b>Quarry operations</b>				
	(a)	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 Licences; 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 protected sites identified under the FFPO and FO	All, quarry sites which will be used during construction phase.	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project, CEA, GSMB, local authorities
	(b)	It is recommended not to seek material from quarries that have ongoing disputes with community.		-		
	(c)	The maintenance and rehabilitation of the access roads in the event of damage by the contractors operations shall be a responsibility of the contractor.		Engineering cost		
	<b>2.2</b>	<b>Storage and handling of construction material</b>				
	<b>2.2.1</b>	<b>Emission of dust</b>				
	(a)	Storage locations of sand, metal, soil should be located away from settlements and other sensitive receptors and covered (with artificial barriers or natural vegetation). Measures given under clauses 2.5.1 (c), (d), (e) should be considered within	At all material storage locations (stockpiles of sand, gravel and metal)	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		material storage site to minimize dust during handling of material. All access roads within the storage site should be sprinkled with water for dust suspension.				sub-project
	<b>2.2.2</b>	<b>Storage of fuel, oil and chemicals (avoid fumes and offensive odor)</b>				
	(a)	All cement, bitumen (barrels), oil and other chemicals should be stored and handled on an impervious surface (concrete slab) above ground level. Storage facility of cement, bitumen (barrels), oil and other chemicals should be an enclosed structure ensuring that no storm water flows in to the structure. A ridge should be placed around the storage facility to avoid runoff getting in to the structure. Adequate ventilation should be kept to avoid accumulation of fumes and offensive odor that could be harmful to material handlers. Measures given under clause 2.9 should be considered to avoid any accidents and risks to worker population and public.	At all material storage locations (cement, bitumen, fuel, oil and other chemicals used for construction activities)	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	<b>2.2.3</b>	<b>Transportation of material</b>				
	(a)	The contractor should avoid over loaded trucks to transport material to construction sites. During transportation, materials should be covered with tarpaulin. Avoid peak hours in roads with moderate to high traffic; the contractor shall minimize possible public nuisance due to dust, traffic congestion, air pollution, etc., due to such haulage; If local roads are used, select routes based on the truck load; divide the load to prevent damages to local roads and bridges; observe speed limits and maintain vehicles in the good condition; transport material under cover; avoid peak hours in roads with moderate to high traffic. If there are damages to local roads and other utilities due to hauling in roads which were not identified during design stage, Contractor shall attend to repair all damaged infrastructure/ roads, if needed through relevant authorities	Within the project locations and the vicinity	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	<b>2.3</b>	<b>Water – Protection of Water Sources and Quality</b>				
	<b>2.3.1.</b>	<b>Loss of minor water sources and disruption to water users</b>				
	(a)	Contractor should make employees aware on water conservation and waste minimization in the construction process.	Project sites and worker camps	-	Contractor	RDA, NBRO/PMU,

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
	(b)	<p>Arrange adequate supply of water for the project purpose throughout the construction period. Not obtain water for project purposes, including for labor camps, from public or community water supply schemes without a prior approval from the relevant authority.</p> <p>Not extract water from ground water or surface water bodies without the permission from engineer &amp; relevant authority. Obtain the permission for extracting water prior to the commencing of the project, from the relevant authority.</p>		Engineering cost		ID and MASL Engineer to the sub-project
	(c)	<p>Contractor shall protect sources of water (potable or otherwise) such as water sources used by the community so that continued use these water sources will not be disrupted by the work. In case the closer of such sources is required on temporary basis contractor shall provide alternative arrangement for supply. Alternative sources such as wells thus provided should be within acceptable distance to the original sources and accessible to the affected community.</p>	Wells and other public water sources locations within the project sites			
	(d)	<p>Contractor shall not divert, close or block existing canals and streams in a manner that adversely affect downstream intakes. If diversion or closure or blocking of canals and streams is required for the execution of work, contractor must obtain the engineers approval in writing. Contractor shall also obtain the approval from the National Water Supply and Drainage Board (NWS&amp;DB) or local authority or Divisional Secretary depending on the operating agency of the intake/water supply. Contractor shall restore the drainage path back to its original status once the need for such diversion or closure or blockage ceased to exist. During the affected period contractor shall supply water to the affected community.</p>	Waterways located in the surrounding areas of road sections or the contractor's work sites.			
	(e)	<p>In case the contractors activities going to adversely affect the quantity or quality of water, the contractor shall serve notice to the relevant authorities and downstream users of water sufficiently in advance.</p>	Project sites			
	(f)	<p>Apply best management practices to control contamination of run-off water during maintenance &amp; operation of equipment.</p> <p>Maintain adequate distance between stockpiles &amp; water bodies to control effects to natural drainage paths.</p>	construction sites, material and soil storage areas, and equipment and	-		

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
			machinery service areas			
	<b>2.3.2</b>	<b>Siltation into water bodies</b>				
	(a)	Contractor shall take measures to prevent siltation of water bodies as a result of construction work including, construction of temporary/ permanent devices to prevent water pollution due to siltation and increase of turbidity. These shall include the measures against erosion as per EMP 2.1.6.	All water bodies located around the project areas	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	Construction materials containing small/ fine particles shall be stored in places not subjected to flooding and in such a manner that these materials will not be washed away by runoff.				
	(c)	Temporary soil dumps should be placed at least 200m away from all water bodies				
	(d)	If temporary soil piles are left at the site for a long time those piles should be covered with thick polythene sheets				
	(e)	All fills, back fills and slopes should be compacted immediately to reach the specified degree of compaction and establishment of proper mulch				
	<b>2.3.3</b>	<b>Alteration of drainage paths</b>				
	(a)	Contractor shall not close or block existing canals and streams permanently. If diversion or closure or blocking of canals and streams is required for the execution of work (e.g. for construction of bypass), contractor must first obtain the Engineers approval in writing. Contractor shall carry out an investigation and report to the Engineer, if an investigation is requested by the Engineer. Contractor shall also obtain the approval from the relevant agencies such as ID/ /Divisional Secretary prior to such action is taken. Contractors shall restore the drainage path back to its original status once the need for such diversion or closure or blockage is no longer required.	All drainage paths impacted by the project activities	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	The debris and spoil shall be disposed in such a manner that waterways and drainage paths are not blocked.				
	(c)	Avoid/ minimize construction works near/ at such drainage locations during heavy rain seasons such as monsoon rain periods.				
	<b>2.3.4.</b>	<b>Contamination of water from construction wastes</b>				

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
	(a)	The work shall be carried out in such a manner that pollution of natural water courses rivers, lagoons, sea and other minor stream paths located within construction areas or downstream. Measures as given in 2.1.6., 2.1.7, 2.1.8, 2.3.2 and 2.3.6 clauses shall be taken to prevent the wastewater produced in construction from entering directly into streams, water bodies or the irrigation systems.	At all water courses located adjacent construction sites and downstream	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	Avoid / minimize construction works near/ at such drainage locations during heavy rainy seasons	At all water courses located adjacent construction sites	-		
	(c)	The discharge standards promulgated under the National Environmental Act shall be strictly adhered to. All waste arising from the project is to be disposed in a manner that is acceptable to the engineer and as per the guidelines/instructions issued by the CEA.	At all water courses located adjacent construction sites and downstream	Engineering cost		
	<b>2.3.5.</b>	<b>Contamination from fuel and lubricants</b>				
	(a)	All vehicle and plant maintenance and servicing stations shall be located and operated as per the conditions and /or guidelines stipulated under the EPL issued by CEA. In general these should be located at least 200m away from water bodies and wastewater shall not be disposed without meeting the disposal standards of the CEA. Wastewater from vehicle and plant maintenance and servicing stations shall be cleared of oil and grease and other contaminants to meet the relevant standards before discharging to the environment.	Vehicle and plant maintenance and servicing centers	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	Vehicle, machinery and equipment maintenance and re-filling shall be done as required in EMP clause 2.1.6. to prevent water pollution as well	Yards, servicing centers			
	<b>2.3.6.</b>	<b>Locating, sanitation and waste disposal in construction camps</b>				
	(a)	Locations selected for labor camps should be approved by engineer and comply with guidelines/ recommendations issued by the CEA/Local Authority. Construction of laborer camps shall not be located within 200m from waterways or near to a site or premises of religious, cultural or archeological importance and school.	At all labor camps	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	Labor camps shall be provided with adequate and appropriate facilities for				

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		disposal of sewerage and solid waste. The sewage systems shall be properly designed, built and operated so that no pollution to ground or adjacent water bodies/watercourses takes place. Garbage bins shall be provided at the camps and regularly emptied. Garbage should be disposed off in a hygienic manner, to the satisfaction of the relevant norms. Compliance with the relevant regulations and guidelines issued by the CEA/LA shall be strictly adhered to.				
	(c)	Contractor shall ensure that all camps are kept clean and hygienic. Necessary measures shall be taken to prevent breeding of vectors				
	(d)	Contractor shall report any outbreak of infectious disease of importance in a labor camp to the engineer and the Medical Officer of Health (MOH) or to the Public Health Inspector (PHI) of the area immediately. Contractor shall carry out all instructions issued by the authorities, if any.		-		
	(e)	Contractor shall adhere to the CEA recommendations on disposal of wastewater. Wastewater shall not be discharged to ground or waterways in a manner that will cause unacceptable surface or ground water pollution.		-		
	(f)	All relevant provisions of the Factories Act and any other relevant regulations aimed at safety and health of workers shall be adhered to.		-		
	(g)	Contractor should remove all labor camps fully after its need is over, empty septic tanks, remove all garbage, debris and clean and restore the area back to its former condition. A consent letter from the land owner should be obtained that certifies the decommissioning has taken place to the level acceptable to the land owner		Engineering cost		
	<b>2.3.7.</b>	<b>Wastage of water and waste minimization</b>				
	(a)	The contractor will minimize wastage of water in the construction process/operations by reusing water as much as possible, utilizing only the required amount of water for the construction works etc...	Within project sites and labor camps	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	The contractor shall educate and make employees aware on water conservation, waste minimization and safe disposal of waste following guidelines given by CEA and LA.				
	<b>2.3.8.</b>	<b>Extraction of water</b>				
	(a)	The contractor is responsible for arranging adequate supply of water for the	Within project sites	Engineering	Contractor	RDA,

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		project purpose throughout the construction period. Contractor shall not obtain water for his purposes including for labour camps from public or community water supplies without approval from the relevant authority. Such extraction (if approved) should be under direct supervision of the engineer	and labor camps	cost		NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	Extraction of water by the contractor for the project purposes shall comply with the guidelines and instructions issued by relevant authority. The Contractor shall not extract water from groundwater or from surface water-bodies without permission from the Engineer.		-		
	(c)	Construction over and close to rivers, minor streams and lagoon shall be undertaken in dry season.	All drainage and irrigation activities			
	(d)	The Contractor may use the natural sources of water subject to the provision that any claim arising out of conflicts with other users of the said natural sources of water shall be made good entirely by the contractor	At all natural water sources used for construction works			
<b>2.4.</b>	<b>Flood Prevention</b>					
	<b>2.4.1.</b>	<b>Blockage of drainage paths and drains</b>				
	(a)	Contractor's activities shall not lead to flooding conditions as a result of blocked drainage paths and drains. The contractor shall take all measures necessary or as directed by the Engineer to keep all drainage paths and drains clear of blockage at all times.	All construction work sites	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	If flooding or stagnation of water is caused by contractor's activities, contractors shall provide suitable means to (a) prevent loss of access to any land or property and (b) prevent damage to land and property. Contractor shall compensate for any loss of income or damage as a result.				
	<b>2.4.2</b>	<b>Work in Flood Prone Areas</b>				
	(a)	Contractor's activities shall not lead to aggravate floods in flood prone areas when working in flood prone areas.	All construction work sites and their impacts areas	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	When working in flood prone areas during rainy season the contractor shall avoid storing materials, chemicals and other items of work in areas where those can be washed away by the floods.				
	<b>2.5</b>	<b>Air Pollution</b>				

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
	<b>2.5.1.</b>	<b>Generation of Dust</b>				
	(a)	The contractor shall effectively manage the dust generating activities such as topsoil removal, handling and transporting sand, rubble, bitumen, and cement during periods of high winds or during more stable conditions with winds directed towards adjacent residences and other facilities.	Within the construction area where earth work will take place, storage locations of sand, rubble, bitumen, cement and all sub roads used for material transportation, paying special attention to sensitive locations.	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	All stockpiles shall be located sufficiently away from sensitive receptors.				
	(c)	All vehicles delivering materials shall be covered to avoid spillage and dust emission.				
	(d)	The Contractor should avoid, where possible and take suitable action to prevent dirt and mud being carried to the roadway (particularly following wet weather).				
	(e)	The contractor should enforce vehicle speed limits to minimize dust generation.				
	(f)	The Contractor shall employ a water truck to sprinkle water for dust suppression on all exposed areas as required (note: the use of waste water / waste oil for dust suppression is prohibited)				
	(g)	All cleared areas shall be rehabilitated progressively.				
	(h)	All earthwork shall be protected in a manner acceptable to the minimize generation of dust.				
	(i)	All existing roads used by vehicles of the contractor, or any of his sub-contractor or supplies of materials or plant and similar roads which are part of the works shall be kept clean and clear of all dust/mud or other extraneous materials dropped by such vehicles or their tyres.				
	(j)	Clearance shall be affected immediately by manual sweeping and removal of debris, or, if so directed by the Engineer, by mechanical sweeping and clearing equipment. Additionally, if so directed by the Engineer, the road surface will be hosed or sprinkled water using appropriate equipment.				
	(k)	Plants, machinery and equipment shall be handled (including dismantling) so as to minimize generation of dust.				
	(l)	The contractor shall take every precaution to reduce the level of dust emission from the hot mix plants and the batching plants up to the satisfaction of the Engineer in accordance with the relevant emission norms.				
	<b>2.5.2</b>	<b>Emission from Hot-Mix Plants and Batching Plants</b>				

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
	(a)	The hot mix plants and batching plants shall be sited in accordance with CEA guidelines. It is recommended that hot mix plants and batching plants to be located sufficiently away from sensitive receptors such as vulnerable habitats, religious and cultural sites, residential areas, schools and industrial areas	Locations at which hot mix plant/s and concrete batching plant/s to be located	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project, CEA
	(b)	The exhaust gases shall comply with the requirements of the relevant current emission control legislation. All operations at plants shall be undertaken in accordance with all current rules and regulations protecting the environment as well as the conditions given in the EPL.				
	(c)	The hot mix plant be sited in accordance with CEA guidelines and operated with an EPL. The hot mix plants shall be fitted with the requirements of the relevant current emission control legislation. Road side mixing should be avoided				
	<b>2.5.3.</b>	<b>Odor and offensive smells</b>				
	(a)	Contractor shall take all precautions such as storing all chemicals used for construction works in properly closed containers with good ventilations to prevent odor and offensive smell emanating from chemicals and processes applied in construction works or from labor camps. In a situation when/where odor or offensive smell does occur contractor shall take immediate action to rectify the situation. Contractor is responsible for any compensation involved with any health issue arisen out of bad odor and offensive smells.	Within construction and work sites including all sites used for store all chemicals and places where chemical reactions take place.	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project, CEA
	(b)	The waste disposal and sewerage treatment system for the labor camps shall be properly designed, built and operated so that no odor is generated. Compliance with the regulations on health and safety as well as CEA and LA guidelines shall be strictly adhered to.	At all labor camps			
	<b>2.5.4.</b>	<b>Emission from construction Vehicles, Equipment and Machinery</b>				
	(a)	The emission standards promulgated under the National Environment Act shall be strictly adhered to.	All plants, machinery and vehicles used for construction	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the
	(b)	All vehicles, equipment and machinery used for construction shall be regularly serviced and well maintained to ensure that emission levels comply with the		Engineering cost		

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		relevant standards.				sub-project, CEA
	(c)	Contractor should obtain the certificate issued by the Vehicular Emission Test (VET) for all construction vehicles, plants and other machineries and it should be renewed annually				
	<b>2.5.5.</b>	<b>Air Pollution from Crusher</b>				
	(a)	Crusher plants should operate under an EPL and shall confirm to relevant dust emission levels as stated in the EPL. Only the quarries approved by GSMB and holding current EPL shall be used for material extraction.	Location of crusher plants	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project, CEA
	(b)	Crushing plants shall be sited sufficiently away from sensitive receptors such as houses, place of worships and outdoor recreation areas (locations given under item 2.4.1) or as required by the Engineer.				
	(c)	Sprinkling of water (through a sprinkler system) for dust suppression.		Engineering cost		
	<b>2.6</b>	<b>Noise Pollution and Vibration</b>				
	<b>2.6.1</b>	<b>Noise from Vehicles, Plants and Equipment.</b>				
	(a)	All machinery and equipment should be well maintained and fitted with noise reduction devices in accordance with manufacturer's instructions.	All machinery and vehicles used for construction works	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project, CEA
	(b)	In construction sites within 150 m of the nearest habitation, noisy construction work such as crushing, concrete mixing and batching, mechanical compaction, etc., will be stopped between 20.00 hours to 06.00 hours. No construction shall take place within 100m around hospitals between 20.00 hours to 06.00 hours. Near noise sensitive sites, such as schools noisy equipment shall not be used during noise sensitive times of the day.	Within the construction sites and their vicinity	-		
	(c)	All vehicles and equipment used in construction shall be fitted with exhaust silences. During routine servicing operations, the effectiveness of exhaust silencers shall be checked and if found to be defective shall be replaced. Notwithstanding any other conditions of contract, noise level from any item of plant(s) must comply with the relevant legislation for levels of sound emission. Non-compliant plant shall be removed from site.		Engineering cost		
	(d)	Noise limits for construction equipment used in this project (measured at one	All equipment,	-		

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		meter from the edge of the equipment in free field) such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators, and saws shall not exceed 75 dB(A).	machinery and vehicles used for construction works			
	(e)	Maintenance of vehicles, equipment and machinery shall be regular and proper, to the satisfaction of the Engineer, to keep noise from these at a minimum.		Engineering cost		
	(f)	Workers in vicinity of strong noise, and workers working with or in crushing, compaction, batching or concrete mixing operations shall be provided with protective gear.		Within the construction sites and their vicinity		
	<b>2.6.2</b>	<b>Vibration</b>				
	(a)	Contractor shall take appropriate action to ensure that construction works do not result in damage to adjacent properties due to vibration.	Within the construction sites and their vicinity	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project, CEA
	(b)	Prior to commencement of excavation, blasting activity, the Contractor shall undertake a condition survey of existing structures within the zone of influence, as agreed with the relevant government agencies and the engineer.				
	(c)	Contractor shall carry out monitoring at the nearest vibration sensitive receptor during blasting or when other equipment causing vibration are used.				
	(d)	The contractor shall modify the method of construction until compliance with the criteria, if vibration levels exceed the relevant vibration criteria.				
	(e)	Contractor shall pay due consideration on vibration impacts of blasting on adjoining structures. Explosive loads shall be determined so that excessive vibration can be avoided and blasts shall be controlled blasting in nature. Notwithstanding to these provisions contractor is liable for any damage caused by blasting work.				
	<b>2.6.3</b>	<b>Noise from Blasting or Pre splitting Operations</b>				
	(a)	Blasting shall be carried out during fixed hours (preferably during mid-day), as permitted by the Engineer. The timing should be made known to all the people within 500 m (200 m for pre-splitting) from the blasting site in all directions. People, except those who actually light the fuse shall be excluded from the area of 200 m (50 m for pre-splitting) from the blasting site in all directions at least 10m minutes before the blasting. Use chemical blasting where rocks have to be removed for landslide mitigation	At quarry sites and landslide mitigation sites	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project, GSMB

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		measures				
	<b>2.7</b>	<b>Impacts to Flora</b>				
	<b>2.7.1</b>	<b>Loss or Damage to Trees and Vegetation</b>				
	(a)	All works shall be carried out in a manner that the destruction to the flora and their habitats is minimised. 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.	All project sites	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project, FD, CEA
	(b)	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.				
	(c)	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.				
	(d)	Removed trees must be handed over to the Timber Corporation.				
	(e)	The contractor shall plant over 5 year old root-balled native trees suitable for the location as identified by the Engineer. The planting should take place in public land suitable for the purpose The contractor shall build hardy structures around the trees for protection. The contractor shall be responsible for ensuring the well-being of the trees/plants until the end of the contract				
	<b>2.7.2</b>	<b>Chance finds of important Flora</b>				
	(a)	During construction, if a rare/threatened/endangered flora species is found, it shall be immediately informed to the PMU by the contractor through the	All project sites	-	Contractor	RDA, NBRO/PMU,

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		engineer. All activities that could destroy such flora and/or its habitat shall be stopped with immediate effect. Such activities shall be started only after obtaining the Engineer's approval. Contractor shall carry out all activities and plans that the Engineer instructed him to undertake to conserve such flora and/or its habitat.				ID and MASL Engineer to the sub-project, FD, DWLC
<b>2.8.</b>	<b>Impact on Fauna</b>					
	<b>2.8.1.</b>	<b>Loss, Damage or Disruption to Fauna</b>				
	(a)	All works shall be carried out in such a manner that the destruction or disruption to the fauna and their habitats is minimum.	All project sites	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project, FD, DWLC
	(b)	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.				
	(d)	Siting of all hot mix plants, crushing plants, workshops, depots and temporary worker camps and storing of toxic and hazardous materials at approved locations, and recycling and dumping of solid waste matter at locations approved by local authorities, maintenance of vehicles and equipment in good operable condition, ensuring no leakage of oil or fuel and the fitting of proper exhaust baffles. Any solid waste should not be dumped into natural habitats.	Locations selected for erecting the asphalt, crusher and concrete batching plants and workshops	Engineering cost		
	<b>2.8.2</b>	<b>Chance found important Fauna</b>				
	(a)	During construction, if a rare/threatened/endangered fauna species is found, it shall be immediately informed to the PMU by the contractor. All activities that could destroy such fauna and/or its habitat shall be stopped with immediate effect. Such activities shall be started only after obtaining the Engineer's approval. Contractor shall carry out all activities and plans that the Engineer instructed him to undertake to conserve such fauna and/or its habitat.	All project sites	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project, FD, DWLC
	<b>2.9</b>	<b>Disruption to people</b>				
	<b>2.9.1</b>	<b>Loss of Access</b>				
	(a)	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	All project sites	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		prior satisfaction of the Engineer.				Engineer to the sub-project, FD, DWLC
	(b)	The works shall not interfere unnecessarily or improperly and ensure convenience of public at all times		-		
	(c)	On completion of the works, all temporary obstructions to access shall be cleared away, all rubbish and piles of debris that obstruct access be cleared to the satisfaction of the Engineer.		Engineering cost		
	(d)	Providing advance information to the public about the planned construction works and activities causing disruption to access and the temporary arrangements made to give relief to public in order to avoid any inconveniences due to the construction activities.				
	<b>2.9.3</b>	<b>Traffic Control and Safety</b>				
	(a)	The Contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as may be required by the Engineer for the information and protection of traffic approaching or passing through the section of the highway under improvement. The provision of traffic safety measures shall be considered incidental to work and follow The Institute for Construction Training and Development (ICTAD) guidelines and instructions given by the Police, if any.	Road-side construction sites	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	Informing the public through newspapers/announcements/ radio/TV etc. about the construction activities in order to avoid any inconveniences due to the construction activities.	Project influence area			
	<b>2.10</b>	<b>Accidents and Risks</b>				
	<b>2.10.1</b>	<b>Public and Worker safety</b>				
	(a)	All reasonable precautions will be taken to prevent danger of the workers and the public from accidents such as fire, explosions, blasts, falling rocks, falling to excavated pits, chemical sprays, unsafe power supply lines etc.	Construction areas, material storage and worker camps	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
	(b)	The Contractor shall comply with requirements for the safety of the workmen as per the international labor organization (ILO) convention No. 62 and Safety and Health regulations of the Factory Ordinance of Sri Lanka to the extent that those are applicable to this contract. The contractor shall supply all necessary safety appliances such as safety goggles, helmets, masks, boots, etc., to the workers and staff. The contractor has to comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, excavations, trenches and safe means of entry and egress.				Engineer to the sub-project
	<b>2.10.2</b>	<b>Prevention of Risks of Electrocutation</b>				
	(a)	All electrical wiring and supply related work should conform to British Standards (BS) or relevant Sri Lankan Standards. Adequate precautions will be taken to prevent danger of electrocuting from electrical equipment and power supply lines including distribution boards, transformers, etc. Measures such as danger signboards, danger/red lights, fencing and lights will be provided to protect the public and workers. All electric power driven machines to be used in the construction shall be free from defect, be properly maintained and kept in good working order, be regularly inspected and as per BS provisions and to the satisfaction of the Engineer.	Construction areas, material storage and worker camps	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	<b>2.10.3</b>	<b>Risk at Hazardous Activity</b>				
	(a)	All workers employed in hazardous activities shall be provided with necessary protective gear. These activities include mixing asphalt material, cement, lime mortars, concrete etc., welding work, work at crushing plants, blasting work, operators of machinery and equipment such as power saws, etc.	Construction areas, material storage and worker camps	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	The use of any toxic chemical shall be strictly in accordance with the manufacturer's instructions. The Engineer shall be notified of toxic chemicals that are planned to be used in all contract related activities. A register of all toxic chemicals delivered to the site shall be kept and maintained up to date by the Contractor. The register shall include the trade name, physical properties and characteristics, chemical ingredients, health and safety hazard information, safe handling and storage procedures, and emergency and first aid procedures for the product.				

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
	<b>2.10.4</b>	<b>Lead Pollution</b>				
	(a)	No paint containing lead or lead products will be used except in the form of paste or readymade paint. Facemasks shall be supplied to workers who are working in spray painting or scraping lead paints.	Workshops, yards where spray painting is done	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	<b>2.10.5</b>	<b>Handling of Explosives</b>				
	(a)	Except as provided in the contract or ordered or authorized by the Engineer, the Contractor shall not use explosives. Where the use of explosives is so provided or ordered or authorized, the Contractor shall comply with the requirements of the following Sub-Clauses of this Clause besides the law of the land as applicable.	All locations where blasting activities will commence	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project CEA
	(b)	The Contractor shall at all times take every possible precaution and shall comply with relevant laws and regulations relating to the importation, handling, transportation, storage and use of explosives. Contractor shall obtain Ministry of Defense (MoD) approval for importing and handling explosives and keep the Local Police informed of the same.		Engineering cost		
	<b>2.11</b>	<b>Health and Safety</b>				
	<b>2.11.1</b>	<b>Prevention of Vector based Diseases</b>				
	(a)	Contractor shall take necessary actions to prevent breeding of mosquitoes at places of work, labor camps, plus office and store buildings. Stagnation of water in all areas including gutters, used and empty cans, containers, tyres, etc shall be prevented. Approved chemicals to destroy mosquitoes and larvae should be regularly applied. All burrow sites should be rehabilitated at the end of their use by the contractor in accordance with the requirements/guidelines issued by the Central Environmental authority and relevant local authorities	At worker camps, stores, yards	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	Contractor shall keep all places of work, labor camps, plus office and store buildings clean devoid of garbage to prevent breeding of rats and other vectors				

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		such as flies.				
	<b>2.11.2</b>	<b>Workers Health and Safety</b>				
	(a)	Contractor shall comply with the provisions in Health and Safety regulations under the Factory Ordinance with regard to provision of health and safety measures and amenities at work place(s).	Within construction sites, workshops and worker camps	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	<b>2.11.3</b>	<b>First Aid</b>				
	(a)	At every workplace, first aid kit shall be provided as per the regulations. At every workplace an ambulance room containing the prescribed equipment and nursing staff shall be provided.	Within construction sites, quarry, crusher, concrete batching plants, workshops and worker camps	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	<b>2.11.4</b>	<b>Potable Water</b>				
	(a)	In every workplace and labor camps portable water shall be available throughout the day in sufficient quantities.	Within construction sites, quarry, crusher, concrete batching plants, workshops and worker camps	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	<b>2.11.5</b>	<b>Hygiene</b>				
	(a)	The contractor shall provide and maintain necessary (temporary) living accommodation and ancillary facilities for labour to standards and scale approved by the engineer.	Worker camps and temporary sheds at work sites	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project, CEA
	(b)	At every workplace and labor camps sufficient number of bathing facilities, latrines and urinals shall be provided in accordance with the Health and Safety regulations and/or as directed by the Engineer. These bathroom and toilet facilities shall be suitably located within the workplace/buildings. Latrines shall be cleaned at least three times daily in the morning, midday and evening and kept in a strict sanitary condition. If women are employed, separate latrines and				

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		urinals, screened from those for men and marked in the vernacular shall be provided. There shall be adequate supply of water, within and close to latrines and urinals.				
	(c)	The sewage system for the camp must be properly designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place.				
	(d)	Garbage bins must be provided in the camp, work sites and regularly emptied and the garbage disposed off in a hygienic manner. Construction camps shall have a clean hygienic environment and adequate health care shall be provided for the work force.				
	(e)	Unless otherwise arranged for by the Local Authority, the contractor shall arrange proper disposal of sludge from septic tanks. The contractor shall obtain approval for such disposal from the Public Health Inspector of the area.				
	<b>2.12</b>	<b>Protection of Archaeological, Cultural and Religious Places and Properties</b>				
	<b>2.12.1</b>	<b>Prevention of damage to Cultural and Religious Places and Properties</b>				
	(a)	During construction activities the contractor should take all necessary and adequate care to minimize impacts on cultural properties which includes cultural sites and remains, places of worship. Workers should not be allowed to trespass in to such areas.	Near physical cultural resources	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project, Department of Archeology, religious leaders
	<b>2.12.2</b>	<b>Chance finds of Archaeological property</b>				
	(a)	All fossils, coins, articles of value of antiquity and structures and other remains or things of geological or archaeological interest etc. discovered on the site and/or during construction work shall be the property of the Government of Sri Lanka, and shall be dealt with as per provisions of Antiquities Ordinance of 1940 (Revised in 1956 & 1998)	In all project sites	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project, Department of
	(b)	The contractor shall take reasonable precaution to prevent his workmen or any		Engineering		

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
		other persons from removing and damaging any such article or thing and shall, immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out the Engineer's instructions for dealing with the same, awaiting which all work shall be stopped within 100m in all directions from the site of discovery.		cost		Archeology
	(c)	If directed by the Engineers the Contractor shall obtain advice and assistance from the Department of Archaeological of Sri Lanka on conservation measures to be taken with regard to the artefacts prior to recommencement of work in the area.				
	<b>2.13</b>	<b>Environmental Enhancement</b>				
	<b>2.13.1</b>	<b>Landscaping</b>				
	(a)	Landscape plantation, re-vegetation of road embankments and other slopes, edge treatment of water bodies shall be taken up as per either detailed design or typical design guidelines given as part of the Bid Documents. The contractor also shall remove all debris, piles of unwanted earth, spoil material, away from the roadsides and from other work places and disposed at locations designated or acceptable to the Engineer or as per Clause 2.1.1.	All project sites and associated sites	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	On completion of the works, the temporary structures shall be cleared away in full, all rubbish burnt, waste dumps and septic tank shall be filled and closed and roadsides, workplaces and labor camps, cleared and cleaned.				
	<b>2.13.2</b>	<b>Utilities and Roadside Amenities</b>				
	(a)	Contractor shall take care not to damage/destroy or affect the functional purposes of utilities such as water, electricity, telephone posts. The arrangements the contractor made with those service providers shall be informed to the Engineer in writing (advance work). Contractor shall assist the service providers in whatever possible manner to minimize disruption to such services.	At all locations where electricity, telecommunication and water supply lines need to be shifted	-	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	In case of an inadvertent damage cause to a utility, the contractor shall immediately inform the service provider and help to restore the service without delay.	All project sites			
	<b>2.13.3</b>	<b>Safety signage</b>				

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility	
					Implement	Supervision
	(a)	Safety signage for slope/landslide protection structures will be provided as appropriate	Sites where slope/landslide protection takes place	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	<b>2.14</b>	<b>Handling Environmental Issues during Construction</b>				
	(a)	For large contracts, the Contractor will appoint a suitably qualified Environmental Officer following the award of the contract. The Environmental Officer will be the primary point of contact for assistance with all environmental issues during the pre-construction and construction phases. He/ She shall be responsible for ensuring the implementation of EMP.	Relevant construction sites during the construction period	Engineering cost	Contractor	RDA, NBRO/PMU, ID and MASL Engineer to the sub-project
	(b)	The Contractor shall appoint a person responsible for community liaison and to handle public complaints regarding environmental/ social related matters. All public complaints will be entered into the Complaints Register. The Environmental Officer will promptly investigate and review environmental complaints and implement the appropriate corrective actions to arrest or mitigate the cause of the complaints. A register of all complaints is to be passed to the Engineer within 24 hrs they are received, with the action taken by the Environmental Officer on complains thereof.				
	(c)	Contractor shall develop suitable method to receive complaints. The complaint register shall be placed at a convenient place, easily accessible by the public.				
	(d)	Contractor shall prepare detailed Environmental Method Statement (EMS) clearly stating the approach, actions and manner in which the EMP is implemented. It is required from the contractor to prepare the EMS for each work site, if work will be carried out at more than one site at once and time plan for implementation. The EMS shall be updated regularly and submit for Engineers review.				
<b>3.0</b>		<b>Operational stage</b>				
	<b>3.1</b>	<b>Stagnation of water at culverts, drainage and irrigation structures during heavy rains due to siltation and blocking of openings with debris.</b>				
	(a)	Regular clearing/ cleaning and maintenance of all culverts, drainage and	At all hydraulic	Maintenanc	RDA, ID and	

Activities		Protection and preventive measures	Locations/ Project phase	Mitigation cost	Institutional Responsibility		
					Implement	Supervision	
		irrigation structures to reduce the chances of failures and blocking due to debris.	structures supported by the project	e cost	MASL		
	<b>3.2</b>	<b>Encochement of ROW and reservation</b>					
	(a)	Continuous monitoring and strict regulations should be followed to avoid the encroachment.	In all project sites	Maintenanc e cost	RDA, ID and MASL		

## **4. ENVIRONMENTAL MANAGEMENT FRAMEWORK**

The environmental management framework (EMF) outlines the framework for planning, implementation and monitoring of environmental management measures required to ensure that potential adverse environmental impacts from the project activities are eliminated, offset, or reduced to an acceptable level. At the same time, it is expected that the framework will help the project enhance environmental benefits from the project interventions. The EMF has been built on relevant existing national policies, legislation, regulations and guidelines and on World Bank safeguard policy requirements.

### **4.1 Negative List of Activities**

Environmental approach proposed is to emphasize early consideration of environmental risks and factors, avoidance of higher risks, and value-addition to the projects by timely environmental inputs and long-term sustainability of interventions. Any activity that falls within the negative list below will not be included under the project for funding.

- Any activity located in the protected area or area proposed for protection or area of known high conservation value or nearby an area, which is known to be a critical wildlife habitat (irrespective of whether or not inside a protected area). Critical wildlife habitats would essentially include habitats of globally threatened species as per the red list prepared by the IUCN and those that are listed as totally protected species in the FFPO, or project/ activity that depend on resources from those areas.
- Any activity that will require full Environmental Assessment by the Sri Lanka EIA legislation and associated regulations
- Any activity that involves cutting of trees or land clearance within 100m on either side of the banks or edge of the rivers, streams, water courses or water sources kept as riparian reserve for conservation
- Any activity that may adversely impact nationally and/or internationally renowned/ listed physical cultural resource (within 50 m of its premise).

### **4.2 Environmental Safeguards Processing Steps**

Implementation of environmental requirements will follow the following steps closely linking with activity planning, design and implementation steps.

Step 1: Preliminary Environmental Information and Analysis

Step 2: Environmental Screening

Step 3: Preparing Environmental Assessment and/or Environmental Management Plan

Step 4: Environmental Clearances

Step 5: Inclusion of Environmental Specifications and Environmental Management Plan in bid documents

Step 7: Environmental Method Statements (for large investments)

Step 6: Compliance and Monitoring

#### **4.2.1 Preliminary Environmental Information and Analysis**

During the pre-feasibility and feasibility field investigations, the project teams with the participation of an environmental officer will check environmental risks by collecting environmental information of the project site and its surroundings. A checklist has been prepared to assist in this process in Annex 3. The team will observe the sites, make simple measurements and also discuss with the local people and stakeholders. The team will analyze the environmental risks, and identify possible measures for avoidance, minimization, or mitigation of the risks/impacts. These will be shared with the technical members of the team for consideration while detailing the project plans and designs. The pre-feasibility or feasibility report will contain environmental section summarizing the findings and recommendations. The initial analysis of project-supported activities and proposed mitigation measures are provided under the section 3.

#### **4.2.2 Environmental Screening**

Based on the preliminary information, the next step is to screen the activities to ensure that activities do not fall in the categories identified under the negative list, which should be eliminated at this stage. During this stage scoping will be also undertaken to decide on the level of assessments necessary. The responsibility to ensure this is completed lies with the environmental officer of the implementing agency and/or PMU.

The preliminary investigations of proposed project activities indicate that all isolated investments will require only a site-specific EMP. These could be prepared by the environmental officer of the implementing agency and/or PMU or outsources to a consultant. However, large complex activities that are interconnected will require site-specific EAs and EMPs to be carried out by an independent consultant and should be closely associated with the structural designs.

#### **4.2.3 Preparing Environmental Assessment and/or Environmental Management Plan**

The preparation of site-specific EMPs for simple activities can be undertaken by the environmental officer of the implementing agency and/or PMU, while the complex activities should be assessed by a consultant. The terms of reference to undertake EAs for complex activities should be prepared by the implementing agency and clearances should be obtained by the relevant PAA if necessary and IDA.

The EA report is expected to generate the following information and should be presented as part of the report:

- Detailed description of the project activity
- Description of the environment (physical, biological and socio-cultural) to develop the baseline condition
- Legislative, regulatory and policy considerations (both national and World Bank)
- Determination of potential environmental impacts (with focus on significant positive and negative impacts, direct, indirect and cumulative impacts, and immediate and long-term impacts)
- Analysis of alternatives (focused on siting and design of new alignments, rehabilitation techniques and phasing, and operating and maintenance procedures)
- Public consultations and the key findings and recommendations
- Development of the environmental management and monitoring plan

The following areas are expected to be included as contents of the environmental management and monitoring plan

- *Identification of impacts and description of mitigation measures:* Firstly, Impacts arising out of the project activities need to be clearly identified. Secondly, feasible and cost effective measures to minimize impacts to acceptable levels should be specified with reference to each impact identified. Further, it should provide details on the conditions under which the mitigatory measure should be implemented (ex; routine or in the event of contingencies) The EMP also should distinguish between type of solution proposed (structural & nonstructural) and the phase in which it should become operable (design, construction and/or operational).
- *Enhancement plans:* Positive impacts or opportunities arising out of the project need to be identified during the preparation of the check list and Environmental Assessment process where applicable. Some of these opportunities can be further developed to draw environmental and social benefits to the local area. The Environmental management and Monitoring Plan (EMP) should identify such opportunities and develop a plan to systematically harness any such benefit.
- *Monitoring programme:* In order to ensure that the proposed mitigatory measures have the intended results and complies with national standards and donor requirements, an environmental performance monitoring programme should be included in the EMP. The monitoring programme should give details of the following;
  - Monitoring indicators to be measured for evaluating the performance of each mitigatory measure (for example national standards, engineering structures, extent of area replanted, etc).
  - Monitoring mechanisms and methodologies
  - Monitoring frequency

- Monitoring locations
- *Institutional arrangements:* Institutions/parties responsible for implementing mitigatory measures and for monitoring their performance should be clearly identified. Where necessary, mechanisms for institutional co-ordination should be identified as often monitoring tends to involve more than one institution.
- *Implementing schedules:* Timing, frequency and duration of mitigation measures with links to overall implementation schedule of the project should be specified.
- *Reporting procedures:* Feedback mechanisms to inform the relevant parties on the progress and effectiveness of the mitigatory measures and monitoring itself should be specified. Guidelines on the type of information wanted and the presentation of feedback information should also be highlighted.
- *Cost estimates and sources of funds:* Implementation of mitigatory measures mentioned in the EMP will involve an initial investment cost as well as recurrent costs. The EMP should include costs estimates for each measure and also identify sources of funding.
- *Contract clauses:* This is an important section of the EMP that would ensure recommendations carried in the EMP will be translated into action on the ground. Contract documents will need to be incorporated with clauses directly linked to the implementation of mitigatory measures. Mechanisms such as linking the payment schedules to implementation of the said clauses could be explored and implemented, as appropriate.

During this stage, the environmental officer or the EA consultant will liaise closely with the design teams to ensure environmental requirements are integrated into the final design of the infrastructure.

#### **4.2.4 Environmental Clearances**

The implementing agency will be required to share sample of EMPs of simple activities with IDA during the initial stages of project implementation. All site-specific EMPs should be made available at the project sites with the relevant field officers of the implementing agency for review as and when required. The draft and final EAs of complex project will be reviewed, commented and cleared by the relevant PAA if necessary and by IDA.

#### **4.2.5 Inclusion of Environmental Specifications and Environmental Management Plan in bid documents**

It is important to ensure the environmental specifications and EMP are included in the bid documents prior to commencement of the bidding process. It will be necessary to include a provisional sum for the EMP as part of the Bill of Quantities for those mitigations measure that

are not part of the engineering costing. The environmental specifications should also include penalty clauses for non-compliance, specifically for complex and large contracts. The procurement staff of the relevant implementing agency and PMU together with environmental officer(s) will be responsible for this step.

#### **4.2.6 Compliance and Monitoring**

Regular supervision and quality control of the construction will be done by the site team (site engineer and implementing agency). The environmental officer(s) assigned to the project will carry out periodic environmental compliance monitoring. The monitoring will focus on the site-specific EMPs and key monitoring indicators in the two tables for compliance and impact monitoring presented at the end of this sub-section description.

The monitoring will include representative sample of simple activities and all sites of complex activities at least once in 3 months and monitoring report will be prepared to document the findings, recommendations given and actions taken on non-compliance. These documents should be shared with IDA. However, if new environmental issues not identified during the assessments have risen or the mitigations measures agreed have not been adequately implemented, monitoring will need to be done more frequently.

All construction activities will need to be visited by the environmental officer(s) prior to issuance of the final payment for the activity to ensure the project sites are in environmentally acceptable status, demobilization of temporary structures have taken place and redevelopment of associated project sites such as burrow, disposal and quarry sites have taken place to the level acceptable to the land owners.

Consolidated monitoring report will be prepared bi-annually by the PMU on behalf of the MIWRM and will be shared with IDA. Two independent environmental audits will be conducted by end of second year of project implementation and six months before the closure of the project. The terms of reference for the environmental audit will be prepared by the PMU and agreed with IDA and the audit reports (drafts and final) will be shared with IDA for comments and recommendations.

***Compliance Monitoring Indicators, Schedule and Responsible Agency***

<b>Parameters /Indicator</b>	<b>Verifiable Indicators</b>	<b>Verification Methods</b>	<b>Location</b>	<b>Schedule</b>	<b>Responsible Implementation and Monitoring Agency</b>
Awareness and orientation training	Training programs for skill development, occupational safety and environmental protection	Training records, feedback from participants	At construction area	Beginning of construction and during construction	RDA, MASL, ID, NBRO and PMU
Compliance to occupational health and safety matters	Health and safety regulations, first aid and medical arrangements, number and type of safety equipment such as mask, helmet, glove, safety belt, accidental insurance	Spot checks at work sites, photos, accident records, interviews	At key construction sites	Throughout construction period	RDA, MASL, ID, NBRO and PMU
Vegetation clearance	Actual number of trees felled during construction works	Record, counting, observation, inspection and interview with local people	At construction sites	Before construction work, construction period	RDA, MASL, ID, NBRO and PMU
Measures to protect environment from air & noise pollution	Dust level and noise level at work sites, major settlements and sensitive spots like health centers and schools	Visual observation and discussion with residents and workers	At construction sites	Every three months during construction	RDA, MASL, ID, NBRO and PMU
Measures to protect water bodies from pollution	Visual observation, observation of open defecation and waste disposal around water sources near construction sites, camp sites, and laboratory test results	Site inspections and laboratory sections if necessary.	Rivers and water sources used particularly drinking water	Every three months during construction	RDA, MASL, ID, NBRO and PMU
Adequate	Adequate number of technicians	Number and type of	At	During construction	RDA, MASL, ID,

<b>Parameters /Indicator</b>	<b>Verifiable Indicators</b>	<b>Verification Methods</b>	<b>Location</b>	<b>Schedule</b>	<b>Responsible Implementation and Monitoring Agency</b>
technical and environmental supervision	regularly at site with ability to implement the EMP	technicians available at site, discussion	construction sites		NBRO and PMU
Compensatory plantation	Number of trees planted	Records, field observation	Planted area	During project implementation	RDA, MASL, ID, NBRO and PMU

***Impact Monitoring Indicators, Schedule and Responsible Agency***

<b>Parameters /Indicator</b>	<b>Verifiable Indicators</b>	<b>Verification Methods</b>	<b>Location</b>	<b>Schedule</b>	<b>Responsible Implementation and Monitoring Agency</b>
Slope stability and erosion	Slope failures, causes; fresh gullies and erosion; sedimentation of waterways	Site observation, discussion with local people, photos	Near steep slopes and at landslide areas and sites	Continuously during construction	RDA, MASL, ID, NBRO and PMU
Debris disposal	Affected aesthetic value, water stagnation	Site observation and interviews, photos	At debris disposal sites	During construction	RDA, MASL, ID, NBRO and PMU
Quarrying	Dust, erosion, landslide due to quarrying, degradation of vegetation	Site observation, photos,	Quarry site areas	During construction	RDA, MASL, ID, NBRO and PMU
Habitat degradation	Changes to vegetation cover, signs of land degradation such as soil erosion	Site observation, interview	Natural habitat sites	During project implementation and operation	RDA, MASL, ID, NBRO and PMU
Water quality	Visual observation of reduced quality due to solid and liquid waste, sedimentation, etc. and laboratory test results.	Visual observation, laboratory test	Local water sources and streams (particularly drinking water	During construction and operation	RDA, MASL, ID, NBRO and PMU

<b>Parameters /Indicator</b>	<b>Verifiable Indicators</b>	<b>Verification Methods</b>	<b>Location</b>	<b>Schedule</b>	<b>Responsible Implementation and Monitoring Agency</b>
			source)		
Air quality	Dust level in ambient air	Visual inspection	At construction sites	During construction and operation	RDA, MASL, ID, NBRO and PMU
Forest and vegetation	Numbers of trees felled, presence of ground vegetation cover, completion of replanting programs	Observations, records, photos, interview , counting	In and around the construction sites	During construction and operation	RDA, MASL, ID, NBRO and PMU
Occupational safety and hazard	Type and number of accident occurred during construction; adequacy of occupational safety measured provided; compensation provided in case of fatal accidents	Observations, photos, spot checks, health center records, interview with workers, accident number	Throughout subproject area	During construction	RDA, MASL, ID, NBRO and PMU
Change in socio-economic structure	Number and extent of new businesses; number and extent of new services and utilities, social conflicts	Observations, interview with local people, records	Throughout project area	During operation	RDA, MASL, ID, NBRO and PMU

### **4.3 Environmental consultation and grievance addressing**

Consultations are inbuilt in the project planning, design and implementation approach. Pre-feasibility and feasibility team will conduct and record consultations with the local stakeholders and project affected persons. During construction, the site supervision team will consult regularly with the affected people/community as well as local stakeholders for their observations and feedback.

For the grievances, the project implementation and/or supervision team at site will keep a feedback register and let the local stakeholder know that they can register their project related complaints or comments or suggestions. The project team will review the feedback and take appropriate actions. The overall environmental grievance process will be in line with the social grievance process proposed.

### **4.4 Chance find procedures on physical cultural resources**

If any person discovers a physical cultural resource, such as (but not limited to) archeological sites, historical sites, remains and objects, or a cemetery and/or individual graves during excavation or construction, the Contractor shall:

1. Stop the construction activities in the area of the chance find;
2. Delineate the discovered site or area;
3. Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible authorities take over;
4. Notify the Supervising Officer who in turn will notify the responsible authorities immediately (within 24 hours or less);
5. Responsible authorities are in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by archeologists. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values used by the GoSL;
6. Decisions on how to handle the finding shall be taken by the responsible authorities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance) conservation, preservation, restoration and salvage;
7. Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities; and
8. Construction works could resume only after permission is granted from the responsible local authorities concerning safeguard of the physical cultural resource.

The Supervising Officer must have capacity to manage the processes in the plan. At a minimum, expert opinion should be sought from government agencies or specialist consultants for the following:

- Issues with relocation / removal that cannot be resolved through the procedures in this plan.
- Restoration of damages to physical cultural resources or graves caused by construction-related

## 5. INSTITUTIONAL ARRANGEMENTS AND CAPACITY

### 5.1 Institutional arrangements

The institutional entity and the roles and responsibilities to ensure the EAMF is implemented are given below:

***Ministry of Irrigation and Water Resources Management*** will have the overall responsibility to ensure the EAMF is implemented by the relevant IAs. The PMU established at the MIWRP will take this responsibility on behalf of Ministry. The PMU will recruit an environmental officer (EO) for the project who will be responsible for the following:

- Prepare EMPs for simple activities
- Prepare terms of references to undertake EAs for complex activities associated with ID, MASL and NBRO and obtain necessary clearances
- Manage the EA consultants and provide coordination support with relevant agencies and individuals
- Review draft and final EAs for quality and obtain necessary clearances
- Include environmental specifications and EMP into bidding documents of NBRO investments
- Monitor the activities financed under ID, MASL and NBRO, provide recommendations to engineers and report
- Liaise closely with the EO assigned for RDA activities to ensure monitoring reports are obtained
- Provide training to contractor staff and staff of ID, MASL and NBRO on environmental management requirements of the project
- Prepare terms of references for environmental audits and obtain clearances
- Review and comment on audit reports, take necessary actions to address audit issues raised and obtain comments from IDA

***Irrigation Department and Mahaweli Authority of Sri Lanka*** will be responsible to ensure initial screening of is carried out and share the environmental information with the EO of PMU to prepare the site-specific EMPs or get EAs conducted for relevant sub-projects. The design engineers of these two agencies will also interact closely with the EO to ensure the EMP requirements are integrated into the engineering designs and costing where relevant. ID and MASL are also responsible to ensure inclusion of environmental specifications and EMP into bidding documents and maintain safeguard documents at field offices for review. The assigned engineers of field offices will provide support to EO of PMU to carry out supervision of EMPs as part of the engineering supervision including ensuring environmental method statements (EMSs) for complex activities are prepared in line with the engineering method statements.

*National Building and Research Organization* will be also responsible to undertake the initial screening as part of pre-feasibility/feasibility work and share the environmental information with the EO of PMU to prepare the site-specific EMPs or get EAs conducted for relevant sub-projects. The design engineers of the NBRO will also interact closely with the EO to ensure the EMP requirements are integrated into the engineering designs and costing where relevant. The assigned engineers of field offices will provide support to EO of PMU to carry out supervision of EMPs as part of the engineering supervision including ensuring environmental method statements (EMSs) for complex activities are prepared in line with the engineering method statements.

Road Development Authority will assign or recruit a qualified EO to support the team and will have the following responsibilities:

- Conduct screening and prepare EMPs for simple activities
- Prepare terms of references to undertake EAs for complex activities associated with RDA and obtain necessary clearances
- Manage the EA consultants and provide coordination support with relevant agencies and individuals
- Review draft and final EAs for quality and obtain necessary clearances
- Include environmental specifications and EMP into bidding documents of RDA investments
- Monitor the activities financed under RDA, provide recommendations to engineers and report
- Provide quarterly monitoring report to the EO assigned for the PMU in MIWRM
- Provide training to contractor staff and staff of ID, MASL and NBRO on environmental management requirements of the project
- Review and comment on audit reports and take necessary actions to address audit issues raised

## **5.2 Capacity Assessment and Strengthening**

Consultations and interactions with various revealed that inadequate capacity at various levels is a constraint in effective and efficient environmental management of the project. Currently, the PMU established by the DSWRPP is providing project management support to this project. The EO assigned is undertaking the initial functions of project preparation. However, he will not be able to provide the level of time and effort necessary to undertake the above mentioned responsibilities of this project due to the proposed expanded scope of the DSWRPP. The PMU will therefore be required to recruit a qualified EO to take the environmental safeguards

responsibilities of this project. Similarly, RDA will be also required to recruit or assign a qualified EO.

While many of the large contractors now have capacity to understand environmental requirements and implement EMPs, the small contractors lack capacity. In addition, sensitivity of field staff of the four implementing agencies is still low towards integration of environmental management in project activities. In order to overcome the capacity weaknesses identified above, the project will include the following specific measures for strengthening capacity:

<b>Type of Training/ capacity building</b>	<b>Duration</b>	<b>Target Group</b>	<b>Expected results</b>
Training on understanding the EAMF including initial environmental screening, reporting on preliminary environmental information and EIA	3 days per program (maximum 25 participants per program)	Field engineers of ID, MASL, NBRO and RDA	A well informed IA field staff on project environmental safeguards requirements
Training on environmental specifications of contract documents, EMPs and preparation of EMSs	3 days per program (maximum 25 participants per program)	Field engineers of ID, MASL, NBRO and RDA Contractor staff responsible for environmental management	A well informed IA field staff and contractor staff on project environmental safeguards implementation

Further training needs will be identified as the project commence implementation to be supported through the project.

## **ANNEX 1: Sample Terms of Reference for Strategic Environmental and Social Assessments**

### **A. Background**

The Strategic Social and Environmental Assessment (SSEA) is a process that promotes the inclusion of environmental and social criteria in policy-making and planning, by helping to assess the environmental and social impacts of development options, thus reducing upfront planning and preparation costs, screening out inappropriate or unacceptable activities/projects at an early stage, and minimizing the risk that activities/projects encounter serious problems due to environmental and social considerations.

### **B. Introduction to the Proposed Basin Plans**

*To be included once the details are in place.*

### **C. Objective**

The objective of this task is to provide inclusive and participatory SSEAs for the proposed basin plans under the Component 1 of the Improving Climate Resilience Project (ICRP). The outcome would be an assessment of the baseline environmental and social circumstances and environmental and social issues associated with various development options to allow for informed and transparent decision-making in identification and selection of investments to improve climate resilience of infrastructure, settlements and land stability within the selected river basins. The SSEA will be used to broadly examine, in an integrated manner, the linkages and cumulative impacts of potential scenarios on physical, biological, socio-economic and cultural issues. Key safeguard issues, such as natural habitats, pest management, physical cultural resources, involuntary resettlement and dam safety should be broadly addressed as part of the SSEA process. In addition to safeguards assessment and impact mitigation measures, the SSEA will also outline mechanisms and options for benefit-sharing among local communities in the basin. It would identify critical areas within a given basin that requires specific attention such as critical natural habitats and settlements of vulnerable communities. It intends to inform the scope of activity/project-specific Environmental Impact Assessments (EIAs), Social Impact Assessments (SIAs) and other safeguards instruments that will be necessary during the investment period.

### **D. Scope of Work**

The consultant will undertake the tasks described below.

**Task 1: Scoping Study.** The Consultant will undertake a comprehensive scoping exercise comprising the following activities:

- 1.1 *Understand the basin planning framework:* Identify and assess the existing institutional and policy setting for the project, and identify how the SSEA is linked with existing planning frameworks for national and regional environmental management and for the ICRP Component 1. Undertake preliminary assessment of policy, governance, financial and decision-making mechanisms in the basin. Provide an overview of the current stakeholders in the basin.
- 1.2 *Review information on project area:* Explore the existing knowledge base. Identify the major natural habitats/ecosystems of the basin to understand the broader ecological context. Assess demographic patterns and migration trends to understand the population dynamics likely to influence the basin's development. Identify the topography, landuse/landcover, major watersheds, sub-basins, ecosystems, populated areas, key occupations, key infrastructure, foundational activities of the local economy. Assess the social, environmental and natural resources context of the project area. Review the resource base to understand the spatial context of the environmental and social challenges and opportunities. This assessment should include a mapping and analysis of threats from the status quo.
- 1.3 *Determine appropriate multi-sectoral focus:* So as to ensure the SSEA has a sufficiently broad technical focus, determine sectors that may be affected through proposed basin plans, including agriculture, energy, water, transportation and natural resources. This should include a realistic assessment of past problems with achieving effective multi-sectoral cooperation at basin and administrative levels (eg. Provincial, district levels, etc.).
- 1.4 *Identify and consult key stakeholders:* Identify key stakeholders whose input is critical to project success (e.g. in various levels and sectors of government, farmers, private sector, academia, NGOs, etc.). Conduct discussions with representative stakeholders.
- 1.5 *Identify the environmental and social issues to be considered* in more detail during investment phase of the basin plans. Items to be considered include, but are not limited to: (i) competition for land use and water, (ii) land use planning, (iii) protected areas, (iv) land (soil) and water management, (v) climate change, and (vi) environmental assessment. It is important that both the potential short term conflicts between social and environmental interests - as well as longer term benefits - are considered, as well as cumulative impacts due to project interventions and projected developments within the basin.
- 1.6 *Identify appropriate institutional arrangements:* In association with the Ministry of irrigation and Water Management, identify the optimal arrangements to oversee the implementation of the further assessments and mitigations measures during the implementation stage of the basin plans. Such an arrangement may include setting up a task force of relevant agencies.

- 1.7 *Produce a draft scoping report, disseminate and consult with key stakeholders:* Develop a draft scoping report and conduct consultation event(s) with key stakeholders to refine these elements.

**Task 2: Stakeholder Analysis, Participation and Consultation Plan.** The consultant will undertake a stakeholder analysis, and design a participation and consultation plan accordingly.

- 2.1 *Stakeholder Analysis:* The consultants shall undertake a stakeholder analysis outlining the key stakeholders likely to be affected, either positively or negatively, directly or indirectly, through project implementation. For each stakeholder group identified, the analysis shall: 1) outline the specific ways in which the project may positively or negatively affect them; 2) recommend ways to enhance positive benefits, or mitigate negative impacts; and 3) recommend measures to encourage their participation in project consultation and implementation, as appropriate.
- 2.2 *Design a Participation and Consultation Plan:* the Consultant will design a participatory consultation plan that will include:
- Awareness raising seminars at the time of launching the SSEA in key administrative towns of the basin. In these seminars, the Consultants in collaboration with the Ministry, World Bank, Central Environmental Authority (and other relevant regulatory agencies) will explain objectives, approach and expected outcome and how stakeholders will participate in the assessment.
  - Adequate awareness-raising, consultation and participation of key stakeholders in the development of the SSEA. Such key stakeholders will be defined through Task 3, but are preliminarily expected to include NGOs, scientific experts, relevant agencies from all levels of government, development partners, other industrial, commercial and labor interests as relevant and community representatives.
  - Regular dissemination events to update Ministry, key national agencies and potential development partners as to the progress of the SSEA.

### **Task 3: Strategic Social and Environmental Assessment**

The consultant will prepare the SSEA comprising the following tasks: (a) establish baseline conditions; (b) assess the legal and institutional framework; and (c) conduct a scenario analysis based on the basin assessments.

- 3.1 *Establish Baseline Conditions:*
- The consultant shall identify and quantitatively describe the key physical, biological, cultural and socio-economic characteristics of the basin. Given the size of the basin area, the consultant should propose an appropriate subdivision for analytical

purposes. Such a subdivision may be done according to ecosystem/landscape, watershed/catchment wide scenarios and conduct environmental and social assessments in the respective areas as appropriate.

- Describe, to the extent possible, the past trends in distribution, quantity and/or quality of the important environmental components, and how such trends might change with and without the expected investment plan.
- Describe key environmental issues of concern in the basin (e.g., competing demands for water resources, tourism, pressures on protected areas, biodiversity hotspots and other areas qualifying as Critical Natural Habitats (per OP 4.04), settlement expansion, potential conflicts between settled agriculture – especially irrigated agriculture).
- Assess which areas and types of land use will be more or less resilient to long-term climate changes. Identify the specific areas well-suited for achieving project objectives from an environmental and social perspective.
- Identify the primary environmental and social concerns for project development and on-going monitoring.
- Identify a sub-set of core social and environmental indicators that need to be tracked as part of the basin monitoring systems. Using existing data, identify baseline levels for these indicators. Identify database gaps. This may include, but is not limited to, information on: landuse/landcover, erosion/siltation/landslides, mining (metal, sand, gravel, etc.), biodiversity including all areas supporting Critical Natural Habitats (per OP 4.04), water use, population distribution, access to basic services, diseases (such as dengue, malaria, etc.), land tenure, existing and proposed hydropower projects.
- Understand the threats (e.g. pollution, surface and groundwater scarcity, etc.) and opportunities (e.g. improved service provision) in the project area based on recent trends and future outlook especially with the basin plan concept. Identify how best to monitor these trends and threats.

### 3.2 *Assess Legal and Institutional Framework:*

- Assess and describe the existing Sri Lankan legal and institutional framework for project implementation from an environmental perspective. Are existing environmental regulations and policies sufficient to promote sustainable development in the project context? Is the current set up sufficient to ensure the project meets its objectives without yielding environmental damage? Is the set up adequate for the encouragement of the multi-sectoral planning and implementation necessary for sustainable basin development? What improvements could be made to enhance project implementation from a legal, policy and institutional perspective? What changes are necessary in order to manage the environmental and social aspects/impacts of basin plan? What capacity building needs exist? How can/should

they be addressed? Additionally, identify any World Bank environmental and social safeguard policies which might be applicable, and which types of project actions might trigger them.

- Assess the existing capacity of Government of Sri Lanka, Ministry and environmental regulators to ensure compliance with the legal and policy framework for environmental and social management in the basin plan implementation.

3.3 *Conduct Scenario Analysis of the Potential Environmental and Social Impacts (including no action) based on the basin assessments:* The development of the Environmental and Social Management Framework and associated monitoring system needed to be informed by a closer look at alternative scenarios for development in the basin. This will be based, for the purposes of this SSEA, on a more detailed investment scenario analysis for key investments. The consultant will detail the methods of this scenario analysis, and the associated baseline database. The consultant will:

- Establish the scenario analysis framework to analyze environmental and social impacts over a 20-year timeframe in one pilot for each key investment. Identify key environmental, social, and economic indicators that can be used to compare alternative development/investment scenarios across the basin.
- Working with the client, and on the input from other key stakeholders, the consultant will identify at least three development growth scenarios within a 20 year time frame (including the no project alternative, and based on possible investment outcomes) related to the area and activities.
- Analyze the scenarios based on impacts on the indicators developed. Develop a consequence table to summarize, visualize, and compare the impacts of the scenarios on the indicators.
- Assess potential impacts of the basin development – biophysical and socioeconomic positive and negative, direct and indirect, and cumulative. Review the balance and mechanisms for achieving viable trade-offs between growth and environmental protection. What are the key environmental and social considerations that should be taken into consideration to ensure that project development does not have unintended negative environmental consequences? For each scenario, what are specific measures that should be undertaken and/or policies that should be implemented to avoid, minimize, or mitigate identified negative impacts? What are specific measures that can enhance positive impacts?
- Create a database with GIS maps (proposed at a scale of 1:150,000) for key variables underlying the scenario analysis including (depending on the levels of data readily available in national databases):
  - Land Resources: - Climate, hydrology, geology, landforms, soils, forests, protected areas, Critical Natural Habitats and other important natural habitats.

- Expected sources include, but are not limited to, topographic base maps, air photographs and satellite imagery, existing surveys and departmental records
- Land Ownership/Use/Tenure - land use, land titling and administration, farming systems, commercial and village forestry, production levels and trends. Legal and traditional ownership and user rights for land, trees and grazing; forest reserves, national parks
  - Infrastructure - Transport, energy, communication and extension services for agriculture, livestock management, forestry and tourism.
  - Population - Numbers, demographic trends, location of settlements, the role of women, ethnic groups, class structure, leadership.
  - Employment and Training opportunities directed at agricultural, natural resource and environmental management, and related services
  - Existing Economic Framework – what are the current employment and livelihood opportunities presently in place, average income
  - Social Structures – leadership at village level, decision making structures, political structure
  - Government and Legislation- Administrative structure and key authorities; services provided and demands placed upon them. Laws and regulations that affect land use; traditional law and custom; local district development plans; whether and how laws are enforced
  - NGOs – social development NGOs in the area, out-grower associations, marketing cooperatives that may have roles in planning or implementing land-use plans
  - Commercial/Private sector organizations – lending processes, commercial and development banks, agro-industry, input suppliers, small and large scale traders, SME organizations, etc.
  - Key Ecosystem Services linked to various natural resources such as water sustainability, watershed management, climate change and ecosystem vulnerability as discussed by various studies
  - Summarize how this database and scenario analysis can be extended to other areas under the basin planning

**Task 4: Prepare an Environmental and Social Management Framework.** Develop an Environmental and Social Management Framework (ESMF) outlining mandatory procedures to ensure basin investments identify, assess and avoid, minimize and/or mitigate potential negative environmental and social impacts. The framework should meet all requirements for a Category A investment in accordance with OP 4.01. The ESMF is intended for use by development partners, investors, project proponents and resource management agencies, and therefore the more stringent safeguards requirements will be identified. The ESMF will:

- Include a typology of potential project investments with a screening process that identifies those investments requiring further environmental assessment and associated mitigation provisions
- Contain specific environmental and social due diligence provisions necessary to avoid, minimize or mitigate subprojects with potential risks, and monitor their outcomes. This process will also include identification of institutional responsibilities, timing of actions, how these provisions will be monitored, and identify budget requirements. This framework will comply with international best practices and national/local legislation.
- Be developed from the implementers' perspective, emphasizing practicality and avoiding replicating generic background discussions about laws, regulations, and World Bank safeguard policies. Instead, the consultant will utilize summary tables to summarize key safeguard related regulations and their implication(s) for project implementation, including a clear concise reference table across all safeguards and Sri Lankan environmental and social regulations and mandates. Any gaps should be clearly identified with corresponding measures outlined to address these gaps
- Identify specific capacity building actions and activities to mitigate potential project impacts and enhance positive externalities. The ESMF should include recommendations for potential policy amendments, as necessary, to improve the project environmental and social outcomes. Such a capacity training program should be based on the specific basin investment plan delivery modalities. It will identify the mechanism for guiding the use of these tools and methods for enhancing the understanding and use of these provisions across the plan.
- Include a Monitoring and Evaluation process of project environmental and social issues, including key indicators, baseline values, ways of measurement and possible ways to enhance the use of these indicators. Proposed indicators should be assessed for their cost-effectiveness and utility. Such a framework should include a "safeguard" verification process based on a sampling of projects under the plan. It should also consider including participation of civil society organizations in monitoring project implementation.
- Identify knowledge gaps and, research areas that could improve investment sustainability and delivery of viable investments.

**Task 5. Prepare a Resettlement Policy Framework.** These activities in this task are to be complimented with the findings in the SSEA. The Resettlement Policy Framework needs to be prepared to establish resettlement objectives and principals, organizational arrangements, and funding mechanisms for any resettlement operation as part of basin plan investments. When the extent of resettlement is identified for any basin activity, a Resettlement Action plan is subsequently prepared. The Framework ensures that any Resettlement Action Plan protects

affected parties and physical structures, and livelihoods are restored to their previous standard and preferably exceed their current status. The Framework will include the process for valuation of all associated impacts on people's property and livelihoods and address mitigation of the impacts of resettlement based on international standards. The Framework shall include the following contents:

- Legal Framework: a) Reviews of relevant laws, policies, legal and administrative procedures of the Government of Sri Lanka, relevant laws and laws and regulations relating to the agencies responsible for implementing resettlement activities; b) to identify gaps and, c) suggest the mechanisms to bridge such gaps to ensure the effective implementation of resettlement activities.
- Institutional Framework: Assessment of institutional capacity of local institutions and relevant agencies and suggest an organizational structure responsible for resettlement activities and, propose mechanism to enhance its institutional capacity.
- Methods for Valuation of Assets: Identification of methodology to be used in valuing losses to determine their replacement cost; and a description of the proposed types and levels of compensation under local law and such supplementary measures as are necessary to achieve replacement cost for lost assets.
- Resettlement measures: A description of the technically and economically feasible packages of compensation and other Resettlement measures. The resettlement packages should be compatible with the cultural preferences of the displaced persons, and prepared in consultation with them.
- Site selection, site preparation, and relocation. Identification of (a) institutional and technical arrangements for identifying and preparing relocation sites, (b) any measures necessary to prevent land speculation or influx of ineligible persons at the selected sites; (c) procedures for physical relocation under the project, (d) legal arrangements for regularizing tenure and transferring titles to re-settlers.
- Methods for Valuation of Assets: To establish principles, basis and methods to be used in valuing losses and, a description of a) eligibility for compensation, b) types and levels of compensation under relevant law and, c) such supplementary measures as are necessary to achieve replacement cost for lost assets.
- Implementation Arrangements: To develop a) an implementation schedule covering all resettlement activities and, b) grievance redress mechanism that provide local communities with a means of raising concerns relating to the project's operations, and dealing with these in ways that are considered to be fair, by both the community and the project management.
- Monitoring and Evaluation Arrangements: To develop principles, strategy and plan for monitoring of resettlement activities, and to set frame work for project evaluation and impact assessment.

- Cost and Budget and identifying possible Source of Funding: Estimation of a) budget to cover expropriation and compensation costs for loss of properties, operational arrangements as well as for necessary studies. b) Identification of possible funding sources c) institutional mechanisms for the payment of compensation

### **E. Approach, Overall Management and Coordination**

The Consultant shall report to the designated officer in the Ministry and consult regularly with other partners. A monthly meeting and briefing shall be required between the Consultant and the relevant Ministry staff and other GOSL stakeholders. All required reports will be submitted to the designated officer, and appropriate GOSL environment authorities. The Consultant will coordinate closely with the Ministry and relevant government agencies in executing all aspects of this work and in doing so, will engage in active knowledge transfer of methods and procedures for the relevant activities' planning and design for key stakeholders to be agreed upon at the beginning of the contract. This function, while not necessarily involving formal training sessions, is considered an important element of the Consultant's work. In addition, the Consultant will engage in the following:

- *Documentation.* The Consultant will establish and maintain a comprehensive inventory of all relevant documents and data collected. Any confidential material provided to the consultants will be returned in an organized fashion to the Ministry at the end of the contract.
- *Personnel.* The Consultant must provide and maintain all key personnel proposed. Any changes are subject to approvals from the contracting authority.
- *Logistics.* The Consultant will be responsible for all their logistical need in-country including workspace, office support, communications and transportation. The proposed work involves significant interrelated activities and subcontracting and consistent coordination with the Ministry. As such, there will be a need for general project administration and technical coordination including:
  - Project Supervision
  - Regular Progress Meetings and Reporting
  - Contract Management
  - Subcontracting Plan and Management
  - Scheduling and Logistics
  - Report Oversight, Quality Control and Coordination

All deliverables shall be submitted in electronic form and in hardcopy (3 copies each deliverable) in English. All hardcopy documents shall be two sided printed to conserve paper. All deliverables will be considered draft upon initial receipt. Draft documents will be reviewed and accepted or comments will be provided within two weeks of receipt. The Consultant shall appropriately address concerns and provide final deliverables within two weeks of receiving

comments unless a mutually-agreed upon arrangement stipulates otherwise. It is anticipated that the duration of this contract will be for X months.

## **F. Contents of the Technical Proposal**

To ensure that appropriate information addressing the scope of work is provided in the offer, the consultant is requested to follow the instructions below.

- **Past Performance.** The Proposal must highlight (in no more than 8 pages, excluding project summary sheets in the annex) the Consultant's experiences that relate to the work described by the terms of reference – in Sri Lanka -- specifically to the tasks requested. Prior experience of carrying out similar assignments will be essential. This section may include the past performance of proposed subcontractors. The Consultant must include reference to specific agriculture, water resource, and natural resource projects. Specifically the Consultant must demonstrate its overall and proven track record acting as environmental and social technical consultants including policy analysis and strategic environmental assessments in the support of large regional (in country) and national infrastructure and planning projects, including the names and descriptions of the specific project that the Consultant has worked on. An overview summary table of these experiences is required with sufficient details.
- **Management and Implementation Plan.** The Consultant must submit a management and implementation plan (no more than 10 pages excluding graphics and figures). The management plan will include a description of the Consultant's proposed management structure for implementing the work under the Contract; how it plans to ensure the quality of its performance in each activity; and its capability to quickly mobilize required experts to guide and execute the various assignments in this proposal. The implementation plan will contain a description of proposed activities and products for each task demonstrating a solid technical grasp of the requirements. The Consultant must identify Key Personnel in addition to the Project Manager and must provide a summary of specific experiences and times for performance with each task. The consultant will provide a proposed work plan showing all tasks, schedule of activities, deliverables and dates for drafts, reviews and revisions.
- **Capabilities and Experience of Staff.** The Consultant is expected to assemble and describe (no more than 10 pages excluding graphs and figures) a team with a mix of senior and mid-level specialists. The anticipated duration of the assignment will be approximately five months from notice to proceed. Knowledge of local conditions, social and cultural practices, and Tanzanian laws and regulations will be essential to accomplish these tasks. Prior experience conducting ESMF, RPFs, SEAs or sector-based environmental assessments, social impact assessments and impact management tools, is highly desirable.

The Consultant will be required to identify **KEY PERSONNEL** and provide sufficient qualified personnel to ensure achievement of all objectives of these tasks. A Project Manager and Deputy Project Manager must be designated. It is expected that the following categories of key professional personnel will be required:

- Key Personnel - Senior Specialists (minimum 15 years relevant experience)
- Mid-Level Specialists (minimum 7-10 years relevant experience)

The following minimum Key Personnel will be required for the contract:

1) **Team Leader** preferably with at least 15 years of international experience, having an advanced degree, English language capacity and broad knowledge in environmental and social impact assessment and mitigation, long term impact planning and carrying capacity and/or limits of acceptable change methodologies, and institutional strengthening. The Team Leader should have significant experience in undertaking environmental assessments, reporting, capacity building, and environmental advisory services.

2) **Participatory Planning and Consultation Specialist** with at least 10 years experience in developing and implementing participatory planning strategies, preferably for infrastructure development context. Experience must include extensive field consultations with a range of stakeholders. The Specialist should be knowledgeable about the local institutional and social structures and be proficient in local languages.

3) **Regional Development Planner**, with at least 15 years of experience, having English language capacity and broad knowledge in regional and agricultural development planning, mapping and spatial analysis skills.

4) **Social/Gender Impact Assessment Specialist(s)** preferably with at least 15 years of international experience at senior level, including operational experience with rural and urban communities. Experience working with gender and institutions essential. Knowledge of local languages is essential.

The Consultant may combine specialists so long as the required expertise capabilities are met. In addition, the Consultant may need to solicit additional, short term international and local assistance from senior, mid-level and junior technical professionals with the following qualities, as needed:

- Agricultural Specialist (e.g. irrigation, crop production, crop protection)
- Civil Engineers (e.g. water resources, hydrology, hydrogeologist)
- Environmental Impact Assessment Specialists (e.g. ecology, wetlands, zoology, geology)
- Social/Gender Impact Assessment Specialists (e.g. community specialist, sociologist, resettlement)
- Participatory Planning and Consultation specialist
- Regional Planner
- Institutional specialist (especially district government agencies)
- Communications specialist, graphic designer

- Agricultural/Macro economist
- Computer aided design and Geographical Information System Expert

The Consultant may wish to propose alternative staffing configurations to ensure achievement of all objectives. The availability of each proposed staff person must be identified as well as whether they are full-time staff persons of the Consultants firm or subcontractors or consultants. It is expected that the Project Manager or Deputy Project Manager, if not costed full time for the project, will be available throughout the duration of the contract to address all management and administrative matters.

### **G. Outputs and deliverables**

- (i) Scoping Study
- (ii) Stakeholder Analysis, Participation and Consultation Plan
- (iii) Strategic Social and Environmental Assessment Executive Summary
- (iv) Strategic Social and Environmental Assessment
- (v) Environmental and Social Management Framework.
- (vi) Resettlement Policy Framework

The work will be completed over a five (5) calendar month period with deliverables submitted directly to the Ministry.

### **H. Payment Schedule**

- 10% at the time of the signing of the contract
- 30% after submission of Scoping report.
- 30 % after submission of draft report
- 30% after submission of final report ,

## **ANNEX 2: Site-specific assessment of sample sites**

The following sites have been screened and assessed:

### **School Protection**

- Dharmaraja College, Kandy
- Galkanda Vidyalaya Kandy
- Wattegama Central, Kandy

### **Flood Risk Mitigation**

- Nuwarawewa, Anuradhapura
- Tissawewa, Anuradhapura
- Rugam, Batticaloa
- Vahanery, Battacaloe
- Kanthale, Trincomalee
- Allai, Trincomalee

### **Transport Continuity**

- Sungawila Bridge, Polonnaruwa
- Koddamunai Bridge, Battacaloe
- Thelgamuwa Oya causeway, Matale
- Kandy-Mahiyangana-Padiyathalawa Road landslides

## 1. School Protection

### *Description of the sites and proposed project activities*

#### (a) Dharmaraja College, Kandy

Several cutting failures and development of tension cracks have taken place in recent time covering approximately 2ha and school had to be temporary evacuated during rainy days. Slope failures were observed at 4 locations within the school premises. Controlling surface drainage and sealing tension cracks and temporary evacuation of school buildings during rainy days were recommended as short term mitigation measures.

The project will (a) install an early warning system at the landslide locations to alert students, school staff and nearby residents who may get affected; and (b) stabilize the landslide areas with engineering solutions such as provision of surface and subsurface drains, RR masonry and rubble gabian type retaining walls, slope modification and protection with geotextiles, turfing and re-vegetation.



Tension cracks observed outside school buildings

#### (b) Galkanda Vidyalaya, Kandy

Back slope failure and damage to school building was observed and the last occurrence taking place in November, 2010. The landslide details include: width at head 60m, width at toe 30m, length 50m and area 0.3ha. The slope cut behind the school buildings is highly unstable with frequent earth slips and rock falls. Tension cracks were observed above the cut. There is potential for the large boulders embedded in the soil may slide during rainy period, as the erosion continues. As temporary measure, covering the tension cracks and the cut slope with polythene and diverting the surface runoff have been recommended.

While it was recommended that the school is completely relocated, based on social factors and unavailability of suitable land within the vicinity, it may not be possible for school to be moved to an alternate site. The project will (a) install an early warning system at the landslide locations to alert students, school staff and nearby residents who may get affected; and (b) stabilize the landslide areas with engineering solutions such as provision of surface and subsurface drains, RR masonry and rubble gabion type retaining walls, slope modification and protection with geotextiles, turfing and re-vegetation.



Cut slope failure sites

**(c) Wattegama central, Kandy**

The landslide that affects the school can be observed from Wattegama junction along the Katugastota Madawala Road. A cluster of small scale slope failures with last occurrence in January 2011 can be observed. The initial failures have taken place in 2009. Retaining wall behind the Chemistry laboratory had collapsed. The landslide details within the school premises include width at head 45m and toe 26m, length 68m and area of 0.3ha. Vertical slope cut up to 31m have failed and school buildings have been damaged. As short-term measures, controlling infiltration by covering the exposed slope and diverting the runoff have been recommended.

Similar to galkanda Vidyalaya, relocation of the school has been proposed which is unlikely to take place. The project will (a) install an early warning system at the landslide locations to alert students, school staff and nearby residents who may get affected; and (b) stabilize the landslide areas with engineering solutions such as provision of surface and subsurface drains, RR masonry and rubble gabion type retaining walls, slope modification and protection with geotextiles, turfing and re-vegetation.



Damaged school buildings

### ***Site-specific environmental impacts for school protection***

Debris will get accumulated on school land due to removal of landslide debris and damaged and/or decommissioned structures, which have to be safely removed from the school premises and disposed in a local authority cleared disposal site or to be used for slope protection activities on site. No significant vegetation that required to be removed to undertake slope protection activities. Since there is limited open space within the schools, it may be necessary to temporary relocate the school during the construction period and construction work should overlap school holiday period. If temporary relocation is not possible, stringent measures will need to be put in place to reduce the interaction of construction laborers and school occupants that may cause social issues by providing spate access to workers, cordoning the construction areas and diverting the movement of school occupants, only allowing works to take place during after school hours, etc. Safety measures will be required to ensure worker, as well as the school occupants' safety during the construction period.

### ***Site-specific environmental management plan***

Impact	Potential Significance	Location	Mitigation Measures	Frequency of Interventions	Implementing Responsibility	Monitoring Responsibility
<b>Pre-Construction Stage</b>						
Poor slope protection design that affects the structural integrity and safety	High	Slope protection sites	Design the slope protection to ensure robustness of structures and safety and a certification should be issued on the applicability and appropriateness of the structural criteria employed	One time during the design stage	Design engineer	EO, PMU
Unsafe open drain	High	Within school premises	Make arrangements to close the drains that will be built to channel to surface runoff	One time during the design stage	Design engineer	EO, PMU
Flooding outside school premises due to inadequate capacity of drains to receive diverted/channeled the runoff of the school	High	Outside school premises	Arrangements should be made to ensure the receiving drainage system outside the school premises have adequate capacity to receive additional runoff. It may be necessary to clean-up these drains to improve their capacity	One time during the design stage, followed by implementation of capacity improvement during construction period	Design engineer	EO, PMU
<b>Construction stage</b>						
Improper disposal of debris during site clearing blocking drains and waterways and contaminating water	High	Construction area and disposal sites	Regular removal of debris generated to an approved disposal site If demolished material contains hazardous waste, disposal should be carried out as per the guidelines provided EAMF and relevant local authority All structures demolished should be removed, and debris recycled or disposed of in sites authorized by the appropriate authority	At least once a week; all debris generated as part of site clearing including demolition of structures should be done before construction activities commence	Contractor	Site engineer EO, PMU
Improper storing and lengthy	Moderate	Construction	All materials should be stored	At the stage of	Contractor	Site engineer

Impact	Potential Significance	Location	Mitigation Measures	Frequency of Interventions	Implementing Responsibility	Monitoring Responsibility
stockpiled period of gravel/soil washing off to low-lying areas		area	in a manner to minimize erosion. Silt traps shall be placed where appropriate to minimize sedimentation of nearby waterways. Reduce the length of stockpiling through proper planning of construction stages.	construction planning		EO, PMU
Storm water congestion on site can creating inconveniences to school activities and construction work	Moderate	Construction area	Drainage paths should be cut at the early stages of the construction work to divert the storm water out Ensure water is not stagnated on the construction area at all times	Early stages of site preparation	Contractor	Site engineer EO, PMU
Waste water generated during construction can contaminate water sources	Moderate	Construction areas and the vicinity	Divert the waste water to the sewage systems with the approval of the relevant authority Treat water generated through construction activities, particularly water mixed with hazardous material	To be set up at the early stages of mobilization  During the times when hazardous material are in use	Contractor	Site engineer EO, PMU
The use of machines working with fuel, oils and lubricants on work sites maybe a source of water contamination risks by infiltration	Moderate	Construction areas and the vicinity	All machines should good conditions without any possible leaks Handling of fuel, oils and lubricants for the machines should be done on designated workshops/ fuel sheds located outside the school premises	At all times	Contractor	Site engineer EO, PMU
Various types of waste such as litter, human waste, food waste, etc. from laborers construction-related wastes will be generated can create inconveniences to public and school users, and	High	Construction areas and the vicinity	Waste management plan should be agreed at the mobilization stage A waste recycling plan shall be prepared by the contractor to reduce the amount of waste	Planning part should be carried out as construction planning and should be in place by the time of	Contractor	Site engineer EO, PMU

Impact	Potential Significance	Location	Mitigation Measures	Frequency of Interventions	Implementing Responsibility	Monitoring Responsibility
<p>contribute negatively towards public health; wastes that are not disposed properly can become breeding grounds for water borne diseases and can contribute to groundwater and surface water contamination; and Unsafe disposal of asbestos from degraded roofs may cause public health issues</p>			<p>disposed Waste generated during site clearance should be disposed of in areas approved by local authority Construction sites shall be cleared on a daily basis of any material that can cause injury or potential become a public health hazard Proper and marked waste bins should be located on construction sites Disposal of hazardous materials shall be done in a manner that does not cause harm to surrounding environment and public. Temporary storage areas should be barricaded and marked. During decommissioning activities, hazardous material shall be identified (e.g asbestos sheets) and removed separately and immediately to minimize contamination and disposal to be done according to national guidelines.</p>	<p>mobilization At least weekly disposal of waste should take place</p>		
<p>Unsustainable and unapproved extraction of construction materials such as sand and metal placing a burden of the resources</p>	<p>Low</p>	<p>Sites of resources</p>	<p>Source construction material only from licenced sites and licensed commercial vendors</p>	<p>At the time of extraction / purchasing</p>	<p>Contractor</p>	<p>Site engineer EO, PMU</p>
<p>Overexploitation of water for construction</p>	<p>High</p>	<p>Construction site</p>	<p>Water should be obtained with a consent from the relevant authority Water use at site should be monitored to manage possible</p>	<p>Consent to be taken by the time of mobilization Water usage to be monitored daily</p>	<p>Contractor</p>	<p>Site engineer EO, PMU</p>

Impact	Potential Significance	Location	Mitigation Measures	Frequency of Interventions	Implementing Responsibility	Monitoring Responsibility
			over use and improper use			
Transportation of material to and from the site creating disturbances during school hours; can cause injury to children and increase traffic congestion in the area and transportation of construction material on open vehicles and the high speed of vehicle running can generate dust and will cause potential safety issues	High	Construction site and vicinity	Plan transportation to take place after school hours. Speed limits should be introduced for various strategic points. Vehicles should also have proper reverse signaling (both light and sound) to reduce possible accidents. Material transportation should be carried out in closed vehicles or make arrangements to cover the vehicles.	Planning should be done as part of construction planning All other actions to be carried out at all times	Contractor	Site engineer EO, PMU
Unplanned access and working conditions for workers making space for interactions with school occupants creating negative social impacts	Moderate	Construction site and vicinity	Provide separate worker access to site if possible and closely monitor the movements of workers through strict labor supervision.	Setting up of access to laborers should be planned as part of construction planning Supervision should be carried out at all times	Contractor	Site engineer EO, PMU
Construction sites that are not cordoned off can contribute towards potential safety hazards to school occupants and residents who are located close to the construction site	High	Construction site and vicinity	Vehicle drivers should maintain appropriate speeds in order to avoid accidents, especially when driving in school premises. Strict labor supervision should be undertaken of construction workers Labor awareness program to educate laborers on codes of conduct shall be introduced Safety regulations shall be followed by contractors to	Code of conduct and safety protocols should be put in place as part of construction planning First aid facility should be in place as soon as the contractor mobilizes to the site Labor awareness	Contractor	Site engineer EO, PMU

Impact	Potential Significance	Location	Mitigation Measures	Frequency of Interventions	Implementing Responsibility	Monitoring Responsibility
			<p>minimize risks Necessary barriers, warnings, signs demarcating unsafe areas should be followed according to standard construction practices Safety nets should be used to cover buildings and prevent injury to students and teachers Safety paths should be identified for student and teacher movements. Provide first aid facilities in case of an emergency and safety protocols during such event.</p>	<p>creation on safety should be carried out as soon as the staff are mobilized Physical interventions should be in place at all times of construction activities</p>		
<p>During site preparation and construction work noise will be generated due to construction related work and during school hours this may create disturbances to classroom activities and to residents living close to the construction site; and construction-induced traffic movement from pick-ups, excavators, dump trucks, etc., use of powerful mechanical equipment, and demolition of existing buildings will also contribute to noise pollution.</p>	High	Construction site and vicinity	<p>Noise shall be kept to minimum required standards during school hours in order to prevent any inconveniences Where possible, usage of noise generating equipment should be kept to the minimum during school hours or work should be only carried out after school hours and holidays Strict labor supervision should be undertaken to reduce noise Equipment used on site shall be in good serviced condition.</p>	All times during construction activities	Contractor	Site engineer EO, PMU
<p>Dust generated during excavation work, backfilling, reinstatement work, demolition activities, cement mixing, handling construction material, truck movement in the site area can</p>	High	Construction site and vicinity	<p>Materials such as gravel and soil shall be covered during transport Frequent watering down of construction site shall be needed to minimize dust</p>	All times during construction activities	Contractor	Site engineer EO, PMU

Impact	Potential Significance	Location	Mitigation Measures	Frequency of Interventions	Implementing Responsibility	Monitoring Responsibility
impacts the air quality during construction; dust generated during clearing and construction work can cause difficulties for students who have respiratory problems, and become a nuisance during school hours; soil/ gravel kept for long periods without proper cover can generate dust and become an inconvenience to the school and for surrounding residents; transportation of materials to site will also generate dust; and decommissioning of existing structures can also create dust that is potentially hazardous.			generation Put up dust barriers in decommissioning areas and areas of extensive earth works and cement mixing areas Excessive dust generating activities should be planned out during off school hours			
Gaseous emissions from construction plants, paint and vehicles contributing to air pollution	High	Construction site and vicinity	The vehicles should be maintained well to reduce excessive emissions Construction plants and mixing areas should be away from areas used by the school and residences Operation of construction plants should preferably take place during after school hours.	All times during construction activities	Contractor	Site engineer EO, PMU
Potential soil erosion from edges of slope protection and drainage structures after completing construction	High	Construction site	Adequate compacted backfilling after completion of drainage and slope protection structures and turfing or use of other soil erosion mitigation measures where necessary	After completion of construction	Contractor	Site engineer EO, PMU

## 2. Flood Risk Mitigation

### *Description of the sites and proposed project activities*

#### (a) Nuwarawewa, Anuradhapura

The spill tail canal is silted and there is vegetation grown inside the canal. Nearly 200 families getting affected during the spilling time as the conveyance capacity is not sufficient which includes farmer and other residents. People cannot cross the spill tail canal during the spilling time and some people need to cross the canal to come to Anuradhapura city for their livelihood. There are existing crossings which are low and easily going under water during spilling time. The affected communities have requested irrigation authorities to improve the spill tail canal and provide them a solution.

It is proposed that the overgrown vegetation over the canal will be removed and the canal will be desilted. There is no necessity to acquire land. The following specific activities will be supported through the project:

- Widening and deepening of RB spill tail canal from 1.5 km to 3.75km
- Construction of bridge across RB spill tail canal at 1Km 150m
- Construction of bridge across RB spill tail canal at 2Km 300m



#### (b) Tissawewa, Anuradhapura

The spill of Tissawewa is an unregulated spill and therefore, it is not possible to regulate flood waters during heavy rainy seasons. It is proposed that the existing crest wall is removed and replaced with a gated spillway to improve the operational capability. Spill tail canals are silted and vegetated reducing their conveyance capacity. These will require to be cleared. Due to inadequacy of the culvert about 15-20 families in the upstream get affected during spilling time

annually reducing their daily movements. The project is expected to build a new culvert with sufficient capacity to divert the spill water without inundating the access road. In addition, some of the field canals have been damaged due to floods, which need to be rehabilitated. There is no necessity to acquire land for any of the proposed activities. The following specific activities will be supported through the project:

- Improvements to LB spill
- Improvements to LB spill tail canal from 0m to 1km to 050m
- Construction of new box culvert at 0+700 m in spill tail canal
- Improvements to the existing box culvert at 1+075 m
- Improvements to FC 4 in LLD 01 canal from 149 m to 525m



Unregulated spill



Low capacity culvert



Damaged field canals

(c) Rugam, Batticaloa

Initiated under the Re-awakening Project, but was not completed due to shortage of funds. The proposed activity under the Rugam scheme is to construct a small anicut across a canal to provide water to new agriculture land. Small extents of paddy land will be required to construct the new canal for which the farmers have provided written consent to the ID. In addition, the project will support the improvement of an ID road that goes across an extensive paddy field which get flooded and eroded during rainy season. It is proposed that the road needs to be concreted and raised to address the flooding issue. It may be necessary to provide culverts along the road to ensure water movement across the road once concreted. The following specific activities will be financed through the project:

- Construction of Koddadikkaddu anicut
- Construction of Irrigation channel from Sadawakkai High Level channel to Sinaveli Sinnalamveli tract
- Improvements to Mahilayadi Road



The ID gravel road that gets flooded and eroded

(d) Vahanery, Battacaloo

There are no people living within the proposed project area. There is an existing flood bund to protect paddy lands from Maduruoya floods. The height of the bund is not sufficient to cope with recent heavy flows. It is proposed that the flood bund is rehabilitated and the height increased. One possible social consequence would be acquisition of some lands from the river reservation, which are being cultivated by farmers. The initial consultations of ID indicate that the farmers

are willing to give up the cultivation in the reservation in favor of the proposed improvements. In addition, there is a silted canal with canal bunds getting washed away annually during high rainfall season, which will be provided with a concrete lining with concrete canal banks and desilted and vegetation removed. The following specific investments are proposed:

- Improvements of flank bunds and Improvements to Muruthanai Anicut
- Improvements & widening of RB channel of Punanai anicut



Flood bund that requires improvements



Silted and collapsed canal

(e) Kanthale, Trncomalee

There are number of existing canals that have been damaged by previous floods that required to be rehabilitated. Most of the sides are eroded and structures are either collapsed or about to collapse. In addition, there are few farm roads that needs to be improved and graveled. A number of activities have been also proposed to improve the spill tail canal of Kantale dam. The canal is silted and vegetation grown inside the canal. The bund needs to be improved and the canal desilted and vegetation removed. Canal reservation may need to be cleared from paddy fields as part of the improvement work. The following activities will be funded through the project;

- Flood damage repairs and impacts to D1 ,D2,D3 Bund Road off L.B Main Canal Mullipothana
- Construction of retaining wall in Peraru MC to prevent future floods
- Improvements to Kusumankadawela Dr Canal to prevent future floods
- Improvements to Peraru main chl. from FC 66 to FC 73 to prevent future floods

- Improvements to FC 3,4,5 Chl. bund & bund road in Vendrasan main canal to prevent future floods
- Improvements to Kusumankadawela Bund Road to prevent future floods
- Improvements to spill tail canal from 7+000km to 9+000km to prevent future floods
- Construction of R/Wall in Kusumankadewala Dr Canal at 29+700km
- Improvements to spill tail canal from 9+000km to 11+000km
- Improvements to spill tail canal from 0+900km to 1+670km



Flood damage to canal structures  
Bottleneck for efficient water movement



Improved canal by ID

(f) Allai, Trincomalee

The Allai irrigation system has been damaged in number of places during the past flooding events, which requires to be rehabilitated. The damages include scouring, erosion and collapsed structures. The following specific activities have been proposed for funding:

- Canal lining in DC1/RBMC to repair flood damages
- Construction of Retaining wall in Fc2/D1/LB Main Chl From 100m to 500m to arrest further erosion
- Construction of Bridge at 2km 450m in RBMC to regulate floods
- Canal lining in BC1/RBMC to repair flood damages
- Flood Damage Improvements to D2/BC3/RBMC canal (0-1km 500m)
- Construction of retaining wall at D/S of Arippu regulator in RBMC to prevent further erosion
- Construction of Box culvert & Repairs to regulator at Sinnappumaleweddai in muthur channel for flood regulation



Collapsed structures of Allai scheme

### ***Site-specific environmental impacts for flood risk mitigation***

Debris will get accumulated on nearby land due to removal of debris (sediments and vegetation) and damaged and/or decommissioned structures that may impact paddy fields in the vicinity, which have to be safely removed from the sites and disposed in a local authority cleared disposal site or to be used for bund improvement activities on site. No significant vegetation that required to be removed, as they are mostly common shrubs that get established easily, grasses, and invasive plants. As these are man-made structures there are no significant fauna or flora found as part of the aquatic habitat. Construction may have to be carried out during off cultivating seasons to mitigate possible disruption to cultivation. There are possible impacts to forest areas of the watershed due to extraction of construction material such as gravel, which will be prohibited. All construction material should be extracted from approved localities outside protected areas and forest reserves or purchased from licensed commercial vendors. Due diligence will be required to ensure no further erosion around completed structures through compacted backfilling and use of soil conservation measures. There will not be any adverse impacts related to dam safety, but will provide further positive benefits to the proposed irrigation schemes after completion of rehabilitation work.

### ***Site-specific environmental management plan***

All above activities will use the appropriate sections of the detailed EMP under sub-section 3.3 of the main text of this report.

### 3. Transport Continuity

#### *Description of the sites and proposed project activities*

##### (a) Sungawila Bridge, Polonnaruwa

The proposed bridge to be improved is found in Sungawila on the B488 – Polonnaruwa-Thambala-Sungawila-Somawathiya Road. It is an existing bridge located between Sungawila and Somawathiya villages in Polonnaruwa District. This bridge connects Somawatiya and Polonnaruwa crossing Peri Aru (a branch of the river Mahaweli). There are no forested areas close to the bridge that will be impacted and no valuable, endemic or endangered vegetation that will be affected due to rehabilitation work in the site. However, care should be needed as the Somawatiya National Park is located close by and begins from Somawathiya side of the Peri Aru.



Existing bridge at Sungawila



Somawathiya National Park



Warning board to prevent from crocodiles



Roaming elephants in the Somawathiya National Park

##### (b) Koddamunai Bridge, Battacaloe

This bridge (1/1) to be rehabilitated is located on the Batticalloa-Trikandamadu-Trincomalee Road – A015 in the middle of Batticaloa town. During rainy season, spilled water coming from village tanks surrounding the Batticaloa town are diverted through this bridge. However, due to reduced capacity, the bridge has become a bottleneck for the water movement; hence submerge the surrounding settlements and business premises. To address these issues, the bridge capacity needs to be improved.

(c) Thelgamuwa Oya causeway, Matale

This causeway numbered 37/8 is located in Ilukkumura village on the Matale-Ilukkumbura-Pallegama Road (B274) crossing Thelgamuwa Oya in the Matale District. This bridge connects Raththota and Laggala Pallegama towns which are located long distances from the causeway. The road stretches via Riverstone through Knuckles Conservation Forest. During rainy season, the causeway gets inundated and the road users and villagers are faced severe transport problems. There are some damaged sections in the causeway. It is proposed, the causeway to be removed and a bridge to be constructed at the same location to improve connectivity and reduce flood damage to the road and the nearby areas. The existing length is 30m and 28.5m, the height is 2 m and width is 4.1m. The proposed bridge will have a height of 4.2 m. The length will remain the same as the causeway; however the width will be increased to match the required road width of a B-class road. There are adequate spaces on either side of the existing causeway to construct a new bridge without causing serious damages to environment. There are no valuable, endemic or endangered vegetation that will be affected due to bridge construction.



The causeway



The upstream side



Damages to the causeway

(d) Kandy-Mahiyangana-Padiyathalawa Road (A026) landslides

This stretch of the road has been recently rehabilitated. However, due to inappropriate slope cutting and inadequate slope protection measures, numbers of sites along the road are prone to landslides. Initially 11 sites have been identified by the NBRO along the road that have been slipped and sites of rock falls. However, the site assessment revealed that there are additional sites where landslides have taken place. The following are the initial assessment of the 11 sites identified by the NBRO.

*Landslide No. 01.* The site is located from 27km to culvert no. 28/1 at LS of the road. It is in between Theldeniya and Medamahanuwara towns. Length is 100m. This section is located within the village called Thithawelkandura. The RS belongs to VRR sanctuary and it has an enriched forest cover by planting trees. The LS has private lands. The The RoW is from the center line to the drain; hence landslide mitigation measures will be outside the RoW. There are evidence of falling rock boulders and landslides. The private lands located on the upper side are at risk and degraded due to erosion. Land ownership will be established under the social assessment.

*Landslide No. 02.* This is located between 29km to culvert no. 29/1 at LS of the road within Wegala village. It is in Between Theldeniya and Medamahanuwara towns. Length is 100m. The RS belongs to VRR sanctuary and it has an enriched forest cover by planting trees. The LS has private land and a road going over the top side of the location. A junior school and settlement are also found on the top. The The RoW is from the center line to the drain; hence landslide mitigation measures will be outside the RoW. There are evidence of falling rock boulders and landslides. The private lands located on the upper side are at risk and degraded due to erosion. Land ownership will be established under the social assessment.

*Landslide No. 03.* The site is located in Bombrawa village from 36km to culvert no. 37/1 at RS of the road. It is in between Medamahanuwara and Hunnasingiriya towns. Length is 100m. The RS has private lands and a road going over the top side of the location. The adjacent area behind private lands belongs to VRR Sanctuary. There are some existing mitigation measures to prevent soil erosion by constructing a wall by RDA. It was not clear if there is any need for further mitigation measures. The RoW is from the center line to the drain.

*Landslide No. 04.* This landslide is located from culvert no. 46/2 to 46/3 at RS of the road within Udadumbara village. It is the end part of Udadumbara town towards Hasalaka. Length is 75m. Around 40m of the landslide area towards the Udadumbara town belongs to private owners and remainder of the area belongs to the VRR Sanctuary having natural forest cover. The RoW is from center line to the lined drain. Slope failure is evident in this stretch. Due to the instability of

the land, there is potential danger to 9 houses located from the toe to the top of the site and the bus halt. The continued erosion will also degrade the habitats of the VRR sanctuary.

*Landslide No. 05.* The site is located from culvert No. 48/9 to 48/10 at RS of the road in the Kovil Madu village. It is in between Udadumbara and Hasalaka towns. Length is 150m. The RS belongs to VRR Sanctuary. The LS has private lands. The RoW is from the center line to the lined drain. Slope failure is evident.

*Landslide No. 06.* The site is located from culvert no. 50/4 to 50/5 at RS of the road in between Udadumbara and Hasalaka towns. Length is 50m. Both sides belong to VRR Sanctuary. The RoW is from the centre line to the lined drain.

*Landslide No. 07.* The site is situated from culvert no. 51/1 to 51/2 at RS of the road in between Udadumbara and Hasalaka towns. Length is 100m. Both sides belong to VRR Sanctuary. The RoW is from the center line to the drain. Slope failure is evident.

*Landslide No. 08.* The site is found in the Oyathenna village from culvert No. 55/4 to 55/6 at LS of the road. It is in Between Udadumbara and Hasalaka towns. The RS belongs to VRR Sanctuary. The downside of LS has a settlement. The RoW is from the center line to the drain. Falling rock boulders and landslides are evident.

*Landslide No. 09.* The landslide site is located at 56km post on the LS of the road in between Udadumbara and Hasalaka towns. Length is 50m. Both sides belong to VRR Sanctuary. The RoW is from the center line to the drain of the road. Slope failure is evident.

*Landslide No. 10.* The site is located from culvert no. 58/2 to 58/4 at LS of the road in between Udadumbara and Hasalak towns. Length is 100m. Both sides belong to VRR Sanctuary. The RoW is from the center line to the drain of the road. Falling rock boulders and slope failure are evident.

*Landslide No. 11.* The site is situated from culvert No. 60/3 to 60km post on RS of the road. It is in between Udadumbara and Hasalaka towns. Length is 50m. Both sides belong to VRR Sanctuary. The RoW is from the center line to the drain of the road. Falling rock boulders and land failures are evident.



Falling rock boulders at 60/3



House threatened by landslide at 46/2



Hanging rock boulders at 55/4



Affected persons explaining risk

### ***Site-specific environmental impacts and mitigation measures for transport continuity***

#### **Budgets and culverts**

*General impacts:* Debris will get accumulated on nearby land due to removal of debris (sediments and vegetation) and decommissioned structures that may impact waterways in the vicinity, which have to be safely removed from the sites and disposed in a local authority cleared disposal site or to be used for improvement activities on site. No significant vegetation that required to be removed. Continuation of water movement and structures to prevent debris, sediments and construction material contaminating the waterways should be used during construction. The access to road users could get disrupted and therefore alternative access for movement should be maintained at all times. There are possible impacts to forest areas of the watershed due to extraction of construction material such as gravel and sand, which will be prohibited. All construction material should be extracted from approved localities outside protected areas and forest reserves or purchased from licensed commercial vendors. Due diligence will be required to ensure no further erosion around completed structures through compacted backfilling and use of soil conservation measures.

*Sungawila Bridge:* Since the site is close to Somawatiya national park, there are potential dangers of wildlife attacks to the workers and adequate protection in terms of timing of construction work and safe movement to and from the labor camps to construction site needs to be provided. Use of the national park for temporary purposes or for extract of construction material will not be allowed to avoid any potential negative impacts to the natural habitats and wildlife. It may be necessary to obtain no violation certificate from the Department of Wildlife Conservation by the contractor prior to release of IPCs. If labor camps are used, such sites should be located away from the national park and should not also disturb the villagers. Night work should not be conducted due to dangers of wildlife and possible disturbances to wildlife. Periodical water test reports (for both upstream and downstream) should be submitted periodically to manage water contamination of Peri Aru during construction. Precautions should be taken to prevent workers been attacked by crocodiles in the Peri Aru. Noise level should be managed to reduce disturbances to wildlife.

*Koddamunai Bridge:* If the bridge is to be widened, trees, water pipelines, children's park, roundabout and private businesses will be affected. The existing bridge goes over the lagoon connecting key towns. Therefore, alternative access roads should be arranged during construction period for motorists and pedestrians. The Coast Conservation Department should be consulted to obtain technical guidance and clearance before the construction commences. Measure should be taken to prevent water contamination.

*Thalgamuwa Oya Bridge:* All site-specific issues identified and mitigation measures proposed for Sungawila Bridge are applicable for this site, except issues related to crocodiles.

#### Landslides along roads

It is important to ensure adequate landslide mitigation measures are put in place to reduce land degradation including degrading important natural habitats and to ensure safety of settlements and road users. The issues related to Kandy-Mahiyangana-Padiyathalawa Road landslides include changes to landuse of the area that will likely to undergo structural changes due to landslide mitigation measures and impacts to the VRR sanctuary due to removal of vegetation and possible encroachment during construction period for temporary use and resource extraction.

#### *Site-specific environmental management plan*

All above activities will use the appropriate sections of the detailed EMP under sub-section 3.3 of the main text of this report including the site-specific mitigation measures proposed above. **Given the road runs through Victoria-Randenigala-Rantambe (VRR) sanctuary and the proposed designs of the landslide mitigation measures are not available, a full EA is**

**required to conducted once the draft designs are completed, but prior to finalization of designs.**

### **ANNEX 3: Sample checklist to identify environmental risks and related information**

*Will the subproject and/or activity likely to affect the following? Where, why, and to what extent?  
What can be done to avoid, minimize, or mitigate?*

1. Protected Areas and known natural habitat (national parks, wildlife reserve, legally protected or area proposed for protection, unprotected but of known high conservation value) or biodiversity corridor, or nearby an area which is known to be a critical wildlife habitat, and those area that are listed as totally protected species in the FFPO.
2. Forest (national forest, reserve forest, religious forest, community forest, private forest – core forest or fringe forest)
3. Known route of wildlife or wild bird movement
4. High risk of landslides and erosion prone areas
5. Flood Prone / River Cutting / Low Lying Areas
6. Water Sources / Water Bodies such as pond, lakes, springs, drinking water sources etc.
7. Historical / religious / Cultural Sites such as monastery, temple, fort, palace, other religious sites, etc.
8. Aesthetically important places / valued natural landscapes / viewpoints
9. Local/ Community Infrastructures (Irrigation canal, water supply, foot trails, trails bridges, religious trees & resting places, electricity poles, telephone poles etc.)
10. Agricultural land, private property (land, house, structure), local resources, community forests, etc.
11. Increased use of chemical pesticide and fertilizer
12. Risk of disaster (such as from dam break or from fire, or from accidental release of chemicals, etc.).

*Are there any other visible and/or significant environmental not covered above? What are they?  
Where, why, and to what extent? What can be done to avoid, minimize, or mitigate?*